

# Contents

## Preface

---

Message from the Chairs . . . . .	xix
Committees . . . . .	xxiii
Sponsors . . . . .	xxx

## Technical Research

---

### Fault Handling

A Systematic Study of Automated Program Repair: Fixing 55 out of 105 Bugs for \$8 Each Claire Le Goues, Michael Dewey-Vogt, Stephanie Forrest, and Westley Weimer — <i>University of Virginia, USA; University of New Mexico, USA</i> . . . . .	3
Where Should the Bugs Be Fixed? - More Accurate Information Retrieval-Based Bug Localization Based on Bug Reports Jian Zhou, Hongyu Zhang, and David Lo — <i>Tsinghua University, China; Singapore Management University, Singapore</i> . . . . .	14
Developer Prioritization in Bug Repositories Jifeng Xuan, He Jiang, Zhilei Ren, and Weiqin Zou — <i>Dalian University of Technology, China</i> . . . . .	25
WhoseFault: Automatic Developer-to-Fault Assignment through Fault Localization Francisco Servant and James A. Jones — <i>UC Irvine, USA</i> . . . . .	36

### Code Generation and Recovery

Recovering Traceability Links between an API and Its Learning Resources Barthélemy Dagenais and Martin P. Robillard — <i>McGill University, Canada</i> . . . . .	47
Generating Range Fixes for Software Configuration Yingfei Xiong, Arnaud Hubaux, Steven She, and Krzysztof Czarnecki — <i>University of Waterloo, Canada; University of Namur, Belgium</i> . . . . .	58
Graph-Based Pattern-Oriented, Context-Sensitive Source Code Completion Anh Tuan Nguyen, Tung Thanh Nguyen, Hoan Anh Nguyen, Ahmed Tamrawi, Hung Viet Nguyen, Jafar Al-Kofahi, and Tien N. Nguyen — <i>Iowa State University, USA</i> . . . . .	69
Automatic Input Rectification Fan Long, Vijay Ganesh, Michael Carbin, Stelios Sidiroglou, and Martin Rinard — <i>MIT, USA</i> . . . . .	80

### Empirical Studies of Development

Overcoming the Challenges in Cost Estimation for Distributed Software Projects Narayan Ramasubbu and Rajesh Krishna Balan — <i>Singapore Management University, Singapore</i> . . . . .	91
Characterizing Logging Practices in Open-Source Software Ding Yuan, Soyeon Park, and Yuanyuan Zhou — <i>University of Illinois at Urbana-Champaign, USA; UC San Diego, USA</i> . . . . .	102
The Impacts of Software Process Improvement on Developers: A Systematic Review Mathieu Lavallée and Pierre N. Robillard — <i>École Polytechnique de Montréal, Canada</i> . . . . .	113

Combining Functional and Imperative Programming for Multicore Software: An Empirical Study Evaluating Scala and Java Victor Pankratius, Felix Schmidt, and Gilda Garretón — <i>KIT, Germany; Oracle Labs, USA</i> . . . . .	123
<b>Performance Analysis</b>	
Uncovering Performance Problems in Java Applications with Reference Propagation Profiling Dacong Yan, Guoqing Xu, and Atanas Rountev — <i>Ohio State University, USA; UC Irvine, USA</i> . . . . .	134
Performance Debugging in the Large via Mining Millions of Stack Traces Shi Han, Yingnong Dang, Song Ge, Dongmei Zhang, and Tao Xie — <i>Microsoft Research, China; North Carolina State University, USA</i> . . . . .	145
Automatically Finding Performance Problems with Feedback-Directed Learning Software Testing Mark Grechanik, Chen Fu, and Qing Xie — <i>Accenture Technology Labs, USA; University of Illinois at Chicago, USA</i> . . . .	156
Predicting Performance via Automated Feature-Interaction Detection Norbert Siegmund, Sergiy S. Kolesnikov, Christian Kästner, Sven Apel, Don Batory, Marko Rosenmüller, and Gunter Saake — <i>University of Magdeburg, Germany; University of Passau, Germany; Philipps University of Marburg, Germany; University of Texas at Austin, USA</i> . . . . .	167
<b>Defect Prediction</b>	
Sound Empirical Evidence in Software Testing Gordon Fraser and Andrea Arcuri — <i>Saarland University, Germany; Simula Research Laboratory, Norway</i> . . . . .	178
Privacy and Utility for Defect Prediction: Experiments with MORPH Fayola Peters and Tim Menzies — <i>West Virginia University, USA</i> . . . . .	189
Bug Prediction Based on Fine-Grained Module Histories Hideaki Hata, Osamu Mizuno, and Tohru Kikuno — <i>Osaka University, Japan; Kyoto Institute of Technology, Japan</i> . . . .	200
<b>Refactoring</b>	
Reconciling Manual and Automatic Refactoring Xi Ge, Quinton L. DuBose, and Emerson Murphy-Hill — <i>North Carolina State University, USA</i> . . . . .	211
WitchDoctor: IDE Support for Real-Time Auto-Completion of Refactorings Stephen R. Foster, William G. Griswold, and Sorin Lerner — <i>UC San Diego, USA</i> . . . . .	222
Use, Disuse, and Misuse of Automated Refactorings Mohsen Vakilian, Nicholas Chen, Stas Negara, Balaji Ambresh Rajkumar, Brian P. Bailey, and Ralph E. Johnson — <i>University of Illinois at Urbana-Champaign, USA</i> . . . . .	233
<b>Human Aspects of Development</b>	
Test Confessions: A Study of Testing Practices for Plug-In Systems Michaela Greiler, Arie van Deursen, and Margaret-Anne Storey — <i>TU Delft, Netherlands; University of Victoria, Canada</i> . . . .	244
How Do Professional Developers Comprehend Software? Tobias Roehm, Rebecca Tiarks, Rainer Koschke, and Walid Maalej — <i>TU Munich, Germany; University of Bremen, Germany</i> . . . .	255
Asking and Answering Questions about Unfamiliar APIs: An Exploratory Study Ekwa Duala-Ekoko and Martin P. Robillard — <i>McGill University, Canada</i> . . . . .	266
<b>Bug Detection</b>	
Automated Repair of HTML Generation Errors in PHP Applications Using String Constraint Solving Hesam Samimi, Max Schäfer, Shay Artzi, Todd Millstein, Frank Tip, and Laurie Hendren — <i>UC Los Angeles, USA; IBM Research, USA; McGill University, Canada</i> . . . . .	277
Leveraging Test Generation and Specification Mining for Automated Bug Detection without False Positives Michael Pradel and Thomas R. Gross — <i>ETH Zurich, Switzerland</i> . . . . .	288
Axis: Automatically Fixing Atomicity Violations through Solving Control Constraints Peng Liu and Charles Zhang — <i>Hong Kong University of Science and Technology, China</i> . . . . .	299
CB CD: Cloned Buggy Code Detector Jingyue Li and Michael D. Ernst — <i>DNV Research and Innovation, Norway; University of Washington, USA</i> . . . . .	310

