ICST 2017, ICSTW 2017, & IWESSEP 2017

13-17 March 2017
Waseda University, Tokyo, Japan

10th IEEE International Conference on Software Testing, Verification and Validation (ICST 2017)
10th IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW 2017)
Most of the sessions and the reception on Tuesday take place in **Building 63**, while some workshops on Monday are assigned rooms in **Building 62**.
10th IEEE International Conference on Software Testing, Verification and Validation

10th IEEE International Conference on Software Testing, Verification and Validation Workshops

13-17 March 2017
Waseda University, Tokyo, Japan

Conference Program
Message from the ICST 2017 General Chairs

Yokoso! We welcome you all to Tokyo, Japan, for the 10th IEEE International Conference on Software Testing, Verification and Validation (ICST 2017). Yes, ICST is 10 years old! It seems like only yesterday that the founders of this conference were talking about establishing ICST, emphasizing the importance of having a flagship all-encompassing annual event for the software testing and verification community. Over the years, ICST has indeed become the go-to event for our field.

We are excited that ICST 2017 is being held in Japan, a country known for its innovation and practical application of quality improvement processes. Beautiful and impressive Tokyo, the capital of Japan is the focal point of much of Japan’s financial and industrial activity. Holding the conference in Tokyo has ensured the participation and support of major companies and professional organizations. Tokyo also boasts of facilities important for a successful conference. It has been ranked first in the "Best overall experience" category of TripAdvisor's World City Survey. The city also ranked first in the categories: Helpfulness of locals, Nightlife, Shopping, Local public transportation and Cleanliness of streets. The Michelin Guide has awarded Tokyo by far the most Michelin stars of any city in the world. Tokyo also has plenty of cultural and exciting places such as museums, the sumo wrestling arena, the kabuki theater, and Akihabara town.

Our aim is to have this meeting continue the long ICST tradition of fostering the integration of software testing and verification research and practice, which is why we have worked very hard to develop a strong technical content that combines research, practice, and tools. For this, our deep thanks go to Ina Schieferdecker and Hironori Washizaki, Chairs of the Main Technical Track Program Committee for putting together an amazing technical program. In addition, we also wish to thank Bao Nguyen and Xun Yuan for Chairing the Industry Papers Track and encouraging practitioners to showcase their work on the application of recently developed techniques to real industrial software systems. We thank Domenico Amalfitano and Tatsuhito Tsuichiya, Chairs of the Testing Tools Papers Track, for putting together an excellent set of papers that describe new tools for software testing and verification. We thank Zhenyu Chen and Ana Paiva, Tool Demonstrations Chairs, for all their hard work both before and during the conference so that we can get first hand experience with new tools. We thank Aho Pekka, Posters Chair, for single-handedly putting together an amazing set of posters for us to enjoy during the conference and coffee breaks. Finally, we thank Kinji Akemine, Emil Alégroth, Shinsuke Matsuki, and Tanja E. J. Vos, for organizing the International Software Testing Contest, in which new techniques can compete to detect the maximum number of bugs.

On the organizational front, we are deeply indebted and grateful to Myra Cohen and Wei Le, our Workshops Chairs, who managed and organized all the workshops associated with ICST; Anna Rita Fasolino and Jeff Offutt, for running the Doctoral Symposium, a valuable event for our PhD students; Sreedevi Sampath and Tetsuro Katayama, our Finance Chairs who had to balance our budgets and deal with IEEE rules; Renee Bryce and Zebao Gao, our Awards Chairs for creating our awards plaques and certificates; Shingo Takada, our Student Volunteers Chair for organizing and taking care of our student volunteers; Leslie C Milton, our Diversity Chair, for ensuring that diversity was considered at all points in the conference; Susumu Tokumoto, our Registration Chair for putting together a wonderful registration system; Hideo Tanida and Tomohiko Takagi, our Proceedings Chairs for ensuring that these proceedings make it to you on time; Toshiaki Aoki, our Publicity Chair, for spreading the word about this event; Shuji Morisaki, our Tutorials Chair, for organizing this year’s tutorials; and Masato Matsuoka, Michael Mlynarski, Andrej Pietschker, Adam Porter, and Shilomo Mark, our Marketing Chairs, for reaching out to sponsors; Saiji Nema, our Web Chair, for putting together our website and keeping it updated; Keizo Tatsumi, our Social Networking Chair for managing our social networking; and Satomi Yoshizawa and Chio Fujimoto, our Local Arrangements Chairs for their extreme patience and help with this conference.

We are especially excited about our two panel discussions, the first of which bring together practitioners from Industry to discuss their current software testing practices, and the challenges they face. Our second panel discusses issues of software quality in our Computer Science and Engineering University curricula, and efforts to design a quality-driven curriculum.

It takes a diverse and hard-working team to put a conference together. Working with this team has been an amazing experience for us. Working together, we hope that we have created an event that is long remembered by the community, both enjoyable and educational. Once again, we welcome you to ICST 2017.

General Chairs of ICST 2017

Atif Memon
University of Maryland, USA
atif@cs.umd.edu

Yasuharu Nishi
University of Electro-Communications
Tokyo, Japan
Yasuharu.Nishi@uec.ac.jp
Message from the ICST 2017 Program Chairs

It is our great pleasure to welcome you to Waseda University, Tokyo, Japan, for ICST 2017, the 10th IEEE International Conference on Software Testing, Verification and Validation!

ICST continues to be the premier conference on software quality. Along with the increasing importance of software in all types of cyberphysical systems (e.g., safety-critical, security-critical, mission-critical or autonomous systems), both the demands and challenges of software quality engineering have continued to grow. In its 10th anniversary, ICST celebrates recent excellent results in software testing, verification and validation. It brings together researchers and practitioners who work on theoretical foundations, methods, algorithms, technologies, tools and applications in software testing, verification and validation.

