## Table of Contents

Message from the General Chair..........................................................................................xvii
Committees............................................................................................................................xix
Industry Paper Organizers....................................................................................................xxi
Message from the Fast Abstract Chair................................................................................xxii
Fast Abstract Organizers.......................................................................................................xxiii
Message from the Student Paper Track Chair.....................................................................xxiv
Student Paper Organizers.......................................................................................................xxv
Message from ASSURE 2014 Workshop Co-Chairs............................................................xxvi
ASSURE 2014 Workshop Organizers....................................................................................xxvii
Message from the IWPD 2014 Workshop Organizers...........................................................xxviii
IWPD 2014 Workshop Organizers........................................................................................xxix
Message from RISK 2014 Workshop Chairs........................................................................xxx
RISK 2014 Workshop Organizers........................................................................................xxxi
Message from the RSDA 2014 Workshop Co-Chairs............................................................xxxii
RSDA 2014 Workshop Organizers.........................................................................................xxxiii
Message from the WoSAR 2014 Workshop Chairs.............................................................xxxiv
WoSAR 2014 Organizing Committee and Reviewers..........................................................xxxv
Message from the WOSD 2014 Workshop Chairs.............................................................xxxviii
WOSD 2014 Workshop Organizers.........................................................................................xxxix
Message from the WoSoCer 2014 Workshop Organizers.........................................................xl
WoSoCer 2014 Workshop Organizers....................................................................................xli
Industry Sessions

Session 1: Testing 1
Maryam Raiyat Aliabadi, Karthik Pattabiraman, and Nematollah Bidokhti

Fault Injection Experiments with the CLAMR Hydrodynamics Mini-App
Brian Atkinson, Nathan Debardeleben, Qiang Guan, Robert Robey, and William M. Jones

Event Logging in an Industrial Development Process: Practices and Reengineering Challenges
Fabio Baccanico, Gabriella Carrozza, Marcello Cinque, Domenico Cotroneo, Antonio Pecchia, and Agostino Savignano

Session 2: Reliability Modeling 1
Event Based Robot Prognostics Using Principal Component Analysis
V. Sathish, S.D. Sudarsan, and Srini Ramaswamy

Proving Model Equivalence in Model Based Design
Ashlie B. Hocking, John Knight, M. Anthony Aiello, and Shin'ichi Shiraishi

Developing Software Reliability Models in the Architecture Phase of the Software Lifecycle
Alberto A. Avritzer and André B. Bondi

Session 3: Testing 2
Architecture for a Hard-Real-Time System Enabling Non-intrusive Tests
Joachim Froehlich and Reiner Schmid

Handling Soft Error in Embedded Software for Networking System
Haichong Henry Zhu

Safety Critical Robot Programming and Testing for Operations in Industrial Co-Production
Linn Gustavsson Christiernin, Svante Augustsson, and Stefan Christiernin

Session 4: Industry Best Paper Nominees
NAPOLI FUTURA: Novel Approaches for Protecting Critical Infrastructures from Cyber Attacks
Stefano Avallone, Gabriella Carrozza, Marcello Cinque, Raffaele Della Corte, Antonio Marotta, Antonio Pecchia, and Agostino Savignano

Network Function Virtualization: Challenges and Directions for Reliability Assurance
D. Cotroneo, L. De Simone, A.K. Iannillo, A. Lanzaro, R. Natella, Jiang Fan, and Wang Ping
Session 5: Availability and Performance
Towards an Evaluation Framework for Availability Solutions in the Cloud ..............................................43
Majid Hormati, Ferhat Khendek, and Maria Toeroe
Verifying Response Times in Networked Automation Systems Using Jitter Bounds ........................................47
Seshadhri Srinivasan, Furio Buonopane, Srin Ramaswamy, and Jüri Vain
Performability Comparison of Lustre and HDFS for MR Applications .......................................................51
Rekha Singhal, Manoj Nambiar, Harish Sukhwani, and Kishor Trivedi

Session 6: Reliability Modeling 2
Reliability Models for the Internet of Things: A Paradigm Shift ........................................................................52
Mudasir Ahmad
Predicting Release Quality ........................................................................................................................................60
Pete Rotella and Sunita Chulani

Session 7: Model-Based Testing
Automated Generation of Failure Modes and Effects Analysis from SysML Models ........................................62
Myron Hecht, Emily Dimpfl, and Julia Pinchak
Gil Bernabeu, Eddie Jaffuel, Bruno Legeard, and Fabien Peureux

