Chapter 88

Boosting the Competitiveness of Organizations With the Use of Software Engineering

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ABSTRACT

Software has become the core of organizations in different domains because the capacity of their products, systems, and services have an increasing dependence on software. This fact highlights the research challenges to be covered by computer science, especially in the software engineering (SE) area. On the one way, SE is in charge of covering all the aspects related to the software development process from the early stages of software development until its maintenance and therefore is closely related to the software quality. On the other hand, SE is in charge of providing engineers able to provide technological-base solutions to solve industrial problems. This chapter provides a research work path focused on helping software development organizations to change to a continuous software improvement culture impacting both their software development process highlighting the human factor training needs. Results show that the implementation of best practices could be easily implemented if adequate support is provided.

INTRODUCTION

Nowadays in most organizations, the capacity of their products, systems, and services increasingly depends on software. The software allows them to compete, adapt and survive in a highly changing environment (Muñoz, Mejía & de León, 2020).

The importance acquired by the software industry becomes an opportunity for organizations of this domain, all of them (large, SMEs and SVEs), to have constant growth, and in most cases their survival. This opportunity brings a high demand for them to develop high-quality software. In this context, software development organizations have an increasing need to improve their software development process in an effort to meet the demand of the software industry (Muñoz et al., 2016).

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Software Engineering is an area of Computer Science, which covers all the aspects related to the software development process from the early stages of software development until its maintenance (Pressman, 2002). The foundation of Software Engineering is the process because it defines a framework for a set of key areas that must be established for the effective delivery of software engineering technology (Pressman, 2002).

Due to the importance of the Process, the Software Process Improvement is a research field within the Software Engineering area that has emerged from the need to respond to the problems involved in software development offering to software development organizations the opportunity of increasing its efficiency, taking as base that the efficiency in software development depends largely on the quality of the processes used to create it (Williams, 2008).

In this context, Software Process Improvement (SPI) becomes an obvious and logical way to address the increasing need to be competitive in the software industry (Cuevas et al, 2002). However, although there are many organizations motivated to improve their software processes, very few know how best to do so. Therefore, introducing process improvement has been a path full of obstacles for most organizations, and always away from the original path (Potter & Sakry, 2006; Morgan, 2009). Moreover, most improvement efforts fail, stakeholders feel frustrated, and they are more convinced that they must continue doing their work as before and the resistance to change increases (Calvo-Manzano et al., 2010).

The goal of this chapter is to present a path of a research that has been developed since 2005, which aims to implement Software Process Improvement in a smooth and continuous way, depending on the improvement pace accepted by the organization, and addressing four aspects to be taken into account for a success SPI such as people, models and standards, methods and methodologies; and software tools (Cuevas et al, 2002). By this way, the rejection attitudes regarding the implementation of SPI are prevented; therefore, the resistance to change are reduced.

After the introduction, this chapter is structured as follows: Section 2 shows four aspects covered in this research; Section 3 presents the research path developed; Section provides 4 discussion, conclusions and future trends.

BACKGROUND

As exposed in the introduction section, according to Cuevas (Cuevas et al, 2002) four aspects should be taken into account to achieve a successful SPI: *people, models and standards, methods and methodologies; and software tools*. This way allows software development organizations to establish "how" to define and improve their software development process that will help them to provide high-quality software to meet the requirements of software market.

This section provides an overview of the four aspects this research took as base toward the reinforcement of the development processes of SDOs.

- *People.* It refers to the qualified professionals able to work with international models and standards to enhance the quality and effectiveness of software developed. Moreover, they are required to be able to work on teams. Then, this chapter covers the research done, on the one way, analyzing the training provided by professionals at universities (Muñoz et al., 2019b), and the research focused on motivate and organize talented people to integrate high effective teams (Muñoz et al., 2019c).