## Multiversion Software

Crosscutting Revision Control System	
Sagi Ifrah and David H. Lorenz — <i>Open University, Israel</i> . . . . .	321
Where Does This Code Come from and Where Does It Go? - Integrated Code History Tracker for Open Source Systems -	
Katsuro Inoue, Yusuke Sasaki, Pei Xia, and Yuki Manabe — <i>Osaka University, Japan</i> . . . . .	331
Improving Early Detection of Software Merge Conflicts	
Mário Luís Guimarães and António Rito Silva — <i>Technical University of Lisbon, Portugal</i> . . . . .	342
A History-Based Matching Approach to Identification of Framework Evolution	
Sichen Meng, Xiaoyin Wang, Lu Zhang, and Hong Mei — <i>Key Laboratory of High Confidence Software Technologies, China; Peking University, China</i> . . . . .	353

## Similarity and Classification

Detecting Similar Software Applications	
Collin McMillan, Mark Grechanik, and Denys Poshyvanyk — <i>College of William and Mary, USA; Accenture Technology Labs, USA; University of Illinois at Chicago, USA</i> . . . . .	364
Content Classification of Development Emails	
Alberto Bacchelli, Tommaso Dal Sasso, Marco D'Ambros, and Michele Lanza — <i>University of Lugano, Switzerland</i> . .	375
Identifying Linux Bug Fixing Patches	
Yuan Tian, Julia Lawall, and David Lo — <i>Singapore Management University, Singapore; INRIA/LIP6, France</i> . . . . .	386
Active Refinement of Clone Anomaly Reports	
Lucia, David Lo, Lingxiao Jiang, and Aditya Budi — <i>Singapore Management University, Singapore</i> . . . . .	397

## Analysis for Evolution

Automated Analysis of CSS Rules to Support Style Maintenance	
Ali Mesbah and Shabnam Mirshokraie — <i>University of British Columbia, Canada</i> . . . . .	408
Graph-Based Analysis and Prediction for Software Evolution	
Pamela Bhattacharya, Marios Iliofotou, Iulian Neamtui, and Michalis Faloutsos — <i>UC Riverside, USA</i> . . . . .	419
Integrated Impact Analysis for Managing Software Changes	
Malcom Gethers, Bogdan Dit, Huzefa Kagdi, and Denys Poshyvanyk — <i>College of William and Mary, USA; Wichita State University, USA</i> . . . . .	430
Detecting and Visualizing Inter-worksheet Smells in Spreadsheets	
Felienne Hermans, Martin Pinzger, and Arie van Deursen — <i>TU Delft, Netherlands</i> . . . . .	441

## Debugging

An Empirical Study about the Effectiveness of Debugging When Random Test Cases Are Used	
Mariano Ceccato, Alessandro Marchetto, Leonardo Mariani, Cu D. Nguyen, and Paolo Tonella — <i>Fondazione Bruno Kessler, Italy; University of Milano-Bicocca, Italy</i> . . . . .	452
Reducing Confounding Bias in Predicate-Level Statistical Debugging Metrics	
Ross Gore and Paul F. Reynolds, Jr. — <i>University of Virginia, USA</i> . . . . .	463
BugRedux: Reproducing Field Failures for In-House Debugging	
Wei Jin and Alessandro Orso — <i>Georgia Tech, USA</i> . . . . .	474
Object-Centric Debugging	
Jorge Ressaia, Alexandre Bergel, and Oscar Nierstrasz — <i>University of Bern, Switzerland; University of Chile, Chile</i> . . . .	485

## Human Aspects of Process

Disengagement in Pair Programming: Does It Matter?	
Laura Plonka, Helen Sharp, and Janet van der Linden — <i>Open University, UK</i> . . . . .	496
Ambient Awareness of Build Status in Collocated Software Teams	
John Downs, Beryl Plimmer, and John G. Hosking — <i>University of Melbourne, Australia; University of Auckland, New Zealand; Australian National University, Australia</i> . . . . .	507

What Make Long Term Contributors: Willingness and Opportunity in OSS Community	
Minghui Zhou and Audris Mockus — <i>Peking University, China; Key Laboratory of High Confidence Software Technologies, China; Avaya Labs Research, USA</i> . . . . .	518
Development of Auxiliary Functions: Should You Be Agile? An Empirical Assessment of Pair Programming and Test-First Programming	
Otávio Augusto Lazzarini Lemos, Fabiano Cutigi Ferrari, Fábio Fagundes Silveira, and Alessandro Garcia — <i>UNIFESP, Brazil; UFSCar, Brazil; PUC-Rio, Brazil</i> . . . . .	529
<b>Models</b>	
Maintaining Invariant Traceability through Bidirectional Transformations	
Yijun Yu, Yu Lin, Zhenjiang Hu, Soichiro Hidaka, Hiroyuki Kato, and Lionel Montrieux — <i>Open University, UK; University of Illinois at Urbana-Champaign, USA; National Institute of Informatics, Japan</i> . . . . .	540
Slicing MATLAB Simulink Models	
Robert Reicherdt and Sabine Glesner — <i>TU Berlin, Germany</i> . . . . .	551
Partial Evaluation of Model Transformations	
Ali Razavi and Kostas Kontogiannis — <i>University of Waterloo, Canada; National Technical University of Athens, Greece</i> . . . . .	562
Partial Models: Towards Modeling and Reasoning with Uncertainty	
Michalis Famelis, Rick Salay, and Marsha Chechik — <i>University of Toronto, Canada</i> . . . . .	573
<b>Concurrency and Exceptions</b>	
Static Detection of Resource Contention Problems in Server-Side Scripts	
Yunhui Zheng and Xiangyu Zhang — <i>Purdue University, USA</i> . . . . .	584
Amplifying Tests to Validate Exception Handling Code	
Pingyu Zhang and Sebastian Elbaum — <i>University of Nebraska-Lincoln, USA</i> . . . . .	595
MagicFuzzer: Scalable Deadlock Detection for Large-Scale Applications	
Yan Cai and W. K. Chan — <i>City University of Hong Kong, China</i> . . . . .	606
<b>Software Architecture</b>	
Does Organizing Security Patterns Focus Architectural Choices?	
Koen Yskout, Riccardo Scandariato, and Wouter Joosen — <i>KU Leuven, Belgium</i> . . . . .	617
Enhancing Architecture-Implementation Conformance with Change Management and Support for Behavioral Mapping	
Yongjie Zheng and Richard N. Taylor — <i>UC Irvine, USA</i> . . . . .	628
A Tactic-Centric Approach for Automating Traceability of Quality Concerns	
Mehdi Mirakhorli, Yonghee Shin, Jane Cleland-Huang, and Murat Cinar — <i>DePaul University, USA</i> . . . . .	639
<b>Formal Verification</b>	
Build Code Analysis with Symbolic Evaluation	
Ahmed Tamrawi, Hoan Anh Nguyen, Hung Viet Nguyen, and Tien N. Nguyen — <i>Iowa State University, USA</i> . . . . .	650
An Automated Approach to Generating Efficient Constraint Solvers	
Dharini Balasubramaniam, Christopher Jefferson, Lars Kotthoff, Ian Miguel, and Peter Nightingale — <i>University of St. Andrews, UK</i> . . . . .	661
Simulation-Based Abstractions for Software Product-Line Model Checking	
Maxime Cordy, Andreas Classen, Gilles Perrouin, Pierre-Yves Schobbens, Patrick Heymans, and Axel Legay — <i>University of Namur, Belgium; INRIA, France; LIFL-CNRS, France; IRISA, France; Aalborg University, Denmark; University of Liège, Belgium</i> . . . . .	672
<b>Invariant Generation</b>	
Using Dynamic Analysis to Discover Polynomial and Array Invariants	
ThanhVu Nguyen, Deepak Kapur, Westley Weimer, and Stephanie Forrest — <i>University of New Mexico, USA; University of Virginia, USA</i> . . . . .	683
Metadata Invariants: Checking and Inferring Metadata Coding Conventions	
Myoungkyu Song and Eli Tilevich — <i>Virginia Tech, USA</i> . . . . .	694