ICST is the top forum for presentations and discussions on all aspects of software testing, verification and validation. The conference program includes 3 keynotes by John Micco, Google, USA; Kenji Nishikawa, Toyota Motor Corporation, Japan; and Andreas Zeller, Saarland University, Germany. In the main research program, 36 full papers and 8 short papers out of 135 paper submissions are presented in 14 sessions. The selected papers cover a variety of topics including faults, theory and complexities, security testing, model-based testing, parallel systems and concurrency, web and mobile applications, regression testing, automated and run-time testing, empirics on testing, search-based testing, and model checking and verification. The industrial track attracted 18 submissions of which 6 were accepted. Moreover, the testing tools papers track attracted 29 submissions of which 10 were accepted. They will be presented in sessions on 14–16 March 2017. The submissions altogether demonstrate the strong ongoing interest in the field.

Furthermore, ICST presents 7 workshops including Mutation (12th International Workshop on Mutation Analysis), TAIC PART (12th Workshop on Testing: Academia-Industry Collaboration, Practice and Research Techniques), ITEQS (1st International Workshop on Testing Extra-Functional Properties and Quality Characteristics of Software Systems), IWCT (6th International Workshop on Combinatorial Testing), A-MOST (13th Workshop on Advances in Model-Based Testing), InSTA (4th International Workshop on Software Test Architecture), and ACSE (First Asian Symposium on Collaborative Software Engineering). The doctoral symposium includes 7 presentations by PhD students. The 3 co-located events, IWESEP (8th IEEE International Workshop on Empirical Software Engineering in Practice), AsianPLoP (6th Asian Conference on Pattern Languages of Programs), and IPSJ/SIGSE (195th meeting of Special Interest Group on Software Engineering, Information Processing Society of Japan), together with the special session on Aerospace IV&V, the poster session, tool demonstrations, panels, and the testing contest complete the program.

We would like to extend our most heartfelt thanks to all the authors of all the submitted papers and proposed workshops, who are working hard to advance our field, to improve software quality, and to share their advancements at ICST. Special thanks go to the 73 program members and external reviewers who each did up to 10 detailed, well-argued reviews and meta-reviews in a timely manner and contributed to the discussion in the selection process. We thank the authors and the keynote speakers, who provide the content of our program and are presenting their contributions at the conference. Last but not least, the ICST steering committee always had good recommendations and provided help whenever it was need. Thank you!

You all greatly helped us in selecting and shaping this great program for ICST 2017. We hope that you will find the program interesting and inspiring for your upcoming work and research.

Finally, we look forward to meeting and having discussions with presenters and participants. Please all take the opportunity to exchange results, to share visions and ideas, to learn from each other, and to meet new colleagues and potential collaborators in our young and vibrant software testing, verification, and validation community.

Please enjoy the conference program!

Program Chairs of ICST 2017

Ina Schieferdecker
Fraunhofer FOKUS / TU Berlin
Germany

Hironori Washizaki
Waseda University
National Institute of Informatics
SYSTEM INFORMATION
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ICST 2017 Organization

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Zhiqiang Yang, Western Michigan University, USA
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Saori Egawa, ASTER, Japan

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Michael Emmi, Eduard Paul Enou, Elizabeta Fourneret, Gordon Fraser
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Nicolas Hil, Andreas Johnsen, Rashid Kaleem, Mikhail Kazdagli, Muhammad Uzair Khan
Dongsun Kim, Hyunwoo Kim, Yunho Kim, Matthias Kowal, Vinh Hoa La, Remo Lachmann
Li Li, Kui Liu, Jorge Lopez, Hong Lu, Daniel Luchaup, Tao Ma, Nesredin Mahmud
Dongyu Mao, Raluca Marinescu, Darko Marinov, Sergey Mehtaeva, Eric Mercer
Aurélien Monot, Hussan Munir, Phu Nguyen, Jeff Offutt, Raquel Oliveira
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Gehan Selim, Shin Hwei Tan, Bissyandé Tegwuwende, Oksana Tkachuk, Tugkan Tugluler
Michael Wahler, Kaiyuan Wang, Mingzhong Wang, Shuai Wang, Franz Wotawa
Woong-Gyu Yang, Man Zhang
**Keynote Speakers**

**Keynote 1: The State of Continuous Integration Testing at Google**

**Speaker**
John Micco, Google, USA

**Abstract**
We are always working on improving the efficiency of our developers’ core workflows by providing better and faster tooling and processes for testing their code submissions. This talk will describe some of the most interesting problems (such as scalability and flaky tests) that we are finding in the developer workflow and how we are working to improve core testing workflows for all Google engineers.

**Bio**
John Micco is a senior manager at Google focusing on the internal Continuous Integration Testing and Continuous Deployment systems. He has been working in the software industry for 30 years and working on CI/CD solutions for the last 12 years.

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**Keynote 2: Testing and Validation Requirements for Automated Driving Technology**

**Speaker**
Kenji Nishikawa, Toyota Motor Corporation, Japan

**Abstract**
Development of automated driving system is in transition from experimental phase to actual implementation phase. This talk will describe about the system trend which utilizes various automated driving technology and the revolution of system development process which imposes new/additional system validation requirements

**Bio**
Kenji Nishikawa is a General Manager at Toyota. He has been working on system/software development of automotive control systems for more than 20 years and is currently responsible for the development of basic software including testing and validation of communication software for Toyota vehicles. He is also a steering committee member of AUTOSAR Development Partnership which is an industry wide standardization activity for automotive basic software.

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**Keynote 3: Model-Based Testing and Model Inference: Better Together!**

**Speaker**
Andreas Zeller, Software Engineering Chair
Saarland University - Computer Science

**Abstract**
Model-based testing techniques allow for a thorough exploration of the program behavior, but require a model in the first place. Model inference techniques, on the other hand, promise to extract suitable models from program executions, but require these very executions in the first place. Is there a way out of this chicken-and-egg problem? In this talk, I suggest to conduct both testing and inference at the system interface, which allows a clear distinction between valid and invalid inputs, and effectively allows to both test and infer models at the same time. Given only a program without any sample inputs, our AUTOGram prototype uses parser-directed test generation to infer a context-free grammar that models the program input; this grammar can be immediately used to synthesize millions of valid inputs.

