



**25th IEEE International Conference on
Software Analysis, Evolution and Reengineering
SANER 2018**
Campobasso, Italy
March 20-23



Benvenuti!

Welcome!

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BENVENUTI A CAMPOBASSO!

Welcome to Campobasso, the regional capital of Molise, in central/southern Italy, and welcome to SANER 2018, the 25th edition of the IEEE International Conference on Software Analysis, Evolution, and Reengineering.

SANER is the premier conference on the theory and practice of recovering information from existing software systems. It features the newest advances to the state of the art in software analysis, evolution, and reengineering. It also explores innovative

methods for extracting the many kinds of information of interest to software developers and it examines innovative ways of using this information in system renovation and program understanding. Since 2015, SANER combines the Working Conference on Reverse Engineering (WCRE) series, i.e., the premier conference series on the theory and practice of recovering information from existing software and systems, and the European Conference on Software Maintenance and Reengineering (CSMR) series, i.e., the premier European conference series on the theory and practice of maintenance, reengineering, and evolution of software systems.

SANER 2018 is held at the University of Molise in Campobasso, Italy. The University of Molise counts four University campuses arranged across our beautiful region, over 10,000 students, more than 100 PhD students and about 600 personnel, split among teaching and non-teaching staff. The University campus is nearby the center of Campobasso. Campobasso is deep into history; it was originally a settlement of the Samnites, an ancient Italic people. In the 3rd century d.C., the Samnitic wars resulted in their inclusion in the Roman Republic: witness of such a period, there are Samnite walls in the uptown and Roman remains in the nearby Altilia archaeological site.

SANER 2018 takes place from Tuesday, March 20th to Friday, March 23rd, 2018. It starts on Tuesday with the co-located International Workshop on Software Clones (IWSC), the Workshop on Blockchain Oriented Software Engineering (IWBOSE), the Workshop on Machine Learning Techniques for Software Quality Evaluation (MaLTeSQuE), the Workshop on Mining and Analyzing Interaction Histories (MAINT), and the Workshop on Validation, Analysis and Evolution of Software Tests (VST). The main conference starts on Wednesday and it features keynotes from Elmar Juergens, Jan Bosch, and Peter Gromov, seventeen technical research paper sessions, one early research achievements (ERA) session, two sessions (new this year) for the track about Reproducibility Studies and Negative Results (RENE), two industry sessions, and three tool demonstration sessions, including a hands-on session.

This year, SANER received 151 full paper submissions, of which five were desk rejected and 146 were considered for review. Each paper was reviewed by at least three program committee members and extensively discussed online. We made decision on papers' acceptance/rejection based only on the assessed papers' quality, without considering any quota in terms of number of papers or topics to accept. Following this process, we selected 39 papers for presentation at the conference (27% acceptance rate). This year the program chairs will select a set of outstanding papers to be invited to submit extended versions of their work to a special issue of the Journal of Empirical Software Engineering. In addition, for the first time in the SANER history, the technical committee of SANER will give two Distinguished Paper Awards sponsored by the IEEE TCSE.



Town hall of Campobasso



Blue Note Music Club – SANER Reception

Concerning the other tracks, we received: 18 ERA submissions, 5 of which have been accepted (27%); 11 RENE papers, of which 5 have been accepted (45%); 12 industry papers of which 5 have been accepted (42%); and 12 tool demos of which 7 have been accepted (58%).

In addition to the technical program, SANER 2018 features three social events: (i) the SANER cocktail hour, a buffet light dinner served at the Conference venue, (ii) the SANER reception, at Blue Note, the main Music Club in Campobasso. Before the reception, there will be a

guided tour of the historical center of Campobasso, (iii) the SANER banquet, at “Piana dei Mulini”, an ancient residence that dates back to the end of XVIII century. All the events provide an excellent opportunity for all participants to have fun, to network, and to exchange ideas and solutions to advance the state of the art in SANER related research areas.

Before conclusion, we would like to thank all the people who actively participate to the organization of SANER. Special thanks go to the outstanding SANER 2018 Organizing Committee: Jens Krinke and Shane McIntosh (ERA track co-chairs); Mario Linares Vasquez and Luca Ponzanelli (Tool demo co-chairs); Dongmei Zhang and Neha Rungta (Industrial track co-chairs); Denys Poshyvanyk and Neil Ernst (Reproducibility Studies and Negative Results co-chairs); Julia Rubin (Journal First chair); Takashi Kobayashi (Workshops chair); Ahmed Hassan (MIP Award chair); Damian Tamburri (Finance chair); Fausto Fasano (Proceedings chair); Gabriele Bavota, Simone Scalabrino and Giovanni Carugno (Local Arrangements co-chairs); Salvatore Geremia, Fabio Palomba, Damian Tamburri, Michele Tufano, and Fiorella Zampetti (Social media), Angelo Parziale (Web master).



Piana dei Mulini – SANER Banquet

Special thanks go to XEOS s.r.l., our platinum sponsor, Democom s.r.l., our silver sponsor, and the University of Molise for their financial support, and to the student volunteers for helping us to organize a memorable edition of SANER 2018. We would also like to acknowledge the sponsorship of SANER 2018 through the IEEE Computer Society, which provides great benefits for conference organizers. In particular, we would like to thank Daria Shypova from IEEE for her continuous support in the planning of the event. Finally, special thanks go to Conference Publishing for the excellent work done for the production of SANER 2018 proceedings.

