Using Grounded Theory to Acquire Knowledge About Critical Success Factors for Conducting Software Process Improvement Implementation Initiatives

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ABSTRACT

The successful implementation of Software Process Improvement (SPI) depends not only on the abilities of practitioners to identify processes modifications that may help to increase organizations capabilities to develop software, but also abilities to overcome barriers that can jeopardize the organizational change process provoked by SPI initiatives. The literature reports show that SPI practitioners must have experienced skills to overcome common social-cultural factors that pose as critical barriers for successfully implementing SPI. Nevertheless, there is no consensus in the area about what the critical success factors are for conducting SPI implementation initiatives. This work presents a study based on Grounded Theory methodology to acquire knowledge about SPI critical success factors. The main product of this study is a theoretical knowledge framework consisting of a set of inter-related categories grounded on a set of propositions that explains the phenomenon associated to the success of SPI implementation initiatives.

Keywords: Computer Science, Critical Success Factors, Grounded Theory, Knowledge Acquisition, Software Process Improvement, SPI Implementation Strategies

1. INTRODUCTION

Software Process Improvement (SPI) implementation is a knowledge intensive activity. The implementation of process improvements is usually conducted in the context of SPI initiatives with a specific objective, such as reducing costs, improving product quality or implementing process improvements aiming to adhere to best practices advocated by process reference models like CMMI (SEI, 2006). Thus,
SPI initiatives efforts involve modifying the status quo of a software organization aiming to provoke changes that may lead the organization to an improved future status.

The effective implementation of SPI requires specialized knowledge, such as knowledge about process reference models. In order to facilitate the conduction of SPI implementation initiatives, software organizations usually acquire the services of SPI consultancy organizations. Nevertheless, the variety of models and methodologies increases the amount of knowledge required by SPI consultants. The literature reports in the SPI area also show that SPI practitioners must have abilities to overcome social-cultural factors that pose as critical barriers for successfully implementing SPI, such as lack of motivation and resistance to changes (Baddoo & Hall, 2003). Therefore, the successful implementation of process improvements depends not only on the abilities of the SPI practitioners to identify processes modifications that may help to increase organizations capabilities to develop software, but also abilities to overcome barriers that can jeopardize the organizational change process provoked by SPI initiatives.

The issues that have influence on the success of SPI implementation initiatives are commonly referred as critical success factors (Niazi, Wilson, & Zowghi, 2006), because they consist of a reduced set of relevant issues that SPI consultants must focus attention aiming to achieve success on the coordination of SPI implementation initiatives in client organizations. Nonetheless, there is no consensus in the area about those factors and how they interact or influence the success of SPI implementation initiatives (Rainer & Hall, 2002).

This work presents a study conducted to acquire knowledge about SPI critical success factors in the perspective of consultants of SPI consultancy organizations. The knowledge acquisition approach adopted in the study was defined based on Grounded Theory methodology, because it is indicated to study human behavior and organizational cultures (Strauss & Corbin, 1998; Coleman & O’Connor, 2007). The main product of this study is a theoretical knowledge framework consisting of a set of inter-related categories grounded on a set of propositions that tries and explains the phenomenon associated to the success of SPI implementation initiatives.

This work is organized as follows: Section 2 presents some qualitative studies that applied Grounded Theory. Section 3 presents the knowledge acquisition approach adopted to guide the study. The application of such approach and the theoretical framework acquired by the study are presented in Section 4. Results of assessment and verification of the theoretical framework are presented in Section 5. Finally, contributions, limitations of the study, and the next steps are presented in Section 6.

2. USING GROUNDED THEORY IN QUALITATIVE STUDIES

Ground Theory methodology was originally designed to guide investigations in the social sciences area. Nevertheless, it has also been used to support researchers to understand behavioral issues concerning organizational changes promoted by Information Systems implementation. One interesting study describing the application of grounded theory approach to investigate the critical success factors of Geographical Information Systems (GIS) implementation is presented by Nasirin, Birks, and Jones (2003). The results of this study demonstrate the benefits of applying grounded theory approach in qualitative studies conducted to understand the critical success factors and the implementation strategies to effectively introduce organizational changes.

Another study is presented by Orlikowski that shows the application of a Grounded Theory approach to investigate aspects related to the implementation of CASE tools (Orlikowski, 1993). The author conducted a series of interviews with members of two organizations. The analysis of this data using Grounded Theory showed that the implementation of CASE tools should consider the real intentions of key players
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