Abstract. In today’s dynamic organizational environment, understanding the various sides of organizational change has been an endless quest. The lack of a recipe for undergoing change, as been replaced with the definition of best practices. However the emergent changes that spring within the carefully detailed plan, usually induce a sense of resistance to change, which must be mitigated by conveying the necessary information, so employees can understand how their work is going to be affected. This knowledge about how the organization operates as a whole, allows to develop an global awareness amongst every individual, transforming it in Organizational Self-Awareness. In this thesis we propose a methodology for change management, that advocates the development of a self-awareness within the organization, gathering employees’ context information and aggregate those activities to form a representation of how business processes are executed. The study includes the application of the proposed methodology in a real organizational environment, namely INATEL.

1 Introduction

1.1 Motivation

"Life requires a person to navigate a host of relationships with people and things. People’s lives tend to be relatively stable. They live in the same house, drive the same car, put the same children to bed in the evening and go to work to the same place each morning. This stability allows people to perfect a strategy that works in their typical situations." (Wikipedia, 2009)

However, when this stability ends, chances are that most people will try to fight the changing process, so they can return to what they know, what they are used to, and more important, to what they are good at. In order to minimize the causes and effects of such resistance, appears the notion of change management, which in its essence is a structured approach for coping with a transition process, involving, in this context, information systems, individuals and organizations.

Although traditional literature emphasizes rational decision and planned change, Yates and Orlikowsky differentiate three types of change: planned, emergent, and opportunistic (Yates, 2006). With these different types of change as
a background, it is clear that the concept of change management should not be viewed as something that can be carefully planned and thoroughly executed. Employees must adapt rapidly to a great variety of internal and external forces, some of these changes are very small, but are crucial to the organization's dynamic. So, if change is a part of the daily routine of employees, why is there the notion that organizational change is difficult to accomplish?

The answer lies in the type of change that is being implemented, and most daily changes are emergent changes. Thus, it is a mistake to assume that people are inherently resistant to change, in fact what we refer to as "resistance to change" is in reality "resistance to uncertainty" (Carnall, 2007).

Aiming a response to this issue comes the concept of Decision Downloading, which is the action of communicating a decision that has already been made, to those who have not been involved in the decision-making process (Williams & Clampitt, 2007). Hence, it is essential to give employees an awareness of their place in the organization, so they can understand what changes will arrive, why is it going to affect them and how they will be able to deal with it.

1.2 Problem and Research Goals

As stated before, manage change in organizations is a strenuous and complex task, and requires a great effort of everyone involved. In order to assure that every employee is committed to the change process, it is essential to make them part of the project and give them the necessary information to understand how their daily work is going to be affected by that change.

Starting with the hypothesis that it is possible to ease an organizational change process, if employees have accessibility to information about how their work is going to be affected. The work conducted focuses on how to provide employees with the necessary tools, information and knowledge to successfully undergo organizational change. Thus, the objective of this thesis relies on the following topics:

- Define and explicit a method to support organizational change, through providing key information to employees;
- Describe a Case study, regarding a real organizational environment, where the methodology is going to be applied;
- Evaluate the methodology according to contributions it had to case study’s outcome;
- Assess the benefits of organizational self-awareness in the change management process.

Although being a broad subject, this thesis is centred on the Organizational Engineering (OE) discipline, which aims to overcome the gap between the hard/technical sciences of engineering and the soft/social sciences related to management. By concentrating on these two facets, it creates a way of representing the whole aspects of an organization.

With this in mind, the study involves finding a way to explicit the tacit knowledge employees have about the way they work, in order to represent it in
a graphical, clear and easy to use form. With the graphical representation of the organizational processes, it will be possible to give employees an idea of their place in the whole organization and the processes in which they are involved, i.e., convey the "big picture". To address this issue, the concepts of enterprise architectures and organizational self-awareness (OSA) shed important notions about modelling organizational practices.