Generating Obstacle Conditions for Requirements Completeness Dalal Alrajeh, Jeff Kramer, Axel van Lamsweerde, Alessandra Russo, and Sebastián Uchitel — <i>Imperial College London, UK; Université Catholique de Louvain, Belgium</i> . . . . .	705
<b>Regression Testing</b>	
make test-zesti: A Symbolic Execution Solution for Improving Regression Testing Paul Dan Marinescu and Cristian Cadar — <i>Imperial College London, UK</i> . . . . .	716
BALLERINA: Automatic Generation and Clustering of Efficient Random Unit Tests for Multithreaded Code Adrian Nistor, Qingzhou Luo, Michael Pradel, Thomas R. Gross, and Darko Marinov — <i>University of Illinois at Urbana-Champaign, USA; ETH Zurich, Switzerland</i> . . . . .	727
On-Demand Test Suite Reduction Dan Hao, Lu Zhang, Xingxia Wu, Hong Mei, and Gregg Rothermel — <i>Peking University, China; Key Laboratory of High Confidence Software Technologies, China; University of Nebraska, USA</i> . . . . .	738
<b>Software Vulnerability</b>	
Automated Detection of Client-State Manipulation Vulnerabilities Anders Møller and Mathias Schwarz — <i>Aarhus University, Denmark</i> . . . . .	749
Understanding Integer Overflow in C/C++ Will Dietz, Peng Li, John Regehr, and Vikram Adve — <i>University of Illinois at Urbana-Champaign, USA; University of Utah, USA</i> . . . . .	760
A Large Scale Exploratory Analysis of Software Vulnerability Life Cycles Muhammad Shahzad, Muhammad Zubair Shafiq, and Alex X. Liu — <i>Michigan State University, USA</i> . . . . .	771
<b>API Learning</b>	
Synthesizing API Usage Examples Raymond P. L. Buse and Westley Weimer — <i>University of Virginia, USA</i> . . . . .	782
Semi-automatically Extracting FAQs to Improve Accessibility of Software Development Knowledge Stefan Henß, Martin Monperrus, and Mira Mezini — <i>TU Darmstadt, Germany; University of Lille, France; INRIA, France</i> .	793
Temporal Analysis of API Usage Concepts Gias Uddin, Barthélémy Dagenais, and Martin P. Robillard — <i>McGill University, Canada</i> . . . . .	804
Inferring Method Specifications from Natural Language API Descriptions Rahul Pandita, Xusheng Xiao, Hao Zhong, Tao Xie, Stephen Oney, and Amit Paradkar — <i>North Carolina State University, USA; Chinese Academy of Sciences, China; CMU, USA; IBM Research, USA</i> . . . . .	815
<b>Code Recommenders</b>	
Automatic Parameter Recommendation for Practical API Usage Cheng Zhang, Juyuan Yang, Yi Zhang, Jing Fan, Xin Zhang, Jianjun Zhao, and Peizhao Ou — <i>Shanghai Jiao Tong University, China</i> . . . . .	826
On the Naturalness of Software Abram Hindle, Earl T. Barr, Zhendong Su, Mark Gabel, and Premkumar Devanbu — <i>UC Davis, USA; University of Texas at Dallas, USA</i> . . . . .	837
Recommending Source Code for Use in Rapid Software Prototypes Collin McMillan, Negar Hariri, Denys Poshyvanyk, Jane Cleland-Huang, and Bamshad Mobasher — <i>College of William and Mary, USA; DePaul University, USA</i> . . . . .	848
Active Code Completion Cyrus Omar, YoungSeok Yoon, Thomas D. LaToza, and Brad A. Myers — <i>CMU, USA</i> . . . . .	859
<b>Test Automation</b>	
Automated Oracle Creation Support, or: How I Learned to Stop Worrying about Fault Propagation and Love Mutation Testing Matt Staats, Gregory Gay, and Mats P. E. Heimdahl — <i>KAIST, South Korea; University of Minnesota, USA</i> . . . . .	870
Automating Test Automation Suresh Thummalapenta, Saurabh Sinha, Nimit Singhania, and Satish Chandra — <i>IBM Research, India; IBM Research, USA</i>	881

Stride: Search-Based Deterministic Replay in Polynomial Time via Bounded Linkage Jinguo Zhou, Xiao Xiao, and Charles Zhang — <i>Hong Kong University of Science and Technology, China</i> . . . . .	892
iTree: Efficiently Discovering High-Coverage Configurations Using Interaction Trees Charles Song, Adam Porter, and Jeffrey S. Foster — <i>University of Maryland, USA</i> . . . . .	903

