



# **ICSEA 2014**

The Ninth International Conference on Software Engineering Advances

October 12 - 16, 2014

Nice, France

## **ICSEA 2014 Editors**

Herwig Mannaert, University of Antwerp, Belgium

Luigi Lavazza, Università dell'Insubria - Varese, Italy

Roy Oberhauser, Aalen University, Germany

Mira Kajko-Mattsson, Stockholm University & Royal Institute of Technology,  
Sweden

Michael Gebhart, iteratec GmbH, Germany

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2014) by International Academy, Research, and Industry Association (IARIA)  
Please refer to the Copyright Information page.

Printed by Curran Associates, Inc. (2014)

International Academy, Research, and Industry Association (IARIA)  
412 Derby Way  
Wilmington, DE 19810

Phone: (408) 893-6407  
Fax: (408) 527-6351

[petre@iaria.org](mailto:petre@iaria.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## ICSEA 1: FUNDAMENTALS FOR SOFTWARE DEVELOPMENT I

Intertwining Relationship Between Requirements, Architecture, and Domain Knowledge .....	1
<i>Azadeh Alebrahim, Maritta Heisel</i>	
Unified Conceptual Model for Joinpoints in Distributed Transactions .....	8
<i>Anas Alsobeh, Stephen Clyde</i>	
A Tool Evaluation Framework Based on Fitness to Process and Practice. A Usability Driven Approach.....	15
<i>Diego Fontdevila</i>	
Enhanced Design Pattern Definition Language .....	22
<i>Salman Khwaja, Mohammad Alshayeb</i>	

## ICSEA 2: FUNDAMENTALS FOR SOFTWARE DEVELOPMENT II

Model Transformations for the Automatic Suggestion of Architectural Decisions in the Development of Multi-Layer Applications .....	28
<i>Jose Garcia-Alonso, Javier Berrocal Olmeda, Juan Manuel Murillo</i>	
An MDE Approach for Reasoning About UML State Machines Based on Constraint Logic Programming .....	34
<i>Beatriz Pérez</i>	
Several Issues on the Layout of the UML Sequence and Class Diagram .....	40
<i>Oksana Nikiforova, Dace Ahilcenoka, Dainis Ungurs, Konstantins Gusarovs, Ludmila Kozachenko</i>	
Communication Aspects with CommJ: Initial Experiment Show Promising Improvements in Reusability and Maintainability .....	48
<i>Ali Raza, Jorge Edison Lascano, Stephen Clyde</i>	

## ICSEA 3: FUNDAMENTALS FOR SOFTWARE DEVELOPMENT III

Customized Choreography and Requirement Template Models as a Means for Addressing Software Architects' Challenges.....	55
<i>Nebojša Taušan, Sanja Aaramaa, Jari Lehto, Pasi Kuvaja, Jouni Markkula, Markku Oivo</i>	
MDD for Smartphone Application with Smartphone Feature Specific Model and GUI Builder .....	64
<i>Koji Matsui, Saeko Matsuura</i>	
Quality-Oriented Requirements Engineering for Agile Development of RESTful Participation Service.....	69
<i>Michael Gebhart, Pascal Giessler, Pascal Burkhardt, Sebastian Abeck</i>	
Architecture Coverage: Validating Optimum Set of Viewpoints.....	75
<i>Sunia Naeem, Salma Imtiaz</i>	

## ICSEA 4: FUNDAMENTALS FOR SOFTWARE DEVELOPMENT IV

Challenges of Adopting Software Reuse: Initial Results .....	85
<i>Sajjad Mahmood, Ali Al Zayer</i>	
Comparison of Stakeholder Identification Methods - The Effect of Practitioners Experience .....	90
<i>Markus Kelanti, Samuli Saukkonen</i>	
What are the Features of this Software? An Exploratory Study .....	97
<i>Barbara Paech, Paul Hübner, Thorsten Merten</i>	
Towards Duplication-Free Feature Models when Evolving Software Product Lines .....	107
<i>Amal Khtira, Anissa Benlarabi, Bouchra El Asri</i>	

## ICSEA 5: FUNDAMENTALS FOR SOFTWARE DEVELOPMENT V

Quantum States in Bivalent Logic .....	114
<i>Mikael Fridenfalk</i>	

<b>An Approach for Modeling and Transforming Contextually-Aware Software Engineering Workflows .....</b>	117
<i>Roy Oberhauser</i>	
<b>A Software Category Model for Graphical User Interface Architectures .....</b>	123
<i>Stefan Wendler, Detlef Streitferdt</i>	
<b>The Impact of User Interface Patterns on Software Architecture Quality .....</b>	134
<i>Stefan Wendler, Detlef Streitferdt</i>	