**Bio**
Andreas Zeller is a full professor for Software Engineering at Saarland University in Saarbrücken, Germany, since 2001. His research concerns the analysis of large software systems and their development process. In 2010, Zeller was inducted as Fellow of the ACM for his contributions to automated debugging and mining software archives, for which he also was awarded 10-year impact awards from ACM SIGSOFT and ICSE. In 2011, he received an ERC Advanced Grant, Europe's highest and most prestigious individual research grant, for work on specification mining and test case generation. In 2013, Zeller co-founded Testfabrik AG, a start-up on automatic testing of Web applications, where he chairs the supervisory board.
## ICST 2017 Program at a Glance

Rox: Research full paper sessions, Sxx: Research short paper sessions, Txx: Tool paper sessions, \( \text{xxx}: \) Industry paper sessions, Dox: Tool demo sessions, Cox: Testing contest, Axx\( / \)01: Special sessions

### Mon. March 13

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### Tue. March 14

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**Welcome Reception at a Cafeteria on the 1st Floor of Building 63**

### Wed. March 15

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**Banquet at “SUNSHINE CRUISE CRUISE” in Ikebukuro** (chartered buses from the university are available)

### Thu. March 16

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**Open Steering Committee & Closing**

### Fri. March 17

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**Open Steering Committee & Closing**
6th International Workshop on Combinatorial Testing (IWCT 2017)


The 12th International Workshop on Mutation Analysis (Mutation 2017)

Room 203

8:15 - Registration & Breakfast
10:40 - Coffee Break
12:30 - Lunch (with Poster Session continued)
15:30 - Coffee Break
16:30 - Session 5: Applications of Combinatorial Testing: II

Room 204

8:15 - Registration & Breakfast
9:00 - Opening
9:05 - Scorable Software Testing and Verification
Through Heuristic Search and Optimization: Experiences and Lessons Learned (Keynote 1)
Prof. Lionel Briand, University of Luxembourg
10:00 - A Process for Sound Conformance Testing of Cyber-Physical Systems
Hugo Araujo, Gustavo Carvalho, Augusto Sampaio, Mohammad Reza Mousavi, Massoumeh Taramomad
9:00 - Opening
9:05 - Keynote 1: Challenges to Improve the Confidence in Cyber-Physical Systems
Tetsuya Tohdo, DENDO CORPORATION, Japan
9:10 - Coverage-Based Reduction of Test Execution Time: Lessons from a Very Large Industrial Project
Thomas Bach, Attar Andreak and Raj Panneman

Room 205

8:15 - Registration & Breakfast
5:00 - Coffee Break
12:30 - Lunch
15:30 - Coffee Break
16:30 - Panel: From Academia to Industry and Back Again

Room 206

8:15 - Registration & Breakfast
9:00 - Session 2: Applications of Combinatorial Testing: I
Applying Combinatorial Testing to High-Speed Railway Track Circuit Recoverer
Chang R. Jiao, Xiao Rin, Yao Li, and Yuan Cao
9:05 - Applications of Practical Combinatorial Testing Methods at Siemens Industry Inc., Building Technologies Division
Murad Ozcan
9:10 - Using Timed Base-Choice Coverage Criterion for Testing Industrial Control Software (short 15 mins.)
Hiroyuki Iwamoto and Eduard Emre
9:15 - Session 3: Poster Session (at the Lobby)
Finding Minimum Locating Arrays Using a SAT Solver
Tatsuya Konishi, Hirohito Koshiba, Hiroyuki Nakagawa, and Tatsuske Tsutshita
Testing Optimization using Combinatorial Test Design
Santha Routh
9:20 - Lunch
9:30 - Session 4: Modelling
Building Combinatorial Test Input Model from Use Case Artifacts
Priest S. Milind B. Muthi and Krishnan Ramarajan
9:35 - Combinatorial Methodologies for Modelling Composed Software Systems
Ludwig Kampel, Bernhard Garo and Dimitris E. Simos
9:40 - Combinatorial Interaction Testing for Automated Constraint Repair
Angelo Gargantini, Justyna Petke and Marco Redavalli
9:45 - A Composition-Based Method for Combinatorial Test Design (short 15 mins)
Anna Zamojska, Amir Schwarz, Sen Khoysh and Elton Faroči
9:50 - Performance-driven software model refactoring (Keynote 2)
Prof. Vittorio Cortelezzi, University of L'Aquila
Raluca Marinescu, Eduard Paul Enoiu, Cristina Seceleanu, and Daniel Sundmark
10:00 - Test Case Generation and Prioritization: A Process-mining Approach
Andrea Janes
10:05 - Keyword II: Software Testing in Industry and Academia: A View of Both Sides in Japan
Satoshi Masuda, IBM Research - Tokyo, Japan
10:10 - Results of a Comparative Study of Code Coverage Tools in Computer Vision
Iulia Nica, Gerhard Jakob, Kathrin Juhart, and Franz Wotawa
10:15 - Software Architectures and Reuse in Combinatorial Testing
Pietro E. Mafra and Monique Branchi
10:20 - Runtime Verification for Detecting Suspicious Bugs in Multicore and Parallel Software
Sara Abbasapour Asadofar, Daniel Sundmark, Hans Hansson
10:25 - Generating Controllably Invalid and Atypical Inputs for Robustness Testing
Simon Pouliot, Rolf fibre
10:30 - Panel Discussion: Challenges of Testing EPP
10:35 - Coffee Break
10:40 - Session 5: Applications of Combinatorial Testing: II
Applying Combinatorial Testing to Data Mining Algorithms
Jaganmohan Chandrasekaran, Huadong Feng, Yu Lei, and D. Richard Kuhn
9:00 - Combinatorial Testing on Implementations of HTML5 Support
Xiaojing Wang, Tianyong Wu, Yuan Yao, Bolei Jin and Liping Ding
9:05 - Runtime Verification for Detecting Suspicious Bugs in Multicore and Parallel Software
Sara Abbasapour Asadofar, Daniel Sundmark, Hans Hansson
9:10 - Generating Controllably Invalid and Atypical Inputs for Robustness Testing
Simon Pouliot, Rolf Feld
9:15 - Panel Discussion: Challenges of Testing EPP
10:15 - Best Paper Award & Closing
16:50 - Open Session
16:55 - Best Paper Award & Closing

