

Sebastiano Panichella - Curriculum vitae

BIOGRAPHICAL SKETCH

Sebastiano Panichella was born in Isernia (Italy), he received (cum laude) the Laurea in Computer Science from the University of Salerno (Italy) in December 2010 defending a thesis on IR-based Traceability Recovery.

He received the PhD in Computer Science from the University of Sannio (Department of Engineering) in July 18th 2014 defending the thesis entitled “*Supporting Newcomers in Open Source Software Development Projects*”.

His research interests are in the domain of Software Engineering (SE). In particular, during his bachelor, master and doctoral studies, he had the opportunity to explore a wide range of research topics in SE such as IR-based Traceability Recovery, Mining Software Repositories (MSR), Software maintenance and evolution and Empirical Software Engineering.

Currently he is a (Permanent) Senior Research Associate at Zurich University of Applied Science (from **20-08-2018**), leading research in Software Engineering (SE) and cloud computing (CC) research fields. Previously he was postdoc at University of Zurich (**01-11-2014 - 19-08-2018**) working in the *SEAL Lab* of **Prof. Harald Gall**. During the postdoctoral experience, Sebastiano wrote 100% of a proposal that was awarded (Sebastiano figured as co-applicant with Prof. Gall) by the Swiss National Science Foundation, i.e., the project SURF-MobileAppsData SNF – No. 200021–166275– (current results of the projects are available on-line ¹), which is funding his research collaboration with the UZH (since 2016), on mobile computing and mobile testing, and two PhD Students. During the experience as postdoc in the SEAL group he investigated further SE research fields such as Mobile Computing, Continuous Delivery and Continuous integration, and the new line of research related to the use of Summarization Techniques for Code, Changes and Testing. His research interests include Mobile Computing, Code Review, IR-based Traceability Recovery, Textual Analysis, Machine Learning and Genetic Algorithms applied to SE problems, Continuous Delivery (with special attention to Continuous Integration Problems), Software maintenance and evolution and Empirical Software Engineering. Another topic that is also of his interest is Code Review, indeed, he is currently working and advising students on research ideas aimed at automating the process of code inspection. His research is funded by a Swiss National Science Foundations project. He is author or co-author of **46** (considering also demos, datasets and poster) papers appeared in International Conferences and Journals (**26** of them published during the experience at the SEAL lab). In summary he published in high-ranked, peer-reviewed (according to the <http://www.core.edu.au/conference-portal>), and international venues (where he also received best and distinguished paper awards²). Specifically, he published, considering the conference venues, 7 papers at ICSE (RANK: A*), 3 at FSE (RANK: A*), 6 at ICSME (RANK: A), 2 at ASE (RANK: A), 1 at GECCO (RANK: A), 8 at SANER, 1 at WCRE (RANK: B), 6 at ICPC (RANK: C); 1 at ONWARD (RANK: C). He also published papers at workshop like WAMA (1) and MaLTeSQuE (1). He also published in top journals such as TSE (1), EMSE (3), IST (1), STVR (1) and JSEP (1).

These research works involved relevant industrial companies (e.g., ING NEDERLAND, Sony Mobile Communication) and their extensions will involve further industrial organizations (e.g., Allianz, Facebook, Google, etc.) and open source projects. He serves and has served as program committee member of various international conference (e.g.,

¹<http://www.ifi.uzh.ch/en/seal/people/panichella/SNF-Projects.html>

² <https://spanichella.github.io/#awards>

ICSE, SBST, ASE, ICPC, ICSME, SANER, MSR, SEAA) and as reviewer for various international journals (e.g., TSE, TOSEM, EMSE, JSS, IST, JSEP) in the fields of software engineering and evolutionary computation. He is currently Editorial Board Member of *Journal of Software: evolution and process* (JSEP) and (Leading) Editor of special Issues at International Journals such as EMSE and IST.

CONTACT INFORMATION

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Home Page: <https://spanichella.github.io/>

Google Scholar Ref:

<https://scholar.google.it/citations?user=HiNuBFgAAAAJ&hl=en&oi=ao>

Detailed CV: <https://spanichella.github.io/img/CV.pdf>

RESEARCH INTERESTS

Mining Software Repositories

Software repositories such as source control systems, archived communications between project personnel, and defect tracking systems are used to help manage the progress of software projects. Software practitioners and researchers are recognizing the benefits of mining this information to support the maintenance of software systems, improve software design/reuse, and empirically validate novel ideas and techniques. Research is now proceeding to uncover the ways in which mining these repositories can help to understand software development and software evolution, to support predictions about software development, and to exploit this knowledge concretely in planning future development. The Mining Software Repositories (MSR) field analyzes the rich data available in software repositories to uncover interesting and actionable information about software systems and projects.

Work in progress. In past work Panichella focused his attention in mining software repository to build recommender systems for supporting developers during maintenance and program comprehension tasks. For instance, he conceived tools for (i) enabling the automatic re-documentation of existing systems [35] [43]; (ii) summarizing software artifacts [42] [6]; (iii) or profiling developers or experts in OSS projects [28][33][34][36][39][41]. Currently Panichella is focusing his attention in mining App Store data and data from traditional repositories for designing and developing tools to help developers digest the huge amount of feedback they receive from users on a daily basis, transforming user reviews into maintenance tasks (fixing issues or building features) [18][19][21][23]. More in general, he is interested to conceive tools to support developers in evolving modern software applications [24][30].

Empirical Software Engineering

Empirical software engineering is a sub-domain of software engineering focusing on experiments on software systems (software products, processes, and resources). It is interested in devising experiments on software, in collecting data from these experiments, and in devising laws and theories from this data. Proponents of experimental software engineering advocate that the nature of software is such that we can advance the knowledge on software through experiments only. The scientific method suggests a cycle of observations, laws, and theories to advance science. Empirical software engineering applies this method to software.

Work in progress. In past work Panichella performed empirical studies to understand (i) how OSS communities upgrades dependencies [4][37]; (ii) to what extent static analysis tools help developers with code reviews [32]; (iii) how developers' collaborations identified from different sources vary when they are mined from different sources [33]; (iv) how the evolution of emerging collaborations relates to code changes [36]; or (v) to study the behaviour of developers during maintenance tasks (e.g., while they modify existing features or fix a bug) by analyzing their navigation patterns [38]. Currently Panichella is focusing his attention in performing empirical work to understand possible ways to measure and foster developer productivity during testing [26], maintenance [38] and code reviewing tasks [32].

Code Review

Peer code review, a manual inspection of source code by developers other than the author, is recognized as a valuable tool for reducing software defects and improving the quality of software projects. In 1976, Fagan formalized a highly structured process for code reviewing, based on line-by-line group reviews, done in extended meetings—code inspections. Over the years, researchers provided evidence on code inspection benefits, especially in terms of defect finding, but the cumbersome, time-consuming, and synchronous nature of this approach hinders its universal adoption in practice. Nowadays, many organizations are adopting more lightweight code review practices to limit the inefficiencies of inspections. In particular, there is a clear trend toward the usage of tools specifically developed to support code review. Modern code reviews are (1) informal (in contrast to Fagan-style), (2) tool-based, and (3) occurs regularly in practice nowadays, for example at companies such as Microsoft, Google, Facebook, and in other companies and OSS projects.

Work in progress. The research focus of Panichella is to develop recommender systems able to (better) support developers during the code review process [32].

IR-based Traceability Recovery

Traceability has been defined as "the ability to describe and follow the life of an artefact (requirements, code, tests, models, reports, plans, etc.), in both a forwards and backwards direction". Thus, traceability links help software engineers to understand the relationships and dependencies among various software artefacts (requirements, code, tests, models, etc.) developed during the software lifecycle. The two main research topics related to the traceability management are event-based systems for traceability management and information retrieval based methods and tools supporting the software engineer in the traceability link recovery.

