Adapting a Requirements Engineering Process by Key Factors Estimation

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INTRODUCTION

The monolithic application of any process, disregarding the context conditions, may lead to unnecessary lack of effectiveness. By the contrary, the adaptation of any process to a particular situation is considered a good practice in many fields. Literature shows that this practice is quite common in Software Engineering processes, such as the methodologies Rational Method Composer (Haumer, 2005) and OPEN Process Framework (Firesmith &Henderson-Sellers, 2002). However, Requirements Engineering (RE) approaches are seldom tailored to context or project situations (Potts, 1995; Leite, Hadad, Doorn, & Kaplan, 2000; Leffingwell & Widrig, 2003; Seyff et al., 2009). Nevertheless, sometimes the elicitation activity, as part of an RE process, is performed taking into account some environmental characteristics, usually called situational factors, such as number of information sources, users geographical distribution, users time availability, users experience, among others (Maiden & Rugg, 1996; Hickey & Davis, 2003; Coulin, 2007; Carrizo, Dieste, & Juristo, 2008). Recently, some proposals have appeared to design an RE process for a specific project by selecting existent RE techniques (Lauesen, 2002; Lobo & Arthur, 2005; Alexander & Beus-Dukic, 2009).

There are activities of most of the requirements processes that are invariant regardless of situational factors, while others should be modified, removed or replaced. Not only activities may be adapted, models created in the process may be also suited for the situation (Galster, Weyns, Tofan, Michalik & Avgeriou, 2014). This means that these processes may be assembled like a flexible puzzle using interchangeable pieces depending on the situational factors identified.

Situational Method Engineering (SME) is advocated to build methods tailored to specific situations for the development of systems (Kumar & Welke, 1992). Following its principles, the adaptation of any software development process is based on indicators describing the situation (Khan, bin Mahrin & bt Chuprat, 2014). Part of the task is to compose such indicators based on observable factors, like degree of business processes reengineering, context complexity, developer expertise in the application domain, and project size, among others. Ideally, these situational factors should be considered before beginning the software process. However, there are factors not accurately known when initiating a software project, while other factors may change during the project. Hence, a dynamic view of the adaptation of a software

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development process achieves a better performance of the process itself. Considering that defining requirements is the starting point of a software development, it should be necessary to pay more attention to factors influencing the RE process.

A frequent question of practitioners is related with the need of performing all the process steps to develop the software requirements. *Is it possible to shorten the road or to follow a different one?* Under some circumstances, there is an opportunity to reduce the RE process by deleting or simplifying activities; and sometimes different paths may be followed by choosing other techniques or even extending some activities. Project managers should make decisions depending mainly on the reality he or she is facing.

Therefore, the rational and some practice on the tailoring of an RE process according to a particular set of situational factors is presented in this chapter. Recommendations about the estimation of these factors are exposed as an enhanced solution. Additionally, some lessons learned, and future works are reported.

BACKGROUND

To follow a process guiding the development of an engineering project or system is valuable enough since it means that performing a predictable set of activities using techniques helps to get the outcome within a controllable quality.

Hence, the way the work is performed does not depend on individual criteria, allowing repeatability of costs, times and quality, and promoting the accumulation of knowledge about the process. The first activity of a process to develop a product consists in defining, as precisely as desirable, the expected outcome. When the product is a software system, this initial activity is an RE process, whose outcome is a consistent set of requirements. The RE process is particularly different from other activities of the software development process since it is the one that most interacts with people and their environment, while other activities are mainly carried out within the development team (Carrizo, 2009). Besides, project decisions impose constraints, tools and methods to carry out those activities. Therefore, if the requirements process takes into account the particularities surrounding the application context and the project itself, then it will probably result both in a better set of requirments and in a more efficient process.

Furthermore, a requirements process needs appropriate and continuous communication to gain as much customers and users compromise as possible. A better communication is achieved when all stakeholders use the same language. In RE, a proven way to accomplish this is by using the vocabulary of the application context (Leite, Doorn, Kaplan, Hadad, & Ridao, 2004). Communication occurs when stakeholders orally interact, also when reports, documents and models are exhibited to customers. In this sense, natural language (NL) models, such as glossaries, use cases and scenarios, stimulate stakeholders' communication (Leite et al., 2004), and they are the most frequently used in RE (Kaindl, 2000; Leffingwell & Widrig, 2003; Seyff et al., 2009; Jacobson, Spence, & Bittner, 2011; Antonelli, Rossi, Leite, & Oliveros, 2012).

Software development processes put into practice in real projects are often forced to be adjusted due to contingent circumstances, sometimes in a poorly controlled fashion while the projects are ongoing. Hence, the situations within their application context and projects should be observed as the processes go forward for better tailoring to such evolution. Possible adjustments to the processes can be known in advance based on certain characteristics, though they may change dynamically, i.e., settings are preplanned but only implemented when an aspect of the situation changes (Rolland, 2008). In this regard, the process may be defined as a set of blocks, having process blocks common to all situations and variant process blocks according to situational factors. Thus, the process is made up by assembling blocks for