

Report on the 10th International Workshop on Quantitative Approaches to Software Quality (QuASoQ 2022)

Horst Lichter^a, Selin Aydin^a, Thanwadee Sunetnanta^b and Toni Anwar^c

^aResearch Group Software Construction, RWTH Aachen University, Aachen, Germany

^bComputer Science Academic Group, Faculty of Information And Communication Technology, Mahidol University, Bangkok, Thailand

^cFaculty of Science and Information Technology, Chair Computer & Information Systems, Universiti Teknologi Petronas: Bandar Seri Iskandar, Perak, MY

1. Introduction

After a successful 9th QuASoQ workshop we have again included the following topics of interest:

- New approaches to measurement, evaluation, comparison, and improvement of software quality
- Application of metrics and quantitative approaches in agile projects
- Case studies and industrial experience reports on the successful or failed application of quantitative approaches to software quality
- Tools, infrastructure, and environments supporting quantitative approaches
- Empirical studies, evaluation, and comparison of measurement techniques and models
- Quantitative approaches to test process improvement, test strategies, or testability
- Empirical evaluations or comparisons of testing techniques in industrial settings
- Mining software repositories

Overall, the workshop aimed at gathering together researchers and practitioners to discuss experiences in applying state-of-the-art approaches to measure, assess and evaluate the quality of both software systems and software development processes in general and software test processes in particular.

As software development organizations are constantly forced to develop software in the "right" quality, quality

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✉ lichter@swc.rwth-aachen.de (H. Lichter);

aydin@swc.rwth-aachen.de (S. Aydin);

thanwadee.sun@mahidol.ac.th (T. Sunetnanta);

toni.anwar@utp.edu.my (T. Anwar)

🌐 <https://www.swc.rwth-aachen.de> (H. Lichter);

<https://www.swc.rwth-aachen.de> (S. Aydin);

<https://www.ict.mahidol.ac.th> (T. Sunetnanta);

<https://www.utp.edu.my> (T. Anwar)

🆔 0000-0002-3440-1238 (H. Lichter); 0000-0002-0390-8749

(T. Anwar)

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specification and quality assurance are crucial. Although there are many approaches to deal with quantitative quality aspects, it is still challenging to choose a suitable set of techniques that best fit the specific project and organizational constraints.

Even though approaches, methods, and techniques are known for quite some time now, little effort has been spent on the exchange of real-world problems with quantitative approaches. For example, only limited research has been devoted to empirically evaluating risks, efficiency, or limitations of different testing techniques in industrial settings.

Hence, one main goal of the workshop was to exchange experience, present new promising approaches, and to discuss how to set up, organize, and maintain quantitative approaches to software quality.

2. Workshop History

The QuASoQ workshop series has been started in 2013. Since then, the workshop is always organized as a collocated event of the Asia-Pacific Software Engineering Conference (APSEC).

These are the past workshop editions:

- **9th QuASoQ 2021**
Taipei | CEUR Vol-3062
- **8th QuASoQ 2020**
Singapore | CEUR Vol-2767
- **7th QuASoQ 2019**
Putrayaya, Malaysia | CEUR Vol-2511
- **6th QuASoQ 2018**
Nara, Japan | CEUR Vol-2273
- **5th QuASoQ 2017**
Nanjing, China | CEUR Vol-2017
- **4th QuASoQ 2016**
Hamilton, New Zealand | CEUR Vol-1771
- **3rd QuASoQ 2015**
New Delhi, India | CEUR Vol-1519
- **2nd QuASoQ 2014**
Jeju, Korea | IEEE Xplore
- **1st QuASoQ 2013**
Bangkok, Thailand | IEEE Xplore

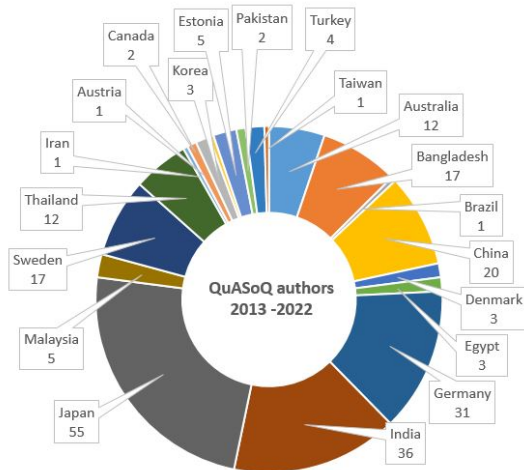


Figure 1: Origin of QuASoQ authors

Since the first edition, 67 papers have been presented; the average acceptance rate is 77 %. The chart shown in figure 1 depicts where the authors of accepted papers come from.

