Process Management Methodology

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INTRODUCTION

As organizations (involved or not in virtual organizations [VOs]) try to define their processes, they also recognize the need for continuous software process improvement (SPI) in order to improve the quality and productivity of products and to keep up their competitiveness. Although efforts have been made, organizations continue without success in achieving the intended goals. Recognizing that the most critical problems occurs during project activities, we strongly believe that both development process and project alignment can be the best practice to get better project results and improve organizations' development processes.

The authors assume the reader has a basic understanding of development processes (from now on, referred to as "process") and project concepts in general. Definitions and discussions about process and project are contained in (Krasner, 1992). "Process" in the most general sense, defines how an identified set of activities is to be performed in the context of the goals, objectives and constraints of an organization; "project" is defined as an instance of a process.

Nowadays, various development process models exist for efficient software development. They range from traditional, such as rational unified process (Kruchten, 2003) to agile processes, like eXtreme Programming (Beck, 2004). Traditional processes are much more rigid and prescriptive. *Agile processes* are a new and growing approach to software development methods. They attempt to offer an answer to the community asking for "lighter weight" along with faster software development processes. The focal aspects in agile processes are simplicity and speed. Development groups concentrate only on the immediately requested functions, delivering them fast, getting feedback and reacting quickly to business and technology innovations (Beck, 2004).

There is a great deal of literature about models for process improvement within organizations (e.g., CMM (SEI, 1993), CMMI (SEI, 2002), ISO/IEC 15504 (ISO/IEC 15504-7, 1998), Bootstrap (Kuvaja, 1994)). These models are very descriptive explaining essential attributes that would be expected to characterize an organization at a particular maturity level. However, they do not tell though how to improve and which are the specific means to get into a particular maturity level. This is the main reason for limited success in many SPI programs. Some studies recognize the need of further research on implementing SPI (El Emam et al., 1999).

The aim of this article is to propose a new methodology in the SPI domain. Target readers are people interested in process management and SPI. This subject concerns standalone organizations as well as collaborative organizations, such as virtual organizations. This article is structured in five parts. Part two presents a research review about process modeling and software process improvement. Part three describes the proposed methodology to support SPI based on process and project alignment. Part four presents an overview about SPI within the domain of VOs. Part five concludes and introduces future trends.

BACKGROUND

Research on software development process intends to define the process elements that constitute good practices, leaving implementation and enactment of the process to organizations. Also important is the way processes evolve within the changing needs of the development organizations. Currently, there is a lack of support on how SPI approaches address the problem about how processes are effectively applied and improved using knowledge from projects. Another challenge is how to control and validate important project changes that must be integrated within the project. So, the main challenges are: process representation, project representation and process and project alignment.

The quality improvement paradigm (QIP), the IDEAL model and ISO 155504 Part 7 methods propose an approach to managing an SPI initiative. QIP can be seen as a more detailed model drawing upon deming cycle applied in the context of software engineering (Basili, 1994). While QIP is an open approach for managing improvement, IDEAL improvement model is based on the process assessment results of CMM giving guidance on how to execute and manage an improvement program (McFeeley, 1996). In the ISO 15504 Part 7 model, the focus of SPI is expressed as: "software process improvement is based on process assessment results and process effectiveness measures" (ISO/IEC 15504-7, 1998, pp. 2).

Process modeling techniques are useful in defining the process, especially in the upper levels of maturity models like CMMI. Curtis (1992) discussed some approaches using process modeling to support process improvement, software project management and process-centered software engineering environments (PCSEEs). The software process management system (SPMS) development identified and addressed the need for process models to be reusable, to support multiple views, to recognize process, product and human interactions to support process changes during development projects, and to support historical recording of the process over long periods of time (Krasner, 1992). In the domain of change management, the problem tracking system (PTS) is used to track errors and manage change request for the Wohnungswirtschaftliche Information System (WIS), a system built in a process-oriented way to support all business processes from the area of house constructing and administration (Gruhn, 1998). The Endeavors system is a flexible environment that allows users to create and evolve processes while a project is in progress (Bolcer, 1996). Although Endeavors supports most of the features in process definition languages and process modification, some problems arise about process coordination which can lead to chaotic and disorganized development processes. The BORE tool and methodology extends the experience factory concept (Basili, 1994) through rule-based process tailoring, support for process modeling and enactment as well as case-based organizational learning facilities. AHEAD system also supports the management and modeling of development processes. Additionally, AHEAD provides an integrated set of tools for evolving both process definitions and projects (Heller, 2003). In AHEAD, process evolved in terms of packages, which serve as units of version.

In Krasner (1991), the authors concluded that a flexible as well as active, intelligent, adaptive and orchestrated groupware that manages concurrent access to shared work spaces is a desirable goal for future process management systems. Collaborative environments are important for effective SPI but workshops are essential to a faster dissemination of process practices. Traditional SPI methods and approaches are based on final projects retrospectives. Since this work is performed in finished projects, project improvement can only be applied to future projects. There is a long-time span between problem identification and validation of the new process. Improvement opportunities resulting from projects must be analyzed, controlled and validated prior to dissemination in the organization practices. In agile principles (Beck, 2004), the project has reflections meetings in regular intervals. Cockburn proposes a reflection workshop technique (Cockburn, 2004), Dingsøyr and Hanssen have a workshop technique called postmortem review (Dingsøyr, 2002), whereas Salo and Abrahamsson discuss a Post Iteration Workshop (PIW) method (Salo, 2004).

Our work proposes a methodology that allows the definition, evaluation and improvement of an organization software development process. This proposal, called a Process and Project Alignment Methodology (ProPAM), allows for a general vision on the current state of an organization development process, as well project alignment with the development process.

MAIN FOCUS OF THE ARTICLE: PROCESS AND PROJECT MANAGEMENT

The proposed methodology supports SPI based on process and project management alignment. Process and project alignment is defined as the degree to which project goals and plans support and are supported by the process practices. Moreover, it involves a real match between process practices and project activities, work products and actors. However, several modifications in a project can cause misalignments with the development process. These modifications can be management innovations or changes in the way activities are executed. Furthermore, a modification may regard not only the considered activity, work product or actor, but it could also affect other elements having a dependence relation with the modified one. So, keeping track on