Reuse in the MPS.BR cooperative model

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Abstract. This work aims at identifying the development organizations and MPS.BR Implementing Institutions expectations about the implementation of processes related to software reuse. We present the context of our work, planning and analysis of the study, draw a parallel with another study that discusses some similar issues, and bring some conclusions about the work's final outcome and the identification of some requirements for the software reuse adoption in Brazilian organizations.

1 Introduction

Reuse is something intrinsic to human beings, who always tried to solve their problems by seeking for existing solutions and adapting these solutions to similar problems.

In the Computer Science context it is not different, and since the early days, when we were working with integrated circuits, we were aware that reuse should be something natural. Therefore, when it comes to the software development process, we can conclude that the problem is not to reuse software, but how to reuse it. Currently, the Brazilian industry is performing software reuse in a chaotic way and without the proper management.

In this work, we adopted the Krueger's (1992) definition for software reuse considering it as the process of creating software systems from existing software rather than building software systems from scratch. Assuming that software processes are software too [Osterweil, 1997], several analogies can be made between techniques for software reuse and process reuse. Moreover, according to Henninger (1998), the reuse of processes and software artifacts should be treated in a combined manner. Indeed, to allow this to occur in a satisfying manner, it is necessary that the organization has a mechanism to establish goals, scope, and a strategy for dealing with issues related to business, people, processes, and technology involved in adopting a software reuse program [MPS.BR, 2007].

The purpose of this paper is to analyze the current situation of cooperative groups in the MPS.BR model, either from the perspective of MPS Implementation Institution (MPS II), or from the perspective of the organizations themselves, in order to verify their expectations of adopting new processes referring to software reuse in this model.

This paper is organized into 6 sections, besides this introduction. Section 2 briefly presents the context of this work, which consists of cooperative groups in the

MPS.BR maturity model. Section 3 details the current scenario of such cooperative groups. Section 4 describes the study and presents the obtained results. Section 5 discusses some related works. Finally, section 6 provides some closing comments.

2   Context: cooperative groups in the MPS.BR model

Currently, there are various standards and models that detail and regulate software reuse, among them is MPS.BR. MPS.BR was created in 2003 under the coordination of the Association for Promoting the Brazilian Software Excellence (SOFTEX). MPS.BR is an acronym for Brazilian Software Process Improvement [Rocha et al., 2007]. Its main goal is to develop and disseminate a Brazilian model for Software Process Improvement (SPI), the MPS Reference Model, based on ISO/IEC 15504 [ISO/IEC, 2004] and ISO/IEC 12207 [ISO/IEC, 1995], and in accordance to the CMMI-DEV [CMU/SEI, 2006]. It focuses on achieving, especially for small and medium enterprises, cost reduction and faster improvement results when compared with international standards of SPI.

MPS Reference Model also defines financial aspects together with the technical aspects. In this scope of financial aspects, a business model was established, explaining the responsibilities of the various stakeholders and directing its focus to the Cooperative Business Model, responsible for joining, implementing, and evaluating the MPS Reference Model in Small and Medium-size enterprises (SMEs), which form the cooperative groups.

The arrangement of such groups was inspired in the productive arrangements initiatives already existing in Brazil and in the world that, while not formally aligned to any concept definition, have several associated characteristics, for example, comparing to definitions of productive arrangement types giving by IPEA (1999). IPEA (1999) defines four arrangement types (potential, emerging, mature and advanced) and more clustering, technopole and outsourcing network.

MPS program is strongly characterized by its proposal to be an Innovation System that, as shown in Cassiolato (2002), is the main concept that endorses the arrangements and local productive systems characterization in various dimensions.

The implementations of SPI in cooperative groups are carried out by MPS IIs, (currently 16 in total) through official implementers certified by SOFTEX. This is the specific context of this work.

The inclusion of Reuse Management Process and Reuse Development Process in version 1.2 of the MPS.BR General Guide [MR-MPS, 2007] aims at the introduction of implementation and institutionalization of Reuse Programs in Brazilian organizations.

3   Current scenario of the cooperative groups in MPS.BR

Considering the organizations that have implemented SPI through MPS Model, most of them participate in one of the 15 cooperative groups joined by the year 2007, or in one of the 6 groups currently in progress, all of them with financial support, reaching the mark of 144 organizations participants to date.

Most of the SMEs develop software for specifics markets or to large-scale organizations. Regarding the organizational context, their internal policies are usually

immature - or nonexistent - which can be explained by the predominant adoption of CEOs with technical backgrounds.

Despite limited resources, the groups have shared only the financial benefits achieved by incentive programs and formal training programs, although there are rare reports of groups that go beyond, share tools, processes, and even lessons learned.