Work in progress. In past work Panichella explored several enhancing strategies for improving IR-based Traceability Recovery approaches, most of them are based on (i) smoothing filters [5] [7] and (ii) NLP approaches [44] [45] [46]. Recently Panichella is focusing his effort in tracing link between data and software artifacts stored in modern software repositories [18] [19] [21].

Textual analysis

Textual analysis can be described as the examination of a text in which an educated guess is formed as to the most likely interpretations that might be made of that text. It is where the researcher must decentre the text to reconstruct it, working back through the narratives mediations of form, appearance, rhetoric, and style to uncover the underlying social and historical processes, the metalanguage that guided the production. It is suggested that textual analysis can cover four main underlying constructs: language and meaning, ideology, ideology and myth, and historicity. In this sense, textual analysis

is a methodology: a way of gathering and analysing information in academic research (McKee, A 2001).

Work in progress. Panichella studied text analysis approaches since his bachelor and master studies and was always fascinated by the great usability of Natural Language Processing (NLP) and Information Retrieval (IR) tools and techniques for solving several practical problems. He adopted such techniques in several work during his PhD and also during the postdoctoral experience. He is currently learning new techniques and tools based on Textual Analysis (e.g. WORD2VEC) and neural networks techniques [17].

Machine Learning and Genetic Algorithms

Machine learning (ML) and Genetic Algorithms (GA) deals with the issue of how to build computer programs that improve their performance at some tasks through experience. ML and Genetic algorithms have proven to be of great practical value in a variety of application domains. Not surprisingly, the field of software engineering turns out to be a fertile ground where many software development and maintenance tasks could be formulated as learning problems and approached in terms of learning algorithms. **Work in progress.** Panichella was also very fascinated by the potential of ML and Genetic Algorithms for solving SE problems. He started to study them during the PhD studies. Examples of the successful application of ML and genetic algorithms to SE problems by Panichella are bug prediction, code (and code change) prediction [25] [3] [5] [40], prioritization or clustering of user reviews (in the context of mobile apps) [18][19][21][23] [24][30], test case generation [26], etc.. Current research interest are toward experimenting customized solutions based on ML and Genetic Algorithms for enhancing traditional testing approaches and GUI testing processes 1.

Continuous Delivery

Continuous delivery (CD) is a software engineering approach in which teams produce software in short cycles, ensuring that the software can be reliably released at any time. It aims at building, testing, and releasing software faster and more frequently. The approach helps reduce the cost, time, and risk of delivering changes by allowing for more incremental updates to applications in production. A straightforward and repeatable deployment process is important for continuous delivery. Continuous Integration (CI) consists in a specific stage of CD process where team members integrate their work in an automatic manner, which allows a fast building, testing, and releasing of software, leading to multiple integrations per day. Researchers in this field have as main focus the development of recommender systems able to provide suggestions to developers and testers during Continuous Integration activities.

Work in progress. In the context of CI Panichella is currently conducting empirical work to understand the problems that developers face when integrating new changes in the code base [16] 1. The main focus is the development of recommender systems able to provide suggestions to developers and testers during Continuous Integration activities.

ACADEMIC
APPOINTMENTS

Currently he is a (Permanent) Senior Research Associate at Zurich University of Applied Science (from *20-08-2018*), leading research in Software Engineering (SE) and cloud computing (CC) research fields. Previously he was postdoc at University of Zurich (*01-11-2014 - 19-08-2018*) working in the *SEAL Lab* of **Prof. Harald Gall**. He is a **member of IEEE**. During the experience as postdoc in the SEAL group he investigated further SE research fields such as Mobile Computing, Continuous Delivery and Continuous integration, and the new line of research related to the use of Summariza-

tion Techniques for Code, Changes and Testing. Currently His research interests include Mobile/Cloud Computing, IR-based Traceability Recovery, Textual Analysis, Machine Learning and Genetic Algorithms applied to SE problems, Continuous Delivery (with special attention to Continuous Integration Problems), Software maintenance and evolution and Empirical Software Engineering (with particular focus on Cloud Applications). Another topic that is also of his interest is Code Review, indeed, he is currently working and advising students on research ideas aimed at automating the process of code inspection. His research is funded by a Swiss National Science Foundations project. He is author or co-author of **46** (considering also demos, datasets and poster) papers appeared in International Conferences and Journals (**26** of them published during the experience at the SEAL lab). In summary he published in high-ranked, peer-reviewed (according to the <http://www.core.edu.au/conference-portal>), and international venues (where he also received best and distinguished paper awards³). Specifically, he published, considering the conference venues, 7 papers at ICSE (RANK: A*), 3 at FSE (RANK: A*), 6 at ICSME (RANK: A), 2 at ASE (RANK: A), 1 at GECCO (RANK: A), 7 at SANER, 1 at WCRE (RANK: B), 6 at ICPC (RANK: C). He also published papers at workshop like WAMA (1), MaLTeSQuE (1) and VST (invited paper). He also published in top journals such as EMSE (3), IST (1), STVR (1) and JSEP (1).

ACADEMIC
EXPERIENCE AND
HISTORY

University of Zurich, Switzerland

Postdoc at University of Zurich working in the SEAL Lab of **Prof. Harald Gall**.
Period **01-11-2014 - 19-08-2018**.

University of Sannio, Italy

PhD., Computer Engineering, July 2014

- Thesis Title: *“Supporting Newcomers in Open Source Software Development Projects”*
- Thesis Topics: Supporting Developers, Mining of Software Repositories (Mailing lists, Issue trackers, Versioning Systems etc.)

University of Salerno, Italy

M.S., Computer Science, December 2010

- *Magna cum Laude*
- Thesis Title: *Improving IR-based Traceability Recovery Using Smoothing Filters*
- Adviser: Prof. Andrea De Lucia
- Thesis Topics: Software Engineering, Traceability Recovery, Textual Analysis

University of Molise, Italy

B.S., Computer Science, October 2008

- *Magna cum Laude*
- Thesis Title: *Improving IR-based traceability recovery via noun-based indexing of software artifacts*
- Advisers: Prof. Giovanni Capobianco, Dr Rocco Oliveto
- Thesis Topics: Software Engineering, Traceability Management, Natural Language Processing (NLP)

³ <http://www.ifi.uzh.ch/en/seal/people/panichella/Awards-Best-Paper-Nominations.html>

In papers marked with (*) the authors are listed in alphabetic order.

Journal Publications during the postdoctoral experience:

- [1] Y. Zhou and C. Wang and Y. Xin and T. Chen and S. Panichella and H. Gall . **Automatic Detection and Repair Recommendation of Directive Defects in Java API Documentation.** *Transaction on Software Engineering 2018* - <https://ieeexplore.ieee.org/document/8478004>.
- [2] C. Alexandru, S. Panichella, S. Proksch, Harald Gall. ***Redundancy-free Analysis of Multi-revision Software Artifacts.** *Empirical Software Engineering (EMSE)* 2018.
doi:To Appear
- [3] G. Canfora, A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Defect Prediction as a Multi-Objective Optimization Problem.** *Software Testing, Verification and Reliability (STVR)* 2015.
doi:10.1002/stvr.1570

Journal Publications during the PhD study:

- [4] G. Bavota, G. Canfora, M. Di Penta, R. Oliveto, S. Panichella. ***How the Apache Community Upgrades Dependencies.** *Empirical Software Engineering (EMSE)* 2014.
doi:10.1007/s10664-014-9325-9
- [5] A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Applying a Smoothing Filter to Improve IR-based Traceability Recovery Processes: An Empirical Investigation.** *Information and Software Technology (INFOSOF)* 2012.
doi:10.1016/j.infsof.2012.08.002
- [6] A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Labeling Source Code with Information Retrieval Methods: An Empirical Study.** *Empirical Software Engineering (EMSE)* 2013. doi:doi:10.1007/s10664-013-9285-5

Journal Publications during the master study:

- [7] G. Capobianco, A. De Lucia, R. Oliveto, A. Panichella, S. Panichella. ***Improving IR-based traceability recovery via noun-based indexing of software artifacts.** *Journal of Software: Evolution and Process (JSE)* 2012.
doi:10.1002/smr.1564

In papers marked with (*) the authors are listed in alphabetic order.