## Validation of Specification

Inferring Class Level Specifications for Distributed Systems Sandeep Kumar, Siau-Cheng Khoo, Abhik Roychoudhury, and David Lo — <i>National University of Singapore, Singapore; Singapore Management University, Singapore</i> . . . . .	914
Statically Checking API Protocol Conformance with Mined Multi-Object Specifications Michael Pradel, Ciera Jaspán, Jonathan Aldrich, and Thomas R. Gross — <i>ETH Zurich, Switzerland; CMU, USA</i> . . . . .	925
Behavioral Validation of JFSL Specifications through Model Synthesis Carlo Ghezzi and Andrea Mocchi — <i>Politecnico di Milano, Italy</i> . . . . .	936
Verifying Client-Side Input Validation Functions Using String Analysis Muath Alkhalaf, Tevfik Bultan, and Jose L. Gallegos — <i>UC Santa Barbara, USA</i> . . . . .	947

## Keynotes

---

Digital Formations of the Powerful and the Powerless (Keynote) Saskia Sassen — <i>Columbia University, USA</i> . . . . .	961
Supporting Sustainability with Software - An Industrial Perspective (Keynote) Frank-Dieter Clesle — <i>SAP, Germany</i> . . . . .	962
Whither Software Architecture? (Keynote) Jeff Kramer — <i>Imperial College London, UK</i> . . . . .	963

## Software Engineering in Practice

---

### Services and Analytics

Towards a Federated Cloud Ecosystem (Invited Industrial Talk) Clovis Chapman — <i>Dell, Ireland</i> . . . . .	967
Specification Patterns from Research to Industry: A Case Study in Service-Based Applications Domenico Bianculli, Carlo Ghezzi, Cesare Pautasso, and Patrick Senti — <i>University of Lugano, Switzerland; Politecnico di Milano, Italy; Credit Suisse, Switzerland</i> . . . . .	968
Methodology for Migration of Long Running Process Instances in a Global Large Scale BPM Environment in Credit Suisse's SOA Landscape Tarmo Ploom, Stefan Scheit, and Axel Glaser — <i>Credit Suisse, Switzerland</i> . . . . .	977
Information Needs for Software Development Analytics Raymond P. L. Buse and Thomas Zimmermann — <i>University of Virginia, USA; Microsoft Research, USA</i> . . . . .	987

### Mini-Tutorial: Software Analytics

Software Analytics in Practice: Mini Tutorial Dongmei Zhang and Tao Xie — <i>Microsoft Research, China; North Carolina State University, USA</i> . . . . .	997
---	-----

### Invited Industrial Experts

Software as an Engineering Material: How the Affordances of Programming Have Changed and What to Do about It (Invited Industrial Talk) Keith Braithwaite — <i>Zühlke Engineering, UK</i> . . . . .	998
Software Architecture - What Does It Mean in Industry? (Invited Industrial Talk) Eberhard Wolff — <i> adesso, Germany</i> . . . . .	999

How Software Engineering Can Benefit from Traditional Industries - A Practical Experience Report (Invited Industrial Talk)	
Tom Sprenger — <i>AdNovum Informatik, Switzerland</i> . . . . .	1000

## Formal Methods

Ten Years of Automated Code Analysis at Microsoft (Invited Industrial Talk)	
Wolfram Schulte — <i>Microsoft Research, USA</i> . . . . .	1001
Large-Scale Formal Verification in Practice: A Process Perspective	
June Andronick, Ross Jeffery, Gerwin Klein, Rafal Kolanski, Mark Staples, He Zhang, and Liming Zhu — <i>NICTA, Australia; UNSW, Australia</i> . . . . .	1002
Constructing Parser for Industrial Software Specifications Containing Formal and Natural Language Description	
Futoshi Iwama, Taiga Nakamura, and Hironori Takeuchi — <i>IBM Research, Japan</i> . . . . .	1012
Formal Correctness, Safety, Dependability, and Performance Analysis of a Satellite	
Marie-Aude Esteve, Joost-Pieter Katoen, Viet Yen Nguyen, Bart Postma, and Yuri Yushtein — <i>European Space Agency, Netherlands; RWTH Aachen University, Germany; University of Twente, Netherlands</i> . . . . .	1022

## Goldfish Bowl Panel: Software Development Analytics

Goldfish Bowl Panel: Software Development Analytics	
Tim Menzies and Thomas Zimmermann — <i>West Virginia University, USA; Microsoft Research, USA</i> . . . . .	1032

## Re-engineering

Making Sense of Healthcare Benefits	
Jonathan Bnayahu, Maayan Goldstein, Mordechai Nisenson, and Yahalomit Simionovici — <i>IBM Research, Israel</i> . . . . .	1034
On the Proactive and Interactive Visualization for Feature Evolution Comprehension: An Industrial Investigation	
Renato Novais, Camila Nunes, Caio Lima, Elder Cirilo, Francisco Dantas, Alessandro Garcia, and Manoel Mendonça — <i>Federal University of Bahia, Brazil; Federal Institute of Bahia, Brazil; PUC-Rio, Brazil</i> . . . . .	1044
Extending Static Analysis by Mining Project-Specific Rules	
Boya Sun, Gang Shu, Andy Podgurski, and Brian Robinson — <i>Case Western Reserve University, USA; ABB Research, USA</i> . . . . .	1054

## Debugging

Debugger Canvas: Industrial Experience with the Code Bubbles Paradigm	
Robert DeLine, Andrew Bragdon, Kael Rowan, Jens Jacobsen, and Steven P. Reiss — <i>Microsoft Research, USA; Brown University, USA</i> . . . . .	1064
Characterizing and Predicting Which Bugs Get Reopened	
Thomas Zimmermann, Nachiappan Nagappan, Philip J. Guo, and Brendan Murphy — <i>Microsoft Research, USA; Stanford University, USA; Microsoft Research, UK</i> . . . . .	1074
ReBucket: A Method for Clustering Duplicate Crash Reports Based on Call Stack Similarity	
Yingnong Dang, Rongxin Wu, Hongyu Zhang, Dongmei Zhang, and Peter Nobel — <i>Microsoft Research, China; Tsinghua University, China; Microsoft, USA</i> . . . . .	1084

## Case Studies

Understanding the Impact of Pair Programming on Developers Attention: A Case Study on a Large Industrial Experimentation	
Alberto Sillitti, Giancarlo Succi, and Jelena Vlasenko — <i>Free University of Bolzano, Italy</i> . . . . .	1094
How Much Does Unused Code Matter for Maintenance?	
Sebastian Eder, Maximilian Junker, Elmar Jürgens, Benedikt Hauptmann, Rudolf Vaas, and Karl-Heinz Prommer — <i>TU Munich, Germany; Munich Re, Germany</i> . . . . .	1102
Using Knowledge Elicitation to Improve Web Effort Estimation: Lessons from Six Industrial Case Studies	
Emilia Mendes — <i>Zayed University, United Arab Emirates</i> . . . . .	1112