4   Reuse in the cooperative business model

A survey study was planned and carried out in order to identify the future steps related to the reuse program implementation and the main needs, expectations, and difficulties of cooperative groups. This study was conducted according to the concepts defined by Pfleeger (2001) for population and sample definitions.

We selected the 16 MPS IIs and the organizations that were involved with SPI adherent to MPS Reference Model, participating in cooperative groups supported by SOFTEX, as the target audience of this study. Faced to the differences between the two groups (IIs and organizations), we prepared different questions for each one, in order to compare expectations regarding the reuse process implementation.

4.1   Sample and result analysis

We consolidated and analyzed the answers and some data that crossed between the two groups of the study. Regarding MPS IIs, 18 questionnaires were sent, and although only 44% of these questionnaires were answered, they covered more than 60% of the implementers universe because the IIs that answered the questionnaires are the most representative ones. Moreover, the MPS IIs that answered to the questionnaires were responsible for 75% of the implementations carried out in organizations that have already been evaluated and reached some level in the MPS Model. With regard to research directed to organizations, 102 questionnaires were sent and we received 20% of answers.

Considering a four-level scale (excellent, good, regular and insufficient), half of the respondents considered that the general knowledge of the MPS IIs is regular and the other half believes that in general such knowledge is between excellent and good. On the other hand, analyzing data from organizations, we realize a low level of training and, besides we have directed our research to participants with the strategic and technical expertise (administrators, managers and members of processes groups), only 5% of respondents have finished the MPS.BR official course's and although 10% declared to have some practical or academic knowledge regarding software reuse, 85% of the total considers that the organization has insufficient or irregular knowledge to carry out reuse process activities.

With respect to their perceptions, 58% of the organizations expect to implement, within the next two years, activities in the reuse process at some level. At this point, we observed that there is a tendency of answers, from respondents with the technical profile, to the recognition of absence of people trained to implement software reuse in their organization. Moreover, the answers suggest that the high-level managers believe that their development teams are able to treat themselves the implementation of reuse processes, ignoring that, together with technical knowledge, it is also needed management and strategic knowledge.

Both, organizations and MPS IIs, have low knowledge rates of their strategies for implementation. Regarding the main difficulties to adopt the reuse process, 45% of MPS IIs identified the lack of tools and the culture of business. Moreover, 55% of the MPS IIs said they are not able or do not know how to identify problems in their process.

5 Related works

Lucrédio et al. (2008) mentioned 21 factors, divided into 2 distinct perspectives, which are significant to the success of the reuse adoption. Although this work was not been directed to the same universe of organizations that we studied, the authors claim that the results serve as a guide for small, medium, and large size enterprises.

The main goal of this study was to identify factors that have major and minor influence on the success of reuse. The influences levels were defined as Strong, Weak and None. There were also factors that could not be characterized.

According to the study, the following factors were considered to have high influence to the success of reuse adoption: (i) independent reusable assets development team, (ii) product family approach, (iii) CASE tools usage, (iv) quality models usage, (v) systematic reuse processes, (vi) kind of reused assets, (vii) previous development of reusable assets, and (viii) configuration management of the reusable assets. At this point, we can draw a parallel between the factors characterized as "strong" and the results of our study. We can see points in common such as "tools usage" and support of "Quality Models".

6 Conclusions

We noticed that, in most cases, when thinking about reuse, SMEs consider only technical issues (code reuse, frameworks usage, etc). Rarely managerial and strategic aspects are considered. However, these aspects show to be vital here as they are elsewhere in the software development process.

The organizations need to improve their awareness regarding their capabilities on the reuse process, defining strategies to achieve software reuse in the future [MPS.BR, 2007]. Such strategies would be useful even if the organization concludes it is not quite the exact moment to implement software reuse, faced to the related costs. In this case the organization may consider adopting reuse in the future in a more comprehensive way, considering aspects that help in the domain knowledge, in the product lines definition or in the development reuse process.

We believe that those who organize and participate in the implementation of cooperative groups have a main role in helping organizations to define a strategy for implementing software reuse. This strategy includes processes and basic tools and may be established based on a common Reuse Program among organizations in the cooperative group.

We also believe that the same component repository would support different organizations in the cooperative group. This could help in the execution of further essential activities, propitiating reuse dissemination in the organizations, even for those that are beginning in the software process improvement.

Moreover, it is important to provide initial practices that help organizations to move from the chaotic stage, where most of them are at this moment according to our

study, to the monitored stage[1]. After that, the organizations will be possibly prepared for the decision to adopt reuse, enjoy its real benefits, and making it a competitive differential.

7   References

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[1] Considering the five stages characterized in the RMM Model (Koltun et al., 1991)