Room 207

8:15 - Registration & Breakfast
9:00 - Session 1: Test Case Generation & Quality Assessment
A Model for I-way Fault Profile Evolution During Testing
D. Richard Kuhn, Raghu N. Kacker and Yu Lei
9:05 - Mutation Score, Coverage, Model Inference: Quality Assessment For I-way Combinatorial Test-Suites
Herrmann Fellinger, Franz Wotawa and Mihai Nica
9:10 - Optimizing IPOC's Vertical Growth with Constraints Based on Hypergraph Coloring
Feng Duan, Yu Lei, Linlin Yu, Raghu N. Kacker and D. Richard Kuhn
9:15 - Test Case Generation with Regular Expressions and Combinatorial Techniques
Mascari Polu, Francisco Romero, Rosana Rodriguez-Bobadilla Aranda and Ignacio Garcia-Rodriguez
9:20 - Testing Cache Side-channel Leakage
Tyasih Basu, Sudipta Chatterpahdy
9:25 - Simulation-Based Safety Testing Brake-by-Wire
Nils Mullner, Satriaufah Khud, Mhid. Babhir Rahim, Wasif Aftal, Mehnad Saadatmand
9:30 - Targeted Mutation: Efficient Mutation Analysis for Testing Non-Functional Properties
Bjorn Lisper, Birgitta Lindstrøm, Pasquale Potena, Mehrdad Saadatmand, Markus Bohlin
9:35 - Are CISQ Reliability Measures Practical? A Research Perspective
Johannes Brauer, Reinhold Pittsch and Manuel Windhager
9:40 - Impact of Education and Experience Level on the Effectiveness of Exploratory Testing: An Industrial Case Study
Ceren Şahin Gebizli and Hasan Sözer
9:45 - A Test Case Recommendation Method Based on Morphological Analysis, Clustering and the Mahalanobis-Taguchi Method
Hiroko Chiba, Takashi Kajihara, Hideo Ogasaawa and Minoru Kawahara
9:50 - Are Deletion Mutants Easier to Identify Manually?\nVinicius Dorelli, Nilto de Souza and Marcos Eduardo Delamaro
9:55 - Finding Redundancy in Web Mutation Operators
Utpal Pramahornpoom and Jeff Oltif
9:00 - Reducing Mutants with Mutant Killable PreCondition
Chitra Ila and Shingo Takada
9:05 - Speeding-up mutation testing via data compression and state infection
Qianqian Zhu, Annabale Panichella and Andy Zaidman
9:10 - Keynote 2: Mutation analysis for the real world: effectiveness, efficiency, and proper tool support
Rene Just
9:15 - Session: Experimental Studies
Applying Mutation Analysis On Kernel Test Suites: An Experience Report
Rheek Ahmed, Carles Jensen, Alex Grace and Paul McKenney
9:20 - How Good are Your Types? Using Mutation Analysis to Evaluate the Effectiveness of Type Annotations
Rahul Gopinath and Eric Walkingshaw
9:25 - Session: Operator Design and Tool Development
Towards Security-aware Mutation Testing
Thomas Loise, Xavier Devroy, Gilles Peronn, Mike Papadakis and Patrick Heymans
9:30 - Mutation patterns for temporal requirements of reactive systems
Mark Traikembor
9:35 - An architecture for the development of mutation operators
Marcro Polo, Gonzalo Rojas, Isayed Rodriguez and Suilim Hernandez
9:40 - Panel: From Academia to Industry and Back Again
Closings
17:00 - Panel: From Academia to Industry and Back Again
Closings
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<tr>
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<tr>
<td>9:00</td>
<td>Opening (Chairs: Alif Memon and Yasuharu Nish)</td>
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<tr>
<td>9:30</td>
<td>Keynote 1 (Chair: Alif Memon)</td>
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<tr>
<td>10:30</td>
<td>The State of Continuous Integration Testing at Google</td>
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<td>John Micco, Google, USA</td>
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<tr>
<td>11:00</td>
<td>Coffee Break</td>
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<td>12:30</td>
<td>Lunch</td>
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<td>14:00</td>
<td>R02: Debugging, Composite Faults and Complexity Analysis</td>
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<td>(Chair: Jose Miguel Rojas)</td>
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<td>15:30</td>
<td>Security Testing (Chair: Francis Wotawa)</td>
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<td>16:00</td>
<td>Recovering Semantic Traceability Links between APIs and Security</td>
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<td>Vulnerabilities: An Ontological Modeling Approach</td>
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<tr>
<td>17:30</td>
<td>Coveringcerts: Combinatorial Methods for X.509 Certificate Testing</td>
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<tr>
<td>18:00</td>
<td>New Methods and Empirical Results (short papers)</td>
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<tr>
<td>19:00</td>
<td>Welcome Reception at a Cafeteria on the 1st Floor of Building 63</td>
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<td>Daniel S. Fowler, Madeline Chean, Siraj Ahmed Shakti and Jeremy Bryans</td>
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<td>Model Checking and DSL-based Testing (Chair: Eun-Hye Cho)</td>
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<td>Opening (Chars: Ait Memon and Yasuharu Nish)</td>
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<tr>
<td>9:15 -</td>
<td>Introduction of JSTQB and its activities</td>
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<td>9:30 -</td>
<td>Keynote 2 (Chair: Hitomori Washizaki)</td>
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<td>9:45 -</td>
<td>Testing and Validation Requirements for Automated Driving Technology</td>
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<td>10:30 -</td>
<td>Coffee Break</td>
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<td>11:00 -</td>
<td>020: Industry #2 (Chair: Bao Nguyen)</td>
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<td>11:00 -</td>
<td>Information Needs for Validating Evolving Software Systems: An Exploratory Study at Google</td>
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<td>A Controlled Experiment on Coverage Maximization of Automated Model-Based Software Test Cases in the Automotive Industry Rashid Darwesh, Lynne Nailianzsi Gwivasa and Richard Torka</td>
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<td>Lunch</td>
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<td>14:00 -</td>
<td>A01: Special Session - Aerospace IV&amp;V: Why and how we use software testing to trust products #1 (Chair: Naoki Ishihama)</td>
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<td>14:00 -</td>
<td>Usage of software testing at NASA IV&amp;V (with VIDEO)</td>
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<td>15:30 -</td>
<td>How JAXA uses software testing for IV&amp;V, and what is the needs</td>
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<td>Coffee Break</td>
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<td>A02: Special Session - Aerospace IV&amp;V: Why and how we use software testing to trust products #2 (Chair: Naoki Ishihama)</td>
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<tr>
<td>16:30 -</td>
<td>Integrated Formal Analysis for Software IV&amp;V</td>
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<td>Hideki Nomoto, JAMSS</td>
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<td>Panel Discussion with audience: The needs for software testing from Aerospace IV&amp;V domain and Testing technology Moderator: Masafumi Katahara, JAXA</td>
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<td>Panelists: Maria Hernek, ESA, Naoki Okubo, JAXA, Hideki Nomoto, JAMSS, Takao Futagami, TOYO Corp, Koich Tanzyuki, VeriServe Corp.</td>
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<td>19:30 -</td>
<td>Banquet at “SUNSHINE CRUISE CRUISE” in Ikebukuro (chartered buses from the university are available)</td>
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ICST Posters Track (Tue. March 15 - Thu. March 17) - Presented at the Lobby (Chair: Panka Ahn)

