Chapter 70
Offshore Software Testing in the Automotive Industry:
A Case Study

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ABSTRACT

This paper presents a mixed-method study performed in the software department of an automotive supplier operating in India as an offshore service provider to a German company. The research focuses on the social dimension and human aspects involved in software testing in an intercultural setting. Qualitative and quantitative analyses of testers' perception regarding their daily activities and challenges were conducted. External and internal factors posing recurrent problems for testers were identified. Among the external were late inputs (documentation and software) and lack of recognition on the contribution of testing by other teams. A key internal factor was the view testers themselves hold about testing: boring when describing manual tests and interesting for the automated ones. Some of the testers feel they are not recognized by other teams and are not entirely satisfied with their job. Maintaining motivation over time was found to be a fundamental problem for testers.

INTRODUCTION

Globalization is one of the recognized trends of the 21st century that has affected almost all industries (Klein, Rausch, & Fischer, 2009; Šmite, Wohlin, Gorschek, & Feldt, 2010). The software engineering industry is no exception: today large software projects are globally developed, having teams in more than one location and often in more than one continent (Babar & Lescher, 2014; Bartelt et al., 2009; Schneider, Torkar, & Gorschek, 2013; Sundararajan, Bhasi, & Pramod, 2017). Three significant forces have pushed global software engineering forward:

1. **Economic:** Cost concerns; e.g., significant differences in cost personnel as well as a need to compete against global players who develop increasingly complex software under time and budget pressure;
2. **Organizational:** If a company is globally distributed then the project organization should naturally be distributed since resources are already in different locations;
3. **Strategic:** Localized software development brings developers closer to customers. This brings an advantage due to knowledge of the local culture (Bartelt et al., 2009).

Nonetheless, there are numerous challenges, e.g. limited synchronous and less rich communication due to the inability to establish face-to-face meetings, and a varied implementation of software engineering practices and techniques influenced by multicultural dynamics (Bartelt et al., 2009; Shah & Harrold, 2013; Šmite et al., 2010; ul Haq, Raza, Zia, & Khan, 2011). A systematic literature review (Šmite et al., 2010) showed that there is a need to conduct more empirical studies regarding software engineering practice, especially investigating the topic of testing in distributed software development (Marques, Rodrigues, & Conte). In the global context, more than in collocated settings, culture plays a fundamental role on how software engineering processes are executed and it has shown to be an important factor influencing them (Shah & Harrold, 2013).

Our objective is to study global software testing in a real-world setting. There is a need for further exploration of this topic for several reasons: Testing in general and global software testing in particular is an area of research that has received relatively little attention (Casey, 2009; Daniela S. Cruzes & Moe; Rooksby, Rouncefield, & Sommerville, 2009). Given the importance of non-technical factors in software testing activities (Shah, Harrold, & Sinha, 2014), it is important to investigate the social, cultural, and organizational aspects of global software testing in a way that does not limit culture to a set of dimensions (Shah, Nersessian, Harrold, & Newstetter, 2012). Hence, we take an inductive approach to the real-world issues that people are facing in global software testing. Our research goal is to investigate the social interaction and human aspects regarding software testing in global software engineering. With a mixed method approach using quantitative and qualitative analyses we focus on the perception of the members of a remote testing team, thus identifying the most recurrent problems that remote testers in India face in their day-to-day activities. In the following sections, we outline related work on the complex social situation of offshore software testing as the background of our study. Then we present the testing team of an automotive passive safety business unit of a large multinational engineering company working in an offshore setting as the organizational context of our study, specify the participants and our mixed-method procedure to gain insights into the testing team members' perception. The findings of the most recurrent problems and challenges are presented in the next section and finally concluding thoughts and the implication for project management are presented along with suggestions for directions of future research.

BACKGROUND

As part of the global software engineering process, offshore software testing has been growing rapidly and is expected to continue to grow in quantity and importance (Rooksby et al., 2009; Shah et al., 2014), yet global software testing has received rather little attention (Casey, 2009) (Deak, Stålhane, & Sindre, 2016; Garousi & Mäntylä, 2016). The studies that have been conducted show the importance of non-technical factors in testing. Looking at software testing in general, Martin, Rooksby, Rouncefield,

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