Session 8: Security
Assessing the Threat Landscape for Software Libraries ......................................................................................71
Raghudeep Kannavara
Security Evaluation of a Linux System: Common Criteria EAL4+ Certification Experience ................................77
Luca Recchia, Giuseppe Procopio, Andrea Onofrii, and Francesco Rogo

Session 9: Data Management and Analysis
Balanced Measurement Sets: Criteria for Improving Project Management Practices ......................................82
Luigi Buglione, Daniele Gagliardi, Sergio Oliolina, Gabriele Ruffatti, Ernesto Damiani, and Fulvio Frati
CAMDIT: A Toolkit for Integrating Heterogeneous Data for Enhanced Service Provisioning ........................86
Ipadeola Abayomi, Ipadeola Oladipupo, Ahmed Ameen, and Sadiku Joseph
Applying Metrics to Identify and Monitor Technical Debt Items during Software Evolution

Claudrton A. Siebra, Antonio Cavalcanti, Fabio Q.B. Silva, Andre L.M. Santos, and Tatiana B. Gouveia

Session 10: Static Analysis

Quantitative Evaluation of Static Analysis Tools

Shin’ichi Shiraishi, Veena Mohan, and Hemalatha Marimuthu

Code Analysis as an Enabler for SW Quality Improvement: The SELEX ES SW Engineering Experience

Salvatore Scervo, Stefano Rosati, and Gabriella Carrozza

Supporting Reviewing of Warnings in Presence of Shared Variables: Need and Effectiveness

Tukaram Muske

Session 11: Design and Planning

A Formal Method Applied to the Automated Software Engineering with Quality Guarantees

Marcelo Teixeira, Richardson Ribeiro, Marco Barbosa, and Luciene Marin

Planning of Prioritized Test Procedures in Large Integrated Systems: Best Strategy of Defect Discovery and Early Stop of Testing Session, The Selex-ES Experience

Gianfrancesco Ranieri

Session 12: Avionics

Understanding DO-178C Software Certification: Benefits Versus Costs

Vance Hilderman

Challenges in Future Avionic Systems on Multi-Core Platforms

Andreas Löfvenmark and Simin Nadjm-Tehrani

Model-Checking Real-Time Properties of an Auto Flight Control System Function

Pierre-Alain Bourdil, Bernard Berthomieu, and Eric Jenn

Fast Abstracts

Fast Abstracts 1

Practical Behavioral Inconsistency Detection between Source Code and Specification Using Model Checking

Saeko Matsuura, Yoshitaka Aoki, and Shinpei Ogata

Early Conflict Detection with Mined Models

Leonardo Mariani, Daniela Micucci, and Fabrizio Pastore
Analysis of Functional Software Dependencies through Supervised Execution .......................................................... 128
  Jasmin Jahić and Thomas Kuhn

Applying Parameter Value Weighting to a Practical Application ............................................................................. 130
  Satoshi Fujimoto, Hideharu Kojima, Hiroyuki Nakagawa, and Tatsuhiro Tsuchiya

Regression Testing Approach for Large-Scale Systems ..................................................................................................... 132
  Passant Kandil, Sherin Moussa, and Nagwa Badr

Automatic Testing Framework for Virtualization Environment ......................................................................................... 134
  Chia Hung Kao, Ping-Hsien Chi, and Yi-Hsuan Lee

Fast Abstracts 2

Mapping the Software Errors and Effects Analysis Method to ISO26262 Requirements for Software Architecture Analysis ............................................................................................................................ 136
  Paulo Victor Carvalho

Is Cut Sequence Necessary in Dynamic Fault Trees? .............................................................................................................. 138
  Jianwen Xiang, Fumio Machida, Kumiko Tadano, and Shigeru Hosono

Exploiting Behavior Models for Availability Analysis of Interactive Systems ............................................................. 140
  Maximilian Junker

Evaluating Embedded-Software Specifications—Quantitative and Structured Assessment of Declarative Interface Descriptions ......................................................................................................................... 142
  Marc Förster

Are the Classical Disaster Recovery Tiers Still Applicable Today? ........................................................................................... 144
  Omar H. Alhami and Yashwant K. Malaiya

Student Papers

Describing Software Specification by Combining SysML with the B Method ................................................................. 146
  Satoko Kinoshita, Hidekazu Nishimura, Hiroki Takamura, and Daichi Mizuguchi