A Mechanism of Reliable and Standalone Script Generator on Android
Kueichun Liu, Yu-Yu Lai and Ching-Hong Wu
EarthCube Software Testing and Assessment Framework
Emily Loo
Using Model-Checking for Timing Verification in Industrial System Design
Laurens Rovin, Rafik Hnena and Nicolas Sordan
Challenges of Operationalizing Spectrum-Based Fault Localization from a Data-Centric Perspective
Mylène Gogolla and Alexander Pretschner
Towards a Gamified Equivalent Mutants Detection Platform
Thomas Laurent, Laura Galbó, Motomichi Tiyama, Ross Smith, Dan Bean and Anthony Ventresque
Cloud API Testing
Junyi Wang, Xiaoying Bai, Haoran Ma, Linyi Li and Zhicheng Jie

Automated A/B Testing with Declarative Variability Expressions
Kosuke Watanabe, Takuya Fukamachi, Naoyasu Ubayashi and Yasutaka Kamel
Weighting for Combinatorial Testing by Bayesian Inference
Eun-Hye Choi, Tsyutshi Fujisawa and Osamu Metz
Impact of Static and Dynamic Coverage on Test-Case Prioritization: An Empirical Study
Jianyi Zhou and Dan Hui
BDTest, a System to Test Big Data Frameworks
Alexandre Langéon, Anthony Ventresque and Eduardo Cunha de Almeida
What You See Is What You Test - Augmenting Software Testing with Computer Vision
Rudolf Ramler and Thomas ZiebeMay
Framework for Model-Based Design and Verification of Human-in-the-Loop Cyber-Physical Systems
Filip Cucklo, Grant Riddick and Liam Ohy
Automated test case generation from OTS/CafeOBJ specifications by specification translation
Ryusuke Mori and Masaki Nakamura
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<tr>
<th>8:30 -</th>
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<tr>
<td>9:00 - 10:30</td>
<td>Keynote Speech</td>
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<td>The New Version of the UML Testing Profile</td>
<td>Modelling test automation architectures: Integrating ISO 29519, ISTQB, UML Testing Profile 2 and TTCN-3</td>
<td>Localizing and Fixing Faults in SQL Predicates</td>
<td>Debugging Multithreaded Programs Using Symbolic Analysis</td>
<td>Automated and Scalable Mutation Testing</td>
<td>Testing multithreaded programs as if they were sequential</td>
<td>Randomized test generation methods for model-based control system development</td>
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<td>Ina Schieferdecker</td>
<td>Marc-Florian Wendland, Fraunhofer FOXUS</td>
<td>Yun Guo</td>
<td>Xiaodong Zhang</td>
<td>Thierry Ticheu Chekam</td>
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<td>Paper Session 1: Functional MBT</td>
<td>11:00 - 12:30</td>
<td>Research Paper</td>
<td>11:00 - 12:30</td>
<td>Research Paper</td>
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<tr>
<td>Mutation-Based Test-Case Generation with Ecdar</td>
<td>Improvement of Description for Reusable Test Type by Using Test Frame</td>
<td>A Framework for Failure Diagnosis</td>
<td>Enhancing Trust- Software Vulnerability Analysis Framework</td>
<td>Faculty Talk</td>
<td>The future directions of crowdsourced testing</td>
<td>Development of a meteorological observation system using arduino by KGSN network</td>
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<tr>
<td>Kim G. Larsen, Florian Lorber, Brian Nielsen and Unik M. Nyman</td>
<td>Kei Uetake and Mitsuru Yamamoto</td>
<td>Mojdeh Golagha</td>
<td>Sultan Aliaphtani</td>
<td>How to Give a Great Presentation</td>
<td>Zheny Chen</td>
<td>Kazuya Kanda</td>
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<tr>
<td>Reducing the Concretization Effort in FSM-Based Testing of Software Product Lines</td>
<td>Accepted Talk</td>
<td>Enhancing Trust- Software Vulnerability Analysis Framework</td>
<td>Faculty Talk</td>
<td>A new random testing-based fault localization approach</td>
<td>A new random testing-based fault localization approach</td>
<td>Zhenzhao Wang</td>
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<tr>
<td>Vanderson Hallmann Fragal, Adenilso Simao, André Takeshi Endo and Mohammad Reza Mousavi</td>
<td>Re-Define the Test Coverage by Law of Large Numbers</td>
<td>Mojdeh Golagha</td>
<td>Tanja Vos</td>
<td>Faculty Talk</td>
<td>The future directions of crowdsourced testing</td>
<td>Zhenzhao Wang</td>
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<tr>
<td>Property-Based Testing with External Test-Case Generators</td>
<td>Geng Chen</td>
<td>Mojdeh Golagha</td>
<td>Tanja Vos</td>
<td>Jeff Oliff</td>
<td>The future directions of crowdsourced testing</td>
<td>Zhenzhao Wang</td>
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<tr>
<td>Bernhard K. Alchemegn, Silvio Marcovic and Richard Schum</td>
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<tr>
<td>12:30 - 14:00</td>
<td>Lunch</td>
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<td>12:30 - 14:00</td>
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<tr>