We would also like to thank all the people who allowed us to build up such an exciting program and in particular applaud the program committees in their efforts in reviewing papers. In addition, we thank all the authors for submitting to SANER 2018 a set of very high quality papers.

We hope that you will have a productive and pleasant experience at SANER 2018!

Rocco Oliveto, *SANER 2018 General Chair*
 Massimiliano Di Penta, *SANER 2018 Program co-Chair*
 David C. Shepherd, *SANER 2018 Program co-Chair*



Technical program

SANER 2018

International Workshop on Blockchain Oriented Software Engineering (IWBOSE)

Tuesday, 20th March 2018, Room “Aula S.E.G.e.S. – G. Fortunato”

08.00 – 08.30	Registration
08.30 – 09.00	Welcome
09.00 – 10:30	Session 1 – Smart Contracts <i>Smart Contracts: Security Patterns in the Ethereum Ecosystem and Solidity</i> M. Wöhler and U. Zdun <i>SmartInspect: Solidity Smart Contract Inspector</i> S. Bragagnolo, H. Rocha, M. Denker, and S. Ducasse <i>Smart Contracts Vulnerabilities: A Call for Blockchain Software Engineering?</i> G. Destefanis, M. Marchesi, M. Ortu, R. Tonelli, A. Bracciali, and R. Hierons
10.30 – 11.00	Coffee break
11.00 – 12.30	Session 2 – ICOs and Blockchain <i>The ICO Phenomenon and Its Relationships with Ethereum Smart Contract Environment</i> G. Fenu, L. Marchesi, M. Marchesi, and R. Tonelli <i>Evaluation of Initial Cryptoasset Offerings: The State of the Practice</i> F. Hartmann, X. Wang, and M. I. Lunesu <i>Checking Laws of the Blockchain with Property-Based Testing</i> A. Chepurnoy and M. Rathee
12.30 – 14.00	Lunch
14.00 – 15.30	Keynote by Michele Marchesi <i>Why Blockchain is important for software developers, and why software Engineering is important for Blockchain software</i>
19.00 – 23.00	Welcome cocktail @ University Campus

International Workshop on Software Clones (IWSC)
Tuesday, 20th March 2018, Room “Sala del Consiglio – Dipartimento S.U.S.eF.”

08.00 – 08.30	Registration
08.30 – 09.00	Welcome
09.00 – 10:30	Keynote by Chanchal K. Roy <i>Large Scale Clone Detection, Analysis and Benchmarking: an Evolutionary Perspective</i>
10.30 – 11.00	Coffee break
11.00 – 12.30	Session 1 – Clone Analysis <i>Are There Functionally Similar Code Clones in Practice?</i> V. Käfer, S. Wagner, and R. Koschke <i>Structural Clones: An Evolution Perspective</i> J. Kanwal, H. A. Basit, and O. Maqbool <i>Generated Code in Studies on Clone Rates</i> R. Koschke and M. Weinig
12.30 – 14.00	Lunch
14.00 – 15.30	Session 2 – Cloning Applications: Code Generation and Software Quality Metrics <i>On the Characteristics of Buggy Code Clones: A Code Quality Perspective</i> Md. Rakibul Islam and M. Zibran <i>Towards Automated Generation of Java Methods: A Way of Automated Reuse-based Programming</i> K. Shimonaka, Y. Higo, J. Matsumoto, K. Naitou, and S. Kusumoto <i>Correlation Analysis between Code Clone Metrics and Project Data on the Same Specification Projects</i> Y. Higo, S. Matsumoto, S. Kusumoto, T. Fujinami, and T. Hoshino
15.30 – 16.00	Coffee break
16.00 – 17.25	Session 3 – Clone Detection: Techniques and Clone Visualization <i>A Picture is Worth a Thousand Words: Code Clone Detection based on Image Similarity</i> C. Ragkhitwetsagul, J. Krinke, and B. Marnette <i>Detecting Functionally Similar Code within the Same Project</i> R. Tajima, M. Nagura, and S. Takada <i>Towards Slice-Based Semantic Clone Detection</i> H. Alomari and M. Stephan <i>Code Difference Visualization by a Call Tree</i> T. Kamiya
17.25 – 17.45	People’s Choice Award (chair: Matthew Stephan) Moving Forward and Adjourn
19.00 – 23.00	Welcome cocktail @ University Campus

International Workshop on Validation, Analysis and Evolution of Software Tests (VST)

Tuesday, 20th March 2018, Room “Laboratorio 1 – W. von Humboldt”

08.00 – 08.50	Registration
08.50 – 09.00	Welcome
09.00 – 10:00	Keynote by Sebastiano Panichella <i>Summarization Techniques for Code, Change, Testing and User Feedback</i>
10.30 – 11.00	<i>Detecting Duplicate Examples in Behaviour Driven Development Specifications</i> L. P. Binamungu, S. M. Embury, and N. Konstantinou
10.30 – 11.00	Coffee break
11.00 – 12.30	Session 1 <i>Automated Generation of Requirements-Based Test Cases for an Adaptive Cruise Control System</i> A. Aniculaesei, F. Howar, P. Denecke, and A. Rausch <i>A Retrospective of Production and Test Code Co-evolution in an Industrial Project</i> C. Klammer, G. Buchgeher, and A. Kern <i>Evaluating the Efficiency of Continuous Testing during Test-Driven Development</i> S. Demeyer, B. Verhaeghe, A. Etien, N. Anquetil, and S. Ducasse
12.30 – 14.00	Lunch