A Runtime Verification Based Trace-Oriented Monitoring Framework for Cloud Systems .......................................................... 152
  Jingwen Zhou, Zhenbang Chen, Ji Wang, Zibin Zheng, and Wei Dong

Towards Fault Propagation Analysis in Cloud Computing Ecosystems ................................................................................. 156
  Luigi De Simone

Towards Making Safety-Critical Systems Safer: Learning from Mistakes ........................................................................ 162
  Nuno Silva and Marco Vieira

A Research Agenda for Benchmarking the Resilience of Software Defined Networks ..................................................... 168
  Luís Eduardo Santos, Marília Curado, and Marco Vieira

Do Injected Faults Cause Real Failures? A Case Study of Linux .......................................................................................... 174
  Nobuo Kikuchi, Takeshi Yoshimura, Ryo Sakuma, and Kenji Kono
ASSURE 2014 — Second International Workshop on Assurance Cases for Software-Intensive Systems

Session 1: Principles and Techniques

The Definition and Assessment of a Safety Argument ................................................................. 180
V. Cassano and T.S.E. Maibaum

Building Blocks for Assurance Cases .......................................................................................... 186
Robin Bloomfield and Kateryna Netkachova

Linking Traceability with GSN ..................................................................................................... 192
Kenji Taguchi, Souma Daisuke, Hideaki Nishihara, and Toshinori Takai

Retrieving Information from a Document Repository for Constructing Assurance Cases .......................................................................................................................... 198
Khana Chindamaikul, Toshinori Takai, and Hajimu Iida

Session 2: Processes and Tools

A Model-Driven Safety Certification Method for Process Compliance ........................................ 204
Barbara Gallina

A Technique for Demonstrating Safety and Correctness of Program Translators:
Strategy and Case Study .............................................................................................................. 210
Junbeom Yoo, Jong-Gyun Choi, Young Jun Lee, and Jang-Soo Lee

SCT: A Safety Case Toolkit .......................................................................................................... 216
M. Anthony Aiello, Ashlie B. Hocking, John Knight, and Jonathan Rowanhill

Session 3: Applications

A Security Argument Pattern for Medical Device Assurance Cases ........................................ 220
Anita Finnegan and Fergal McCaffery

Arguing Software Compliance with ISO 26262 ........................................................................ 226
Ashlie B. Hocking, John Knight, M. Anthony Aiello, and Shin’ichi Shiraishi

IWPD 2014 — The Fifth IEEE International Workshop on Program Debugging

Session 1: Event Set and Trace Reduction

Pinpointing Failure Inducing Event Orderings .......................................................................... 232
Hanefi Mercan and Cemal Yilmaz

Trace Reduction and Pattern Analysis to Assist Debugging in Model-Based Testing ................. 238
Teemu Kanstrén and Marsha Chechik
Session 2: Panel Discussion

Program Debugging: Research and Practice ................................................................. 244

W. Eric Wong

Session 3: Debugging with Support for Reliability, Static Analysis, and Temporal Assertions

Defect Analysis and Reliability Assessment for Transactional Web Applications ........................................... 245

Wafa Jaffal and Jeff Tian

A Memory Model Based on Three-Valued Matrix for Static Defect Detection ............................................. 251

Qian Wang, Dahai Jin, and Yunzhan Gong

Debugging with Dynamic Temporal Assertions ......................................................................................... 257

Ziad A. Al-Sharif, Clinton L. Jeffery, and Mahmoud H. Said

Session 4: Quality and Applicability of Debugging and Fault Localization

Spectrum-Based Fault Localization for Spreadsheets: Influence of Correct Output Cells on the Fault Localization Quality ................................................................................. 263

Birgit Hofer

Studying the Advancement in Debugging Practice of Professional Software Developers .................................. 269

Benjamin Siegmund, Michael Perscheid, Marcel Taeumel, and Robert Hirschfeld

RISK 2014 — Second International Workshop on Risk Assessment and Risk-Driven Testing

Session 1: Risk Analysis and Assessment

Evaluation of Risk for Complex Systems Using Attack Surface ..................................................................... 275

Leanid Krautsevich, Fabio Martinelli, and Artsiom Yautsiukhin

Structuring Compliance Risk Identification Using the CORAS Approach: Compliance as an Asset .................. 281

