SPI-KM - Lessons Learned from Applying a Software Process Improvement Strategy Supported by Knowledge Management

Gleison Santos, Mariano Montoni, Sávio Figueiredo, and Ana Regina Rocha

COPPE/UFRJ - Federal University of Rio de Janeiro
POBOX 68511 – ZIP 21945-970 – Rio de Janeiro, Brazil
{gleison,mmontoni,savio,darocha}@cos.ufrj.br

Abstract. Software development organizations recognize the importance of improving software processes to enhance their competitive advantages. COPPE/UFRJ software process research group has been providing SPI consultancy services to the Brazilian software industry for more than two decades. In order to support the SPI activities of the group, a SPI deployment strategy named SPI-KM that is supported by Knowledge Management and has been developed based on international and national reference models and standards. This paper presents the SPI-KM strategy and the results of an empirical study executed aiming to characterize the SPI initiatives that employed it. The study findings are presented as lessons learned and their applications are discussed in different organizations. We consider the adoption of the SPI-KM strategy and the lessons learned as important knowledge to be appreciated during SPI initiatives aiming to facilitate SPI deployment and to assure their success.

1 Introduction

Its necessary to drive the improvement initiatives based on organizational business goals, i.e., a SPI deployment plan must be elaborated, executed and monitored aiming to achieve these goals, to minimize impact on resources and to maximize return on investments [1]. The significant time to fully implement an SPI initiative is often considered too expensive for many organizations as they need to commit significant resources over an extensive period of time. Moreover, SPI initiatives exhibit low levels of adoption and limited success (the failure rate of SPI initiatives is estimated as 70%) [11]. Therefore, there is a need of developing effective strategies to increase processes' maturity and capacity in software organizations.

COPPE/UFRJ software process research group comprises 2 PhD and 12 PhD and master students of the Federal University of Rio de Janeiro. This group also has been providing Software Process Improvement (SPI) consultancy services to the Brazilian software industry for more than two decades. In order to support the SPI activities of the group, a SPI deployment strategy named SPI-KM was developed based on international and national reference models and standards. The SPI-KM strategy is supported by Knowledge Management and has been applied in more than 30 organizations. The results of SPI-KM application are promising since all of the

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organizations that applied the strategy have been successfully assessed by official appraisals and demonstrate positive impacts and benefits of their SPI initiatives.

This paper presents the main characteristics of the SPI-KM strategy and the results of an empirical study aiming to characterize the SPI initiatives that adopted the strategy. Through this study we were able to identify common problems that could jeopardize SPI deployment supported by the SPI-KM strategy. The study findings are presented as five lessons learned. To adduce how the problems pointed out have been identified and overcome we discuss their occurrences during SPI initiatives in five different Brazilian organizations.

The next section discusses the deployment of SPI initiatives and the maturity models CMMI and MPS.BR. Section 3 presents how Knowledge Management can support SPI. Section 4 describes the main characteristics of the SPI-KM strategy. The findings of the empirical study executed are described in section 5. Finally, section 6 presents final considerations and points out future directions.

2 Software Process Improvement

Over the last years a consensus has emerged that an iterative process of assessment and improvement of the software process is essential to increase understanding and manageability of software development process, to ensure quality of the product, to reduce costs and maximize productivity [6]. In order to reduce the time to assess and introduce process changes, an adequate SPI infrastructure must be defined and implemented. According to Krasner [19] a successful systematic SPI program requires: (i) well defined objectives, (ii) a method for catalyzing and institutionalizing the SPI program in an organizational setting, (iii) one or more goal/maturity model for guidance, (iv) best practice examples and benchmarks to draw from, (v) an organizational commitment to action in the form of an improvement roadmap that is defined, resourced and followed, (vi) expertise in process diagnosis, culture change tactics, process problem solving, etc, and (vii) a set of champions/change agents that can sponsor, commit to and effectively implement a planned SPI program.

International standards like ISO 12207 [15], ISO 15504 [7] and software process quality models like CMMI (Capability Maturity Model Integration) [8] were developed aiming to define the requirements of an ideal organization, i.e., a reference model to be used in order to assess the maturity of the organization and their capability to develop software.

Based on these standards and models, Brazilian industry and research institutions have worked together during the last two years defining a Reference Model for Software Process Improvement in Brazil (MR-MPS.BR) in order to enhance the maturity of the processes of Brazilian software organizations and to improve the quality of its products [9, 10]. Among the main goals of the MR-MPS.BR, the Brazilian Reference Model was meant to be affordable for small and medium-sized companies. Therefore, instead of having five maturity levels like CMMI, the model comprises seven maturity levels in order to make possible for the company employees, managers and partners to see the results soon. Moreover, the company can enhance the maturity of its processes gradually and with less effort to go from a lower maturity level to the next one. For each of these maturity levels, processes are assigned based on the ISO/IEC