International Workshop on Mining and Analyzing Interaction Histories (MAINT)

Tuesday, 20th March 2018, Room “Laboratorio 1 – W. von Humboldt”

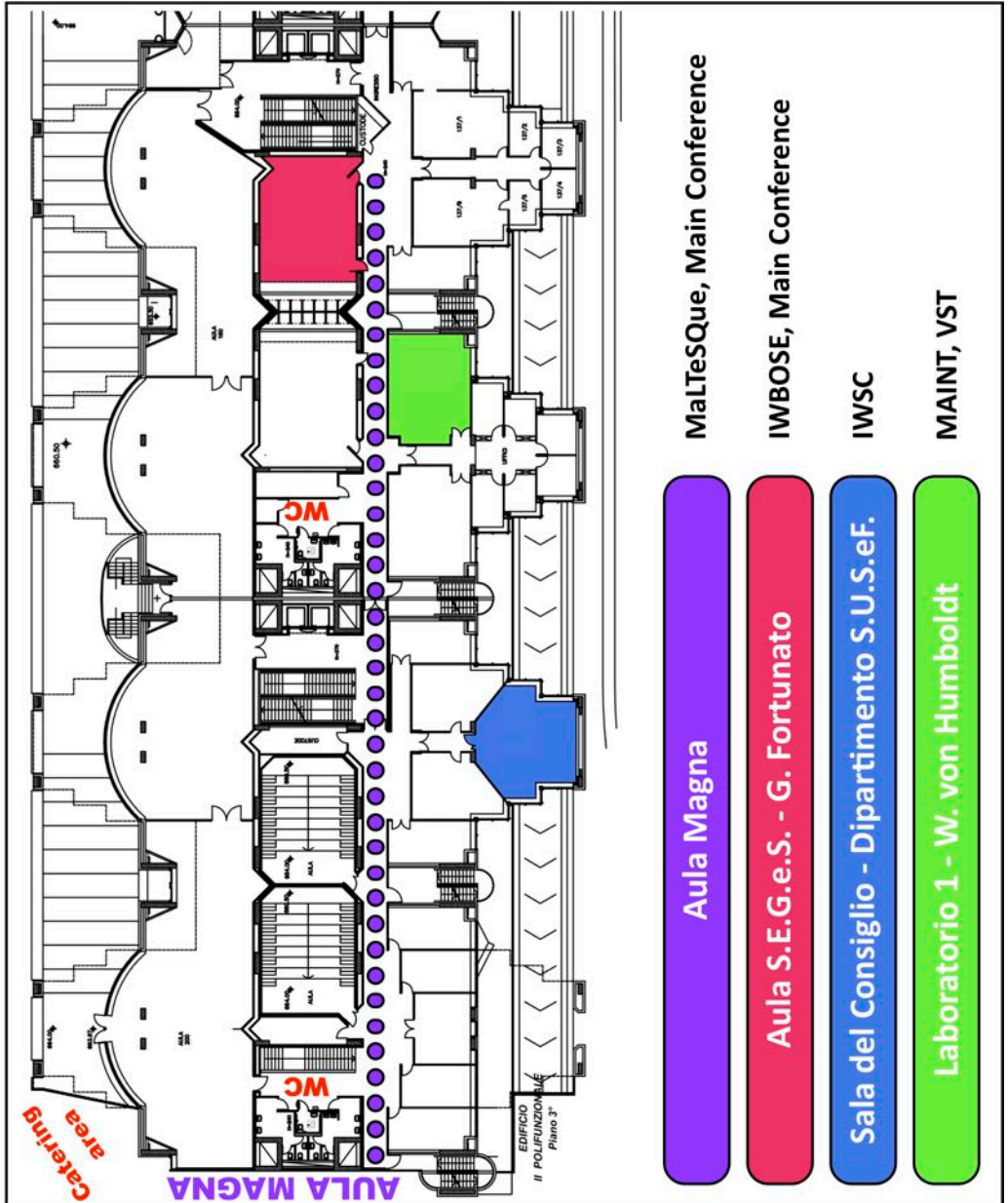
13.00 – 14.00	Registration
14.00 – 14.15	Opening
14.15 – 15.30	Keynote by David C. Shepherd <i>The Cost-Benefit Analysis of Usage Data in RobotStudio</i>
15.30 – 16.00	Coffee break
16.00 – 17.30	Session 1 – Programmer Reactions, Privacy and Code Changes <i>CodeCAM: Capturing Programmer’s Reaction during Coding Session</i> Y. Shinyama, Y. Arahori, and K. Gondow <i>Privacy Preservation in Interaction History on Integrated Development Environments</i> T. Omori <i>Integrating Source Code Search into Git Client for Effective Retrieving of Change History</i> M. Sasaki, S. Matsumoto, and S. Kusumoto
17.30 – 18.00	General Discussion Closing
19.00 – 23.00	Welcome cocktail @ University Campus

