

Organisational Readiness and Software Process Improvement

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Abstract. The Capability Maturity Model Integration (CMMI) is a structured representation of software development processes that can support an organisation's software process improvement (SPI) strategies. However, CMMI and SPI initiatives generally exhibit low levels of adoption and limited success. One of the major reasons for these shortcomings is that many organisations undertake SPI initiatives without knowing whether or not they are ready to undertake them. Our previous research has enabled us to develop a software process improvement readiness model/framework to address this problem.

This paper reports on the implementation of the SPI readiness model in three large-scale case studies. We have found that organisations with higher CMMI levels are more ready for SPI initiatives than organisations with low CMMI levels. We suggest that organisations at higher CMMI levels have developed capabilities that enable them to further leverage SPI than organisations at lower CMMI levels.

Keywords: Software Process Improvement, Case Study, Organisational Readiness.

1 Introduction

Software Process Improvement (SPI) has been a long-standing approach promoted by software engineering researchers, intended to help organisations develop higher-quality software more efficiently. Process capability maturity models such as CMM, CMMI [1] and ISO/IEC 15504 (SPICE) are SPI frameworks for defining and measuring processes and practices that can be used by software developing organisations. However, only a small number of software organisations have successfully adopted SPI. SPI initiatives exhibit low levels of adoption and limited success [2]. Deployment is often not only multi-project, but multi-site and multi-customer and the whole SPI initiative typically requires a long-term approach. It takes significant time to fully implement an SPI initiative [3]. A recent report of the Software Engineering Institute shows the number of months needed in order to move from one maturity level of CMM to the next one [3]:

- Maturity level 1 to 2 is 22 months
- Maturity level 2 to 3 is 19 months
- Maturity level 3 to 4 is 25 months
- Maturity level 4 to 5 is 13 months

Such time frames mean that the SPI approach is often considered an expensive challenge for many organizations [2] as they need to commit significant resources over an extensive period of time. Even organisations who are willing to commit the resources and time do not always achieve their desired results. The failure rate of SPI initiatives is very high, estimated as 70% [4; 5]. The significant investment and limited success are reasons for many organisations being reluctant to embark on a long path of systematic process improvement.

In order to improve the SPI implementation process, in our previous research, we have developed a SPI implementation readiness model [6]. The objective of the SPI readiness model is to assist organisations in assessing and improving their SPI implementation readiness. In this paper we report on our evaluation of the readiness model in three large scale case studies. The objective of this evaluation is to further improve the readiness model and to observe the correlation between organisation readiness and SPI maturity.

In this paper we have addressed the following research question:

RQ: Are organisations in higher CMM(I) levels more ready for SPI implementation than organisations in lower CMM(I) levels?

This paper is organised as follows. Section 2 describes the background. Section 3 describes the research design. In Section 4 findings are presented and analysed. Discussion is provided in Section 5. In Section 6 case study validity is discussed. Section 7 provides the conclusion.

2 Background

Despite the importance of the SPI implementation process, little empirical research has been carried out on developing ways in which to effectively implement SPI programmes [2; 7]. Much attention has been paid to developing standards and models for SPI. Also, organisations typically adopt ad hoc methods instead of standard, systematic and rigorous methods in order to implement SPI initiatives [8]. This risk can lead organisations to a chaotic situation with no standard for SPI implementation practices. In the appraisal of SPI models, e.g. CMMI, the software process maturity of the organisations is assessed. Little attention, however, has been paid to assess the SPI implementation maturity/ readiness of the organisations. The assessment of SPI implementation maturity/ readiness can help organisations in successfully implementing SPI initiatives. This is because the readiness of the organisations for successfully implementing SPI initiatives could be judged through this SPI implementation maturity. We have focused on these issues and developed a SPI readiness model (as shown in Figure 1) in order to assess the SPI implementation maturity/ readiness of the organisations [6]. The CMMI perspective [1] and the findings from our previous empirical study [9; 10] were used in the design of the SPI readiness model. The SPI