## **ICSEA 6: AGILE SOFTWARE TECHNIQUES I**

<b>A Guideline for Supporting Agile Process Assessments .....</b>	144
<i>Teresa M. M. Maciel, Silvio R. L. Meira</i>	
<b>Usage of Kanban in Software Companies an Empirical Study on Motivation, Benefits and Challenges.....</b>	150
<i>Muhammad Ovais Ahmad, Jouni Markkula, Markku Oivo, Pasi Kuvaja</i>	
<b>Scaling Agile Estimation Methods with a Parametric Cost Model.....</b>	156
<i>Carl Friedrich Kreß, Oliver Hummel, Mahmudul Huq</i>	
<b>AP3M-SW – An Agile Project Management Maturity Model for Software Organizations .....</b>	162
<i>Felipe Soares, Silvio Meira</i>	

## **ICSEA 7: AGILE SOFTWARE TECHNIQUES II**

<b>Cybernetic Aspects in the Agile Process Model Scrum .....</b>	167
<i>Michael Bogner, Maria Hronek, Andreas Hofer, Franz Wiesinger</i>	
<b>Can Functional Size Measures Improve Effort Estimation in SCRUM? .....</b>	173
<i>Valentina Lenarduzzi, Davide Taibi</i>	
<b>On Some Challenges in Assessing the Implementation of Agile Methods in a Multisite Environment .....</b>	179
<i>Harri Kaikkonen, Pilar Rodríguez, Pasi Kuvaja</i>	
<b>Towards Agile Composition of Service Oriented Product Lines: A Mashup-based Approach .....</b>	185
<i>Ikram Dehmouch, Bouchra El Asri, Zineb McHarfi</i>	

## **ICSEA 8: SOFTWARE ENGINEERING PRODUCTIVITY RESEARCH**

<b>An Approach and a Tool for Systematic Review Research.....</b>	191
<i>Manuel Gonçalves Da Silva Neto, Walquíria Castelo Branco Lins, Eric Bruno Perazzo Mariz</i>	
<b>Productivity-Based Software Estimation Model: An Economics Perspective and an Empirical Study .....</b>	196
<i>Alain Abran, Jean-Marc Desharnais, Mohammad Zarour, Onur Demirors</i>	
<b>Measuring a Software Production Line with IFPUG-based Function Points.....</b>	202
<i>Volkan Halil Bagci, Umut Orcun Turgut, Ali Ciltik, Semih Cetin, Recep Ozcelik</i>	
<b>Empirical Research in Software Engineering: A Literature Review .....</b>	209
<i>Petr Picha, Premysl Brada</i>	

## **ICSEA 9: SOFTWARE SECURITY, PRIVACY, SAFENESS**

<b>An Automated Signature Generation Method for Zero-day Polymorphic Worms Based on C4.5 Algorithm .....</b>	215
<i>Mohssen Mohammed, Eisa Aleisa, Neco Ventura</i>	
<b>On the Automation of Vulnerabilities Fixing for Web Application.....</b>	221
<i>Kabir Umar, Abu Bakar Sultan, Hazura Zulzalil, Novia Admodisastro, Mohd Taufik Abdullah</i>	
<b>An Approach for Cross-Site Scripting Detection and Removal Based on Genetic Algorithms.....</b>	227
<i>Isatou Hydara, Abu Bakar Md Sultan, Hazura Zulzalil, Novia Admodisastro</i>	
<b>Safety Patterns in Model-Driven Development .....</b>	233
<i>Timo Vepsäläinen, Seppo Kuikka</i>	

## **ICSEA 10: ADVANCES IN SOFTWARE TESTING I**

<b>Test Data Generation Based on GUI: A Systematic Mapping .....</b>	240
<i>Rodrigo Funabashi Jorge, Márcio Eduardo Delamaro, Celso Gonçalves Camilo-Junior, Auri Marcelo Rizzo Vincenzi</i>	

<b>Mapping of State Machines to Code: Potentials and Challenges</b>	247
<i>Mehrdad Saadatmand, Antonio Cicchetti</i>	
<b>Functional Testing Criteria Applied in a Database Project</b>	252
<i>Dianne Dias Silva, Edmundo Sérgio Spoto, Leandro Luís Galdino De Oliveira</i>	
<b>Automatic Unit Test Generation and Execution for JavaScript Program through Symbolic Execution</b>	259
<i>Hideo Tanida, Guodong Li, Indradeep Ghosh, Tadahiro Uehara</i>	