**International Workshop on Machine Learning Techniques
for Software Quality Evaluation (MaLTesQuE)**
Tuesday, 20th March 2018, Room “Aula Magna”

08.00 – 08.30	Registration
08.30 – 09.00	Welcome
09.00 – 10:30	Session 1 – Defects and Anomalies (chair: Martin Pinzger) <i>Varying Defect Prediction Approaches During Project Evolution: A Preliminary Investigation</i> S. Geremia and D. A. Tamburri <i>The Role of Meta-Learners in the Adaptive Selection of Classifiers</i> D. Di Nucci and A. De Lucia <i>Machine Learning-based Anomaly Detection in Software Systems: An Industrial Evaluation</i> F. Huch, M. Golagha, A. Petrovska, and A. Krauss
10.30 – 11.00	Coffee break
11.00 – 12.30	Session 2 – Change Analysis and Testing (chair: Damian A. Tamburri) <i>How High Will it Be? Using Machine Learning Models to Predict Branch Coverage in Automated Testing</i> G. Grano, T. V. Titov, S. Panichella, and H. C. Gall <i>Ensemble Techniques for Software Change Prediction: A Preliminary Investigation</i> G. Catolino and F. Ferrucci <i>Co-evolution Analysis of Production and Test Code by Learning Association Rules of Changes</i> L. Vidács and M. Pinzger
12.30 – 14.00	Lunch
14.00 – 15.30	Keynote by Serge Demeyer (chair: Fabio Palomba) <i>Agile Software Engineering – Opportunities for Industry 4.0</i>
15.30 – 16.00	Coffee break
16.00 – 17.30	User-oriented Machine Learning for Software Quality Assessment (chair: Serge Demeyer) <i>ConfigFile++: Automatic Comment Enhancement for Misconfiguration Prevention</i> Y. Zhang, S. Li, X. Xu, X. Liao, S. Yang, and Y. Xiong <i>Investigating type declaration mismatches in Python</i> L. Pascarella, A. Ram, A. Nadeem, D. Bisesser, N. Knyazev, and A. Bacchelli <i>User-Perceived Reusability Estimation based on Analysis of Software Repositories</i> M. Papamichail, T. Diamantopoulos, I. Chrysovergis, P. Samlidis, and A. Symeonidis
17.30 – 17.40	Closing
19.00 – 23.00	Welcome cocktail @ University Campus

Floor Map – Third floor “II Edificio Polifunzionale”

Main conference and workshops



Program Overview

Main conference and workshops

Tuesday, 20 th March	Wednesday, 21 st March	Thursday, 22 nd March	Friday, 23 rd March
08.00 – 08.30 Registration	08.00 – 08.30 Registration	08.00 – 09.00 Registration	08.00 – 09.00 Registration
08.30 – 09.00 Opening	08.30 – 09.00 Opening		
09.00 – 10.30 Workshop (IWBOSE, IWSC, MaTeSQuE, VST)	09.00 – 10.15 Keynote: Elmar Jurgens	09.00 – 10.15 Keynote: Jan Bosch	09.00 – 10.15 Keynote: Peter Gromov
10.30 – 11.00 Coffee break	10.15 – 10.30 Coffee break	10.15 – 10.30 Coffee break	10.15 – 10.30 Coffee break
	10.30 – 11.30 Research 1: Program Analysis	10.30 – 11.30 Research 6: Software Quality	10.30 – 11.30 Research 14: Developers' Collaboration
	10.30 – 11.30 Tool 1: Mining	10.30 – 11.30 Research 7: Behavior and Runtime Analysis	10.30 – 11.30 Research 15: Code Smells
	11.30 – 11.45 Coffee break	11.30 – 11.45 Coffee break	11.30 – 11.45 Coffee break
11.00 – 12.30 Workshop (IWBOSE, IWSC, MaTeSQuE, VST)	11.45 – 12.45 Research 2: Software Logging	11.45 – 12.45 Research 8: Design Analysis	11.45 – 12.45 Research 15: Refactoring
	11.45 – 12.45 Industry 1: Reengineering	11.45 – 12.45 Research 9: Defect Prediction	11.45 – 12.45 Industry 2: Development and Testing
12.30 – 14.00 Lunch	12.45 – 13.45 Lunch	12.45 – 13.45 Lunch	12.45 – 13.45 Lunch
	13.45 – 14.45 Research 3: Testing	13.45 – 14.45 Research 10: APIs	13.45 – 14.45 Research 16: Recommender Systems
14.00 – 15.30 Workshop (IWBOSE, IWSC, MaTeSQuE, MAINT)	14.45 – 15.00 Coffee break	14.45 – 15.00 Coffee break	14.45 – 15.00 Coffee break
15.30 – 16.00 Coffee break	15.00 – 16.00 Research 4: Program Repair	15.00 – 16.00 Research 11: Exploring Code Bases	15.00 – 16.00 Research 17: Software Security
	16.00 – 16.30 Coffee break	16.00 – 16.30 Coffee break	16.00 – 16.30 Coffee break
16.00 – 17.30 Workshop (IWBOSE, IWSC, MaTeSQuE, VST)	16.30 – 17.30 Research 5: Mobile Development	16.30 – 17.15 Research 12: Language Models	16.30 – 17.30 Most Influential Papers
19.00 Welcome Cocktail	19.30 Reception @ Blue Note	17.15 – 18.00 Open Steering Committee Meeting	17.30 – 18.00 Closing

