A Novel Team Productivity Model for XP Teams

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ABSTRACT

Team productivity is one of the issues that always been considered in the software development teams. In software development process, as a team-oriented process, team productivity is a serious issue in software competitive industry that always gets high attention. Several studies have been conducted on various aspects of team productivity, but because of role of employed methodologies, providing a unified model in this regard is not possible. This article is specifically aimed to focus on team productivity in XP methodology and provide a productivity model dedicated for this method. The proposed model is developed based on the most influential features affecting team productivity. This model evaluated and gained enough acceptance. The article also shows the most effective XP practices that positively impact team productivity in XP projects.

KEYWORDS

Agile Methods, Agile Software Development, Productivity Model, Software Team, Team Productivity, XP

1. INTRODUCTION

Team productivity refers to evaluate the results of teamwork to achieve the objective goals. Team productivity in software development has always been one of the most important issues. Due to the essential role of teams in success of software projects and team-oriented nature of this industry, productivity and performance of software teams have been always a serious concern in software companies. Specially, in recent years, because of increasing competition between software companies, team productivity has gained more attention (Stylianou & Andreou, 2016).

Identifying and assessing team productivity may lead to better time and cost estimation in software development. In recent years, considering this issue in Agile teams, mainly because of their focus on people and teams, has led to conduct several studies. In this regard, considering productivity of Agile teams to control and improve the productivity of software development process has been titled as a necessity in recent years.

Several studies have been conducted in the field of Agile software development team productivity. Some of these studies have been focused on the impact of Agile methods on team productivity and factors affecting productivity (Robiolo & Grane, 2014; Tarhan & Yilmaz, 2014). Other studies have focused on this matter solely in specific methodology. For example, one study emphasized on various

factors such as responsibility of team members and self-organizing teams in software teams that used Scrum in their projects (Moe, Dingsøyr, & Dybå, 2010). In another study, cooperation, coordination, team communication and some other key elements that impact on Extreme Programming (XP) teams, have been mentioned (Sharp & Robinson, 2010).The physical proximity of team members was considered as a factor that affect productivity of Agile teams in another study (Eccles, Smith, Tanner, Van Belle, & van der Watt, 2010). XP as one the most popular Agile methodologies, is rapidly using in software companies. This method mainly focuses on the practices used in the software development process.

Team productivity has been studied differently in different methodologies. It is the reason that providing a unified model to cover all software development methodologies seems difficult. Due to the increasing popularity of XP methodology among software teams and companies, the aim of this study is to propose a team productivity model in this method. Therefore, this study specifically focuses on the related factors in XP teams and process and tries to propose a simple and usable model in this regard.

The rest of this paper is organized as follows: Section 2 provides an overview of the definition of team productivity, XP methodology and the factors affecting productivity in XP process. Section 4 provides the early and final productivity model together with its related factors and aspects. Finally, Section 5 provides a brief conclusion.

2. LITERATURE REVIEW

In this section, the concept of team productivity in software development process is briefly explained. Then, a concise introduction to XP has been provided. Finally, the effective factors addressed in the previous studies, are investigated.

2.1. Software Team Productivity

Productivity is a concept that deals with various issues such as effectiveness, efficiency, generating misunderstandings, and staff turnover (Trendowicz & Münch, 2009; Yilmaz, O'Connor, Colomo-Palacios, & Clarke, 2017). This concept is used in various contexts with different conceptual issues (Tangen, 2005). For example, team productivity in people-centric industries mainly refers to evaluate the results of teamwork. This concept in software engineering emphasizes on the quality of developed software, the ability of team to achieve project goals, achieving expected budget and estimated time, and team members motivation to work together in the future (Petersen, 2011).

As an important issue, there is no general consensus on the definition of software productivity among software experts and researchers and this is more acute in Agile teams. The main reason for this issue is that software development is a people-centric process influenced by various social and technical aspects, so that providing a particular definition of team productivity is difficult (C. D. O. Melo, Cruzes, Kon, & Conradi, 2013). However, definition of productivity greatly depends on the employed development methodology.

2.2. XP Methodology

XP is an acronym of extreme Programming that has been developed by Kent Beck in 2000 (Andres & Beck, 2004). XP, as one of the lightweight/Agile methodologies, simplifies the software development process and increases productivity and performance of software teams. In XP methodology, software development process focuses on fast and iterative development in which the role of customers is very critical. This methodology defines 12 activities and 5 phases (Andres & Beck, 2004).

XP has focused on communication and coordination between all team members at all times and needs to coordinate with customers, managers, and development teams to achieve successful implementation. In XP, people appear in two main roles of customer and developers, and two additional roles; Tracker and Coach (Cunningham, 2003). Although supplementary roles such as programmer,

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