

The Influence of Change Management on the Effectiveness of the Software Development Process

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Abstract

This paper presents the partial results of a field work, the intention of which was to measure change management in the effectiveness of the software development process in real-life projects. The methodology proposed by Pérez and Rojas [Pérez and Rojas, 1997] has been used in this task. A reference framework and the identification of change management measurement indicators, including their corresponding reactives, are the partial results of this field work.

Introduction

It is clear that all transformation processes are of vital importance for organizations to survive in today's competitive environment. A tangible element in this transformation process is the management of change. Change management is one of the factors affecting the effectiveness of the software development process. This dimension, the effectiveness of the process, is one of the most difficult to measure when considering its human and social characteristics. Therefore, it is useful to carry out field work that would help in measuring its results in real-life projects. At present, a study of this kind is taking place in an important sector of the Venezuelan informatics world. This paper presents an advance on the partial results thereof.

Systemic Global Quality in The Process of Developing Information Systems

Systemic global quality is a definition based on the concept of quality for information systems, these in turn being related to the concepts of product-process, efficiency-effectiveness, users-clients [Callaos and Callaos, 1993]. The combination of these concepts form the systemic global quality matrix. Each one of these qualities must be interrelated and integrate. The influence of various factors within the company has been highlighted in studying effectiveness in the development of information systems. Some of the factors that can be mentioned are leadership, the organizational culture, change management and the organizational structure [Rojas and Pérez, 1997]. The aim of this study is to delve deeper particularly into the change management factor.

Change Management

With respect to change management, it is worthwhile mentioning that any transformation process is of vital importance for the survival of an organization in the environment in which it functions. However, for a change to be successful, its management must be of a high quality and it must include the commitment of the top management level [Beckhard, 1979]. This includes certain planning activities introduced by agents of change and/or leaders [French and Bell, 1995]. These activities, according to the model suggested by Cummings and Worley [French and Bell, 1995] can be defined as: motivation towards change, the creation of a vision, the development of political support, management of the transition and the maintenance of the impetus. **a) Motivation towards change:** The priority of the agents of change is to promote and motivate all the individuals in the organization towards change; **b) The creation of a vision:** The creation of a vision provides an image of the future and ways to adapt to it [Silva, 1996]; **c) The development of political support:** Of course, nothing can be sustained without the persons providing the support and facilitating the resources and/or changes in the organization [Beckhard, 1979]; **d) Management of the transition:** Management of the transition involves several activities which are relevant for the proper implementation thereof; **e) Maintenance of the impetus:** As regards the last activity mentioned, actions are suggested to maintain the impetus of the individuals in the organization affected by the transition. The presence of the leader is important to promote change management in the organization. During the process, the normal powers of existing groups - analysts who are part of the staff, line managers or professionals - are cancelled to allow the leader to impose a new integrated vision with his own personalized power. The agent of change must lead the process in such a manner as to promote and generate actions and sustain change within the organization.

Methodology

The objective of this paper is to identify the indicators for the change management factor, so as to perform measurements thereof in a field study. The methodology used in this field study shall be the same as that used by Pérez and Rojas for measuring the effectiveness of the process [Pérez and Rojas, 1997]. The steps in this methodology are the following: -The drafting of a conceptual or reference framework based on change management, inherent to the field study; The identification of the variables to be measured in the field study; The selection and design of the measurement tool to be used in the field study applied within the organization; The selection of information systems projects to be analyzed; The conceptual and operational definition of the variables to be measured; The application of the measurement tool; The analysis of the results obtained from the measurement and the possible influence in the development process for the Information Systems (IS) of the projects selected in the field study, The drafting of recommendations leading to improving process effectiveness in developing systems for the organization.

Table 1. Variables Used to Measure the Influence of Change Management on Process Effectiveness in the Development of Information Systems