<td>14:00 - 15:30</td>
<td>Keynote Speech 2</td>
<td>14:00 - 15:30</td>
<td>Emerging</td>
<td>14:00 - 15:30</td>
<td>Emerging</td>
<td>14:00 - 15:30</td>
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<tr>
<td>Uncertainty-Wise Testing</td>
<td>Suggestion of Practical Quantification Measuring Method of Test Design Which Can Represent The Current Status</td>
<td>Reflecting the Adoption of Software Testing Research in Open-Source Projects</td>
<td>Abstraction Refinement for Non-Zero Fairness Verification of Linear Hybrid Automata</td>
<td>Faculty Talk</td>
<td>Compliance analysis of configurable business process model based on extend CTL</td>
<td>A tool for impact analysis of test cases based on changes in an automotive system</td>
<td></td>
</tr>
<tr>
<td>Shaukat Ali</td>
<td>Sunil Chon and Jihwan Park</td>
<td>Fabian Trautsch</td>
<td>Ryo Yanase</td>
<td>How to Get Your Paper Rejected</td>
<td>Yiwang Huang</td>
<td>Surasak Phetsirmeana</td>
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</tr>
<tr>
<td>15:30 - 16:00</td>
<td>Coffee Break</td>
<td>15:30 - 16:00</td>
<td>Research Paper</td>
<td>15:30 - 16:00</td>
<td>Research Paper</td>
<td>15:30 - 16:00</td>
<td>Research Paper</td>
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<tr>
<td>Paper Session 2: Non-Functional MBT</td>
<td>Analysing Test Basis and Deriving Test Cases Based on Data Design Documents</td>
<td>Towards Decentralized Conformance Checking in Model-Based Testing of Distributed Systems</td>
<td>Test Conglomeration - Proposal for Test Design Notation like Class Diagram</td>
<td>Defining the Phrase Software Test Architecture</td>
<td>Each session within Doctoral Symposium consists of 15 minute presentation from a student and 15 minute feedback from panelists.</td>
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<tr>
<td>Planning-based Security Testing of the SSL/TLS Protocol</td>
<td>Tsuyoshi Yumoto, Toshio Matsuodani and Kazuhiro Tsuda</td>
<td>Bruno Lima and João Fana</td>
<td>Nariyuki Mizuno, Makoto Nakaiuki and Yoshinori Seino</td>
<td>Jon Hagar</td>
<td>Panellists:</td>
<td></td>
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<tr>
<td>Josp Bicz, Kristoffer Kleine, Dimios Simos and Franz Wotawa</td>
<td></td>
<td>Pattern Based Usability Testing</td>
<td>Poster</td>
<td></td>
<td>Jeff Yu Lei, University of Texas at Arlington</td>
<td>Mike Papadakis, Luxembourg University</td>
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<tr>
<td></td>
<td>Towards Decentralized Conformance Checking in Model-Based Testing of Distributed Systems</td>
<td>Fernando Dias and Ana Pavia</td>
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<td></td>
<td>Tanja Vos, Open University</td>
<td>Tingting Yu, University of Kentucky</td>
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<tr>
<td>16:00 - 17:30</td>
<td>Wrap Up and Closing</td>
<td>16:00 - 17:30</td>
<td>Emerging</td>
<td>16:00 - 17:30</td>
<td>Closing</td>
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</tbody>
</table>
Welcome Reception – 19:00-21:00 on March 14
At a Cafeteria on the 1st Floor of Building 63

Banquet – 19:30-21:30 on March 15
At “SUNSHINE CRUISE CRUISE”
on the 58th floor of Ikebukuro Sunshine 60
http://bit.ly/2m5WGqe

<table>
<thead>
<tr>
<th>Going</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>Last</th>
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</thead>
<tbody>
<tr>
<td>Nishi Waseda</td>
<td>17:35</td>
<td>17:45</td>
<td>18:35</td>
<td>18:45</td>
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<tr>
<td>Sunshine City</td>
<td>18:05</td>
<td>18:15</td>
<td>19:05</td>
<td>19:15</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Getting back</th>
<th>1st</th>
<th>Last</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunshine City</td>
<td>21:45</td>
<td>22:00</td>
</tr>
<tr>
<td>Ikebukuro Sta. East Exit</td>
<td>21:50</td>
<td>22:05</td>
</tr>
<tr>
<td>RIHGA Royal Hotel Tokyo</td>
<td>22:00</td>
<td>22:15</td>
</tr>
<tr>
<td>Nishi-Waseda Sta.</td>
<td>22:10</td>
<td>22:25</td>
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<tr>
<td>Higashi-Shinjuku Sta.</td>
<td>22:15</td>
<td>22:30</td>
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<tr>
<td>Seibu-Shinjuku Sta.</td>
<td>22:20</td>
<td>22:35</td>
</tr>
<tr>
<td>Shinjuku Sta. West Exit</td>
<td>22:25</td>
<td>22:40</td>
</tr>
<tr>
<td>Shinjuku-Sanchome Sta.</td>
<td>22:35</td>
<td>22:50</td>
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</tbody>
</table>

(The schedule for bus operations may change depending on traffic conditions)

Basic phrases you may use to reach the banquet venue by yourself (you can use this page to ask the way)

- En) Where is Sunshine city?
  Jp) サンシャインシティはどこですか？
  (Sunshine city wa dokodesuka ?)

