A Goal/Question/Metric Research Proposal to Monitor User Involvement and Participation in ERP Implementation Projects

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ABSTRACT

ERP implementation project success is influenced by a large number of factors, which most of the time are difficult to measure objectively. User involvement and participation is one of the most cited critical success factors in ERP implementation projects, and one of the most critical ones for their satisfactory outcome. This study attempts to define a set of metrics for monitoring user involvement and participation within ERP implementation projects by using the Goals/Questions/Metrics method. The results of this work are twofold. First, a literature review is presented on the user involvement and participation topic as related with ERP implementation projects. And second, the use of the Goals/Questions/ Metrics method is proposed to develop a metrics plan to monitor and control user involvement and participation within ERP implementation projects.

INTRODUCTION

Enterprise Resource Planning (ERP) implementation project success is influenced by a large number of factors, and most of the times it is difficult to measure them objectively. Usually, the metrics proposed within ERP implementation methodologies are related with milestones and costs aspects. This is particularly due to the fact that these methodologies follow the common definition of project success: basically to be on time and on budget. User involvement and participation is one of the most cited Critical Success Factors (CSFs) in ERP implementation projects [e.g. Bingi et al. 1999, Esteves and Pastor 2000, Nah et al. 2001, Kawalek and Wood-Harper 2002]. User involvement and participation results in a better fit of user requirements achieving better system quality, use and acceptance [Esteves and Pastor 2000]. The terms *'user involvement'* and *'user participation'* have been commonly used interchangeably in the Information Systems (IS) literature [Barki and Hartwick 1994], but they are not the same and here we attempt to clarify both concepts. Kappelman and McLean [1991] hypothesized that IS success is indirectly influenced by user participation and mediated by user involvement. The most accepted model of user involvement, user participation and system use was developed and tested by Barki and Hartwick [1994, 2001].

This study attempts to provide a set of metrics to help control and monitor user involvement and participation in ERP implementation projects in order to help managers achieve success in their projects. As a result of this study, we are interested in a small, combined set of metrics to help managers better understand this aspect within an ERP implementation project.

We propose to combine the Balanced Scorecard (BSC) method and the Goals/Question/Metric (GQM) method to develop this set metrics. The result is a GQM plan, which is a document that contains the goals, questions and metrics for a measurement program [Solingen and Berghout 1999], in this case an ERP implementation project. This paper is organized as follows. First, we present the research methodology used. Next, we present background in user involvement and participation and the GQM method. Then, we present the GQM plan proposed. Finally, we present some conclusions and further work.

RESEARCH APPROACH

A literature review of user involvement and participation topic and ERP implementations was made in order to acquire knowledge related with this CSF. The information provided by the literature review was the main source of information. Here, we only provide a preliminary metrics development approach to monitor and control user involvement and participation. Thus, the steps of our research study were:
- Literature review related with user involvement and participation topic.
- Definition of goals related with user involvement and participation in ERP implementation projects.

USER INVOLVEMENT AND PARTICIPATION BACKGROUND

In the IS literature, the terms user involvement and user participation have frequently been used to mean the same thing. However, Barki and Hartwick [1989, 1994] claimed that the two concepts are different, and thus need to be defined separately:
- User involvement is defined as "a psychological stage of the individual, and defined as the importance and personal relevance of a system to a user" [Hartwick and Barki 1994, p. 441], i.e., their attitude toward the development process and its product (the IS itself) and,
- User participation is defined as the observable behavior of users in the IS development and implementation, i.e., the set of operations and activities performed by users or their representatives during the IS development process [Hartwick and Barki 1994] or activities during the system implementation [Kappelman and McLean 1991].

Kappelman and McLean [1991] mentioned the term "*user engagement*" to include both user participation (the behavior) and user

involvement (the attitude). Thus, according to their account, user engagement is "used to refer the total set of user relationships toward IS and their development".

User Involvement

Many reasons have been given to involve users in IS implementation projects. User involvement is predicted to increase user satisfaction and acceptance [Ives and Olson 1984] by: developing realistic expectations about system capabilities, providing an arena for bargaining and conflict resolution about design issues, leading to system ownership by users, decreasing user resistance to change, and committing users to the system. Kappelman and McLean [1991] suggested that user involvement is something distinct from, although associated with, user participation and that the psychological state of user involvement may be more important than user participation in understanding IS success.