Variable	Indicators	Reactives
Change management	Evaluation of the current state of the Information System	<ul style="list-style-type: none"> Understanding of the problem to be solved by the new Information System in the opinion of the users
	Evaluation of the future state of the new Information System	<ul style="list-style-type: none"> Understanding on the part of the user of the impact of the new system. Understanding by the users of the benefits of the new system. Analysis by the users of the possible advantages and disadvantages of the new system.
	Utilization of the change management model	<ul style="list-style-type: none"> Degree of motivation towards change Creation of a vision and political development
		<ul style="list-style-type: none"> Maintenance of the impetus for change through improvement of communications and the reorganization of tasks.
	Use of strategies for the effective accomplishment of change management	<ul style="list-style-type: none"> Perceived degree of use of strategies to obtain the commitment and participation of users in the development of systems
	Evaluation of the activities planned to go from one state to the next	<ul style="list-style-type: none"> Initial contact; diagnosis of the situation. Degree of commitment to change, feedback and analysis of the situation. Analysis of the weaknesses and strengths in the development of Information Systems as a change process. Change planning. Intervention of change actions. Evaluation of the effects of the change program.
	Changes requested by the users in the systems project stages	<ul style="list-style-type: none"> Changes requested in the project design stage. Changes requested in the project development stage. Changes requested in the project maintenance stage.
	Level of leadership in change management	<ul style="list-style-type: none"> Leadership as an agent of promotion of change. Degree of leadership to lead and make concrete changes. The Management's commitment in leading change.
Process Effectiveness	Level of work satisfaction	<ul style="list-style-type: none"> Work relationship with workmates. Degree of work satisfaction. Desire to continue in the work environment.
	Degree of individual satisfaction Relationship among participants measured through conflicts	<ul style="list-style-type: none"> Desire to repeat the experience Frequency of appearance of conflicts in the group of users Frequency of appearance of conflicts between the users and the analysts. Frequency of appearance of conflicts in the group of analysts. Frequency of conflicts of a professional nature. Frequency of conflicts of a personal nature. Frequency of conflicts of a communications nature.
	Degree of resolution of conflicts	<ul style="list-style-type: none"> Frequency of conflict-solving. Degree of satisfaction with the solution given to the conflicts.
Product efficiency	Response time	<ul style="list-style-type: none"> Speed of response
	User-friendly screens	<ul style="list-style-type: none"> Degree of user-friendliness
	Disc consumption	<ul style="list-style-type: none"> Efficiency of consumption
	Code of programs	<ul style="list-style-type: none"> Efficiency of the code
	Consumption of memory	<ul style="list-style-type: none"> Efficiency of consumption
Product effectiveness	Operation	<ul style="list-style-type: none"> Frequency of failures
	Application	<ul style="list-style-type: none"> Degree of application
	Acceptance	<ul style="list-style-type: none"> Degree of acceptance System use probability

Process efficiency	Costs	• Budget adjustment
	Development time	• Compliance with goals
	Human resources	• Use of human resources
Technology	Hardware	• Compliance • Sufficiency • Opportunity
	Software	• Compliance • Opportunity
	Communication services	• Quality of services
	Development methodology	• Degree of satisfaction
	Technical training	• Quality of training

Variables to Be Measured

Following the previously described methodology and based on the conceptual framework previously developed, the following variables to be measured are proposed :

- Change management
- Process effectiveness
- Technology and other dimensions in the quality matrix

Change management: In the literature reviewed, a model is described for the management of change processes in organizations. Also highlighted is the fact that the implementation of a system implies a process of change in the organization, which should be managed as such. The material reviewed leads to reflection on the methodologies for developing information systems, whereby part of the change management process - the evaluation of a different state, the definition of the future state and the planning of activities to go from one to the other - is included. However, said methodologies do not contemplate an important part of the development process in information systems, that regarding the use of strategies to obtain the participation and commitment of the users in the development of a system. Therefore, this study shall concentrate mainly on the degree of use of these strategies. It is also necessary to measure the degree of understanding and point of view of the users in previous situations and situations after the implementation of the system.

Process effectiveness: The degree of process effectiveness obtained can be observed through its results [Silva, 1996].

Technology and other dimensions in the quality matrix: The observation of these dimensions shall be included in the analysis of the projects so as to discard problems related thereto and thus avoid confusion in the results. Lastly, the technology variable was considered in order to identify whether the projects to be measured were carried out with the minimal technological comfort. A set of indicators is proposed for each of these variables, and these in turn shall be measured by means of a questionnaire. These indicators shall have a group of reactives within the questionnaire, responsible for measuring the indicators. The table shows the variables, indicators and corresponding reactives:

Conclusions

This paper presents the partial results of a research in progress. Bearing clearly in mind the importance of the study of the effectiveness of the development process for Information Systems and the factors which have the most influence upon them (leadership, the organizational culture, change management and the organizational structure). This paper presents the indicators for this factor, with their corresponding reactives, that shall later be incorporated into a questionnaire for measurement thereof.

References

References available upon request from M. Perez movalles@usb.ve).