- En) Where is Sunshine Cruise Cruise?
  Jp) サンシャインクルーズクルーズはどこですか？
  (Sunshine Cruise Cruise wa dokodesuka ?)

- En) Take me to Sunshine city, please.
  Jp) サンシャインシティまでお願いします。
  (Sunshine city made onegai shimasu)
Banquet Bus Route Map

Locations of bus stops may change slightly according to traffic situations.

Banquet Venue (Sunshine City)

Ikebukuro Sta.

RIHGA Royal Hotel

Nishi-Waseda Sta.

Conference Venue

Seibu-Shinjuku Sta.

Higashi-Shinjuku Sta.

Shinjuku-Sanchome Sta.

Shinjuku Sta.
8th IEEE International Workshop on Empirical Software Engineering in Practice

13-17 March 2017
Waseda University, Tokyo, Japan

Conference Program
Message from the IEEE IWSEEP 2017 Chairs

It is our great pleasure to welcome everyone to the 8th IEEE International Workshop on Empirical Software Engineering in Practice (IWSEEP 2017). Our workshop aims to foster the development of the area by providing a forum where researchers and practitioners can report on and discuss new research results and applications in the area of empirical software engineering. The workshop encourages the exchange of ideas within the international community to better understand, from an empirical viewpoint, the strengths and weaknesses of technology in use and new technologies, with the expectation of furthering the field of software engineering. The workshop focuses on the processes, design and structure of empirical studies as well as the results of specific studies. The workshop welcomes both original and replicated studies, varying from controlled experiments to field studies, from quantitative to qualitative.

Since much of the data produced by software development is unstructured and complex, empirical software engineering research should evolve by integrating the state-of-the-art techniques and theories for analyzing such data.

We solicited the following two types of submissions: full research papers (max 6 pages) for oral presentations and abstracts (max 700 words) for poster presentations. IWSEEP 2017 received 18 research paper submissions. Papers covered a variety of topics, including developer support, automated program repair, machine learning, empirical analyses, and mining software repositories. All submissions went through a rigorous reviewing process in which every valid submission was reviewed by at least three program committee members, and an open electronic discussion was held for all the reviewed papers. Only 10 of the submitted papers were accepted. Accepted research papers will be published in the conference proceedings with an IEEE catalog number and ISBN number. The proceedings will be submitted to IEEE Xplore for publication. One of these papers received the best paper award.

On behalf of the program and organizing committees, we thank the authors and attendees for making IWSEEP 2017 such an interactive event. We hope you will have a productive and engaging experience at IWSEEP 2017.

Finally, the workshop would not be possible either without the generous supports from the following sponsors, to which we are very honored and grateful:
- The IEEE;
- The IEEE Computer Society;
- The Association of Software Test Engineering (ASTER);
- The Global Software Engineering Laboratory, Waseda University;
- Program for Advancing Strategic International Networks to Accelerate the Circulation of Talented Researchers: Interdisciplinary Global Networks for Accelerating Theory and Practice in Software Ecosystem.

We hope you will have a great time and an unforgettable experience at IWSEEP 2017.

Eunjong Choi, Nara Institute of Science and Technology, Japan
IWSEEP 2017 General Chair

Masao Ohira, Waseda University, Japan
Jaechang Nam, University of Waterloo, Canada
IWSEEP 2017 Program Co-chairs
IWASEP 2017 Conference Organization

General Chair
Eunjung Choi, Nara Institute of Science and Technology, Japan

Program Co-Chairs
Jaechang Nam, University of Waterloo, Canada
Masao Ohira, Kawayama University, Japan

Publication Chair
Sousuke Amanasi, Okayama Prefectural University, Japan

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Patanamon Thongtanunam, Nara Institute of Science and Technology, Japan
Xin Yang, Osaka University, Japan

Local Arrangement Co-Chairs
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Erina Makihara, Nara Institute of Science and Technology, Japan
Hideshi Sakaguchi, Nara Institute of Science and Technology, Japan

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Norihito Kitagawa, Nara Institute of Science and Technology, Japan
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Social Networking Chair
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Shinpei Hayashi, Tokyo Institute of Technology, Japan
Andrea Mocci, University of Lugano, Switzerland

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Hideaki Hata, Nara Institute of Science and Technology, Japan
Akinori Ibara, Nara Institute of Science and Technology, Japan
Yasutaka Kamei, Kyushu University, Japan
Shinsuke Matsumoto, Osaka University, Japan
Masateru Tsunoda, Kinki University, Japan

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Thomas Zimmermann, Microsoft Research, USA

IWASEP 2017 Additional Reviewers
Seyed Amirhossein Abtahizadeh
Xuan-Bach D. Le
Ferdian Thung
Kazuhiro Yamashita
Yun Zhang
## IWSEP 2017 Conference Program