## Testing

Large-Scale Test Automation in the Cloud (Invited Industrial Talk)	
John Penix — <i>Google, USA</i> . . . . .	1122

Efficient Reuse of Domain-Specific Test Knowledge: An Industrial Case in the Smart Card Domain Nicolas Devos, Christophe Ponsard, Jean-Christophe Deprez, Renaud Bauvin, Benedicte Moriau, and Guy Anckaerts — <i>CETIC, Belgium; STMicroelectronics, Belgium</i> . . . . .	1123
The Quamoco Product Quality Modelling and Assessment Approach Stefan Wagner, Klaus Lochmann, Lars Heinemann, Michael Kläs, Adam Trendowicz, Reinhold Plösch, Andreas Seidl, Andreas Goeb, and Jonathan Streit — <i>University of Stuttgart, Germany; TU Munich, Germany; Fraunhofer IESE, Germany; JKU Linz, Austria; Capgemini, Germany; SAP, Germany; itestra, Germany</i> . . . . .	1133
Industrial Application of Concolic Testing Approach: A Case Study on libexif by Using CREST-BV and KLEE Yunho Kim, Moonzoo Kim, YoungJoo Kim, and Yoonkyu Jang — <i>KAIST, South Korea; Samsung Electronics, South Korea</i>	1143

## Software Engineering Education

---

### The Role of Software Projects in Software Engineering Education

Teaching Software Engineering and Software Project Management: An Integrated and Practical Approach Gabriele Bavota, Andrea De Lucia, Fausto Fasano, Rocco Oliveto, and Carlo Zottoli — <i>University of Salerno, Italy; University of Molise, Italy</i> . . . . .	1155
Teaching Collaborative Software Development: A Case Study Terhi Kilamo, Imed Hammouda, and Mohamed Amine Chatti — <i>Tampere University of Technology, Finland; RWTH Aachen University, Germany</i> . . . . .	1165
Using Continuous Integration of Code and Content to Teach Software Engineering with Limited Resources Jörn Guy Süß and William Billingsley — <i>University of Queensland, Australia</i> . . . . .	1175

### Aspects of Teaching Software Engineering

Stages in Teaching Software Testing Tony Cowling — <i>University of Sheffield, UK</i> . . . . .	1185
Integrating Tools and Frameworks in Undergraduate Software Engineering Curriculum Christopher Fuhrman, Roger Champagne, and Alain April — <i>University of Québec, Canada</i> . . . . .	1195
What Scope Is There for Adopting Evidence-Informed Teaching in SE? David Budgen, Sarah Drummond, Pearl Brereton, and Nikki Holland — <i>Durham University, UK; Keele University, UK</i> . . . . .	1205

### Software Engineering Education in Industry

FOCUS: An Adaptation of a SWEBOK-Based Curriculum for Industry Requirements Ganesh Samarthayam, Girish Suryanarayana, Arbind Kumar Gupta, and Raghu Nambiar — <i>Siemens, India</i> . . . . .	1215
--	------

### Teaching Distributed Software Engineering

Ten Tips to Succeed in Global Software Engineering Education Ivica Crnković, Ivana Bosnić, and Mario Žagar — <i>Mälardalen University, Sweden; University of Zagreb, Croatia</i> . . . . .	1225
Collaboration Patterns in Distributed Software Development Projects Igor Čavrak, Marin Orlić, and Ivica Crnković — <i>University of Zagreb, Croatia; Mälardalen University, Sweden</i> . . . . .	1235
Improving PSP Education by Pairing: An Empirical Study Guoping Rong, He Zhang, Mingjuan Xie, and Dong Shao — <i>Nanjing University, China; NICTA, Australia; UNSW, Australia</i>	1245
Five Days of Empirical Software Engineering: The PASED Experience Massimiliano Di Penta, Giuliano Antoniol, Daniel M. Germán, Yann-Gaël Guéhéneuc, and Bram Adams — <i>University of Sannio, Italy; École Polytechnique de Montréal, Canada; University of Victoria, Canada</i> . . . . .	1255

## New Ideas and Emerging Results

---

### NIER in Support of Software Engineers

Automatically Detecting Developer Activities and Problems in Software Development Work Tobias Roehm and Walid Maalej — <i>TU Munich, Germany</i> . . . . .	1261
---	------



Software Process Improvement through the Identification and Removal of Project-Level Knowledge Flow Obstacles	
Susan M. Mitchell and Carolyn B. Seaman — <i>University of Maryland in Baltimore County, USA</i> . . . . .	1265
Symbiotic General-Purpose and Domain-Specific Languages	
Colin Atkinson, Ralph Gerbig, and Bastian Kennel — <i>University of Mannheim, Germany</i> . . . . .	1269
Evaluating the Specificity of Text Retrieval Queries to Support Software Engineering Tasks	
Sonia Haiduc, Gabriele Bavota, Rocco Oliveto, Andrian Marcus, and Andrea De Lucia — <i>Wayne State University, USA; University of Salerno, Italy; University of Molise, Italy</i> . . . . .	1273
Co-adapting Human Collaborations and Software Architectures	
Christoph Dorn and Richard N. Taylor — <i>UC Irvine, USA</i> . . . . .	1277
Release Engineering Practices and Pitfalls	
Hyrum K. Wright and Dewayne E. Perry — <i>University of Texas at Austin, USA</i> . . . . .	1281
Augmented Intelligence - The New AI - Unleashing Human Capabilities in Knowledge Work	
James M. Corrigan — <i>Stony Brook University, USA</i> . . . . .	1285

## **NIER for Mining Product and Process Data**

On How Often Code Is Cloned across Repositories	
Niko Schwarz, Mircea Lungu, and Romain Robbes — <i>University of Bern, Switzerland; University of Chile, Chile</i> . . . . .	1289
Mining Input Sanitization Patterns for Predicting SQL Injection and Cross Site Scripting Vulnerabilities	
Lwin Khin Shar and Hee Beng Kuan Tan — <i>Nanyang Technological University, Singapore</i> . . . . .	1293
Inferring Developer Expertise through Defect Analysis	
Tung Thanh Nguyen, Tien N. Nguyen, Evelyn Duesterwald, Tim Klinger, and Peter Santhanam — <i>Iowa State University, USA; IBM Research, USA</i> . . . . .	1297
Green Mining: Investigating Power Consumption across Versions	
Abram Hindle — <i>University of Alberta, Canada</i> . . . . .	1301
Multi-label Software Behavior Learning	
Yang Feng and Zhenyu Chen — <i>Nanjing University, China</i> . . . . .	1305
Trends in Object-Oriented Software Evolution: Investigating Network Properties	
Alexander Chatzigeorgiou and George Melas — <i>University of Macedonia, Greece</i> . . . . .	1309
Exploring Techniques for Rationale Extraction from Existing Documents	
Benjamin Rogers, James Gung, Yechen Qiao, and Janet E. Burge — <i>Miami University, USA</i> . . . . .	1313

