

Difficulties in Establishing a Defect Management Process: A Case Study

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Abstract. A well-organized defect management process is one of the success factors for implementing software projects in time and in budget. The defect management process includes defect prevention, defect discovery and resolution, defect causal analysis, and the process improvement. However, establishing an organization-wide defect management process is a complicated task. The main research question in this paper is what kind of difficulties organizations have regarding the defect management process. Our findings show that problems are related to defect resolution reports, limited project resources for fixing defects, and challenges in creating a test environment. Results are based on our observations from four case organizations. The main contribution of this study is to help organizations to identify and avoid typical problems with defect management.

1 Introduction

Establishing a defect management process is an attractive way to improve the software quality. Early detection of defects provides cost and time savings for software projects because developers need to produce less new product versions and bug fixes. Moreover, reduced number of defects in applications increases the level of customer satisfaction, and reliable software is easy to sell to new customers.

Several studies have explored defect management activities. For example, different types of defect management models have been described by the Software Engineering Institute (SEI) [1], [2], IBM [3], the IT Infrastructure Library [4], and the Quality Assurance Institute (QAI) [4]. According to the QAI, the defect management process consists of six elements: defect prevention, deliverable baselining, defect discovery, defect resolution, process improvement, and management reporting. The Defect Prevention Model of IBM [3] is focused solely on defect prevention techniques, for example, Defect Causal Analysis method. The causal analysis is used to identify the root cause of the defect [5].

Additionally, there are a number of recent studies that have presented different defect classification schemes [6],[5]. Too detailed reporting and complex classification schemes might increase defect processing costs remarkably [7]. Defect management activities are also supported by various quality standards. CMM at Level 5 considers defect management as a key process area with the following

goals: defect prevention activities are planned, common causes of defects are sought and identified, and common causes of defects are prioritized and systematically eliminated [8].

Currently, many organizations are adopting the Problem Management model described by the IT Infrastructure Library (ITIL) because ITIL has become a de facto standard for IT service management [4]. However, the ITIL model does not define how to perform testing and defect management activities as a part of IT service management. In fact, it seems to be that there is a need for both a problem management model used by the service support staff and a defect management model used by the application developers and testers. This might cause a communication gap if both counterparts use different data repositories for problems and defects.

However, few studies have examined the problems that organizations have with defect management. This study continues the work reported in our previous study [9], where we identified the advantages and problems of using an UML-based test model for creating test cases based on UML diagrams [10].

In this paper the research question is, what kind of problems do organizations have regarding defect management? First, we explore four case organizations' goals for defect management and defect management processes. After that, we will investigate what are their problem areas in defect management. Most of the previous research of defect management has focused solely on software companies, although customers are active participants in the defect management process. In our study we are going to examine defect management problems also from the IT customers' viewpoint.

As main findings we will show that instead of tool-related difficulties major problem areas in defect management are, for example, dealing with defect resolution reports, creating a test environment and a lack of commonly agreed defect management methods.

The rest of the paper is organized as follows. In Section 2 we describe the research methods of this study. In Section 3 findings of the case study are presented. Section 4 is the analysis of findings. The discussion and the conclusions are given in Section 5.

2 Research Methods

This case study is a part of the work of the research project SOSE (Service Oriented Software Engineering) at the University of Kuopio, Finland. SOSE is funded by the National Technology Agency TEKES, the European Regional Development Fund (ERDF), and four partner companies. The study was carried out partly with the research project PlugIT (2001-2004), which focused on research into application integration methods in the healthcare domain.

The main research purpose of this study was to explore the problems that organizations have in defect management. A case study method was used because it is well suited for the study of information systems in organizations. Yin [11] defines a case study as "an empirical inquiry that investigates a contemporary