## **ICSEA 11: ADVANCES IN SOFTWARE TESTING II**

<b>Enabling Functional Integration Testing of Software-Intensive Technical Systems</b>	266
<i>Thomas Bauer, Frank Elberzhager</i>	
<b>Structural Test Case Generation Based on System Models</b>	276
<i>Leandro Teodoro Costa, Avelino Francisco Zorzo, Elder Macedo Rodrigues, Maicon Bernardino, Flávio Moreira Oliveira</i>	
<b>Towards a Maturity Model in Software Testing Automation</b>	282
<i>Ana Paula Furtado, Silvio Meira, Marcos Gomes</i>	
<b>Low-Variance Software Reliability Estimation Using Statistical Testing</b>	286
<i>Fouad Ben Nasr Omri, Safa Omri, Ralf Reussner</i>	

## **ICSEA 12: SOFTWARE DEVELOPMENT MECHANISMS I**

<b>PRReSE – Process of Non-Functional Requirements Reuse for Embedded Systems Based on a NFR-Framework</b>	293
<i>Cristiano Marçal Toniolo, Luiz Eduardo Galvão Martins</i>	
<b>A Model-Driven Approach to the Development of Heterogeneous Software Product Lines</b>	300
<i>Thomas Buchmann, Felix Schwägerl</i>	
<b>System Composition Using Petri Nets and DEVS Formalisms</b>	309
<i>Radek Koci, Vladimir Janousek</i>	
<b>A Prototyping Discipline in OpenUP to Satisfy Wireless Sensor Networks Requirements</b>	316
<i>Gian Ricardo Berkenbrock, Carla Berkenbrock, Celso Hirata</i>	
<b>Easily Evolving Software Using Normalized Systems Theory - A Case Study</b>	322
<i>Gilles Oorts, Kamiel Ahmadpour, Herwig Mannaert, Jan Verelst, Arco Oost</i>	

## **ICSEA 13: SOFTWARE DEVELOPMENT MECHANISMS II**

<b>Towards Task Allocation in Global Software Development Projects</b>	328
<i>Sajjad Mahmood, Sajid Anwer, Waleed Umar, Mahmood Niazi, Mohammad Alshayeb</i>	
<b>Combining MARTE-UML, SysML and CVL to Build Unmanned Aerial Vehicles</b>	334
<i>Paulo Queiroz, Rosana Braga</i>	
<b>Collaborative Team Management in Agile and Distributed Development Environments</b>	341
<i>Nohsam Park, Jonghyun Jang</i>	
<b>Security Through Software Rejuvenation</b>	347
<i>Chen-Yu Lee, Krishna M. Kavi, Mahadevan Gomathisankaran, Patrick Kamongi</i>	
<b>Design of Mobile Services for Embedded Platforms</b>	354
<i>Fabrice Mourlin, Sanae Mostadi, Guy Lahlou Djiken</i>	

## **ICSEA 14: SPECIALIZED SOFTWARE ADVANCED APPLICATIONS**

<b>The Quantification of Risk Factors for Predicting Diabetic Cystoid Macular Edema based on a Hierarchical Approach</b>	362
<i>Eun Byeol Jo, Ju Hwan Lee, Jong Seob Jeong, Byeong Cheol Choi, Sung Min Kim</i>	
<b>Sport Virtual Complex as a Model of Learning Physics (POSTER)</b>	N/A
<i>Miriam Martínez Muñoz</i>	
<b>Identifying Requirements for Centralized Service for Movement and Biodiversity Data Analysis</b>	368
<i>Ivana Nižetić Kosović, Boris Milašinović, Krešimir Fertalj</i>	
<b>Method for Analytic Evaluation of the Weights of a Robust Large-Scale Multilayer Neural Network with Many Hidden Nodes</b>	374
<i>Mikael Fridenfalk</i>	

<b>Reorganizing an Offshore Software Project With the Goal of Favoring Knowledge Transfer.....</b>	379
<i>Carlo Consoli, Paolo Rocchi, Paolo Spagnoletti, Pietro Nico</i>	

