

A Case Study on the Success of Introducing General Non-construction Activities for Project Management and Planning Improvement

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Abstract. The creation of a proper work breakdown structure (WBS) is essential in performing successful project effort estimation and project management. The use of WBS is required on the level 1 of CMMI. There is, however, no standard WBS available. In this paper, the results of a pilot project in which new activities were introduced into the TietoEnator's WBS are reported. The activities were non-construction activities which are necessary but not directly related to the actual software construction. The study shows that the success of the introduction of such activities very much depends on the naming of the activities and how they are introduced to the employees. Additionally, it turned out that the pre-thought set of non-construction activities included activities that should not have been in the set at all as individual activities.

1 Introduction

Since the beginning of software projects and their effort estimations, work has been broken down into smaller entities, i.e. project activities and phases to manage and estimate work easier. The work breakdown structure (WBS), a particular defined tree-structure the project work is broken into [1], was applied even in the early effort estimation models, e.g. the Wolverton Model [2] and COCOMO [3]. WBS is also required by the currently employed capability maturity models, e.g. the staged presentation of CMMI [4] requires WBS on its lowest maturity level 1. However, no standardized way of creating the WBS exists, thus the applied activity sets in software projects are either very general or project-specific. To benefit effort management in the project, the activities should be broken down into suitable granularity level, which in turn leads to activity sets that differ from each other from project to project.

This paper examines the adoption of general project activities to increase the reliability of registered effort and uniformity of the work breakdown structure. In the case study presented in this paper, a two-phased questionnaire survey was conducted to explore the adoption of a new set of project activities, namely the non-construction

activities [5], i.e. the activities which are not directly related to software construction or project management. These activities include various management and support activities such as orientation, planning activities, quality assurance, configuration management, customer support, and documentation, each carried out by several members of the project. Neglecting the non-construction activities in project planning and effort estimation may result in significant effort proportion deviation between projects. Furthermore, regardless of the effort estimation method employed, even the best estimate cannot be accurate if the method neglects or undervalues the non-construction activities that are involved in the project. Effort estimation research has focused on software construction because the majority of the total effort is software construction effort [6], and because the customers are willing to pay for the construction work. However, the rest of the project effort is just as important when a higher estimation accuracy is pursued, and — in large projects — that effort can represent a significant amount of money. Considering the non-construction activities is useful also while comparing the efficiency of different projects.

This study is a part of a larger project aiming to improve effort estimation and effort management by focusing on activities other than the actual software construction or project management, and making the effort distribution proportions more stabile, thus more predictable and controllable, from project to project [5]. The larger project is a part of a company-wide CMMI effort at TietoEnator.

This paper is structured as follows. Section 2 describes the research methodology and the theoretical background, Sect. 3 outlines the effort management process with the adoption of new project activities. The case study is presented in Sect. 4. The analysis of the study is presented in Sect. 5, followed with a discussion in Sect. 6. Section 7 gives a brief conclusion and suggestions for future research.

2 Theoretical Background and Research Methodology

In many cases, the activities and lifecycle phases of software projects have served as the basis for the different factors used for effort-counting. However, no standardized way to divide different project lifecycle activities has been established: different effort estimation methods emphasize different activities and factors in their effort-counting by identifying and using the most important ones. For instance, the COCOMO models use activity breakdown. In the original COCOMO model, the activities were divided into eight major categories, namely requirement analysis, product design, programming, test planning, verification and validation, project office functions, configuration management and quality assurance, and manuals, each having specific activities in the four project lifecycle phases [3].

COCOMO was enhanced to COCOMO II in the mid-1990s in order to develop the model to address the new needs of evolving software engineering such as distributed software and component techniques. COCOMO II categorization is not, however, suitable for all project situations, and should be adjusted via context and judgment to fit individual projects [7]. In COCOMO II, software activity work was divided into five major categories: management, system engineering, programming, test and evaluation, and data [7]. This breakdown was adapted from COCOMO's eight categories, which