SANER 2018 – First day**Wednesday, 21st March 2018, Room “Aula Magna”**

08.00 – 08.30 Breakfast

08.30 – 09.00 Opening

09.00 – 10.15 **Keynote by Elmar Juergens (chair: Massimiliano Di Penta)***A Decade of Software Quality Analysis in Practice: Surprises, Anecdotes and Lessons Learned*

10.15 – 10.30 Coffee break

10.30 – 11.30 **Research 1 – Program Analysis (chair: Jim Cordy)***Context is King: The Developer Perspective on the Usage of Static Analysis Tools*

C. Vassallo, S. Panichella, F. Palomba, S. Proksch, A. Zaidman, and H. Gall

SQL-aware Fault Localization in PHP-based Web Applications

H. Nguyen, H. Nguyen, and T. Nguyen

Microclones in Evolving Software

M. Mondal, C. Roy, and K. Schneider

11.30 – 11.45 Coffee break

11.45 – 12.45 **Research 2 – Software Logging (chair: Takashi Kobayashi)***SMARTLOG: Place Error Log Statement by Deep Understanding of Log Intention*

Z. Jia, S. Li, X. Liu, X. Liao, and Y. Liu

Towards Just-in-time Suggestions for Log Changes

H. Li, W. Shang, Y. Zou, and A. E. Hassan

Which Log Level Should Developers Choose for a New Logging Statement?

H. Li, W. Shang, and A. E. Hassan

12.45 – 13.45 Lunch

13.45 – 14.45 **Research 3 – Testing (chair: Dario Di Nucci)***Exploring the Integration of User Feedback in Automated Testing of Android Applications*

G. Grano, A. Ciurumelea, S. Panichella, F. Palomba, and H. Gall

Structured Random Differential Testing of Instruction Decoders

N. Jay and B. Miller

Clustering Support for Inadequate Test Suite Reduction

C. Coviello, S. Romano, G. Scanniello, A. Marchetto, G. Antoniol, and A. Corazza

14.45 – 15.00 Coffee break

15.00 – 16.00 **Research 4 – Program Repair (chair: Serge Demeyer)***Automatically Repairing Dependency-Related Build Breakage*

C. Macho, S. McIntosh, and M. Pinzger

Mining StackOverflow for Program Repair

X. Liu and H. Zhong

Dissection of a Bug Dataset: Anatomy of 395 Patches from Defects4J

V. Sobreira, T. Durieux, F. Madeiral, M. Monperrus, and M. de Almeida Maia

16.00 – 16.30 Coffee break

16.30 – 17.30 **Research 5 – Mobile Development (chair: Sebastiano Panichella)***Detecting Third-Party Libraries in Android Applications with High Precision and Recall*

Y. Zhang, J. Dai, X. Zhang, S. Huang, Z. Yang, M. Yang, and H. Chen

A Study of the Relation of Mobile Device Attributes with the User-perceived Quality of Android Apps

E. Noei, M. D. Syer, Y. Zou, A. E. Hassan, and I. Keivanloo

How Developers Micro-Optimize Android Apps

M. Linares-Vásquez, C. Vendome, M. Tufano, and D. Poshyanyk

SANER 2018 – First day**Wednesday, 21st March 2018, Room “Aula S.E.G.e.S. – G. Fortunato”**

10.15 – 10.30 Coffee break

10.30 – 11.30 **Tool 1 – Mining (chair: Mario Linares-Vásquez)**

The Statechart Workbench – Enabling Scalable Software Event Log Analysis using Process Mining
M. Leemans, W. van der Aalst, and M. van den Brand

APIDiff: Detecting API Breaking Changes

A. Brito, L. Xavier, A. Hora, and M. Tulio Valente

LICCA: a Tool for Cross-Language Clone Detection

T. Vislavski, G. Rakic, N. Cardozo, and Z. Budimac

GoldRusher: A Miner for Rapid Identification of Hidden Code

A. Salem

11.30 – 11.45 Coffee break

11.45 – 12.45 **Industry 1 – Reengineering (chair: Andrea De Lucia)**

Reengineering an Industrial HMI: Approach, Objectives and Challenges

B. Dorninger, M. Moser, and A. Kern

Model-Based Software Restructuring: Lessons from Cleaning Up COM Interfaces in Industry Legacy Code

D. Dams, A. Mooij, P. Kramer, A. Radulescu, and J. Vanhara

Grammatical Inference from Data Exchange Files: An Experiment on Engineering Software