## **NIER to Leverage Social Aspects**

Continuous Social Screencasting to Facilitate Software Tool Discovery	
Emerson Murphy-Hill — <i>North Carolina State University, USA</i> . . . . .	1317
UDesignIt: Towards Social Media for Community-Driven Design	
Phil Greenwood, Awais Rashid, and James Walkerdine — <i>Lancaster University, UK</i> . . . . .	1321
Influencing the Adoption of Software Engineering Methods Using Social Software	
Leif Singer and Kurt Schneider — <i>Leibniz Universität Hannover, Germany</i> . . . . .	1325
Toward Actionable, Broadly Accessible Contests in Software Engineering	
Jane Cleland-Huang, Yonghee Shin, Ed Keenan, Adam Czauderna, Greg Leach, Evan Moritz, Malcom Gethers, Denys Poshyvanyk, Jane Huffman Hayes, and Wenbin Li — <i>DePaul University, USA; College of William and Mary, USA; University of Kentucky, USA</i> . . . . .	1329
CodeTimeline: Storytelling with Versioning Data	
Adrian Kuhn and Mirko Stocker — <i>University of British Columbia, Canada; University of Applied Sciences Rapperswil, Switzerland</i> . . . . .	1333

## **NIER for Verification and Evolution**

Analyzing Multi-agent Systems with Probabilistic Model Checking Approach	
Songzheng Song, Jianye Hao, Yang Liu, Jun Sun, Ho-Fung Leung, and Jin Song Dong — <i>National University of Singapore, Singapore; Chinese University of Hong Kong, China; University of Technology and Design, Singapore</i> . . . . .	1337

Brace: An Assertion Framework for Debugging Cyber-Physical Systems	
Kevin Boos, Chien-Liang Fok, Christine Julien, and Miryung Kim — <i>University of Texas at Austin, USA</i>	1341
Augmenting Test Suites Effectiveness by Increasing Output Diversity	
Nadia Alshahwan and Mark Harman — <i>University College London, UK</i>	1345
Improving IDE Recommendations by Considering Global Implications of Existing Recommendations	
Kıvanç Muşlu, Yuriy Brun, Reid Holmes, Michael D. Ernst, and David Notkin — <i>University of Washington, USA; University of Waterloo, Canada</i>	1349
Towards Flexible Evolution of Dynamically Adaptive Systems	
Gilles Perrouin, Brice Morin, Franck Chauvel, Franck Fleurey, Jacques Klein, Yves Le Traon, Olivier Barais, and Jean-Marc Jézéquel — <i>University of Namur, Belgium; SINTEF, Norway; University of Luxembourg, Luxembourg; IRISA, France</i>	1353
Towards Business Processes Orchestrating the Physical Enterprise with Wireless Sensor Networks	
Fabio Casati, Florian Daniel, Guenadi Dantchev, Joakim Eriksson, Niclas Finne, Stamatis Karnouskos, Patricio Moreno Montero, Luca Mottola, Felix Jonathan Oppermann, Gian Pietro Picco, Antonio Quartulli, Kay Römer, Patrik Spiess, Stefano Tranquillini, and Thiemo Voigt — <i>University of Trento, Italy; SAP, Germany; Swedish Institute of Computer Science, Sweden; Acciona Infraestructuras, Spain; University of Lübeck, Germany</i>	1357
Engineering and Verifying Requirements for Programmable Self-Assembling Nanomachines	
Robyn Lutz, Jack Lutz, James Lathrop, Titus Klinge, Eric Henderson, Divita Mathur, and Dalia Abo Sheasha — <i>Iowa State University, USA; California Institute of Technology, USA</i>	1361

## Formal Research Demonstrations

---

### Formal Demos 1

Facilitating Communication between Engineers with CARES	
Anja Guzzi and Andrew Begel — <i>TU Delft, Netherlands; Microsoft Research, USA</i>	1367
Interactive Refinement of Combinatorial Test Plans	
Itai Segall and Rachel Tzoref-Brill — <i>IBM Research, Israel</i>	1371
TraceLab: An Experimental Workbench for Equipping Researchers to Innovate, Synthesize, and Comparatively Evaluate Traceability Solutions	
Ed Keenan, Adam Czauderna, Greg Leach, Jane Cleland-Huang, Yonghee Shin, Evan Moritz, Malcom Gethers, Denys Poshyvanyk, Jonathan Maletic, Jane Huffman Hayes, Alex Dekhtyar, Daria Manukian, Shervin Hossein, and Derek Hearn — <i>DePaul University, USA; College of William and Mary, USA; Kent State University, USA; University of Kentucky, USA; CalPoly, USA</i>	1375
Specification Engineering and Modular Verification Using a Web-Integrated Verifying Compiler	
Charles T. Cook, Heather Harton, Hampton Smith, and Murali Sitaraman — <i>Clemson University, USA</i>	1379
Writing Dynamic Service Orchestrations with DSOL	
Leandro Sales Pinto, Gianpaolo Cugola, and Carlo Ghezzi — <i>Politecnico di Milano, Italy</i>	1383
MASH: A Tool for End-User Plug-In Composition	
Leonardo Mariani and Fabrizio Pastore — <i>University of Milano-Bicocca, Italy</i>	1387
BabelRef: Detection and Renaming Tool for Cross-Language Program Entities in Dynamic Web Applications	
Hung Viet Nguyen, Hoan Anh Nguyen, Tung Thanh Nguyen, and Tien N. Nguyen — <i>Iowa State University, USA</i>	1391
MDSheet: A Framework for Model-Driven Spreadsheet Engineering	
Jácome Cunha, João Paulo Fernandes, Jorge Mendes, and João Saraiva — <i>University of Minho, Portugal; University of Porto, Portugal</i>	1395

### Formal Demos 2

WorkItemExplorer: Visualizing Software Development Tasks Using an Interactive Exploration Environment	
Christoph Treude, Patrick Gorman, Lars Grammel, and Margaret-Anne Storey — <i>University of Victoria, Canada</i>	1399
Runtime Monitoring of Component Changes with Spy@Runtime	
Carlo Ghezzi, Andrea Mocchi, and Mario Sangiorgio — <i>Politecnico di Milano, Italy; MIT, USA</i>	1403
GraPacc: A Graph-Based Pattern-Oriented, Context-Sensitive Code Completion Tool	
Anh Tuan Nguyen, Hoan Anh Nguyen, Tung Thanh Nguyen, and Tien N. Nguyen — <i>Iowa State University, USA</i>	1407

