An Empirical Study on Off-the-Shelf Component Usage in Industrial Projects

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Abstract. Using OTS (Off-The-Shelf) components in software projects has become increasing popular in the IT industry. After project managers opt for OTS components, they can decide to use COTS (Commercial-Off-The-Shelf) components or OSS (Open Source Software) components instead of building these themselves. This paper describes an empirical study on why project decision-makers use COTS components instead of OSS components, or vice versa. The study was performed in form of an international survey on motivation and risks of using OTS components, conducted in Norway, Italy and Germany. We have currently gathered data on 71 projects using only COTS components and 39 projects using only OSS components, and 5 using both COTS and OSS components. Results show that both COTS and OSS components were used in small, medium and large software houses and IT consulting companies. The overall software system also covers several application domains. Both COTS and OSS were expected to contribute to shorter time-to-market, less development effort and the application of newest technology. However, COTS users believe that COTS component should have good quality, technical support, and will follow the market trend. OSS users care more about the free ownership and openness of the source code. Projects using COTS components had more difficulties in estimating selection effort, following customer requirement changes, and controlling the component's negative effect on system security. On the other hand, OSS user had more difficulties in getting the support reputation of OSS component providers.

1 Introduction

Due to market requirements concerning cost and time-to-market, software developers are searching for new technologies to improve their projects with respect to these qualities. Software components promise to have a positive impact on software reuse, resulting in time and cost efficient development. Therefore, software developers are

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using an increasing amount of COTS (Commercial-Off-The-Shelf) and OSS (Open Source Software) components in their projects. Although both COTS and OSS component are claimed to save development effort, they are still very different. COTS components are owned by commercial vendors, and their users normally do not have access to the source code of these components. On the other hand, OSS components are provided by open source communities. Thus, they offer full control on the source code [15].

When planning a new software project, project decision makers need to decide whether they should buy a COTS component, or acquire an OSS component if it was decided to use OTS components. To make such a decision, it is important to investigate previous projects using such components and summarize the relevant decision-making processes and project results.

The study presented in this paper has investigated 71 finished software projects using only COTS components and 39 projects using only OSS components. It compared the COTS components with the OSS components in three dimensions: (1) Who is using OTS components, (2) Why project members decide to use them, and (3) What were the results of using them.

The remainder of this paper is organized as follows: Section two presents some previous studies on benefits and risks of using OTS components. Section three describes the research design applied. Section four presents the collected data, whereby the discussion of results is given in section five. Finally, conclusions and future research are presented in section six.

2 Previous Studies on OTS Component

COTS components promise faster time-to-market and increased productivity of software projects [1]. At the same time, COTS software introduces many risks, such as unknown quality of the COTS components, which can be harmful for the final product, or economic instability of the COTS vendor who may terminate maintenance support [2]. Furthermore, the use of OSS in industrial products is growing rapidly. The basic idea behind open source is very simple: When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, and people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing [15].

OSS has many proposed advantages [3]: *OSS is usually freely available for public download. The collaborative, parallel efforts of globally distributed developers allow much OSS to be developed more quickly than conventional software. Many OSS products are recognized for high reliability, efficiency, and robustness.* Despite its wide appeal, OSS software faces a number of serious challenges and constraints. *The popularity of OSS increases the risk that so-called net-negative-producing programmers will become involved. Many software tasks, such as documentation, testing, and field support are lacking in OSS projects. If developers produce or sell a product, which integrates OSS as source code, they may need the licensor's permission. Otherwise, the licensor might claim for damages or force them to end the product's further development, delivery and sale [4].* Furthermore, many common perceptions about OSS need further empirical clarification. For example, there is still no empirical