2 Related Work

2.1 Organizational Engineering

Organizational engineering can be understood as a discipline that aspires the creation of a bridge between the hard sciences of engineering and the soft sciences of organizational management. OE aims at researching concepts, methods and technology related to the enterprise context in order to understand, model, develop and analyse various aspects of changing businesses (Tribolet & Sousa, 2004). In this field, the descriptive properties of business processes have proven to be a powerful tool to represent the flow of work and information throughout the business (Sousa, Caetano, Vasconcelos, Pereira, & Tribolet, 2005). According to Smith and Fingar, "By placing business processes on the centre stage, corporations can gain the capabilities they need to innovate, reenergize performance and deliver the value today’s markets demand" (Smith & Fingar, 2003). Although business processes represent the way organizations work, different viewpoints lead to different representations of the same reality (Mentzas, 1999). This poses as a problem, when we have various process drawing teams arriving at different process blueprints and a consensus must be made.

2.2 Enterprise Architecture

There are various definitions of what an Enterprise Architecture is, each of which giving emphasis on what it should represent and model, in order to provide an holistic view of the organization. The term "enterprise" in the context of "enterprise architecture" can be used to denote both an entire enterprise and a specific domain within the enterprise. Either way, it crosses multiple systems, and multiple functional groups (The Open Group Architecture Forum, 2006).

The Zachman Framework provides a way of viewing a system from many different perspectives and showing how they are all related (Zachman & Sowa, 1992). The framework is organized as a matrix, where the rows correspond to six different and unique perspectives, defined by the roles in the design and implementation processes (planner, owner, designer, builder, subcontractor and functioning enterprise). These representations are not merely successive levels of increasing detail but are actually different representations - different in content, in meaning, in motivation, in use, etc(Zachman, 1987).

From this exploratory investigation was developed an enterprise architecture framework, the CEO Framework, which consists on a conceptual framework.
aiming to define and evaluate the alignment between business processes, business information and the corresponding support systems and technology (Sousa, Pereira, Vendeirinho, Caetano, & Tribolet, 2006).

2.3 Developing Organizational Self-Awareness

In all organizations we can find two levels of consciousness. In one hand, we have the consciousness of the individual as part of the organization, who is aware, at every moment, of what he is doing and in which context he is acting, this type if consciousness allows to answer questions such as "who am I in this organization?, how are things done here? What is the organization - as a whole - doing?" (Zacarias, Magalhaes, Caetano, Pinto, & Tribolet, 2007). On the other hand, we have the consciousness of the organization as a whole, in which the organization is aware of what every member does, dealing with question such as "who are my members?, how do they of things?, what are they doing now?" This organizational self-awareness is much harder to achieve, since the sum of the each individual’s consciousness, is not enough to give the organization a collective self-awareness (Tribolet, Magalhães, & Zacarias, 2007).

Although, the dynamic alignment between the organization and its agents is vital to develop an organizational self-awareness, most enterprise representations do not allow capturing the particularities of individual agents and their interactions (Zacarias, Pinto, & Tribolet, 2007). To overcome this, enterprise ontologies provide formal or semi-formal models of organizations with richer agent models.

To address this issue, Zacarias et al propose a framework towards organizational self-awareness based on the fundamental concepts described in the CEO framework. These concepts include the notion of activity, role and entity, which is a synonym for organizational resource. Resources can be persons, machines, places, concepts or capabilities (Zacarias, Magalhaes, et al., 2007).

2.4 Change Management

In contemporary business environments, organizations often feel the need to adapt and respond to competitive pressures. As a result of this, various change management approaches have been developed (Currie & Hlupic, 2000). Although, most organizational changes start with a strategic decision, they are usually triggered by IT innovations, by new standardized applications, or by radical changes in the way information is structured, accessed, and processed. Hence, it is necessary to ensure that the entire management team is on the same wavelength (Galoppin, 2005).