Code Bubbles: A Practical Working-Set Programming Environment	
Steven P. Reiss, Jared N. Bott, and Joseph J. LaViola, Jr. — <i>Brown University, USA; University of Central Florida, USA</i>	1411
EVOSS: A Tool for Managing the Evolution of Free and Open Source Software Systems	
Davide Di Ruscio, Patrizio Pelliccione, and Alfonso Pierantonio — <i>University of L'Aquila, Italy</i>	1415
Supporting Extract Class Refactoring in Eclipse: The ARIES Project	
Gabriele Bavota, Andrea De Lucia, Andrian Marcus, Rocco Oliveto, and Fabio Palomba — <i>University of Salerno, Italy; Wayne State University, USA; University of Molise, Italy</i>	1419
EXSYST: Search-Based GUI Testing	
Florian Gross, Gordon Fraser, and Andreas Zeller — <i>Saarland University, Germany</i>	1423
JavaMOP: Efficient Parametric Runtime Monitoring Framework	
Dongyun Jin, Patrick O'Neil Meredith, Choonghwan Lee, and Grigore Roşu — <i>University of Illinois at Urbana-Champaign, USA</i>	1427

## Posters and Informal Demonstrations

---

### Posters

Augmenting Test Suites Automatically	
Konstantin Rubinov and Jochen Wuttke — <i>University of Lugano, Switzerland; University of Washington, USA</i>	1433
Using the GPGPU for Scaling Up Mining Software Repositories	
Rina Nagano, Hiroki Nakamura, Yasutaka Kamei, Bram Adams, Kenji Hisazumi, Naoyasu Ubayashi, and Akira Fukuda — <i>Kyushu University, Japan; École Polytechnique de Montréal, Canada</i>	1435
FastFix: Monitoring Control for Remote Software Maintenance	
Dennis Pagano, Miguel A. Juan, Alessandra Bagnato, Tobias Roehm, Bernd Bruegge, and Walid Maalej — <i>TU Munich, Germany; S2 Grupo, Spain; TXT e-solutions, Italy</i>	1437
Modeling Cloud Performance with Kriging	
Alessio Gambi and Giovanni Toffetti — <i>University of Lugano, Switzerland</i>	1439
SOA Adoption in the Italian Industry	
Maurizio Leotta, Filippo Ricca, Marina Ribaudo, Gianna Reggio, Egidio Astesiano, and Tullio Vernazza — <i>Università di Genova, Italy</i>	1441
A Bidirectional Model-Driven Spreadsheet Environment	
Jácome Cunha, João Paulo Fernandes, Jorge Mendes, and João Saraiva — <i>University of Minho, Portugal</i>	1443
A Self-Healing Technique for Java Applications	
Antonio Carzaniga, Alessandra Gorla, Andrea Mattavelli, and Nicolò Perino — <i>University of Lugano, Switzerland</i>	1445
When Open Source Turns Cold on Innovation - The Challenges of Navigating Licensing Complexities in New Research Domains	
Christopher Forbes, Iman Keivanloo, and Juergen Rilling — <i>Concordia University, Canada</i>	1447

### Informal Demonstrations

Language Modularity with the MPS Language Workbench	
Markus Voelter and Vaclav Pech — <i>itemis, Germany; voelter ingenieurbuero fuer softwaretechnologie, Germany; JetBrains, USA</i>	1449
Mining Application Repository to Recommend XML Configuration Snippets	
Sheng Huang, Yi Qi Lu, Yanghua Xiao, and Wei Wang — <i>Fudan University, China</i>	1451
Locating Features in Dynamically Configured Avionics Software	
Maxime Ouellet, Ettore Merlo, Neset Sozen, and Martin Gagnon — <i>École Polytechnique de Montréal, Canada; CMC Electronics, Canada</i>	1453
Detecting Metadata Bugs on the Fly	
Myoungkyu Song and Eli Tilevich — <i>Virginia Tech, USA</i>	1455
Blaze	
Jan-Peter Krämer, Joachim Kurz, Thorsten Karrer, and Jan Borchers — <i>RWTH Aachen University, Germany</i>	1457

ConTexter Feedback System	
Tristan Wehrmaker, Stefan Gärtner, and Kurt Schneider — <i>Leibniz Universität Hannover, Germany</i>	1459
xMapper: An Architecture-Implementation Mapping Tool	
Yongjie Zheng and Richard N. Taylor — <i>UC Irvine, USA</i>	1461
ConcernReCS: Finding Code Smells in Software Aspectization	
Péricles Alves, Diogo Santana, and Eduardo Figueiredo — <i>UFMG, Brazil</i>	1463
Egidio: A Non-Invasive Approach for Synthesizing Organizational Models	
Saulius Astromskis, Andrea Janes, and Alireza Rezaei Mahdiraji — <i>Free University of Bolzano, Italy</i>	1465
SDiC: Context-Based Retrieval in Eclipse	
Bruno Antunes, Joel Cordeiro, and Paulo Gomes — <i>University of Coimbra, Portugal</i>	1467
An Integrated Bug Processing Framework	
Xiangyu Zhang, Mengxiang Lin, and Kai Yu — <i>Beihang University, China</i>	1469
Repository for Model Driven Development (ReMoDD)	
Robert B. France, James M. Bieman, Sai Pradeep Mandalaparty, Betty H. C. Cheng, and Adam Jensen — <i>Colorado State University, USA; Michigan State University, USA</i>	1471

## Doctoral Symposium

---

### Posters 1-12

Going Global with Agile Service Networks	
Damian A. Tamburri — <i>VU University Amsterdam, Netherlands</i>	1475
Using Structural and Semantic Information to Support Software Refactoring	
Gabriele Bavota — <i>University of Salerno, Italy</i>	1479
An Approach to Variability Management in Service-Oriented Product Lines	
Sedigheh Khoshnevis — <i>Shahid Beheshti University G.C., Iran</i>	1483
Using Machine Learning to Enhance Automated Requirements Model Transformation	
Erol-Valeriu Chioaşcă — <i>University of Manchester, UK</i>	1487
Security Testing of Web Applications: A Research Plan	
Andrea Avancini — <i>Fondazione Bruno Kessler, Italy</i>	1491
Application of Self-Adaptive Techniques to Federated Authorization Models	
Christopher Bailey — <i>University of Kent, UK</i>	1495
Improving Information Retrieval-Based Concept Location Using Contextual Relationships	
Tezcan Dilshener — <i>Open University, UK</i>	1499
Effective Specification of Decision Rights and Accountabilities for Better Performing Software Engineering Projects	
Monde Kalumbilo — <i>University College London, UK</i>	1503
Search Based Design of Software Product Lines Architectures	
Thelma Elita Colanzi — <i>Federal University of Paraná, Brazil</i>	1507
Software Fault Localization Based on Program Slicing Spectrum	
Wanzhi Wen — <i>Southeast University, China; Chinese Academy of Sciences, China</i>	1511
Architectural Task Allocation in Distributed Environment: A Traceability Perspective	
Salma Imtiaz — <i>International Islamic University, Pakistan</i>	1515
Using Invariant Relations in the Termination Analysis of While Loops	
Wided Ghardallou — <i>University of Tunis El Manar, Tunisia</i>	1519