Conference Publications during the postdoctoral experience:

- [8] Carol V. Alexandru; Jos J. Merchant; Sebastiano Panichella; Sebastian Proksch; Harald C. Gall; Gregorio Robles. **On the Usage of Pythonic Idioms..** *Onward! 2018* -
to Appear.
- [9] S. Panichella. **Summarization Techniques for Code, Change, Testing and User Feedback..** *Proceedings of the IEEE 25th International Conference on*

Software Analysis, Evolution and Reengineering (SANER 2018) -
<https://doi.org/10.1109/VST.2018.8327148>.

- [10] G. Grano, T. Titov, S. Panichella, H. Gall. **How High Will It Be? Using Machine Learning Models to Predict Branch Coverage in Automated Testing.** *MaLTeSQuE* (collocated with SANER 2018) -
<https://doi.org/10.1109/MALTESQUE.2018.8368454>.
- [11] L. Pelloni, G. Grano, A. Ciurumelea, S. Panichella, F. Palomba, H. Gall. **BE-CLOMA: Augmenting Stack Traces with User Review Information.** *Proceedings of the IEEE 25th International Conference on Software Analysis, Evolution and Reengineering* (SANER 2018) -
<https://doi.org/10.1109/SANER.2018.8330252>.
- [12] A. Ciurumelea, S. Panichella, H. Gall. **Automated User Reviews Analyser.** *Proceedings of the 40th International Conference on Software Engineering* (ICSE 2018) -
<http://doi.acm.org/10.1145/3183440.3194988>.
- [13] G. Grano, A. Ciurumelea, S. Panichella, F. Palomba, H. Gall. **Exploring the Integration of User Feedback in Automated Testing of Android Applications.** *Proceedings of the IEEE 25th International Conference on Software Analysis, Evolution and Reengineering* (SANER 2018) -
<https://doi.org/10.1109/SANER.2018.8330198>.
- [14] C. Vassallo, S. Panichella, F. Palomba, S. Proksch, A. Zaidman and H. Gall. **Context is King: The Developer Perspective on the Usage of Static Analysis Tools.** *Proceedings of the IEEE 25th International Conference on Software Analysis, Evolution and Reengineering* (SANER 2018) -
<https://doi.org/10.1109/SANER.2018.8330195>.
- [15] G. Grano, A. Di Sorbo, F. Mercaldo, C. Visaggio, G. Canfora, S. Panichella. **Android Apps and User Feedback: a Dataset for Software Evolution and Quality Improvement.** *Proceedings of the International Workshop on App Market Analytics* (WAMA 2017).
<http://doi.acm.org/10.1145/3121264.3121266>
- [16] C. Vassallo, G. Schermann, F. Zampetti, D. Romano, P. Leitner, A. Zaidman, M. di Penta, S. Panichella. **A Tale of CI Build Failures: an Open Source and a Financial Organization Perspective.** *Proceedings of the 33rd International Conference on Software Maintenance and Evolution* (ICSME 2017). *Core RANK: A*.
<https://doi.org/10.1109/ICSME.2017.67>
- [17] C. V. Alexandru, S. Panichella, Harald Gall. **Replicating Parser Behavior using Neural Machine Translation.** *Proceedings of the 25th International Conference on Program Comprehension* (ICPC 2017). *Core RANK: C*.
<https://doi.org/10.1109/ICPC.2017.11>
- [18] A. Di Sorbo, S. Panichella, C. V. Alexandru, C. A. Visaggio, G. Canfora. **SURF: Summarizer of User Reviews Feedback.** *Demonstrations Track of the 39th International Conference on Software Engineering* (ICSE 2017). *Core RANK: A**.
<https://doi.org/10.1109/ICSE-C.2017.5>
- [19] F. Palomba, P. Salza, A. Ciurumelea, S. Panichella, H. Gall, F. Ferrucci, A. De Lucia **Recommending and Localizing Change Requests for Mobile Apps**

- based on User Reviews. In: *39th International Conference on Software Engineering (ICSE 2017)*. Core RANK: A*. <https://doi.org/10.1109/ICSE.2017.18>
- [20] Y. Zhou, R. Gu, T. Chen, Z. Huang, S. Panichella, H. Gall. **Analyzing APIs Documentation and Code to Detect Directive Defects**. In: *39th International Conference on Software Engineering (ICSE 2017)*. Core RANK: A*. <https://doi.org/10.1109/ICSE.2017.11>
- [21] A. Ciurumelea, A. Schaufelbuhl, S. Panichella, Harald Gall. **Analyzing Reviews and Code of Mobile Apps for better Release Planning**. In: *Proceedings of the 24th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER) 2017*. Klagenfurt, Austria. <https://doi.org/10.1109/SANER.2017.7884612>
- [22] C. Alexandru, S. Panichella, Harald Gall. **Reducing Redundancies in Multi-Revision Code Analysis**. In: *24th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER) 2017*. Klagenfurt, Austria. <https://doi.org/10.1109/SANER.2017.7884617>
- [23] S. Panichella, A. Di Sorbo, E. Guzman, C. Visaggio, G. Canfora, H. Gall. **ARdoc: App Reviews Development Oriented Classifier**. In: *24th ACM SIGSOFT International Symposium on the Foundations of Software Engineering* will be held in Seattle, WA, USA. Core RANK: A*. <http://doi.acm.org/10.1145/2950290.2983938>
- [24] A. Di Sorbo, S. Panichella, C. V. Alexandru, J. Shimagaki, C. A. Visaggio, G. Canfora, H. Gall. **What Would Users Change in My App? Summarizing App Reviews for Recommending Software Changes**. In: *24th ACM SIGSOFT International Symposium on the Foundations of Software Engineering* will be held in Seattle, WA, USA. Core RANK: A. <http://doi.acm.org/10.1145/2950290.2950299>
- [25] A. Panichella, C. Alexandru, S. Panichella, A. Bacchelli, H. Gall. **A Search-based Training Algorithm for Cost-aware Defect Prediction**. *25th International Conference on Genetic Algorithms (ICGA) and the 21st Annual Genetic Programming Conference (GP) (GECCO 2016)*. Denver, Colorado, USA. Core RANK: A. <http://doi.acm.org/10.1145/2908812.2908938>
- [26] S. Panichella, A. Panichella, M. Bella, A. Zaidman, H. Gall. **The impact of test case summaries on bug fixing performance: An empirical investigation**. In: *Proceedings of the 38th International Conference on Software Engineering (ICSE 2016)*, Austin, TX. Core RANK: A*. <http://doi.acm.org/10.1145/2884781.2884847>
- [27] A. Di Sorbo, S. Panichella, C. Visaggio, M. Di Penta, G. Canfora, H. Gall. **DECA: Development Emails Content Analyzer**. In: *Proceedings of the 38th International Conference on Software Engineering (ICSE 2016)*, Austin, TX. Core RANK: A*. <http://doi.acm.org/10.1145/2889160.2889170>
- [28] S. Panichella. **Supporting Newcomers in Software Development Projects**. In: *Proceedings of the 31st International Conference on Software Maintenance and Evolution (ICSME 2015)*. Bremen, Germany. Core RANK: A. <https://doi.org/10.1109/ICSM.2015.7332519>