**Mon. March 13**

### Room 202

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>9:00 -</td>
<td>Registration</td>
</tr>
<tr>
<td>9:20 - 9:30</td>
<td><strong>Opening</strong></td>
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<tr>
<td>9:30 - 10:30</td>
<td><strong>Keynote</strong></td>
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<tr>
<td>10:30 - 11:00</td>
<td><strong>Coffee Break</strong></td>
</tr>
<tr>
<td>11:00 - 12:00</td>
<td><strong>Session 1: Detection Techniques</strong></td>
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<tr>
<td>12:00 - 12:10</td>
<td><strong>Discussion</strong></td>
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<tr>
<td>12:10 - 12:30</td>
<td><strong>Lightning talk for Posters</strong></td>
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<tr>
<td>12:30 - 14:00</td>
<td><strong>Poster Session &amp; Lunch</strong></td>
</tr>
<tr>
<td>14:00 - 15:20</td>
<td><strong>Session 2: Guiding Software Development</strong></td>
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<tr>
<td>15:20 - 15:30</td>
<td><strong>Coffee Break</strong></td>
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<tr>
<td>15:30 - 16:00</td>
<td><strong>Session 3: Software Analysis</strong></td>
</tr>
<tr>
<td>16:00 - 17:00</td>
<td><strong>Closing</strong></td>
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### Fast Abstracts - Presented at the Lobby as Posters

- **Improved metrics with iterative text mining for questionnaire analysis**
  - Yuki Noyori, Hironori Washizaki, Yasuhiro Watanabe, Kiyoshi Honda, Kentarou Ogawa and Hiroyuki Shibata

- **SOLT MANTRA: Visualizing Popular Library Combinations based on Wisdom of the Crowd**
  - Boris Todorov, Raula Gaikovina Kula, Takashi Itoh and Katsuro Inoue

- **Empirical Study of OSS Regarding the Relationships between Bug Fixing Time and Metrics**
  - Masaki Hosono, Hironori Washizaki, Yoshiaki Fukazawa, Kiyoshi Honda, Kazuki Munakata, Sumie Morita and Yusuke Nemoto

- **An Evolutionary Study on The Popularity of Libraries in NPM JavaScript Package Ecosystem**
  - Shi Qiu, Raula Gaikovina Kula and Katsuro Inoue

- **A Structural Analysis Method of OSS Community Evolution Based on Semantic Graph Models**
  - Seya Kato, Yota Inagaki and Mikio Aoyama

- **A Study of Fault-Prone Method Prediction with Distortions between Method’s Name and its Implementation**
  - Sho Suzuki, Hirohisa Aman and Minoru Kawahara

- **Development of a Real-Time 3D Java Profiler**
  - Katsuya Ogami, Hideaki Hats and Kenichi Matsumoto

- **Monitoring and Visualizing Programming Behaviors by Novices Towards an Automated Programming Exercise**
  - Erina Makihara, Hiroshi Iga, Norhiro Yoshida, Kenji Fujikawa and Hajim Iida

- **Customization Patterns for GQM Model: Optimization of Maintainability Metrics by Checklist Based Review and Machine Learning**
  - Naohiko Tsuda, Hironori Washizaki, Yoshiaki Fukazawa, Shunsuke Sugimura, Yuichiro Yasuda and Masanao Futakami

- **How does gamification work for coding and reviewing?**
  - Kohei Yoshigami, Taishi Hayashi, Masateru Tsunoda and Hitotake Uwano

- **Effect of signalling on recruiting software developers**
  - Akiyoshi Iba and Masateru Tsunoda

- **Toward Predicting A Reviewer Not to Ignore Code Review Requests in OSS Development**
  - Kenichi Omo, Akinori Ibara and Kenichi Matsumoto
Keynote: Leveraging Machine Learning to Guide Software Evolution

Speaker
Leon Moonen, Simula Research Laboratory, Norway

Abstract
Knowledge about dependencies between system artifacts such as modules, methods and variables is essential for a variety of software maintenance and software evolution tasks. Unfortunately, existing approaches to uncover such dependencies by means of static or dynamic program analysis are typically language-specific. Their application is thus largely restricted to homogeneous systems, which is a major drawback given the increasingly heterogeneity in modern software systems.

In this talk, we will look at the alternative of using unsupervised machine learning techniques such as association rule mining, which can be used to infer knowledge about the relationships between items in a data set. Association rule mining has been successfully used to analyze the change history of a software system and uncover so called evolutionary coupling between its artifacts. One of the advantages of this approach is that it is language-agnostic, and uncovering dependencies across artifacts written in different programming languages essentially comes for free.

We will explore how association rule mining can be used to derive evidence-based recommendations to guide software maintenance and evolution tasks. Examples include software change impact analysis, recommending related change during development, and conducting targeted regression testing. We survey the state-of-the-art, analyze why and where the applicability of existing techniques falls short, and discuss several avenues for improvement, including novel mining algorithms, methods for aggregating the evidence captured by individual rules, and guidelines for selecting appropriate values for parameters of the mining algorithms.

Biography
Leon Moonen is a senior research scientist in the Software Engineering department at Simula Research Laboratory, Norway. His research aims at creating better techniques and tools to support the understanding, assessment and evolution of large industrial software systems. This work involves the combination of several fields, such as software analytics, program comprehension, software reverse engineering, software repository mining, machine learning and empirical software engineering. He likes to work in close collaboration with industry to ensure that his research addresses questions of practical value, and to evaluate candidate solutions in real-life circumstances. Current ongoing projects include recommendation systems to support smarter evolution and testing of safety-critical cyber-physical systems, software analytics for continuous software quality and maintainability assessments, methods for creating anti-fragile software systems, and high integrity software engineering.

Dr. Moonen has published over 100 scientific papers and serves on steering-, organizing-, and program committees of international conferences on software maintenance and evolution, reverse engineering, program understanding, and source code analysis. He has (co-)organized various workshops on topics related to these areas. He is co-founder of the Software Improvement Group, a company that specializes in the use of source code analysis to help organizations get control over their software systems. Dr Moonen received his MSc (cum laude, Computer Science, 1996) and PhD (Computer Science, 2002) from the University of Amsterdam. He is a member of ACM, IEEE Computer Society, EAPLS and the ERCIM Working Group on Software Evolution.