3. Workshop Format

Because of the covid-19 pandemic, the workshop was executed digitally using the video conferencing tool Zoom.

Based on our former experience we wanted the workshop to be highly interactive. In order to have an interesting and interactive event sharing lots of experience, we organized the workshop presentations applying the **author-discussant model**.

Based on this workshop model, papers are presented by one of the authors. After the presentation, a discussant starts the discussion based on his or her pre-formulated questions. Therefore, the discussant had to prepare a set of questions and had to know the details of the presented paper. The general structure of each talk was as follows:

- The author of a paper presented the paper (20 minutes).
- After that, the discussant of the paper opened the discussion using his or her questions. Finally, we moderated the discussion among the whole audience (10 minutes).

The presentations were divided into two sessions with a ten-minute break in-between. Each session was accompanied by a moderator who tried to ensure that the schedule was kept to. A particular challenge was the different time zones of the participants. We decided to hold the workshop in the afternoon of the timezone in

Osaka so that presenters don't have to attend at night-time. The order of presenters was also determined by their respective timezone.

4. Workshop Contributions

Altogether the following 5 papers were submitted and accepted by the program committee for presentation and publication covering very different topics.

- Hiroshi Demanou, Akito Monden and Masateru Tsunoda
A Dynamic Model Selection Approach to Mitigate the Change of Balance Problem in Cross-Version Bug Prediction
- Zhaojia Lai, Haipeng Qu and Lingyun Ying
A Composite Discover Method for Gadget Chains in Java Deserialization Vulnerability
- Rafed Muhammad Yasir and Ahmedul Kabir
Exploring the Impact of Code Styles in Identifying Good Programmers
- Umamaheswara Sharma B and Ravichandra Sadam
An Empirical Evaluation of Defect Prediction Models Using Project-Specific Measures
- Miguel Campusano, Simon Hacks and Eun-Young Kang
Towards Model Driven Safety and Security by Design

5. Summary of the Discussions

About 13 researchers attended the workshop and participated in the discussions. The author-discussant model was well received by the participants and led to intensive discussions among them. Hereby, other participants, apart from the discussant, also joined the resulting discussions.

The first discussion was on the paper by Hiroshi Demanou et. al. on the mitigation of the balance problem in cross-version bug prediction. Participants were particularly interested in the object-oriented metrics, such as LCOM, that were used in the data sets. One participant wanted to know how exactly the metrics impacted the result. Another participant was more interested in which versions of projects were used and how versioning could be considered in the approach. Both questions lead to interesting future work directions.

In the paper on identifying good programmers by an analysis of code styles by Rafed Muhammad Yasir et. al., the author's used code submitted to the Google Code Jam Competition as a data source for their analysis. Hereby, participants discussed whether results obtained from these data can be transferred to companies and their

recruiting processes. Since the accuracy value for the identification of developers by their style of code in previous work was high, the impact of auto-formatting by IDEs was considered negligible. However, both aspects need more research to make clearer statements.

The paper by Umamaheswara Sharma B et al. includes project-specific measures that were used in the empirical analysis. One participant asked if there is a link between the measures and if they can be combined. In addition, another participant asked about the effect of size (LOC) on predictions. This resulted in several approaches for future research.

Finally, the paper by Miguel Campusano et. al. led to a discussion of security design principles and provided interesting insights into the field of drones.

The discussions show, that empirical studies and the results of experiments are of high value and lead to a deeper understanding of the subject that has been investigated.

To conclude, in the course of this workshop the participants proposed and discussed different approaches to quantify relevant aspects of software development. Especially the discussions led to new ideas, insights, and takeaways for all participants.

6. Acknowledgments

Many people contributed to the success of this workshop. First, we want to give thanks to the authors and presenters of the accepted papers. Furthermore, we want to express our gratitude to the APSEC 2022 workshop organizers; they did a perfect job and gave us the freedom to conduct the workshop virtually based on our experience.

Finally, we are glad that these people served on the program committee (some of them for many years) and supported the workshop by soliciting papers and by writing peer reviews:

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- Sansiri Tanachutiwat
Thai German Graduate School of Engineering,
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- Apinporn Methawachananont
NECTEC, Thailand
- Ana Nicolaescu
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- Maria Spichkova
RMIT University, Melbourne, Australia
- Minxue Pan
Nanjing University, China
- Lov Kumar
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- Simon Hacks
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