- [29] A. Di Sorbo, S. Panichella, C. Visaggio, M. Di Penta, G. Canfora, H. Gall. **Development Emails Content Analyzer: Intention Mining in Developer Discussions**. In: *30th international conference on Automated Software Engineering (ASE 2015)*. Lincoln, Nebraska. *Core RANK: A*.
<https://doi.org/10.1109/ASE.2015.12>
- [30] S. Panichella, A. Di Sorbo, E. Guzman, C. Visaggio, G. Canfora, H. Gall. **How Can I Improve My App? Classifying User Reviews for Software Maintenance and Evolution**. In: *Proceedings of the 31st International Conference on Software Maintenance and Evolution (ICSME 2015)*. Bremen, Germany. *Core RANK: A*.
<https://doi.org/10.1109/ICSM.2015.7332474>
- [31] G. Schermann, M. Brandtner, S. Panichella, P. Leitner, H. Gall. **Discovering Loners and Phantoms in Commit and Issue Data**. In: *Proceedings of the 37th International Conference on Program Comprehension (ICPC 2015)*. Firenze, Italy. *Core RANK: C*.
<https://doi.org/10.1109/ICPC.2015.10>
- [32] S. Panichella, V. Arnaoudova, M. Di Penta, G. Antoniol. **Would Static Analysis Tools Help Developers with Code Reviews?**. In: *Proceedings of the 22nd International Conference on Software Analysis, Evolution and Reengineering (SANER 2015)*. Montreal, Canada.
<https://doi.org/10.1109/SANER.2015.7081826>

Conference Publications during the PhD experience:

- [33] S. Panichella, G. Bavota, M. Di Penta, G. Canfora, G. Antoniol. **How Developers' Collaborations Identified from Different Sources Tell us About Code Changes**. In: *Proceedings of the 30th International Conference on Software Maintenance and Evolution (ICSME 2014)*. Victoria, Canada. *Core RANK: A*.
<https://doi.org/10.1109/ICSME.2014.47>
- [34] G. Bavota, S. Panichella, N. Tsantalis, M. Di Penta, R. Oliveto, G. Canfora. **Recommending Refactorings based on Team Co-Maintenance Patterns..** In: *29th international conference on Automated Software Engineering (ASE 2014)*. Vasteras, Sweden. *Core RANK: A*.
<https://doi.org/10.1109/ICSE.2017.18>
- [35] C. Vassallo, S. Panichella, G. Canfora, M. Di Penta. **CODES: mining source Code Descriptions from developer discussions**. In: *Proceedings of the 36th International Conference on Program Comprehension (ICPC 2014)*. Hyderabad, India. *Core RANK: C*.
<http://doi.acm.org/10.1145/2597008.2597799>
- [36] S. Panichella, G. Canfora, M. Di Penta, R. Oliveto. **How the Evolution of Emerging Collaborations Relates to Code Changes: an Empirical Study**. In: *Proceedings of the 36th International Conference on Program Comprehension (ICPC 2014)*. Hyderabad, India. *Core RANK: C*.
<http://doi.acm.org/10.1145/2597008.2597145>
- [37] G. Bavota, G. Canfora, M. Di Penta, R. Oliveto, S. Panichella. ***The Evolution of Project Inter-Dependencies in a Software Ecosystem: the Case of Apache**. In: *Proceedings of the 29th International Conference on Software Maintenance (ICSM 2013)*. Eindhoven, Netherlands. *Core RANK: A*.
<https://doi.org/10.1109/ICSM.2013.39>

- [38] G. Bavota, G. Canfora, M. Di Penta, R. Oliveto, S. Panichella. ***An Empirical Investigation on Documentation Usage Patterns in Maintenance Tasks**. In: *Proceedings of the 29th International Conference on Software Maintenance (ICSM 2013)*. Eindhoven, Netherlands. *Core RANK: A*.
<https://doi.org/10.1109/ICSM.2013.32>
- [39] G. Canfora, M. Di Penta, S. Giannantonio, R. Oliveto, S. Panichella. ***YODA: Young and newOmer Developer Assistant**. In: *Proceedings of the 35th International Conference on Software Engineering (ICSE 2013)*. San Francisco, CA, USA. *Core RANK: A**.
<https://doi.org/10.1109/ICSE.2013.6606710>
- [40] G. Canfora, A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Multi-Objective Cross-Project Defect Prediction**. In: *Proceedings of the 7th International Conference on Software Testing, Verification and Validation (ICST 2013)*. Luxembourg. *Core RANK: A*.
<https://doi.org/10.1109/ICST.2013.38>
- [41] G. Canfora, M. Di Penta, R. Oliveto, S. Panichella. ***Who is going to Mentor Newcomers in Open Source Projects?**. In: *Proceedings of the 29th ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE 2012)*. Cary, North Carolina, USA. *Core RANK: A**.
<http://doi.acm.org/10.1145/2393596.2393647>
- [42] A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Using IR Methods for Labeling Source Code Artifacts: Is It Worthwhile?**. In: *Proceedings of the 20th IEEE International Conference on Program Comprehension (ICPC)*, 2012. Passau, Germany. *Core RANK: C*.
<https://doi.org/10.1109/ICPC.2012.6240488>
- [43] S. Panichella, J. Aponte, M. Di Penta, A. Marcus, G. Canfora. **Mining source code descriptions from developer communications**. In: *Proceedings of the 20th IEEE International Conference on Program Comprehension (ICPC)*, 2012. Passau, Germany. *Core RANK: C*.
<https://doi.org/10.1109/ICPC.2012.6240510>
- [44] A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Improving IR-based Traceability Recovery Using Smoothing Filters**. In: *Proceedings of the 19th IEEE International Conference on Program Comprehension (ICPC) 2011*. Kingston, ON, Canada. *Core RANK: C*.
<https://doi.org/10.1109/ICPC.2011.34>

Conference Publications during the bachelor and master studies:

- [45] G. Capobianco, A. De Lucia, R. Oliveto, A. Panichella, S. Panichella. ***On the role of the nouns in IR-based traceability recovery**. In: *Proceedings of the 19th IEEE International Conference on Program Comprehension (ICPC) 2009*. Vancouver, British Columbia, Canada. *Core RANK: C*.
<https://doi.org/10.1109/ICPC.2009.5090038>
- [46] G. Capobianco, A. De Lucia, R. Oliveto, A. Panichella, S. Panichella. ***Traceability Recovery Using Numerical Analysis**. In: *Proceedings of the 16th IEEE Working Conference on Reverse Engineering (WCRE) 2009*. Lille, France. *Core RANK: B*.
<https://doi.org/10.1109/WCRE.2009.14>

BOOK CHAPTERS:

1. Harald C. Gall, Carol V. Alexandru, Adelina Ciurumelea, Giovanni Grano, Christoph Laaber, Sebastiano Panichella, Sebastian Proksch, Gerald Schermann, Carmine Vassallo, Jitong Zhao: **Data-Driven Decisions and Actions in Today's Software Development**. *The Essence of Software Engineering 2018*: 137-168

AWARDS

Awards as Reviewer:

1. **Distinguished Reviewer Award SANER 2018**
2. **Distinguished Reviewer Award SATToSE 2017**

Best Paper Awards⁴:

