Impediments for automated software test execution

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Abstract
Automated software test execution is a critical part of the modern software development process, where rapid feedback on the product quality is expected. It is of high importance that impediments related to test execution automation are prevented and removed as quickly as possible. An enabling factor for all types of improvement is to understand the nature of what is to be improved. The goal with this thesis is to further the knowledge about common problems encountered by software developers using test execution automation, in order to enable improvement of test execution automation in industrial software development. The research has been performed through industrial case studies and literature reviews. The analysis of the data have primarily been performed using qualitative methods, searching for patterns, themes, and concepts in the data.

Our main findings include: (a) a comprehensive list of potential impediments reported in the published body of knowledge on test execution automation, (b) an in-depth analysis of how such impediments may affect the performance of a development team, and (c) a proposal for a qualitative model of interactions between the main groups of phenomena that contribute to the formation of impediments in a test execution automation project. In addition to this, we contribute qualitative and quantitative empirical data from our industrial case studies.

Through our results, we find that test execution automation is a commonly under-estimated activity, not only in terms of resources but also in terms of the complexity of the work. There is a clear tendency to perform the work ad hoc, down-prioritize the automation in favor of other activities, and ignore the long-term effects in favor of short-term gains. This is both a technical and a cultural problem that need to be managed by awareness of the problems that may arise, and also have to be solved in the long term through education and information. We conclude by proposing a theoretical model of the socio-technical system that needs to be managed to be successful with test execution automation.

List of Publications

Publications Included in the Doctoral Thesis


Biography
Kristian Wiklund is a researcher and product owner at Ericsson AB, where he has worked with software integration, verification, validation, quality control, and improvements for close to 15 years. Kristian has a M. Sc degree in Computer Science and Engineering (1997) and a Licentiate degree in Computer Engineering (2000), both from Chalmers University of Technology, Gothenburg, Sweden.

Kristian’s main research interests include software testing, test automation, and organizational efficiency.

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Safety-Critical Engineering
The research group Safety-Critical Engineering, led by Kristina Lundqvist, focuses on bridging the theoretical foundations of dependability and industrial software development practices, with an emphasis on the technology and process aspects of complex dependable systems.
The ITS-EASY post graduate school for Embedded Software and Systems

ITS-EASY is an industrial research school in Embedded Software and Systems, affiliated with the School of Innovation, Design and Engineering (IDT) at Mälardalen University (MDH) as an integrated part of the MDH strategic research area Embedded Systems (ES).

ITS-EASY is funded by the Knowledge Foundation (KKS), and the eleven participating companies. ITS-EASY started October 1st 2011, and will continue until September 30th 2020. During that period the PhD students will complete their studies and obtain the doctoral degree in Computer Science.

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