### Presentations 1-4

Software Regression as Change of Input Partitioning	
Marcel Böhme — <i>National University of Singapore, Singapore</i>	1523
A Generic Methodology to Derive Domain-Specific Performance Feedback for Developers	
Dennis Westermann — <i>SAP Research, Germany</i>	1527

Towards the Verification of Multi-diagram UML Models	1531
Alfredo Motta — <i>Politecnico di Milano, Italy</i>	
Documenting and Sharing Knowledge about Code	1535
Anja Guzzi — <i>TU Delft, Netherlands</i>	

## Presentations 5-6

Timely and Efficient Facilitation of Coordination of Software Developers' Activities	1539
Kelly Blincoe — <i>Drexel University, USA</i>	
Stack Layout Transformation: Towards Diversity for Securing Binary Programs	1543
Benjamin Rodes — <i>University of Virginia, USA</i>	

## Posters 13-25

Synthesis of Event-Based Controllers: A Software Engineering Challenge	1547
Nicolás D'Ippolito — <i>Imperial College London, UK</i>	
Empirically Researching Development of International Software	1551
Malte Ressin — <i>University of West London, UK</i>	
Model Translations among Big-Step Modeling Languages	1555
Fathiye Faghih — <i>University of Waterloo, Canada</i>	
HARPPIE: Hyper Algorithmic Recipe for Productive Parallelism Intensive Endeavors	1559
Pedro Monteiro — <i>Universidade Nova de Lisboa, Portugal</i>	
On the Analysis of Evolution of Software Artefacts and Programs	1563
Fehmi Jaafar — <i>University of Montreal, Canada</i>	
Societal Computing	1567
Swapneel Sheth — <i>Columbia University, USA</i>	
Finding Suitable Programs: Semantic Search with Incomplete and Lightweight Specifications	1571
Kathryn T. Stolee — <i>University of Nebraska-Lincoln, USA</i>	
Certification-Based Development of Critical Systems	1575
Panayiotis Steele — <i>University of Virginia, USA</i>	
Testing and Debugging UML Models Based on fUML	1579
Tanja Mayerhofer — <i>Vienna University of Technology, Austria</i>	
Bridging the Divide between Software Developers and Operators Using Logs	1583
Weiyi Shang — <i>Queen's University, Canada</i>	
The Co-evolution of Socio-technical Structures in Sustainable Software Development: Lessons from the Open Source Software Communities	1587
Marcelo Serrano Zanetti — <i>ETH Zurich, Switzerland</i>	
Log-Based Testing	1591
Alexander Elyasov — <i>Utrecht University, Netherlands</i>	
Moving Mobile Applications between Mobile Devices Seamlessly	1595
Volker Schuchardt — <i>University of Duisburg-Essen, Germany</i>	

## ACM Student Research Competition

---

Timely Detection of Coordination Requirements to Support Collaboration among Software Developers	1601
Kelly Blincoe — <i>Drexel University, USA</i>	
Improving Failure-Inducing Changes Identification Using Coverage Analysis	1604
Kai Yu — <i>Beihang University, China</i>	
A Study on Improving Static Analysis Tools: Why Are We Not Using Them?	1607
Brittany Johnson — <i>North Carolina State University, USA</i>	
Winbook: A Social Networking Based Framework for Collaborative Requirements Elicitation and WinWin Negotiations	1610
Nupul Kukreja — <i>University of Southern California, USA</i>	

Using Automatic Static Analysis to Identify Technical Debt	1613
Antonio Vetrò — <i>Politecnico di Torino, Italy; Fraunhofer CESE, USA</i>	
Coupled Evolution of Model-Driven Spreadsheets	1616
Jorge Mendes — <i>University of Minho, Portugal</i>	
Managing Evolution of Software Product Line	1619
Cheng Thao — <i>University of Wisconsin-Milwaukee, USA</i>	
Enabling Dynamic Metamodels through Constraint-Driven Modeling	1622
Andreas Demuth — <i>JKU Linz, Austria</i>	
Assisting End-User Development in Browser-Based Mashup Tools	1625
Soudip Roy Chowdhury — <i>University of Trento, Italy</i>	
Hot Clones: Combining Search-Driven Development, Clone Management, and Code Provenance	1628
Niko Schwarz — <i>University of Bern, Switzerland</i>	
Capturing and Exploiting Fine-Grained IDE Interactions	1630
Zhongxian Gu — <i>UC Davis, USA</i>	
Restructuring Unit Tests with TestSurgeon	1632
Pablo Estefó — <i>University of Chile, Chile</i>	
A Requirements-Based Approach for the Design of Adaptive Systems	1635
Vítor E. Silva Souza — <i>University of Trento, Italy</i>	
Petri Nets State Space Analysis in the Cloud	1638
Matteo Camilli — <i>University of Milan, Italy</i>	
Mining Java Class Identifier Naming Conventions	1641
Simon Butler — <i>Open University, UK</i>	
Online Sharing and Integration of Results from Mining Software Repositories	1644
Iman Keivanloo — <i>Concordia University, Canada</i>	

## Invited Summaries

---

Refounding Software Engineering: The Semat Initiative (Invited Presentation)	1649
Mira Kajko-Mattsson, Ivar Jacobson, Ian Spence, Paul McMahon, Brian Elvesæter, Arne J. Berre, Michael Striewe, Michael Goedicke, Shihong Huang, Bruce MacIsaac, and Ed Seymour — <i>KTH Royal Institute of Technology, Sweden; Ivar Jacobson Int., UK; PEM Systems, USA; SINTEF, Norway; University of Duisburg-Essen, Germany; Florida Atlantic University, USA; IBM, USA; Fujitsu, UK</i>	
Summary of the ICSE 2012 Workshops	1651
Alessandro Orso and Ralf Reussner — <i>Georgia Tech, USA; KIT, Germany; FZI, Germany</i>	
Summary of the ICSE 2012 Tutorials and Technical Briefings	1654
Andreas Leitner and Oscar Nierstrasz — <i>Google, Switzerland; University of Bern, Switzerland</i>	

## Author Index