## **ICSEA 15: SOFTWARE ENGINEERING TECHNIQUES, METRICS, AND FORMALISMS I**

<b>Challenges of the Existing Tools Used in Global Software Development Projects.....</b>	385
<i>Mahmood Niazi, Sajjad Mahmood, Mohammad Alshayeb, Ayman Hroub</i>	
<b>ARTIST Technical Feasibility Tool: Supporting the Early Technical Feasibility Assessment of Application Cloudifications .....</b>	390
<i>Juncal Alonso, Leire Orue-Echevarria, Zurik Corera, Jesus Gorroñogoitia, Burak Karaboga</i>	
<b>Model Reverse-engineering of Mobile Applications with Exploration Strategies .....</b>	396
<i>Sébastien Salva, Stassia Resondry Zafimiharisoa</i>	
<b>On the Ability of Functional Size Measurement Methods to Size Complex Software Applications .....</b>	404
<i>Luigi Lavazza, Sandro Morasca, Davide Tosi</i>	
<b>An Exploration of the Application of Usability Evaluation Methods by Disabled Users.....</b>	410
<i>Khalid Al-Nafjan, Mona Al-Zuhair, Layla Al-Sahlie</i>	

## **ICSEA 16: SOFTWARE ENGINEERING TECHNIQUES, METRICS, AND FORMALISMS II**

<b>Towards Automating the Coherence Verification of Multi-Level Architecture Descriptions.....</b>	416
<i>Abderrahman Mokni, Marianne Huchard, Christelle Urtado, Sylvain Vauttier, Huaxi Yulin Zhang</i>	
<b>A Set-Oriented Formalism as a Foundation for the Modeling and Verification of Connected Data and Process Specifications .....</b>	422
<i>Julia Martini, Hannes Restel, Raik Kuhlisch, Jörg Caumanns</i>	
<b>Towards Automated Design Smell Detection .....</b>	428
<i>Stefan Burger, Oliver Hummel</i>	
<b>UCDMD: Use Case Driven Methodology Development .....</b>	434
<i>Hanieh Zakerifard, Raman Ramsin</i>	
<b>Insights from the Defect Detection Process of IT Experts: A Case Study on Data Flow Diagrams .....</b>	441
<i>Gul Tokdemir, Nergiz Ercil Cagiltay, Ozkan Kilic</i>	

## **ICSEA 17: BUSINESS TECHNOLOGY**

<b>Using Expert Systems for Coaching and Mentoring ICT Project Managers.....</b>	447
<i>Robert T. Hans, Ernest Mnkanla</i>	
<b>Towards Autonomic Context-Aware Computing for SaaS Through Variability Management Mechanisms .....</b>	453
<i>Asmae Benali, Bouchra El Asri, Houda Kriouile</i>	
<b>ASDeDaWaS: An Assistant System for the Design of Data Warehouse Schema .....</b>	458
<i>Nouha Arfaoui, Jalel Akaichi</i>	
<b>Towards Implementation and Design of Multi-tenant SaaS Based on Variability Management Mechanisms .....</b>	468
<i>Houda Kriouile, Bouchra El Asri, M'Barek El Haloui, Asmae Benali</i>	
<b>Applications Architecture for a Medium Sized Manufacturing Firm .....</b>	472
<i>Alicia Valdez, Sergio Castaneda, Laura Vazquez, Azucena Garcia</i>	

## **ICSEA 18: SOFTWARE DEPLOYMENT AND MAINTENANCE I**

<b>Enhanced Search: An Approach to the Maintenance of Services Oriented Architectures .....</b>	479
<i>Norman Wilde, Douglas Leal, George Goehring, Christopher Terry</i>	
<b>Evaluation of the Applicability of CM3: Emergency Problem Management within the Industry.....</b>	485
<i>Mira Kajko-Mattsson, Joakim Snygg, Emil Hammargren</i>	
<b>An Analysis of Domain and Application Engineering Co-evolution for Software Product Lines based on Cladistics: A Case Study .....</b>	495
<i>Anissa Benlarabi, Amal Khtira, Bouchra El Asri</i>	
<b>EM3: Software Retirement Process Model.....</b>	502
<i>Mira Kajko-Mattsson, Anna Hauzenberger, Ralf Fredriksson</i>	

<b>Causality Control in Dynamic Platforms.....</b>	512
<i>German Vega, Jacky Estublier</i>	