1. G. Grano, T. Titov, S. Panichella, H. Gall. **How High Will It Be? Using Machine Learning Models to Predict Branch Coverage in Automated Testing**. *MaLTeSQuE* (collocated with SANER 2018)
2. **Best paper award**
A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Improving IR-based Traceability Recovery Using Smoothing Filters**. In: *Proceedings of the 19th IEEE International Conference on Program Comprehension (ICPC) 2011*. Kingston, ON, Canada. *Core RANK: B*.
3. **Best tool award**
C. Vassallo, S. Panichella, G. Canfora, M. Di Penta. **CODES: mining source Code Descriptions from developer discussions**. In: *Proceedings of the 36th International Conference on Program Comprehension (ICPC 2014)*. Hyderabad, India. *Core RANK: B*.
4. **Best tool award**
L. Pelloni, G. Grano, A. Ciurumelea, S. Panichella, F. Palomba, H. Gall. **BE-CLoMA: Augmenting Stack Traces with User Review Information..** *Proceedings of the IEEE 25th International Conference on Software Analysis, Evolution and Reengineering (SANER 2018)*

NOMINATED AS
BEST PAPER

In papers marked with (*) the authors are listed in alphabetic order.

1. G. Grano, A. Ciurumelea, S. Panichella, F. Palomba, H. Gall. **Exploring the Integration of User Feedback in Automated Testing of Android Applications..** *Proceedings of the IEEE 25th International Conference on Software Analysis, Evolution and Reengineering (SANER 2018)*
2. C. Vassallo, S. Panichella, F. Palomba, S. Proksch, A. Zaidman and H. Gall. **Context is King: The Developer Perspective on the Usage of Static Analysis Tools..** *Proceedings of the IEEE 25th International Conference on Software Analysis, Evolution and Reengineering (SANER 2018)*
3. C. Alexandru, S. Panichella, Harald Gall. **Reducing Redundancies in Multi-Revision Code Analysis**. In: *24th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER) 2017*. Klagenfurt, Austria. *Core RANK: B*.

⁴ In papers marked with (*) the authors are listed in alphabetic order

4. S. Panichella, G. Bavota, M. Di Penta, G. Canfora, G. Antoniol. **How Developers' Collaborations Identified from Different Sources Tell us About Code Changes**. In: *Proceedings of the 30th International Conference on Software Maintenance and Evolution (ICSME 2014)*. Victoria, Canada. *Core RANK: A*.
5. S. Panichella, G. Canfora, M. Di Penta, R. Oliveto. **How the Evolution of Emerging Collaborations Relates to Code Changes: an Empirical Study**. In: *Proceedings of the 36th International Conference on Program Comprehension (ICPC 2014)*. Hyderabad, India. *Core RANK: C*.
6. G. Bavota, G. Canfora, M. Di Penta, R. Oliveto, S. Panichella. ***The Evolution of Project Inter-Dependencies in a Software Ecosystem: the Case of Apache**. In: *Proceedings of the 29th International Conference on Software Maintenance (ICSM 2013)*. Eindhoven, Netherlands. *Core RANK: A*.
7. G. Canfora, A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Multi-Objective Cross-Project Defect Prediction**. In: *Proceedings of the 7th International Conference on Software Testing, Verification and Validation (ICST 2013)*. Luxembourg. *Core RANK: C*.
8. A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Using IR Methods for Labeling Source Code Artifacts: Is It Worthwhile?**. In: *Proceedings of the 20th IEEE International Conference on Program Comprehension (ICPC)*, 2012. Passau, Germany. *Core RANK: C*.
9. A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella. ***Improving IR-based Traceability Recovery Using Smoothing Filters**. In: *Proceedings of the 19th IEEE International Conference on Program Comprehension (ICPC)* 2011. Kingston, ON, Canada. *Core RANK: C*.

PROFESSIONAL
SERVICES AND
EXPERIENCES

Keynote Speaker of International Conferences and co-located events:

- Keynote speaker at VST 2018 (co-located to SANER 2018)
(<http://vst2018.scch.at/#program>)

Editor or Co-editor of special Issues at International Journals:

- Editor of a the special Issue at EMSE entitled 'Software Engineering for Mobile Applications'
- Editor of a the special Issue at IST entitled 'User Feedback and Software Quality in the Mobile Domain'

Organising research workshops:

- **Co-organizer of the CHOOSE-forum 2017**
(<http://www.choose.s-i.ch/events/forum2017/index.html>)

Organising committee member of International Conferences:

- **Program Committee member** of 26th edition of the IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2019), Zhejiang University in Hangzhou
- **Program Committee member** of 34th International Conference on Software Maintenance and Evolution (ICSME 2018).
- **Program Committee member** of 34th International Conference on Software Maintenance and Evolution (ICSME 2018).
- **Program Committee member** of ESEC/FSE 2018 - Formal Demonstration Track (FSE 2018).

- **Program Committee member** of the 1st International Workshop on Machine Learning and Software Engineering in Symbiosis (MASES18), Montpellier, France.
- **Program Committee member** of the 10th Symposium on Search-Based Software Engineering, Montpellier, France.
- **Program Committee member** of SBST 2018 (11th International Workshop on Search-Based Software Testing), Gothenburg, Sweden.
- **Program Committee member** of 15th Working Conference on Mining Software Repositories (MSR 2018), Gothenburg, Sweden.
- **Program Committee member** of 25th edition of the IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2018), Campobasso, Italy
- **Program Committee member** of the 40th International Conference on Software Engineering - Student Research Competition (ICSE SRC 2018), May 27 - 3 June 2018, Gothenburg, Sweden
- **Expert Review Panel Member of the 32nd IEEE/ACM International Conference on Automated Software Engineering (ASE 2017)**, Urbana-Champaign, Illinois, USA.
- **Program Committee member** of the 33rd International Conference on Software Maintenance and Evolution (ICSME Tool Demo Track 2017), Shanghai, China.
- **Program Committee member** of the 24th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER ERA TRACK 2017), Klagenfurt, Austria.
- **Program Committee member** of the 25th International Conference on Program Comprehension (ICPC ERA TRACK 2017), Buenos Aires, Argentina.
- **Program Committee member** of the 43rd Estimation and Prediction in Software and Systems Engineering (SEAA 2017), Vienna, 2017.
- **Program Committee member** of 10th Seminar on Advanced Techniques & Tools for Software Evolution” (SATToSE 2017), Madrid, Spain.
- **Program Committee member** of the 38th International Conference on Software Engineering (ICSE 2016), Austin, TX, May 14 - 22, 2016
- **Program Committee member** of the 13th International Conference on Mining Software Repositories (MSR 2016) - Mining Challenge, Austin, TX, May 14 - 15, 2016
- **Program Committee member** of the 24th International Conference on Program Comprehension (ICPC 2016), Austin, TX, 2016.
- **Program Committee member** of the 42nd Euromicro Conference on Software Engineering and Advanced Applications (SEAA2016), Limasol, Cyprus, August 31 - September 2, 2016
- **Program Committee member** of the 41st Euromicro Conference on Software Engineering and Advanced Applications (SEAA2015), Funchal, Madeira, Portugal.
- **Program Committee member of the 23rd International Conference on Program Comprehension (ICPC 2015)**, Firenze, Italia.
- **Program Committee member** of the 22nd International Conference on Program Comprehension (ICPC 2014), Hyderabad, India.