An important aspect related with user involvement is '*user perceived control*'. Baronas and Louis [1988, p. 114] stated that "by involving end-users in decisions relating to implementation, workers may become more invested in the success of the implementation and more satisfied with the system through the social-psychological mechanism of perceived control". Personal control has been defined in terms of choice, predictability, responsibility and ability to reduce or get relief from an unpleasant condition. They suggested that:

1. Systems implementation is likely to be experienced by nontechnical users as a period of transition during which users make sense of, and cope with, various differences between old and new systems and their anticipations of these differences;
2. Systems implementation is likely to represent a threat to user's perceptions of control over work.

Traditionally, the assumption in terms of user involvement is that if the organizational structure of an IS project is in place and appropriate committee meetings attended, their integration and coordination will occur. However, as Amoako and White [1997, p. 41] state "unlike the technical side of project management, these activities are very loosely defined, and very often include no mechanisms for the integration that will achieve the desired results". Therefore, there is the need for the distinction between structural integration and effective management of the involvement process. Characteristics such as user expertise, degree of organizational decentralization, project complexity, users' previous experience with IS could determine the degree of their involvement.

Kappelman [1995] divides user involvement in two types: user process involvement and user system involvement. User process involvement refers to the psychological identification of users with the process of IS development (i.e. their subjective attitude toward the IS development task). In addition, user system involvement refers to the psychological identification of users with respect to the IS itself (i.e. their subjective attitude toward the product of development).

User Participation

According to Briolat and Pogman [2000], "user participation is advocated in order to discover users' needs and points of view, validate specifications, and hence build better IS for the organization". Participation reflects what specific behaviors are performed, how many of these behaviors are performed, and how often they are performed [Barki and Hartwick 2001]. Ives and Olson [1984] outlined how user participation (at that time they named it user involvement) can improve system quality by: providing a more and complete assessment of user information requirements, providing expertise about the organization the system is to support, avoiding development of unacceptable or unimportant features, and improving user understanding of the system.

Mckeen and Guimarães [1994] showed that user participation has a positive relationship with user satisfaction. They also argued that four factors affect this relationship: task complexity, system complexity, user influence and user-developer communication. Barki and Hartwick [2001] define four dimensions of user participation: responsibility, user-IS relationship, hands-on-activity, and communication activity. Based

upon a meta-analysis study, Pettingell et al. [1988] concluded that the inclusion of users in definition and design stages is the best way to increase their perception of the value of the system. Figure 1 presents a summary of the constructs proposed by the different authors for user involvement and participation. These constructs are the basis for the development of our metrics program.

METRICS DEVELOPMENT APPROACH

Based on the concepts of the Balanced Scorecard [Kaplan and Norton 1992] and the method of Goals/Questions/Metrics [Solingen and Berghout 1999], we attempt to define a set of metrics to monitor and control user involvement and participation on ERP implementation projects. At the time of writing this paper, we are in the step of metrics definition using the constructs proposed by other authors for user involvement and participation (see Figure 1).

With the development of the BSC, Kaplan and Norton [1992] defined four perspectives that call for a focus on performance: financial, customer, process, and learning. It is our intention to combine the perspectives of user involvement and user participation found on the literature review, with the perspectives within the BSC. One of the issues when using the BSC is how to move from the perspectives to definitive metrics. One approach that provides this transformation is the GQM method [Solingen and Berghout 1999]. The GQM approach is a mechanism that provides a framework for developing a metrics program. It was developed at the University of Maryland as a mechanism for formalizing the tasks of characterization, planning, construction, analysis, learning and feedback. GQM does not provide specific goals but rather a framework for stating measurement goals and refining them into questions to provide a specification for the data needed to help achieve the goals [Basili et al. 1994]. The GQM method was originally developed by V. Basili and D. Weiss, and expanded with many other concepts by D. Rombach. The GQM method contains four phases: planning phase, definition phase, data collection phase and interpretation phase (for more details see Solingen and Berghout [1999]). The definition phase is the second phase of the GQM process and concerns all activities that should be performed to formally define a measurement program. One of the most important outcomes of this phase is the GQM plan. A GQM plan or GQM model documents the refinement of a precisely specified measurement goal via a set of questions into a set of metrics. Thus, a GQM plan documents which metrics are used to achieve a measurement goal and why these are used - the questions provide the rationale underlying the selection of the metrics. The definition phase has three important steps: definition of measurement goals, definition of questions, and definition of metrics.

