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SBES 2020

34th Brazilian Symposium on Software Engineering

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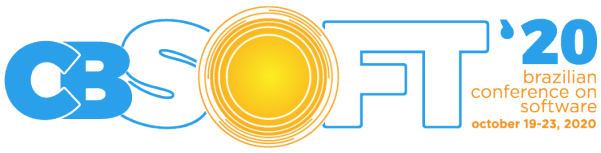

PROCEEDINGS

34th Brazilian Symposium on Software Engineering

— SBES 2020 —

October 21-23, 2020

Natal, Rio Grande do Norte, Brazil

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Foreword

The Brazilian Symposium on Software Engineering (SBES), annually promoted by the Brazilian Computer Society (SBC), is the premier Software Engineering event in Latin America. SBES is held in conjunction with the Brazilian Conference on Software: Theory and Practice (CBSoft) since 2010. The CBSoft program includes sessions from several co-located events. It traditionally puts together academics, practitioners and students. This year, for the first time since its creation in 1987, SBES will be held virtually, due to the COVID-19 pandemic. In spite of this, we have a record number of papers in the four tracks of the event.

The technical program of SBES 2020 includes papers from the Research, Insightful Ideas and Emerging Results, Education, and Tools tracks. The program also includes three keynote speakers: (i) Alexander Serebrenik (Eindhoven University of Technology, Netherlands); (ii) Ana Regina Rocha (Federal University of Rio de Janeiro, Brazil); and (iii) Paulo Borba (Federal University of Pernambuco, Brazil). All the accepted papers are presented in technical sessions that include papers from all tracks.

The SBES 2020 *Research Track* focuses on solid results with a strong contribution to the Software Engineering community. Papers on this track are reviewed based on their originality, relevance, technical soundness, and clarity of presentation, and can be analytical, experimental (primary study), literature review (secondary study), technological, or methodological.

The SBES 2020 *Insightful Ideas and Emerging Results Track* focuses on new and inspiring ideas with promising future results, as well as on research work in progress with preliminary and interesting results. The track welcomes innovative Software Engineering approaches (methods, techniques, and tools) in the early stages of research. It has been organized at SBES since 2015.

The SBES 2020 *Education Track* publishes high-quality papers that address challenges, innovations, and best practices in Software Engineering education. The track focuses on curriculum development, empirical studies, personal or institutional experiences, and conceptual or theoretical work about Software Engineering education. The Education Track aims to be a space in which, through publications, presentations, and discussions of research and reports of experiences, we advance the teaching-learning process of Software Engineering. This track has been organized since 2017.

The SBES 2020 *Tools Track* focuses on original tools that provide contributions to the Software Engineering community, supporting either the development and management of software systems or empirical studies in Software Engineering. For the first time, the Tools Track was organized as a track of SBES.

The technical program of the SBES 2020 - Research Track includes a record 43 full research papers and 5 short research papers selected from 116 valid submissions. The acceptance rate was about 37% for the full research papers. They were selected after a rigorous double-blind review process in which each paper was reviewed by at least three members of the Program Committee. The review process also included a rebuttal phase in which authors had the opportunity to provide clarifications and responses to points raised by the reviewers. We thank the very active participation of the 102 Program Committee members and the 40 additional reviewers.

The technical program of the Insightful Ideas and Emerging Results Track is composed of 22 research papers selected from 47 valid submissions, a record number of accepted papers for this track. The acceptance rate was about 46%. Each submitted paper was reviewed by three members of the program committee regarding its novelty, relevance, technical soundness, and clarity of presentation. We thank the 39 Program Committee members for the great dedication to provide detailed feedback to the authors of the submitted papers.

The Education Track selected 19 papers from 53 submissions, also a record number of papers. The acceptance rate was 36%. Each submitted paper was reviewed by at least three members of the Program

Committee regarding its originality, relevance, technical soundness, and clarity of presentation. A rebuttal phase was part of the process, so authors had the opportunity to answer reviewers' questions about the manuscripts. We are very grateful to all the 65 Program Committee members and the external reviewers for their valuable and timely contribution to the reviewing process.

The technical program of the Tools Track includes 15 full papers selected from 38 valid submissions. The acceptance rate was about 39%. Each submitted tool paper and its accompanying demo video were reviewed by at least three members of the Program Committee regarding their relevance, technical soundness, and clarity of presentation. We thank the 45 members of the program committee for their effort and dedication to review the papers and actively interact during the pos-rebuttal discussions as well.

Since SBES 2019, we also acknowledge the generosity of the reviewers who give their time and best effort to referee submitted papers. A certificate of Outstanding Reviewer was awarded to three reviewers who submitted outstanding quality reviews to the SBES Research Track. After a careful evaluation based on two criteria (quality and usefulness of reviews, and reviewer active participation during the rebuttal and discussion phases), we are delighted to give the certificate of Outstanding Reviewer to Rodrigo Santos (UNIRIO, Brazil), Miguel Goulão (UNL, Portugal), Márcio Ribeiro (UFAL, Brazil), Igor Wiese (UTFPR, Brazil), Alessandro Garcia (PUC-Rio, Brazil), Gleison Santos (UNIRIO, Brazil), Igor Steinmacher (UTFPR, Brazil and Northern Arizona University, USA), and Sabrina Marckzak (PUCRS, Brazil).