Overview of Change Management Methodologies Table 1 presents a comparison between the three change management methodologies, Total Quality Management (TQM), Business Process Reengineering (BPR) and Business Process Management (BPM), according to its benefits and improvements to the business, and to manage change.
Table 1. A Comparison of Three Change Management Methodologies.

<table>
<thead>
<tr>
<th>Change Management Methodology</th>
<th>Business Benefits and Improvements</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Quality Management (TQM)</td>
<td>Quality Enhancement, Customer Satisfaction, Zero Defects, Culture Change, Better communications, Flexible working practices, Employee Empowerment</td>
<td>Incremental Change, Continuous Process Improvement, Top Management, and Employees Participation, Company Wide Scope, Medium Risk, Cultural Type of Change</td>
</tr>
<tr>
<td>Business Process Management (BPM)</td>
<td>Eliminate Non-core Business Processes, Process Optimization and Innovation, Technology Integration, Increase Agility, Encourage Cross-Functional Team Building</td>
<td>Iterative Change, Continuous Improvement, Focus on People and Technology, Medium Risk, Cultural/Cost Reduction Type of Change</td>
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</table>

The Transition Process According to Bridges (Bridges & Mitchell, 2000) the planning detail it frequently not the issue, the true problem resides in the transition process that occurs in every attempt as change. The transition is described as the state that change puts people into, i.e., for every change, people first need to take time to assimilate and adjust to the new order of things, before the transformation actually takes place.

Bridges (Bridges & Mitchell, 2000) assert that transition takes longer because it requires that people go through three separate and often difficult processes.
3 Proposed Approach

The absence of detailed information about the existing business processes in INATEL, regarding how the activities of those processes were conducted and by whom, led to a central problem that had to be solved by the change management team. This lack of organizational knowledge poses as a risk when a new information system, such as the SAP ERP, is being implemented and the overall result will be the modification of the way employees work, changing and creating new and ultimately different business processes. "Training should not focus on how they should use the system, but on how they should do their own job using the system" (Bhattacherjee, 2000). The emphasis given to the importance of providing employees with the necessary knowledge, so they can understand how perform their job, using the new system, is the main concern and objective of the approach presented in this chapter.

3.1 Defining the Proposed Approach

The process of defining the following approach was conducted at some extent during its application in the case study, evolving through the adaptation to the organizations conditions. However it is described in a generic way to be adopted in other scenarios of change. The plan defined by the CEO/INOV team had 3 main components:

i. One component, the Governance Board, concerning the Governance for Organizational Change and the Alignment between Business Processes and Information Systems, from a management point of view;

ii. Another component, the Implementation Team, responsible for the Design, Parameterization and Implementation of the Information System, according to the project’s plan.

iii. And a third component, the Change Management Team, regarding the Auditing and Control of the Organizational Change, Business Process Reengineering and Improvement, and the Documentation of the Change Process, aiming for an operational support.

3.2 Approach for Management Support

One of the most important and beneficial aspects regarding a change project, is the commitment of the top management, which can only happen if every department is involved in the process.

Thus, the change management process began with the creation of a Governance Board formed by the administration board, the department directors. This board would manage the organizational change and the alignment between the business processes and the information systems. It would also have the responsibility of tracing all technical and functional problems resulting from the project. To audit and control the organizational change was created a Change Management Team, composed by internal employees, and assisted by external technical consultants, reporting directly to the Governance Board.
3.3 Approach for Operational Support

To support the operational change management process, the CEO/INOV team adopted a bottom-up approach for the As-Is modelling of each department, and a top-down approach to define the transversal processes of the organization. The bottom-up approach comprised a series of steps, to decrease the granularity.

The operational component consisted in four distinct and sequential phases: (1) characterization of the As-Is business processes; (2) definition of the To-Be model, conducting a gap-analysis; (3) elaboration of the procedures manuals; (4) continuously update the organizational representation, regarding the information flow definition. These phases are described in figure 2.

Phase #1 - Create an As-Is Representation

1. **Scope Definition** - identification of the divisions to be represented and creation of the respective work-groups. These groups should include both employees who executed the activities, knowing in detail what was needed to perform them, and employees who had a broaden view of the majority of activities in a specific process.