Samson Yoseph Esayas

Towards Safety Risk Assessment of Socio-Technical Systems via Failure Logic Analysis ................................ 287

Barbara Gallina, Edin Sefer, and Atle Refsdal
Session 2: Risk Management
Risk Management for Outsourcing to the Cloud: Security Risks and Safeguards as Selection Criteria for Extern Cloud Services ................................................................. 293
  Johannes Viehmann
CRSTIP—An Assessment Scheme for Security Assessment Processes ......................................................... 296
  Arthur-Jozsef Molnar and Jürgen Großmann

Session 3: Risk Modeling and Risk-Based Testing
  Wolfgang Herzner, Sven Sieverding, Omar Kacimi, Eckard Böde, Thomas Bauer, and Brian Nielsen
Schematic Generation of English-Prose Semantics for a Risk Analysis Language Based on UML Interactions .................................................................................................................. 305
  Gencer Erdogan, Atle Refsdal, and Ketil Stolen
How Does the UML Testing Profile Support Risk-Based Testing ............................................................................... 311
  Shaukat Ali, Tao Yue, Andreas Hoffmann, Marc-Florian Wendland, Alessandra Bagnato, Etienne Brosse, Markus Schacher, and Zhen Ru Dai

RSDA 2014 — Second IEEE International Workshop on Reliability and Security Data Analysis

Session 1: Vulnerability Analysis
Predicting Buffer Overflow Vulnerabilities through Mining Light-Weight Static Code Attributes .......................................................................................................................... 317
  Bindu Madhavi Padmanabhuni and Hee Beng Kuan Tan
Mining Security Vulnerabilities from Linux Distribution Metadata ........................................................................ 323
  Jeffrey Stuckman and James Purtilo

Session 2: Security Data Mining
Detection of Compromised Email Accounts Used by a Spam Botnet with Country Counting and Theoretical Geographical Travelling Speed Extracted from Metadata ........................................................................ 329
  Carlo Schäfer
An Experiment with Conceptual Clustering for the Analysis of Security Alerts .............................................................. 335
  Andrea Paudice, Santonu Sarkar, and Domenico Cotroneo
Session 3: Data-Driven Analysis
Failure Prediction of Jobs in Compute Clouds: A Google Cluster Case Study ..................................................341
Xin Chen, Charing-Da Lu, and Karthik Pattabiraman
Supporting Decision-Making for Biometric System Deployment through Visual Analysis ..................................................................................................................................................................................347
Cagatay Turkay, Stephen Mason, Ilir Gashi, and Bojan Cukic
Record and Replay GUI-Based Applications with Less Overhead ..............................................................353
João Matos, Nuno Coração, and João Garcia

Session 4: Secure and Reliable Design
Combining Black Box Testing with White Box Code Analysis: A Heterogeneous Approach for Testing Enterprise SaaS Applications ..............................................................................................359
Stefano Rosiello, Amish Choudhary, Arpan Roy, and Rajeshwari Ganesan
Avoiding Hardware Aliasing: Verifying RISC Machine and Assembly Code for Encrypted Computing ..........................................................365
Peter T. Breuer and Jonathan P. Bowen
Integrating the Security Aspect into Design Space Exploration of Embedded Systems ........................................371
Ingo Stierand, Sunil Malipatlolla, Sibylle Fröschle, Alexander Stühring, and Stefan Henkler
On the Equivalence of SOA Rollback-Recovery Consistency Models .........................................................377
Anna Kobusińska and Jerzy Brzeziński

Session 5: Anomaly Detection
Using Invariants for Anomaly Detection: The Case Study of a SaaS Application ..................................................383
Flavio Frattini, Santonu Sarkar, Jyotiska Nath Khasnabish, and Stefano Russo

Session 6: Internet Threats and Countermeasures
Bypassing Censorship: A Proven Tool against the Recent Internet Censorship in Turkey ..................................................389
Andrea Di Florio, Nino Vincenzo Verde, Antonio Villani, Domenico Vitali, and Luigi Vincenzo Mancini
Finding Domain-Generation Algorithms by Looking at Length Distribution ..................................................395
Miranda Mowbray and Josiah Hagen
Multi-agent System for APT Detection ...........................................................................................................401
Wim Mees and Thibault Debatty
Power Grid Outlier Treatment through Kalman Filter .......................................................................................407
Cesario Di Sarno, Alessia Garofalo, Gianfranco Cerullo, Nadir Murru, Felicita Di Giandomenico, and Silvano Chiaradonna
WoSAR 2014 — The Sixth International Workshop on Software Aging and Rejuvenation

