State of Art of Process Management Techniques for Defining and Measuring

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Abstract. Every business is a software business. This tells us how important software has become in everyday business. The role of software has expanded from simply assisting business activities to managing and controlling its process. To that extent, mismanaged software can have fatal impact on working systems. The purpose of this paper is to suggest ways to improve software processes, and therefore focuses on software process improvement models such SPICE, CMM, PSP, and 6-Sigma. This study presents a standard for developing software life cycle process, which are process definition, execution, and measurement.

Keywords: process management, techniques, definition, measurement

1 Introduction

As the development of science and information technology has transformed the market environment from a supply-oriented to a demand-oriented, customers have been leading the market, and business are faced with the environment of having to create profits only through customer interest and satisfaction. To ensure its survival, companies often merge or cooperate with firms in other industries, and the specific characteristics of the business territory are becoming more and more blurred. The is no exception with the software industry, as different systems and information are now being either integrated or connected, while requirements for new technologies and automated work processes have heightened. Since the scale of software development is becoming ever larger, and more information needs to be processed, the concept of software engineering is becoming more essential. Intensifying market competition is calling for a faster development of software, but the current situation is that it is difficult to timely meet these demands, while costs are high, and quality is not satisfactory enough. The purpose of this study is to suggest ways to improve software process and to build necessary environment to achieve it. There are various process techniques and tools that may be used to achieve improvement. However, this study begins with the belief that the very start of process improvement comes from accurately defining what a process is, and identifying the capability of a process. Process improvement will be achieved only when concept of a process is clearly defined. Moreover, only when the relation between resources and time injected for the execution of the process is identified, then the allocation of individual manpower and time can be accurately measured and managed.

An organization with a mature software process tends to actively utilize relevant tools to manage and improve the process [1]. It is also open-minded in adopting new improvement techniques. This paper therefore suggests various management techniques to clearly define the concept of software process and to measure process execution

2 SW Process Improvement Framework

In the 1980s, the US and UK became increasingly aware of the need to create a criteria for selecting software suppliers. They began to conduct research to build a strict standard for software process development. Their purpose was to create tools that help reduce costs and risks related to software process, and to improve the process. Having done much research, the Software Engineering Institute (SEI) of the US developed Capability Maturity Model (CMM), while the UK's ISO/IEC JTCI/SC7/WG10 established Software Process Improvement and Capability determination (SPICE). The SPICE [2] is also called ISO/IEC 15504. The ISO/IEC 15504 standard addresses all processes- plan, manage, oversee, control and improve - related to software acquisition, development, operation, supply, maintenance, and support. In other words, it is used to assess the current state of the process, whether the process operation is properly done to meet the requirements of an organization. It is also used by the party making the order to judge the appropriateness of the process. SPICE is a SPI framework that can satisfy the requirements of the party placing an order, supplier and reviewer. It is composed of five processes and 40 sub-processes. It is classified into six capability levels. The SPICE Reference Model is two-dimensional: process model and process capability model. Software models are defined in the former, while the latter is defined by Process Attribute that characterizes the capability of a process. CMM [3] is a framework for process improvement, and is a descriptive model as it describes expected key features. It is also a standard model as it explains detailed execution concepts that describe the general types of expected activities. Each stage of CMM is subdivided into key processes, and each key process is again divided into five common parts. These common parts are composed of key practices.

3 Management Technique to Define SW Process

3.1 SIPOC Diagram

SIPOC is an acronym for Suppliers, Input, Process, Output, and Customer. A SIPOC diagram is a tool used by a team to identify all relevant elements of process improvement project before the work begins. It provides a graphical representation of a process that shows where its inputs come from and go to [4,5]. A CQT diagram may be included in the SPIOC diagram.

3.2 Kano Model

Kano Model was created by a Japanese quality expert Noriaki Kano [5]. He developed a model for understanding customer requirements and developed a three-category model of customer needs. This quality model is two-dimensional. Many of the previous definitions of quality were linear and single-dimensional in nature, and believed that customers will be satisfied if physical conditions of a quality are met. Whereas Kano model integrates quality along two-dimensions: the degree to which a product or service performs, and the degree to which the user is satisfied. The Kano Model classifies quality into three types: basic, performance, and excitement. Here two additional qualities are added which are indifferent and reverse qualities. In total there are five types of qualities in Kano Model

3.3 QFD

QFD (Quality Function Deployment) is a process created to address to customer requirements in detail. It is a tool used to identify the areas to focus to enhance customer needs. It takes the role of linking the voice of customers to products and services. The matrix technique enables an understanding of pending customer issues and the effects of each cause. It also enables an easier understanding of relevant factors for standardization [5].

4 Management Technique to Measure SW Process

4.1 Time Value Map

Time Value Map shows how much time is spent during an execution of a process [6]. It helps identify the efficiency of a process as it shows a time lime in a bar graph by dividing value-added work from non-value-added work.

4.2 Run Chart

Run Chart helps identify when and where problems arise in a specific time line. It also helps identify the existence of a consistent pattern. This makes the formation of structure its interpretation easy, and shows whether the relationship is linear of non-linear. In sum, it makes it easy to understand the changes of a process in an hourly, weekly and monthly basis.

4 Conclusion

The maturity of a software process depends on how accurately the process is defined, measured and controlled. That an organization is highly mature means that it has abundant software processes that are consistently applied to all the projects it carries out. This paper will focus on management techniques that have been proven as efficient and effective tools in improving processes.

In process definition stage, process materialization was promoted through the use of SIPOC diagram, an approved standard for process definition was made by using Kano Model, and identification of the relative importance of the process was promoted by using QFD. Consequently, a well-organized process definition could be obtained, while the basic data for process execution could be acquired. In the process measurement stage, the Run Chart was used to secure visibility of schedule plan data, and time record diary data that utilizes Time Value Map was made. It was found that the measured data could be used in process improvement stage

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