We would like to thank all who contributed to this event. The quality of the technical program is a result of the dedication of the members of the Program Committee together with the additional reviewers. We also express our gratitude to the SBES Steering Committee for their great support. Finally, we thank the great and hard work of the CBSoft 2020 organization team led by Everton Cavalcante (UFRN, Brazil).

We hope you enjoy the technical program of SBES 2020.


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Gender in Open-Source Software Development

Alexander Serebrenik

Eindhoven University of Technology, The Netherlands

Abstract. This talk provides a brief overview of several recent studies of gender and gender diversity in software development teams. The main findings are: (1) more gender-diverse GitHub teams are not only more productive than less gender-diverse ones (Vasilescu et al., CHI 2015), but they are also less likely to exhibit suboptimal communication patterns (Catolino et al., ICSE-SEIS 2019) known to lead to suboptimal code patterns (Palomba et al., TSE 2019); and (2) social capital obtained by collaboration in GitHub open source projects is beneficial for duration of engagement in an open source project; diversity of information ties, i.e., involvement in very different projects, is beneficial for people of all genders, more so for women than for men (Qiu et al., ICSE 2019). It also touches on the ongoing work related to going beyond gender binary. In this preliminary study that has been based on interviews of three transgender women working in software development, it has been observed that remote work, facilitated by technological solutions, reduces barriers for participation in software development projects. It is conjectured that remote work can benefit other underrepresented minorities as well (Ford et al., ICSE-SEIS 2019).

Short bio. Alexander Serebrenik is a Full Professor of Social Software Engineering at Eindhoven University of Technology. His research goal is to facilitate evolution of software by taking into account social aspects of software development. He has co-authored a book Evolving Software Systems (Springer Verlag, 2014) and more than 100 scientific papers and articles. He has won several distinguished paper and distinguished review awards.

Return on Investment in Software Quality

Ana Regina Rocha
Federal University of Rio de Janeiro, Brazil

Abstract. This talk discusses the benefits of process improvement for software product quality and the success of organizations. In this context, two software process improvement models (CMMI-DEV v2.0 and MR-MPS-SW:2020) and a software product quality model (QPS) are presented. Finally, an approach for guiding improvement programs to the needs of each organization and the return on investment is presented.

Short bio. Ana Regina Rocha is a Full Professor at COPPE/UFRJ, Brazil. She holds PhD and Master degrees from PUC-Rio, Brazil. She supervised 30 PhD theses and 101 Master theses. She was a Board Member of the International Institute for Software Technology of the United Nations University (1994-1997). She was distinguished researcher of the Brazilian Computer Society's Special Committee on Software Engineering in 2009. In 2010, she was recipient of the Anita Borg Institute's Change Agent Awards. She participated in the definition of the *TI Maior* Program of the Brazilian Ministry of Science, Technology, and Innovations (2012). She led the team that defined the MPS-SW model, which has had more than 700 evaluations in Brazilian and Latin American companies. More recently, she led the team that defined the QPS model for software product quality. She participated in software quality projects in many companies, such as CERN, TSE, Central Bank of Brazil, Petrobras, Brazilian Aeronautics Computing Center, Casnav, PREVI, and Fiocruz. Her main areas of interest are software processes, software product quality, and Software Engineering for start-ups.

In Search of Greater Simplicity and Reliability for the Code Integration Process

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Abstract. The code integration process should be simpler and more reliable. When integrating code contributions, developers should not waste time resolving irrelevant merge conflicts. They should also not compromise system quality by integrating code contributions that unexpectedly interfere and cause defects that are difficult to detect during code review and testing activities. This talk summarizes recent studies that try to better understand and solve these problems. In particular, advanced merge tools that offer better support to developers who often integrate code have been developed. These tools explore the syntax and semantics of programming languages to achieve better accuracy in the integration process. The developed semi-structured merge tool focuses on reducing irrelevant conflicts commonly reported by tools such as `git merge`, while semantic merge tools focus on detecting conflicts that are not normally detected by `git merge` and that cause failures that affect end-users. The main obtained results, the lessons learned, and the history of this journey to reduce frustrations and unnecessary effort in code integration activities are presented.

Short bio. Paulo Borba is Professor of Software Engineering at the Informatics Center of the Federal University of Pernambuco, Brazil, where he leads the Software Productivity Group. He investigates and develops tools and techniques for improving software development quality and productivity levels, especially by reducing unnecessary effort and frustration in software developers work activities. He pursues a mix of academic excellence with industrial relevance. His main research interests are in the following topics and their integration: code integration conflicts and tools, continuous integration and deployment, software modularity, software product lines, and refactoring. Paulo holds a DPhil in Computing from the University of Oxford, and Master and Bachelor degrees in Computer Science from the Federal University of Pernambuco, Brazil. He was a founder of Qualiti Software Processes.