Session Chair of International Conferences::

- *of the 24th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER 2017 - ERA Track), Klagenfurt, Austria.*
- *at the MSR 2018 - technical session, entitled "APIs and Code", Gothenburg, Sweden.*

Web Chair

- *21st International Conference on Program Comprehension (ICPC 2013), San Francisco, California, USA.*

Editorial Board Member of International Journals:

- *Journal of Software: evolution and process.*

Review Board Member of International Journals:

- *Empirical Software Engineering (EMSE).*

Reviewer for the following International Journals:

- *Empirical Software Engineering.*
- *Transactions on Software Engineering.*
- *Transactions on Software Engineering and Methodology.*
- *Journal of Systems and Software.*
- *Information and Software Technology.*
- *Journal of Software: Evolution and Process.*
- *Science of Computer Programming.*
- *Journal of Computer Science and Technology.*
- *Communications of the ACM*

Additional reviewer of International Conferences:

- 31st IEEE/ACM International Conference on Automated Software Engineering (ASE 2016), Singapore, Singapore.
- 30th IEEE/ACM International Conference on Automated Software Engineering (ASE 2015), Lincoln, Nebraska, USA.
- 22nd IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER 2015), Montreal, Canada.

Internships

- *From 27 May 2013 to 27 July 2013 he has been a visiting researcher at the Ecole Polytechnique de Montréal, Canada. Supervisor: Prof. Giuliano Antoniol*

External Reviewer of Grant Applications

- *External Reviewer of projects submitted in the Quebec-Flanders bilateral research cooperation program*

Research Meetings

- *Sebastiano Panichella was invited by the National Institute of Informatics (NII), Japan, to participate in NII Shonan Meeting entitled “Mobile App Store Analytics” (Japan).*
- *Sebastiano Panichella was invited by the Adesso company, Switzerland, to participate in “Adesso Quartalsmeeting” 24th feb 2016 (Zurich).*

GRANTS AND EU PROJECTS

EU projects

- Sebastiano Panichella was partially funded with Gabriele Bavota, Gerardo Canfora, Massimiliano Di Penta, in the EU FP7-ICT-2011-8 project Markos, contract no. 317743. Specifically, the MARKOS project aimed to realize the prototype of a service and an interactive application providing an integrated view on the Open Source projects available the on web, focusing on functional, structural and licenses aspects of software code. My effort is focused on implementing relevant aspects of the Software System realized by Markos and and a generate new research results in the field of Software Engineering. Particular effort is spent on analysis of source code to study the evolution of software project to automatically extract reusable components from source code. From the other things I also extract licensing statements from the source code to monitor their evolution and avoid that changes in source code also generate the break of licenses.

SNF projects

- Sebastiano Panichella obtained funding for the SURF-MobileAppsData SNF (No. 200021–166275) project. The goal of the SURF-MobileAppsData project is mining

mobile apps data available in app stores to support software engineers in better supporting maintenance and evolution activities for these apps (**Total SNSF (CHF) 349,926**).

TALKS GIVEN

International Summer School on Software Engineering 2011

How identify Mentors in software projects? Discussion and perspectives *July 2011*.

FSE 2012

Who is going to Mentor Newcomers in Open Source Projects?, *November 2012*.

ICPC 2012

Mining source code descriptions from developer communications, *June 2012*.

ICSE 2013

YODA: Young and newcOmer Developer Assistant, *May 2013*.

ICSM 2013

Empirical Investigation on Documentation Usage Patterns in Maintenance Tasks, *September*.

CSER 2013 - Concordia University downtown Montral (<http://concordia.ca>)

Supporting Developers, Mining of Software Repositories, *June*.

ICPC 2014

How the Evolution of Emerging Collaborations Relates to Code Changes: an Empirical Study, *June*.

ICPC 2014

CODES: mining souRce cOde Descriptions from developERs diScussions, *June*.

ICMSE 2014

How Developers' Collaborations Identified from Different Sources Tell us About Code Changes, *September*.

ASE 2014

Recommending Refactorings based on Team Co-Maintenance Patterns, *September*.

SANER 2015

Would Static Analysis Tools Help Developers with Code Reviews? *March*.

ICSME 2015

How Can I Improve My App? Classifying User Reviews for Software Maintenance and Evolution, *October*.

ICSME 2015

Supporting Newcomers in Software Development Projects, *October*.

ASE 2015

Development Emails Content Analyzer: Intention Mining in Developer Discussions, *November*.

EOSESE 2015

Textual Analysis or Natural Language Parsing? A Software Engineering Perspective, *December*.

“Adesso Quartalsmeeting” - 2016

Summarization Techniques for Code, Changes, and Testing, *February*.

Invited by Gran Sasso Science Institute, Center of Advanced Studies - 2016

Systematic Mining of Software Repositories, *July*.

ICSE 2016

The Impact of Test Case Summaries on Bug Fixing Performance: An Empirical Investigation, *May*.

FSE 2016

ARdoc: App Reviews Development Oriented Classifier, *November*.

FSE 2016

What Would Users Change in My App? Summarizing App Reviews for Recommending Software Changes, *November*.

ICSE 2017

SURF: Summarizer of User Reviews Feedback., *May*.

ICSE 2017

Analyzing APIs Documentation and Code to Detect Directive Defects, *May*.

VSS 2017

Summarization Techniques for Code, Change, Testing and User Feedback *December*.

VST (collocated with SANER 2018)

Summarization Techniques for Code, Change, Testing and User Feedback *March*.

PHD STUDENTS
SUPERVISED

Carol V. Alexandru, PhD student at University of Zurich, Switzerland, 2016.

- *A Search-based Training Algorithm for Cost-aware Defect Prediction* (GECCO 2016).
- *What Would Users Change in My App? Summarizing App Reviews for Recommending Software Changes* (FSE 2016).
- *ARdoc: App Reviews Development Oriented Classifier* (FSE 2016).
- *Exploring Deep Learning Techniques for Supporting the Mining of information in Structured and Unstructured Data*.
- *Reducing Redundancies in Multi-Revision Code Analysis* (SANER 2017).
- *Replicating Parser Behavior using Neural Machine Translation* (ICPC 2017).
- *Redundancy-free Analysis of Multi-revision Software Artifacts*. EMSE 2018
- *On the Usage of Pythonic Idioms. Artifacts*. ONWARD 2018

Giovanni Grano, PhD student at University of Zurich, Switzerland, 2017.

- *Exploring the Integration of User Feedback in Automated Testing of Android Applications* (SANER 2018).
- *BECLoMA: Augmenting Stack Traces with User Review Information* (SANER 2018).
- *How High Will It Be? Using Machine Learning Models to Predict Branch Coverage in Automated Testing*. MaLTesQuE (collocated with SANER 2018).
- *Android Apps and User Feedback: a Dataset for Software Evolution and Quality Improvement* (WAMA 2017).

Adelina Ciurumelea, PhD student at University of Zurich, Switzerland, 2016.

- *Exploring the Integration of User Feedback in Automated Testing of Android Applications* (SANER 2018).
- *BECLoMA: Augmenting Stack Traces with User Review Information* (SANER 2018).
- *Recommending and Localizing Code Changes for Mobile Apps based on User Reviews* (ICSE 2017).

- *Analyzing Reviews and Code of Mobile Apps for better Release Planning* (SANER 2017).

Carmine Vassallo, PhD student at University of Zurich, Switzerland, 2016.

- *A Tale of CI Build Failures: an Open Source and a Financial Organization Perspective* (ICSME 2017).

- *Context is King: The Developer Perspective on the Usage of Static Analysis Tools* (SANER 2018).

Gerald Schermann, PhD student at University of Zurich, Switzerland, 2015.

Discovering Loners and Phantoms in Commit and Issue Data (ICPC 2015).

Andrea Di Sorbo, PhD student at University of Sannio, Italy, 2016.