2. **Process Information Collection** - the methodology used in this stage was based on creating activity logs, where employees should provide relevant information to support the business process definition phase and the subsequent graphical representation.

3. **Work Meetings for Process Modelling** - The meetings were coordinated by both the CEO/INOV and the change management teams. These meetings
promoted the discussion of the different points of view in the work-group. Hence, assuring the uniformity and coherence of the results, and encouraging the knowledge transfer process.

4. **Creation of business Process Diagrams** - With the decisions made in the work meetings the business processes started to be define. Sometimes requiring more sessions to refine and improve the flow of activities and decision points.

5. **Systematization of the Collected Information and Business Process Integration** - In the last stage, took place the results consolidation and the identification of the issues that needed to be clarified. It was also conducted punctual meetings to answer any existing doubts.

**Phase #2 - Establish the To-Be Model** After the As-Is model was defined and validated, it was possible enter phase 2 and create the To-Be model, representing the changes in the business processes with the introduction of the SAP ERP. This process required the following phases:

1. **Analysis of As-Is Diagrams** - in this analysis must be created a clear definition on the relation between the way activities were done in the present (As-Is) and the new activities supported by the SAP system.

2. **Infer the Changed Activities** - After analyzing the As-Is Models, it would be clear which activities are going to change. This activities were now performed using the new system, and more often than not, lead to a deep change regarding the old process (As-Is).

3. **Definition of the To-Be Processes** - To accomplish this task, the CEO/I-NOV team would help the key-users (who had already learned how to use
SAP) to define the business processes, replacing the old activities with the new ones in the business process.

4. **Creation of Business Processes Representation** - After the changed business processes was defined, a representation should be made. This representation would help employees in understanding how their daily activities were going to change.

This representations, both the As-Is and the To-Be, benefited from being done by employees, which would result in a more accurate and perceptible information, using a language they were familiar to.

**Phase #3 - Develop Available Procedure Manuals** To ensure that the SAP deployment occurred without major problems, the CEO/INOV team, along with the change management team and the key-users, defined the procedure manuals. This phase was composed by the following five stages:

1. **Analysis of To-Be Diagrams** - The To-Be models should be analyzed to understand which activities needed to be created a specific guide to help employees in accomplish the tasks.

2. **Gathering New System’s Information** - In order to understand how a given activity was accomplished with the new system, it was necessary to gather SAP’s manuals and print screen for SAP’s transactions. This information was then used to depict an activity.

3. **Link System’s Information with Activities** - With the new representations (To-Be) created in phase #2, the work teams would link the old activities with the new ones, and for each SAP transaction it would also be created a procedure flow, specifying the SAP screens, forms and navigation buttons that should be used to complete a given activity.

4. **Creation Procedure Manuals** - After the procedure flow was defined it was necessary to create the procedure manuals. These highly detailed representations would be used as clear and concise procedure manuals, which could be understood by every employee, since they were developed and validated by their peers.

5. **Insert Procedure Manuals in the HelpDesk Portal** - To finalize, the procedure manuals and To-Be model were then inserted in the intranet HelpDesk Portal, which was created to share this information with the whole organization.

In the end of the project, INATEL would have a knowledge base that allowed to recognize the business models and provide support to the SAP system. The models represented the relation between the activities executed and the respective SAP transactions. This knowledge creation process, from the organization, to the organization (section ??), revealed to be extremely beneficial in the change management process.
Phase #4 - Continuously Update the Organizational Representation

While the definition of business processes and the development of easy to use manuals are important to the foundation of an organizational knowledge base, it is not enough. It is fundamental that these documents get updated to represent at any given point in time, the actual state of the organization. Hence, in Phase #4 it would be initiated a new cycle to update the organizational representations, with the following stages:

1. **Substitute the As-Is Representations for the To-Be** - To initiate the process of updating the representations created, the first step is to replace the As-Is representation for the To-Be, since the latter is going to be the new reality of the business process. However, the To-Be model is usually a representation of what is expected to be the new process, therefore it is necessary to evaluate if it actually depicts the reality.