## **ICSEA 19: SOFTWARE DEPLOYMENT AND MAINTENANCE II**

<b>Maintaining Vaadin Legacy Applications using DSLs based on Xtext .....</b>	518
<i>Marcel Toussaint, Thomas Baar</i>	
<b>Predicting Change Proneness using Object-Oriented Metrics and Machine Learning Algorithms.....</b>	522
<i>Abdullah Al-Senayen, Abdurhman Al-Sahoo, Mohammed Misbhauddin</i>	
<b>Towards an Efficient Traceability in Agile Software Product Lines.....</b>	529
<i>Zineb McHarfi, Bouchra El Asri, Ikram Dehmouch</i>	
<b>Implementing IT Service Management as an Organizational Change: Identifying Factors Affecting the Change Resistance.....</b>	534
<i>Marko Jäntti, Sanna Heikkinen</i>	

## **ICSEA 20: DESIGN TOOLS FOR SOFTWARE DEVELOPMENT I**

<b>Spider-PE: A Set of Support Tools to Software Process Enactment .....</b>	539
<i>Carlos Portela, Alexandre Vasconcelos, Sandro Oliveira, Antônio André Silva, Elder Silva</i>	
<b>On the Use of Ontology for Dynamic Reconfiguring Software Product Line Products.....</b>	545
<i>Thyago Tenório, Diego Dermeval, Ig Ibert Bitencourt</i>	
<b>A Formal Model of Use-cases and Its Application in Generating a Hierarchical Classstructure .....</b>	551
<i>Sukhamay Kundu, Arnab Ganguly</i>	
<b>Fundamentals, Prospects and Challenges for Totally Functional Programming Style .....</b>	559
<i>Paul Bailes, Leighton Brough, Colin Kemp</i>	

## **ICSEA 21: DESIGN TOOLS FOR SOFTWARE DEVELOPMENT II**

<b>Using Automatic Code Generation Methods for Reusable Software Component Development: Experience Report .....</b>	566
<i>Elif Kamer Karatas, Baris Iyidir</i>	
<b>Automatic Classification of Domain Constraints for Rich Client Development.....</b>	570
<i>Manuel Quintela-Pumares, Daniel Fernández-Lanvin, Alberto-Manuel Fernández-álvarez, Raúl Izquierdo</i>	
<b>A Classification Schema for Development Technologies .....</b>	577
<i>Davide Taibi, Christiane Plociennik, Laurent Dieudonné</i>	
<b>Working With Reverse Engineering Output for Benchmarking and Further Use .....</b>	584
<i>David Cutting, Joost Noppen</i>	

## **ICSEA 22: SOFTWARE PERFORMANCE I**

<b>Software Reliability Markovian Model Based on Phase-Type Distribution .....</b>	591
<i>Mindaugas Brazenas, Eimutis Valakevicius</i>	
<b>Vergil: Guiding Developers Through Performance and Scalability Inferno .....</b>	598
<i>Christoph Heger, Alexander Wert, Roozbeh Farahbod</i>	
<b>A Domain-Specific Language for Modeling Performance Testing: Requirements Analysis and Design Decisions .....</b>	609
<i>Maicon Bernardino, Avelino F. Zorzo, Elder Rodrigues, Flávio M. De Oliveira, Rodrigo Saad</i>	
<b>Inverted Run-Time Behavior of Classic Data Structures on Modern Microprocessors: Technical Background and Performance Guidelines.....</b>	615
<i>Michael Bogner, Andreas Hofer, Maria Hronek, Franz Wiesinger</i>	

## **ICSEA 23: SOFTWARE PERFORMANCE II**

<b>Benchmarking the Performance of Hypervisors on Different Workloads .....</b>	622
<i>Devi Prasad Bhukya, Carlos Gonçalves, Diogo Gomes, Rui Aguiar</i>	
<b>Performance Engineering Using Performance Antipatterns in Distributed Systems .....</b>	627
<i>Chia-En Lin, Krishna Kavi</i>	

<b>Performance Optimisation of Object-Relational Database Applications in Client-Server Environments.....</b>	637
<i>Zahra Davar, Janusz R. Getta, Handoko Handoko</i>	

## **ICSEA 24: WEB ACCESSIBILITY**

<b>Learning, Trust, and Technological Collaboration between Business and Academia: A Successful USA Case Study (POSTER).....</b>	N/A
<i>Daniela Marghitu, Eric Hakanson, Samantha Lewis</i>	
<b>Web Accessibility on Thai Higher Education Websites.....</b>	645
<i>Rattanavalee Maisak, Justin Brown</i>	
<b>A Usability Inspection Approach to Assist in the Software Development Process.....</b>	651
<i>Priscila Silva Fernandes, Bruno Araújo Bonifácio, Tayana Uchôa Conte</i>	
<b>Author Index</b>	