- *How Can I Improve My App? Classifying User Reviews for Software Maintenance and Evolution* (ICSME 2015).

- *Development Emails Content Analyzer: Intention Mining in Developer Discussions* (ASE 2015).

- *DECA: Development Emails Content Analyzer* (ICSE 2016).

- *What Would Users Change in My App? Summarizing App Reviews for Recommending Software Changes* (FSE 2016).

- *ARdoc: App Reviews Development Oriented Classifier* (FSE 2016).

- *SURF: Summarizer of User Reviews Feedback* (ICSE 2017). - *Android Apps and User Feedback: a Dataset for Software Evolution and Quality Improvement* (WAMA 2017).

MASTER
STUDENTS
SUPERVISED

Timofey Titov, Master student at University of Zurich, Switzerland, 2017.

- *BECLoMA: Augmenting Stack Traces with User Review Information* (SANER 2018).

Alessandro Rigamonti, Master student at University of Zurich, Switzerland, 2017.

Develop search-based approaches to better predict change and defect prone classes. Zurich, Switzerland. 2016.

Carmine Vassallo, Master student at University of Sannio, Italy.

CODES: mining source code descriptions from developers discussions. (ICPC 2014)

Te Tan, master student at University of Zurich, Switzerland, 2017.

Advised on a Work on App Store Mining..

Simon Taennler, master student at University of Zurich, Switzerland, 2017.

Advised on a Work on App Store Mining..

BACHELOR
STUDENTS
SUPERVISED

Farul Acibal, bachelor student at University of Zurich, 2018.

Nik Zaugg, bachelor student at University of Zurich, Switzerland, 2018.

Gulshan Kundra, master student at LUT, Finland, 2018.

Ivan Taraca, bachelor student at University of Zurich, Switzerland, 2017.

Tool-support for Test Cases Summaries generator and Enhancements.

Alexander Hofmann, bachelor student at University of Zurich, Switzerland, 2017.

ChangeAdvisor - A tool for Recommending and Localizing Change Requests for Mobile Apps based on User Reviews..

Antonio Galluccio, Bachelor student at University of Zurich, Switzerland, 2017.

Toward Generating Test Case Summaries..

Lucas Pelloni, Bachelor student at University of Zurich, Switzerland, 2017.

- BECLoMA: Augmenting Stack Traces with User Review Information (SANER 2018).

Andreas Schaufelbhl, Bachelor student at University of Zurich, Switzerland, 2016.

Analyzing Reviews and Code of Mobile Apps for better Release Planning. (SANER 2017).

Stefano Giannantonio, Bachelor student at University of Molise, Italy.

YODA: Young and newOmer Developer Assistant. (ICSE 2013)

SKILLS,
COMPETENCIES
GAINED DURING
THE PHD

Statistics:

During the PhD experience, because of his work in “Empirical software engineering”, he gained good experience in Statistics (the R environment was the main tool used for such purposes). He widely used several statistical tests (parametric and non) for formulating hypothesis and demonstrating the statistical significance (or superiority) of the proposed techniques.

Main Programming Languages:

He currently uses for his work programming languages like Java (high level), Perl (base level). He is very skilled in scripting languages like R (high level), Matlab (medium level), Weka, RWeka.

Main Competencies Gained:

1) Machine Learning, Text Analysis and Natural Language Processing

He is an expert in Mining of Software repositories and successfully adopted/conceived tools based on Machine Learning (ADTree, Logistic Regression etc.) methods, Natural Language Processing (Stanford NLP parser, Stanford NLP POS Tagger etc.) techniques and Text Analysis (e.g. Vector Space Model, Latent Dirichlet Allocation, Latent Semantic Indexing Jensen and Shannon Model etc.) techniques. For example, a specific example of application of such competencies is represented by the implementation of the tool ARdoc (App Reviews Development Oriented Classifier) which is a Java tool that automatically recognizes natural language fragments in user reviews that are relevant for developers to evolve their applications. Specifically, natural language fragments are extracted according to a taxonomy of app reviews categories that are relevant to software maintenance and evolution. The categories were defined in our previous paper entitled “*How Can I Improve My App? Classifying User Reviews for Software Maintenance and Evolution*” and are: (i) Information Giving, (ii) Information Seeking, (iii) Feature Request and (iv) Problem Discovery. ARdoc implements an approach that merges three techniques: (1) Natural Language Processing, (2) Text Analysis and (3) Sentiment Analysis to automatically classify app reviews into the proposed categories. The purpose of ARdoc is to capture informative user reviews (requesting a new feature, description of a problem, or proposing a solution) and consequently to allow developers to better manage the information contained in user reviews.

2) Genetic Algorithms in SE

His research has yielded approaches to predict future defects in software artifacts based on historical information, thus assisting companies in effectively allocating limited development resources and developers in reviewing each others code changes. Developers are unlikely to devote the same effort to inspect each software artifact predicted to contain defects, since the effort varies with the artifacts size (cost) and the number of defects it exhibits (effectiveness). He adopted Genetic Algorithms (GAs) for training prediction models to maximize their cost-effectiveness. The evaluation of the approach was performed on on two well-known models, Regression Tree and Generalized Linear Model, and predict defects between multiple releases of six open source projects. The achieved results show that regression models trained by GAs significantly outperform their traditional counterparts, improving the cost-effectiveness by up to 240%. Often the top 10% of predicted lines of code contain up to twice as many defects.

3) *Social Network Analysis*

He is also an expert in Social Network Analysis (SNA) and has successfully used such information for profiling developers/expert in developers' SNA. See for example the papers *How the Evolution of Emerging Collaborations Relates to Code Changes: an Empirical Study* and *Who is going to Mentor Newcomers in Open Source Projects?* and download the related tool Yoda (Young and newcOmer Developer Assistant) which is an Eclipse plugin (available in <https://spanichella.github.io/tools.html>) able to profile expert in developers' SNA.

4) *Other technologies*

Other languages that he used during his academic experience are C, C++, Perl, Scilab, Pascal, Visual basic, Prolog, Lisp, PHP, JSP and Servlet. I also have strong experience with scientific software and tools, such as Matlab, R, Weka, that are widely used to build mathematical models through machine learning techniques (including defect prediction models). Other technologies and tools that he used during the academic years include SVN/GIT and DBMS, PostgreSQL, Gerrit code review Tool.

He works currently without problem with different Operating Systems, like Windows, Mac OS, and Linux (I know very well the Ubuntu distribution).

He is also very familiar with SQL (He currently use for his research work PostgreSQL). He proficiently use GIT/SVN as versioning systems. He also wrote a series of research paper using Latex tool as main reference.

RESEARCH TOOLS **YODA:**

IMPLEMENTED

Yoda (Young and newcOmer Developer Assistant) is an Eclipse plugin (available in <https://spanichella.github.io/tools.html>) that identifies and recommends mentors for newcomers joining a software project. Yoda mines developers' communication (e.g., mailing lists) and project versioning systems to identify mentors using an approach inspired to what ArnetMiner does when mining advisor/student relations. Then, it recommends appropriate mentors based on the specific expertise required by the newcomer.

CODES:

CODES (mining source code Descriptions from developers discussions) is an Eclipse plugin (available in <https://spanichella.github.io/tools.html>) to automatically extract method descriptions of Java Systems from discussions in StackOverflow. Actually, CODES implements an approach defined in our previous work [2], that automatically extracts method descriptions from developers' communication. CODES considers as good descriptions paragraphs describing methods that obtained the higher score and allows developers to put the chosen description into the code as a Javadoc comment also becoming de facto an API description.