M. Exler, M. Moser, J. Pichler, G. Fleck, and B. Dorninger

12.45 – 13.45 Lunch

13.45 – 14.45 **RENE 1 – Examining Past Results (chair: Alexander Serebrenik)**

Duplicate Question Detection in Stack Overflow: A Reproducibility Study

R. F. G. Silva, K. Paixão, and M. de Almeida Maia

How Do Scientists Develop Scientific Software? An External Replication

G. Pinto, I. Wiese, and L. Felipe Dias

Re-evaluating Method-Level Bug Prediction

L. Pascarella, F. Palomba, and A. Bacchelli

14.45 – 15.00 Coffee break

15.00 – 16.00 **Tool 2 – Software Evolution (chair: Mario Linares-Vásquez)**

BECLoMA: Augmenting Stack Traces with User Review Information

L. Pelloni, G. Grano, A. Ciurumelea, S. Panichella, F. Palomba, and H. C. Gall

Bring Your Own Coding Style

N. Ogura, S. Matsumoto, H. Hata, and S. Kusumoto

FINALIST2: Feature Identification, Localization and Tracing Tool

A. Burger and S. Gruener

ChangeMacroRecorder: Recording Fine-Grained Textual Changes of Source Code

K. Maruyama, S. Hayashi, and T. Omori

RETICULA: REal Time Code qUaLity Assessment

L. Frunzio, B. Lin, M. Lanza, and G. Bavota

SANER 2018 – Second day**Thursday, 22nd March 2018, Room “Aula Magna”**

08.00 – 09.00 Breakfast

09.00 – 10:15 **Keynote by Jan Bosch (chair: Rocco Oliveto)***Towards a New Digital Business Operating System*

10.15 – 10.30 Coffee break

10.30 – 11.30 **Research 6 – Software Quality (chair: Rainer Koschke)***How Do Developers Pay Back Technical Debt in the Apache Ecosystem?*

G. Digkas, M. Lungu, P. Avgeriou, A. Chatzigeorgiou, and A. Ampatzoglou

The Relationship between Evolutionary Coupling and Defects in Large Industrial Software

S. Kirbas, B. Caglayan, T. Hall, S. Counsell, D. Bowes, A. Sen, and A. Bener

How Good Is Your Puppet? An Empirically Defined and Validated Quality Model for Puppet

E. van der Bent, J. Hage, J. Visser, and G. Gousios

11.30 – 11.45 Coffee break

11.45 – 12.45 **Research 8 – Design Analysis (chair: Giuseppe Scanniello)***Automatically Exploiting Implicit Design Knowledge When Solving the Class Responsibility Assignment Problem*

Y. Xu, P. Liang, and M. Ali Babar

Modularity and Architecture of PLC-based Software for Automated Production Systems: An Analysis in Industrial Companies

B. Vogel-Heuser, J. Fischer, S. Feldmann, S. Ulewicz, and S. Rösch

A Mapping Study on Design-Time Quality Attributes and Metrics

E. M. Arvanitou, A. Ampatzoglou, A. Chatzigeorgiou, M. Galster, and P. Avgeriou

12.45 – 13.45 Lunch

13.45 – 14.45 **Research 10 – APIs (chair: Patanamon Thongtanunam)***Classifying Stack Overflow Posts On API Issues*

Md Ahasanuzzaman, M. Asaduzzaman, C. Roy, and K. Schneider

Why and How Java Developers Break APIs

A. Brito, L. Xavier, A. Hora, and M. Tulio Valente

Mining Accurate Message Formats for Service APIs

Md Arafat Hossain, S. Versteeg, J. Han, A. Kabir, J. Jiang, and J.-G. Schneider

14.45 – 15.00 Coffee break

15.00 – 16.00 **Research 11 – Exploring Code Bases (chair: Chanchal Roy)***Mining Framework Usage Graphs from App Corpora*

S. Mover, S. Sankaranarayanan, R. B. Pettee Olsen, and B. Y. E. Chang

A Generalized Model for Visualizing Library popularity, Adoption and Diffusion within a Software Ecosystem

R. G. Kula, C. De Roover, D. German, T. Ishio, and K. Inoue

Supporting Exploratory Code Search with Differencing and Visualization

W. Liu, X. Peng, Z. Xing, J. Li, B. Xie, and W. Zhao

16.00 – 16.30 Coffee break

16.30 – 17.15 **Research 12 – Language Models (chair: Yasu Kamei)***Syntax and Sensibility: Using language models to detect and correct syntax errors*

E. A. Santos, J. C. Campbell, D. Patel., A. Hindle, and J. N. Amaral

A Deep Neural Network Language Model with Contexts for Source Code

A. Nguyen, T. Nguyen, H. Phan, and T. Nguyen

SANER 2018 – Second day**Thursday, 22nd March 2018, Room “Aula S.E.G.e.S. – G. Fortunato”**

10.15 – 10.30 Coffee break

10.30 – 11.30 **Research 7 – Behavior and Runtime Analysis (chair: Nevena Milojković)***Maintaining Behaviour Driven Development Specifications: Challenges and Opportunities*

L. P. Binamungu, S. M Embury, and N. Konstantinou

A Comparison Framework for Runtime Monitoring Approaches

R. Rabiser, S. Guinea, M. Vierhauser, L. Baresi, and P. Grünbacher

Recursion Aware Modeling and Discovery For Hierarchical Software Event Log Analysis

M. Leemans, W. M. P. van der Aalst, and M. G. J. van den Brand

11.30 – 11.45 Coffee break

11.45 – 12.45 **Research 9 – Defect Prediction (chair: Martin Pinzger)***Cross-Version Defect Prediction via Hybrid Active Learning with Kernel Principal Component Analysis*

