

Integrating software quality models into risk-based testing

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Abstract: This summary refers to the paper 'Integrating software quality models into risk-based testing' [FF18]. The paper was published as an article in the Software Quality Journal. It shows for the first time how to integrate software quality models into risk-based testing.

Keywords: risk-based testing; software quality models; software testing; software risk management; software quality

1 Overview

Risk-based testing [FS14] is a frequently used testing approach which utilizes identified risks of a software system to provide decision support in all phases of the testing process. Risk assessment, which is a core activity of every risk-based testing process, is often done in an ad-hoc manual way. Software quality assessments based on quality models already describe the product-related risks of a whole software product and provide objective as well as automation-supported assessments. But so far, quality models have not been applied for risk assessment and risk-based testing in a systematic way. The paper 'Integrating software quality models into risk-based testing' fills this gap and investigates how the information and data of a quality assessment based on the established open quality model QuaMoCo [Wa12] can be integrated into risk-based testing. The paper presents two generic approaches how quality assessments based on quality models can be integrated into risk-based testing. In the first approach, a quality assessment based a quality model is conducted for each component (and the assessment results are then used to steer testing activities). In the second approach, metrics on the lowest level of the quality model hierarchy are directly used. The second approach implies one single quality assessment for a software product and further that the measured values of each metric and component are processed to an adequate probability factor for each component. Then, the concrete integration on the basis of the open quality model QuaMoCo and the second approach (because the metrics in the QuaMoCo quality model were calibrated by benchmarking whole software products) is performed in the paper. Finally, a case study is conducted based on five open source products.

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2 Results

The case study of the developed integration approach based on five open source products showed that a risk-based testing strategy outperforms a lines of code-based testing strategy according to the number of classes which must be tested in order to find all defects. On average, all defects of the five analysed software products were found by testing 51.6% of all classes when a risk-based testing strategy was applied. In contrast, 63.8% of the classes had to be tested on average when a testing strategy based on the lines of code was applied. In addition, a significant positive relationship between the risk coefficient (impact factor assumed to be constant) and the associated number of defects of a class was found. Moreover, on average 80% of all defects of the five analysed software products were found by testing 30% of all classes when a risk-based testing strategy was applied.

3 Conclusion

We summarized the paper 'Integrating software quality models into risk-based testing' [FF18] that was published as an article in the Software Quality Journal. It shows for the first time how to integrate software quality models into risk-based testing. In the future, we plan to refine the integration of risk-based testing and quality models, to perform industrial case studies, and to improve tool support.

References

- [FF18] Foidl, Harald; Felderer, Michael: Integrating software quality models into risk-based testing. *Software Quality Journal*, 26(2):809–847, 2018.
- [FS14] Felderer, Michael; Schieferdecker, Ina: A taxonomy of risk-based testing. *Software Quality Journal*, 16(5):559–568, 2014.
- [Wa12] Wagner, Stefan; Lochmann, Klaus; Heinemann, Lars; Kläs, Michael; Trendowicz, Adam; Plösch, Reinhold; Seidl, Andreas; Goeb, Andreas; Streit, Jonathan: The quamoco product quality modelling and assessment approach. In: *Proceedings of the 34th international conference on software engineering*. IEEE, pp. 1133–1142, 2012.