DECA:

DECA (Development Emails Content Analyzer) is a java tool (available in <https://spanichella.github.io/tools.html>) to automatically recognize natural language fragments in emails that are relevant in the software engineering domain. Actually, DECA implements an approach which allows to recognize most informative sentences for development purposes by exploiting a set of recurrent natural language patterns that developers often use in such communication channel. DECA purpose is to capture the intent of each informative sentence (requesting a new feature, description of a problem, or proposing a solution) and consequently to allow developers to better manage the information contained in emails.

ARdoc:

ARdoc (App Reviews Development Oriented Classifier) is a Java tool that automatically recognizes natural language fragments in user reviews that are relevant for developers to evolve their applications. Specifically, natural language fragments are extracted according to a taxonomy of app reviews categories that are relevant to software maintenance and evolution. The categories were defined in our previous paper entitled "*How Can I Improve My App? Classifying User Reviews for Software Maintenance and Evolution*" and are: (i) Information Giving, (ii) Information Seeking, (iii) Feature Request and (iv) Problem Discovery. ARdoc implements an approach that merges three techniques: (1) Natural Language Processing, (2) Text Analysis and (3) Sentiment Analysis to automatically classify app reviews into the proposed categories. The purpose of ARdoc is to capture informative user reviews (requesting a new feature, description of a problem, or proposing a solution) and consequently to allow developers to better manage the information contained in user reviews.

SURF:

Continuous Delivery (CD) enables mobile developers to release small, high quality chunks of working software in a rapid manner. However, faster delivery and a higher software quality do neither guarantee user satisfaction nor positive business outcomes. Previous work demonstrates that app reviews may contain crucial information that can guide developer's software maintenance efforts to obtain higher customer satisfaction. However, previous work also proves the difficulties encountered by developers in manually analyzing this rich source of data, namely (i) the huge amount of reviews an app may receive on a daily basis and (ii) the unstructured nature of their content. In this paper, we introduce **SURF** (Summarizer of User Reviews Feedback) a tool able to (i) analyze and classify the information contained in app reviews and (ii) distill actionable change tasks for improving mobile applications. Specifically, SURF performs a systematic summarization of thousands of user reviews through the generation of an interactive, structured and condensed agenda of recommended software changes. An end-to-end evaluation of SURF, involving 2622 reviews related to 12 different mobile applications, demonstrates the high accuracy of SURF in summarizing user reviews content. In evaluating our approach we also involve the original developers of some analyzed apps, who confirm the practical usefulness of the software changes recommended

by SURF.

BECLoMA: Augmenting Stack Traces with User Review Information: Mobile devices such as smartphones, tablets and wearables are changing the way we do things, radically modifying our approach to technology. To sustain the high competition characterizing the mobile market, developers need to deliver high quality applications in a short release cycle. To reveal and fix bugs as soon as possible, researchers and practitioners proposed tools to automate the testing process. However, such tools generate a high number of redundant inputs, lacking of contextual information and generating reports difficult to analyze. In this context, the content of user reviews represents an unmatched source for developers seeking for defects in their applications. However, no prior work explored the adoption of information available in user reviews for testing purposes. In this demo we present **BECLoMA**, a tool to enable the integration of user feedback in the testing process of mobile apps. **BECLoMA** links information from testing tools and user reviews, presenting to developers an augmented testing report combining stack traces with user reviews information referring to the same crash. We show that **BECLoMA** facilitates not only the diagnosis and fix of app bugs, but also presents additional benefits: it eases the usage of testing tools and aut

LANGUAGES

Sebastiano Panichella currently speak three languages: Italian (mather tongue), English (*B2*) and German (*A1.2*). He is still studying German for achieving the level B2.

TEACHING
EXPERIENCE

University of Zurich, Switzerland

Lecturer

Fall semester 2017

- Sebastiano Panichella will be the Lecturer for the *Software Maintenance and Evolution* course.

Course Description: *Software maintenance is a substantial part in the life-cycle of a software system. Typical studies show that more than 2/3 of the efforts are invested into modifications after delivery to correct faults, to improve performance, or to adapt to various other requirements such as platform or business changes. It seems obvious, therefore, that we need effective techniques and tools to support these activities to save costs and personnel resources in development and testing.*

*In this course students learn the foundations of software evolution and maintenance. This includes successful but aged software systems (i.e. legacy software), object-oriented reengineering, refactoring, change patterns, empirical analysis of software, defect prediction models, software quality analysis, or software evolution visualization. We will also present platforms and tools such as SOFAS, ChangeDistiller, or Software Evolution Facets.***Learning Goals:** Learn theories, models, tools, and processes for the maintenance and evolution of large software systems.

Lecturer

March-June 2016

- Lecturer for the *Software Maintenance and Evolution* course.

Course Description: *Software maintenance is a substantial part in the life-cycle of a software system. Typical studies show that more than 2/3 of the efforts are invested into modifications after delivery to correct faults, to improve performance, or to adapt to various other requirements such as platform or business changes. It seems obvious, therefore, that we need effective techniques and tools to support these activities to save costs and personnel resources in development*

and testing.

In this course students learn the foundations of software evolution and maintenance. This includes successful but aged software systems (i.e. legacy software), object-oriented reengineering, refactoring, change patterns, empirical analysis of software, defect prediction models, software quality analysis, or software evolution visualization. We will also present platforms and tools such as SOFAS, ChangeDistiller, or Software Evolution Facets. **Learning Goals:** Learn theories, models, tools, and processes for the maintenance and evolution of large software systems.

Lecturer

March-June 2015

- Lecturer for the *Software Maintenance and Evolution* course.

Course Description: Software maintenance is a substantial part in the life-cycle of a software system. Typical studies show that more than 2/3 of the efforts are invested into modifications after delivery to correct faults, to improve performance, or to adapt to various other requirements such as platform or business changes. It seems obvious, therefore, that we need effective techniques and tools to support these activities to save costs and personnel resources in development and testing.

In this course students learn the foundations of software evolution and maintenance. This includes successful but aged software systems (i.e. legacy software), object-oriented reengineering, refactoring, change patterns, empirical analysis of software, defect prediction models, software quality analysis, or software evolution visualization. We will also present platforms and tools such as SOFAS, ChangeDistiller, or Software Evolution Facets. **Learning Goals:** Learn theories, models, tools, and processes for the maintenance and evolution of large software systems.

- Co-Lecturer (with Prof. Harald Gall and Dr. Philipp Leitner) for the *Advanced Software Engineering* course.

March-June 2015

Course Description: Software maintenance is a substantial part in the life-cycle of a software system. Typical studies show that more than 2/3 of the efforts are invested into modifications after delivery to correct faults, to improve performance, or to adapt to various other requirements such as platform or business changes. It seems obvious, therefore, that we need effective techniques and tools to support these activities to save costs and personnel resources in development and testing.

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University of Sannio, Italy

Lab Instructor

December 2013

- Lab instructor for the Programming Techniques course of Professor Gerardo Canfora:
 - The Languages and Grammars

- JavaCC parser

University of Sannio, Italy

Teaching Assistant

- Teaching Assistant for the Software Engineering course of Prof. Massimiliano Di Penta:
 - Recovering Traceability Links via Information Retrieval Methods
- Seminars at the *Ecole Polytechnique de Montreal*:
 - Who is going to Mentor Newcomers in Open Source Projects?
- Mining Source Code Descriptions from Developers Communications

University of Molise, Italy

Seminary

- Seminary in the Software Engineering course of Dott. Rocco Oliveto:
 - Improving IR-based Traceability Recovery Using Smoothing Filters.

PROFESSIONAL MEMBERSHIPS

- IEEE Membership (2011–present)

REFERENCES

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