Z. Xu, J. Liu, X. Luo, and T. Zhang

Using a probabilistic model to predict bug fixes

M. Soto and C. Le Goues

Connecting Software Metrics across Versions to Predict Defects

Y. Liu, Y. Li, J. Guo, Y. Zhou, and B. Xu

12.45 – 13.45 Lunch

13.45 – 14.45 **ERA – Early Research Achievement (chairs: Jens Krinke and Shane McIntosh)***Extracting Features from Requirements: Achieving Accuracy and Automation with Neural Networks*

Y. Li, S. Schulze, and G. Saake

OctoBubbles: A Multi-View Interactive Environment for Concurrent Visualization and Synchronization of UML Models and Code

R. Jolak, K.-D. Le, K. B. Sener, and M. R. V. Chaudron

A Comparison of Software Engineering Domain Specific Sentiment Analysis Tools

Md R. Islam and M. F. Zibran

Generating Descriptions for Screenshots to Assist Crowdsourced Testing

D. Liu, X. Zhang, Y. Feng, and J. Jones

Reconciling the Past and the Present: An Empirical Study on the Application of Source Code Transformations to Automatically Rejuvenate Java Programs

R. Dantas, A. Carvalho Júnior, D. Marcílio, L. Fantin, U. Silva, W. Lucas, and R. Bonifacio

14.45 – 15.00 Coffee break

15.00 – 16.00 **Tool 3 – Hands-on (chair: Mario Linares-Vásquez)***Hands-on all the tools presented at SANER 2018*

16.00 – 16.30 Coffee break

16.30 – 17.15 **Research 13 – Binary Analysis (chair: Coen De Roover)***Efficient Features for Function Matching Between Binary Executables*

C. Karamitas and T. Kehagias

Using Recurrent Neural Networks for Decompilation

D. Katz, J. Ruchti, and E. Schulte

SANER 2018 – Third day**Friday, 23rd March 2018, Room “Aula Magna”**

08.00 – 09.00 Breakfast

09.00 – 10:15 **Keynote by Peter Gromov (chair: David C. Shepherd)***Compilers are Sprinters; IDEs are Marathoners*

10.15 – 10.30 Coffee break

10.30 – 11.30 **Research 14 – Developers’ Collaboration (chair: Simone Scalabrino)***Review Participation in Modern Code Review: An Empirical Study of the Android, Qt, and OpenStack Projects*

P. Thongtanunam, S. McIntosh, A. E. Hassan, and H. Iida

How Do Developers Discuss Rationale?

R. Alkadhi, M. Nonnenmacher, E. Guzman, and B. Bruegge

Automated Quality Assessment for Crowdsourced Test Reports of Mobile Applications

X. Chen, H. Jiang, X. Li, T. He, and Z. Chen

11.30 – 11.45 Coffee break

11.45 – 12.45 **Research 15 – Refactoring (chair: Foutse Khomh)***The Impact of Refactoring Changes on the SZZ Algorithm: An Empirical Study*

E. C. Neto, D. A. da Costa, and U. Kulesza

An Extensible Approach for Taming the Challenges of JavaScript Dead Code Elimination

N. G. Obbink, I. Malavolta, G. L. Scoccia, and P. Lago

Automated Refactoring of Client-side JavaScript code to ES6 modules

K. Paltoglou, V. E. Zafeiris, E. A. Giakoumakis, and N. A. Diamantidis

12.45 – 13.45 Lunch

13.45 – 14.45 **Research 16 – Recommender System (chair: Shane McIntosh)***Improving Developers Awareness of the Exception Handling Policy*

T. Montenegro, H. Melo, R. Coelho, and E. Barbosa

Detecting Faulty Empty Cells in Spreadsheets

L. Xu, S. Wang, W. Dou, B. Yang, C. Gao, J. Wei, and T. Huang

Spreadsheet Guardian: An Approach to Protecting Semantic Correctness throughout the Evolution of Spreadsheets

D. Kulesz, V. Käfer, and S. Wagner

14.45 – 15.00 Coffee break

15.00 – 16.00 **Research 17 – Software Security (chair: Shinpei Hayashi)***Detection of Protection-Impacting Changes During Software Evolution*

M.-A. Laverdiere and E. Merlo

Mining Sandboxes: Are We There Yet?

L. Bao, B. T. D. Le, and D. Lo

DeepWeak: Reasoning Common Software Weaknesses via Knowledge Graph Embedding

Z. Han, X. Li, H. Liu, Z. Xing, and Z. Feng

16.00 – 16.30 Coffee break

16.30 – 17.30 **MIP – Most Influential Paper Award (chair: Serge Demeyer)***Most Influential Paper from CSMR 2008 & WCRE 2008*

SANER 2018 – Third day
Friday, 23rd March 2018, Room “Aula S.E.G.e.S. – G. Fortunato”

10.15 – 10.30 Coffee break

10.30 – 11.30 **RENE 2 – Code Smells (chair: Gabriele Bavota)**

Keep It Simple: Is Deep Learning Good for Linguistic Smell Detection?

S. Fakhoury, V. Arnaoudova, C. Noiseux, F. Khomh, and G. Antoniol

Detecting Code Smells using Machine Learning Techniques: Are We There Yet?