Keynote 1
Software Rejuvenation in Cloud Systems ................................................................. 413
Antonio Puliafito

Session 1: Rejuvenation Planning
Rejuvenation and the Spread of Epidemics in General Topologies ................................. 414
Eitan Altman, Alberto Avritzer, Rachid El-Azouzi, Daniel S. Menasche,
and Leandro Pfleger de Aguiar
Detection and Analysis of Performance Deterioration in Mobile Offloading System ............... 420
Qiushi Wang and Katinka Wolter
Software Maintenance Optimization Based on Stackelberg Game Methods .......................... 426
Jing Zhao, Yan-Bin Wang, Gao-Rong Ning, Cheng-Hong Wang, Kishor S. Trivedi,
K-Y Cai, and Zhen-Yu Zhang

Keynote 2
The Dual Nature of Software Aging: Twenty Years of Software Aging Research .................. 431
Stefano Russo

Session 2: Aging Analysis and Mitigation
Towards Patching Memory Leak Bugs in Off-The-Shelf Software .................................. 433
Domenico Cotroneo and Roberto Natella
A Novel Hybridization of Artificial Neural Networks and ARIMA Models
for Forecasting Resource Consumption in an IIS Web Server ........................................ 437
Yongquan Yan, Ping Guo, and Lifeng Liu
A Practice of Forecasting Software Aging in an IIS Web Server Using SVM ......................... 443
Yongquan Yan, Ping Guo, and Lifeng Liu
Reducing Web Test Cases Aging by Means of Robust XPath Locators .............................. 449
Maurizio Leotta, Andrea Stocco, Filippo Ricca, and Paolo Tonella

WOSD 2014 — The Fourth Workshop on Open Systems Dependability

Session 1: Evolution of Assurance
An Evaluation of Assuring Test Case Sufficiency Using a D-Case Pattern .......................... 455
Shuichiro Yamamoto and Shuji Morisaki
Session 2: Management of Open Systems Dependability

Run-Time Adaptive Error and State Management for Open Automotive Systems .................................................. 467
Jelena Frtunikj, Michael Armbruster, and Alois Knoll

Toward SIL Evaluation for a Resilience Strategy .................................................................................................. 473
Ling Fang, Guoqiang Li, Yingjie You, Chaobin Chen, and Liqin Hu

Prediction of the Complexity of Code Changes Based on Number of Open bugs, New Feature and Feature Improvement ........................................................... 478
V.B. Singh and Meera Sharma

WoSoCer 2014 — Fourth IEEE International Workshop on Software Certification

Invited Talk
Assessment Techniques, Certification and [What Else We Need for] Confidence in Software .......................................................... 484
Lorenzo Strigini

Session 1: Certification Arguments
Argument Evaluation in the Context of Assurance Case Confidence Modeling .................................................. 485
S. Grigorova and T.S.E. Maibaum

Session 2: Automotive Certification
Towards Certification of Automotive Software ...................................................................................................... 491
Cristiana Areias, João Carlos Cunha, Davide Iacono, and Francesco Rossi

Automotive SPICE Assessments in Safety-Critical Contexts: An Experience Report ........................................ 497
Giuseppe Lami and Fabio Falcini

Process Model Tailoring and Assessment for Automotive Certification Objectives ............................................. 503
Morayo Adedjouma and Hao Hu

Session 3: Certification Processes
Cost Optimisation in Certification of Software Product Lines ............................................................................. 509
Ricardo J. Rodríguez and Sasikumar Punnekkat

Reducing Certification Costs through Assured Dynamic Software Configuration ............................................. 515
Nermin Kajtazovic, Andrea Höller, Tobias Rauter, and Christian Kreiner

Adding Security Concerns to Safety Critical Certification .................................................................................. 521
Nicola Nostro, Andrea Bondavalli, and Nuno Silva
Session 4: Tools for Dependability and Certifiability Assessment

Safety ADD: A Tool for Safety-Contract Based Design ................................................................. 527
    Fredrik Warg, Benjamin Vedder, Martin Skoglund, and Andreas Söderberg

Improving Usability of Fault Injection ....................................................................................... 530
    D. Cotroneo, L. De Simone, A.K. Iannillo, A. Lanzaro, and R. Natella

Author Index .................................................................................................................................. 533