A Qualitative Survey of Regression Testing Practices

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Abstract. *Aim*: Regression testing practices in industry have to be better understood, both for the industry itself and for the research community. *Method*: We conducted a qualitative industry survey by i) running a focus group meeting with 15 industry participants and ii) validating the outcome in an on line questionnaire with 32 respondents. *Results*: Regression testing needs and practices vary greatly between and within organizations and at different stages of a project. The importance and challenges of automation is clear from the survey. *Conclusions*: Most of the findings are general testing issues and are not specific to regression testing. Challenges and good practices relate to test automation and testability issues.

Keywords: Regression testing, Survey, Industry practice.

1 Introduction

Regression testing is retesting of previously working software after a change to ensure that unchanged software is still functioning as before the change. According to IEEE, regression testing is *Selective retesting of a system or component to verify that modifications have not caused unintended effects and that the system or components still complies with its specified requirements* [1]. The need for effective strategies for regression testing increases with the increasing use of iterative development strategies and systematic reuse in software projects. Studies indicate that 80% of testing cost is regression testing and more than 50% of software maintenance cost is related to testing [2].

There is a gap between research and practices of regression testing. Research on regression testing mainly focuses on selection and prioritization of test cases. Several techniques for regression test selection are proposed and evaluated. Engström *et al.* reviewed the literature in the field recently [3] and highlights the importance of the test context to the outcome of regression testing techniques. Only few empirical evaluations of regression test selection techniques are carried out in a real industrial context [4], [5], [6].

However industry practice on regression testing is mostly based on experience alone, and not on systematic approaches. There is a need for researchers to better understand the needs and practices in industry. Rooksby *et al.* [7] argue for the need for investigation and characterization of real world work. They conclude

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that improvements of current testing practices are meaningful in its specific local context and "cannot be brought about purely through technically driven innovation". In their paper they highlight, based on experiences from testing in four real projects, that improvements in industry are not always sophisticated and accurate as is often pursued in research.

In order to retrieve a better understanding of real world needs and practices, a qualitative survey [8, p. 61-78] of industry practice of regression testing is conducted, by means of focus group discussions in a software process improvement network (SPIN) and a questionnaire to validate the results. Issues discussed in the focus group were definitions and practices of regression testing in industry as well as challenges and improvement suggestions. A total of 46 software engineers from 38 different organizations participated in the focus group and questionnaire survey. Results are qualitative and of great value in that they highlight relevant and possible directions for future research.

To the extent of our knowledge no industrial surveys on regression testing practices have been reported on. However experience reports on regression testing in industrial software development projects can be found [9]. Onoma *et al.* conclude that regression testing is used extensively and that several companies develop in-house regression testing tools to automate the process. Re-test all is a common approach and the selection of test cases is not a critical issue.

When it comes to testing practices in general a couple of industrial surveys have been undertaken [10], [11], [12], [13], concluding that test automation is a key improvement issue [13] and that test case selection for continuous regression testing is a hard task. No systematic approach for test case selection was used by the companies but instead they relied on the developers expertise and judgment [12].

This paper is organized as follows: Section 2 describes how the survey is conducted and discusses validity issues. In section 3 results are presented and analyzed. Finally conclusions are provided in section 4.

2 Method Description

The study's overall goal is to characterize current regression testing practices in industry for the sake of research. It also aims at identifying good practices for spreading across different companies as well as areas in need for improvement within the companies and possibly identification of future research topics. Hence, a qualitative survey is found appropriate [8, p. 61-78]. The research questions for the survey are:

RQ1 What is meant by *regression testing* in industry?
RQ2 Which *problems* or *challenges* related to regression testing exist?
RQ3 Which *good practices* on regression testing exist?

The survey is conducted using two different research methods, one focus group discussion [14, p. 284-289] in a SPIN group, and one questionnaire in a testing interest network. The focus group was used to identify concepts and issues related to regression testing, while the questionnaire was used to validate the findings