D. Di Nucci, F. Palomba, D. A. Tamburri, A. Serebrenik, and A. De Lucia

11.30 – 11.45 Coffee break

11.45 – 12.45 **Industry 2 – Development and Testing (chair: Damian Andrew Tamburri)**

Fuzz Testing in Practice: Obstacles and Solutions

J. Liang, M. Wang, Y. Chen, Y. Jiang, and R. Zhang

Diggit: Automated Code Review via Software Repository Mining

R. Chatley and L. Jones

Keynote speakers**SANER 2018 Main Conference****A Decade of Software Quality Analysis in Practice: Surprises, Anecdotes and Lessons Learned***Elmar Juergens, CQSE GmbH (Germany) – Wednesday, 21st March, 2018*

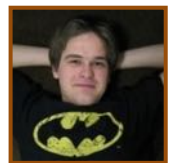
I implemented and ran my first clone detection on industrial software roughly a decade ago. Fueled by both the amounts of problematic code it uncovered, and the (at least partially) positive feedback from developers, our research group subsequently focused on quality analyses to improve engineering practice. Since then, our research prototypes have grown into a commercial tool employed by professional software developers around the world every day. It implements both static and dynamic analyses for over 25 programming languages and runs in development, test and production environments of hundreds of companies. We bootstrapped our spin-off, CQSE GmbH, into a company of 30 employees (half of which hold a PhD in Software Engineering). All of us exclusively work on, or employ as part of our audit services, software quality analyses built upon this community's research. In this keynote, I want to share our key insights: experiences, surprises and anecdotes. I will cover hard lessons learned on how to have an impact in real-world projects, surprising results of seemingly trivial approaches, the role of software visualizations in marketing and our key learnings in transferring research from academia to practice.

**Towards a New Digital Business Operating System***Jan Bosch, Chalmers University of Technology (Sweden) – Thursday, 22nd March, 2018*

We are living in the most exciting time in the history of mankind. The last century has seen unprecedented improvements in the quality of the human condition and technology is at the heart of this progress. Now we are experiencing an even bigger leap as we move towards a new level of digitalization and automation. Ranging from self-driving cars to factories without workers to societal infrastructure, every sensor and actuator is becoming connected and new applications that enable new opportunities are appearing daily. The fuel of this emerging connected, software-driven reality is software and the key challenge is to continuously deliver value to customers. The future of software engineering in this context is centered around a new, emerging digital business operating system consisting of four dimensions: Speed, Data, Ecosystems and Empowerment. The focus on speed is concerned with the constantly increasing rate of deploying new software in the field. This continuous integration and deployment is no longer, only the purview of Internet companies but is also increasingly deployed in embedded systems. Second, data is concerned with the vast amounts of information collected from systems deployed in the field and the behavior of the users of these systems. Software businesses need to significantly improve their ability to exploit the value present in that data. Third, ecosystems are concerned with the transition in many companies from doing everything in-house to strategic use of innovation partners and commodity providing partners. Finally, we need new ways of organizing work in this new, digital age. The keynote discusses these four main developments but focuses on the continuous software engineering. In addition, the keynote provides numerous examples from the Nordic and international industry and predicts the next steps that industry and academia need to engage in to remain competitive.

Compilers are Sprinters; IDEs are Marathoners*Peter Gromov, JetBrains (Germany) – Friday, 23rd March, 2018*

Compilers and IDEs both analyze source code, yet compared to IDEs, compilers are easy. Compilers process source files a module at a time; IDEs have to load entire projects. Compilers exit after each run; IDEs run constantly, requiring responsible memory management and low CPU utilization. Compilers operate in batch; IDEs must constantly, incrementally re-analyze code after each change in the editor. Compilers stop when there is an error; IDEs are expected to be even more helpful when there are errors. Compilers create intermediate representations, soon throwing away source code; IDEs must always map back to source, respecting whitespaces and resolving references to the line and column number. The talk discusses these and other challenges, and how IDEs based on IntelliJ platform attack them.





Rectorate building: main entrance

The 25th edition of the IEEE International Conference on Software Analysis, Evolution and Reengineering will be held at the University of Molise in Campobasso, Italy. The University of Molise counts 4 University campuses arranged across our beautiful region, over 10,000 students, 100+ PhD students and about 600 personnel, split among teaching and non-teaching staff. The University campus of Campobasso is equipped with several technical laboratories covering multimedia, languages, and more, including a rich

library, and a sports centre. The Computer Science School is part of the Department of Biosciences and Territory and currently comprises 9 associate professors, 5 assistant professors, and 10+ scientific and technical staff. The Computer Science programs have currently 400+ students; last year we bootstrapped an advanced Masters' Degree Program on "Software System Security". The Software and Knowledge Engineering (STAKE) Lab is part of the Computer Science School.

WiFi Access – unimolwifi

Username: net.saner

Password: san781rub

Monforte Castle, Campobasso, Italy

The symbol of the city

The most important historic place in Campobasso is the Monforte castle, one of the symbols of the city. Monforte castle was built before 1375 and it was restored in 1458 by Earl Nicola II Monforte, from whom it was named. The bastions of the castle dominate the uptown and are visible from all over the city. Another witness of the medieval period is the city's ancient town center, with its six gates, formerly towers, from which originates the main symbol of the city and of the University of Molise. Campobasso also has many Romanesque churches, like San Bartolomeo and San Leonardo.



Monforte Castle



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SANER 2018**

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