Figure 1 – Constructs proposed by different authors for user involvement and participation.
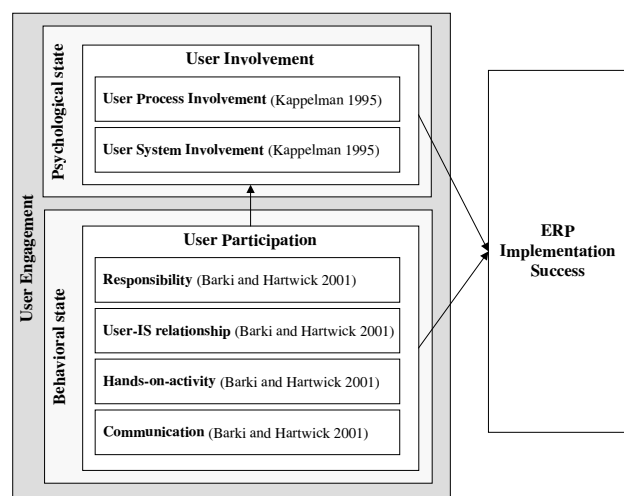
In the case of user involvement and participation, the definition of the measurement goals was made by using the template provided by Basili et al. [1994]. A GQM goal is described according to a template with five dimensions that express the object to be measured, the purpose of measurement, the measured property of the object (quality focus), the subject of measurement (viewpoint), and the measurement's context (environment). We defined two measurement goals based in our CSF, user involvement and user participation:

- Analyze: user participation; for the purpose of: monitoring; with respect to: ERP implementation project; from the viewpoint of: project team; in the context of: ERP implementation project.
- Analyze: user involvement; for the purpose of: monitoring; with respect to ERP implementation project; from the viewpoint of: project team; in the context of: ERP implementation project.

Currently, we are working on the definition of measurement questions and metrics. The questions of user participation measurement goal are based in the Hartwick and Barki [2001] survey. We adapted this survey to the context of an ERP implementation project. For each question we defined metrics that answer the respective question. For example, one of the questions related with responsibility dimension is: How much responsibility did users have for estimating project and systems costs? Regarding this question, two metrics were defined: *responsibility for project estimation* and *responsibility for estimating costs*. For each metric we are defining the following aspects: what they are measuring, when they must be measured, what possible values they could have, who will measure it, what medium is used for data collection. We created a special form for the metrics description. Most of the metrics proposed are direct measurements except the metrics related with percentages.

CONSIDERATIONS AND FUTURE WORK

This study attempts to define a first set of metrics for user involvement and participation in ERP implementation projects. User involvement and participation is cited as one of the most relevant CSFs in ERP implementation projects. We think these metrics should have two important proactive characteristics: metrics should help to detect deviations from the project plan and to act before damage is made, and second, these metrics may have the effect of motivating and encouraging top managers in the involvement and commitment with the ERP project. The results of this work are twofold. First, a literature review on user involvement and participation on ERP implementation projects. Second, a research proposal based on combining the BSC and the GQM method to develop a set of metrics to monitor and control user involvement and participation in ERP projects. The purpose of this study is not to describe an exhaustive list of metrics. Instead, we intend to present a form to develop these metrics in future ERP implementation projects and provided the first set of metrics that should be extended and adapted according to the specific needs of ERP implementation projects.

This study only provides the first step to propose a set of metrics for user involvement and participation, i.e., the definition of these metrics. Another aspect is the importance of knowing the relevance of each CSF along the stages of an implementation project [Esteves and Pastor 2001] due to the fact that this information can help managers know when they should put more attention to specific metrics in each stage. Currently, we are developing an application for the management of the metrics defined here. Further research will attempt to define metrics to other CSFs defined in the literature of ERP implementation projects.

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