Chapter 15

Knowledge Management in Software Process Improvement: A Case Study of Very Small Entities

Shuib Bin Basri
Lero, Dublin City University, Ireland & Universiti Teknologi PETRONAS, Malaysia

Rory V. O’Connor
Lero, Dublin City University, Ireland

ABSTRACT

This chapter discusses knowledge management (KM) aspects of how software process and software process improvement (SPI) is practiced within very small entities (VSEs) in the context of Irish software development industry. In particular, this study is concerned with the process of software development knowledge management in supporting the SPI. In order to understand the support process, the authors of this chapter have studied how KM processes are practiced within VSEs which includes communication, learning, sharing, and documentation process. This study also focuses in detail on the issues of the knowledge atrophy problem in VSEs. The findings explain how KM has been practiced and influenced the software development process and process improvement in VSEs. This result indicates that KM processes in VSEs are being undertaken in a very informal manner and also in indirect way. This is due to a small team size, autonomous working and macro-management style and caused VSEs to be more informal in their KM processes specifically and SPI generally. In addition, the results have indicated that the informal environment and culture helped VSEs to easily create and share knowledge between staff members and also assisted VSEs to mitigate the knowledge atrophy problem in their organization.

INTRODUCTION

Small and very small companies are the fundamental growth of many national economies. It is important to notice that the contribution from the small companies should be seen as important and significant as compare to the large one. The majority of software companies are small (Richardson & Von Wangenheim, 2007) and for example in Ireland the majority of the Irish indigenous software firms are employed between 10 to 99 employees (Crone, 2002) and average size is about
16 employees (Coleman & O’Connor, 2008). The same scenario occurs in many other countries especially in Europe, Brazil and Canada (Laporte et al, 2008a), where Very Small Entities (VSEs), which employed less than 25 people (Laporte et al, 2006) are the majority software companies in the respective country. Therefore in order to be always relevance in software industry, small companies need to maintains and enhances their products and for that they need to improve their development process (Valtanen & Sihvonen, 2008; Reed & Kelly, 2002). Even though several methods and guidelines (e.g. Moprosoft and CMMI) have been produced in order to enhance software companies’ development process, there are still a lot of challenges and obstacles have to manage (Laporte et al, 2008b). Hence, small companies whose have limited resources; particularly in financial and human resources; and practicing unique processes in managing their business have influenced their business style compare to large companies which are very formal and well documented (Sapovadia, 2006; Mtigwe, 2005).

Therefore consider to the above characteristics and situations, have shows that most of the management processes activities (e.g. decision-making, communication and problem solving) are done in informally way (e.g. orally and less documented) and more towards to human-oriented and communication factors (Valtanen & Sihvonen, 2008; Laporte et al, 2008b). Therefore it is belief that these issues will also influence software development VSEs in organized their software development knowledge. Furthermore the influence of well organized software development knowledge is seen could assist small companies or VSEs in maintain their product relevancy in market. This process also could mitigate from knowledge atrophy problem from affecting their company.

BACKGROUND

Software Process and SPI

The software process is all the stages and activities that are followed by organization to develop a software product (Zahran, 1998). The software process has four distinct roles; (i) to present a guidance as the guideline of the activities to be undertaken; (ii) to specify the artefact that should be developed and when; (iii) to direct the task of the development team; and (iv) to offer ways of monitoring and measuring a project progress and output (Kruchten, 2000). Moreover based on the first role, (Sommerville, 2004) has claimed that development process must be update, improve and maintain in order to meet current business and customer requirement. In addition, the issues SPI has gained increasing importance in software engineering area. The main aims of SPI are to understand the software process used in the organization and to guide the implementation of changes of that process in order to achieve specific goals such as to improve software development time, on budget and with the desired functionality. According to several authors, SPI has a close link between the quality of the development process and the quality of the product developed using the process (Kruchten, 2000; Olsen et al, 1989). In regards to small companies, improving software process is like improving a business process and both are related (Sanders, 1998; Ward & Aurum, 2004). In addition 4 categories; economic, people, organization and implementation; are believed as SPI influencing factors in an organization (Hall et al, 2002).

Moreover, SPI also goes through a lifecycle as exist in software development process (Cook & Wolf, 1998). The SPI lifecycle is constantly changing software processes and it consists of two phases; (i) analysing process phase and (ii) changing process phase (Stelzer & Mellis, 1998) and this process will be continuously as depicted in Figure 1.