2. **Define Business Process Owner** - In order to maintain a business process representation updated, it is essential to have someone, or a group of individuals responsible for this task. These individuals would be the business process model owners, and would evaluate the accordance of their business models, with the way activities were executed.

3. **Evaluate the New Activities Workflow** - As stated above, the To-Be models are representations of how a given process should be executed after the change takes place. This idealistic models, not always correspond to what will actually be done. Hence, process owners need to evaluate the workflow of this processes, in order to understand if it is necessary to make any changes to the representation.

4. **Initiate a New Iterative Cycle** - The next step is to make a new iteration in the cycle. Gathering more information about how the activities are executed, and assessing the points of improvement of the business process.

4 Summary of the Approach

In the previous section it was define the proposed approach to manage change projects in organizations. A summary of this approach is depicted in Figure 3, and included a management support component, formed by a (1) Governance Board, and a field team, for operational support, called the (2) Change Management Team.

The Governance Board which would have the responsibility of making every decisions about the project, would also assure the alignment between business processes and information systems. The change management team would report directly to the Governance Board and its responsibility was audit the implementation project and document every organizational change.

To accomplish these tasks the change management team would work closely with employees during different phases of the change management process. Table 2 clarify the different work-teams, according to their activities and required knowledge, for the various phases of the Proposed Approach in Figure 2.
Finally, Figure 4 systematizes the Proposed Approach according to the informational artifacts created in each phase and the work-teams, as organizational agents, necessary to realize its four sequential phases. By having the organization involved in this process, and by gathering the action contexts of each employee, the approach provides an opportunity to develop both an Organizational Self-Awareness and the foundations for an Organizational Knowledge Base. This is possible, because it gathers information about the business processes with differ-
ent granularities, and share this information with the whole organization through an intranet Portal.

Fig. 4. Systematization of the Change Management Approach according to the information created.

5 Analysis Results

Throughout INATEL’s case, it is undeniable the importance of developing an organizational self-awareness, so employees could fully understand what was going to change in the organization and which repercussions would it have in their daily work.
The weak organizational culture in the public sector often results in a shortage of employees’ commitment to undertake organizational-wide changes. This happens in part, due to the inadequacy in rewarding employees’ efforts and premium their excellence. In addition, the complex and fragmented political system, allied to the frequent changes in administration, intensifies the challenge in obtaining top management commitment (Wagner & Antonucci, 2004).

The complex organizational structure presented by INATEL (and general public organizations), affected the ability to integrate the numerous departments, and identify a process owner as opposed to a function owner. Thus, it was crucial to undertake an extensive business process analysis to identify the real process owners. Once that task was accomplished it was necessary to determine the proper role of interaction with the change management team.

5.1 Benefits of Organizational Self-Awareness

We analyze the case study, regarding the benefits of developing an organizational self-awareness amongst employees, we point out the following five key topics:

– How it helps to reduce the project’s resistance forces;
– How it supports the implementation and deployment phases, regarding new business processes;
– How it helps to reduce the impact of the various changes in the organization;
– How it helps to generate the information, necessary to create an organizational knowledge base;
– How it contributes to develop organizational self-awareness, and what contribute does it bring to the project.

The method followed by the CEO/INOV team in INATEL, comprised a sensemaking approach, involving employees in developing a representation of the organization. Employees’ organizational self-awareness, and consequently their organizational culture, would broaden while actively defining the business processes. This happened, because individuals would start to understand their place in the organization, the formal and informal interactions with other employees, their roles and contexts, and the implications of their daily work in the business operations. This was one of the main contributes of adopting an approach towards organizational self-awareness.

By working alongside with employees, the CEO/INOV team had the opportunity to represent the true reality of INATEL’s operations, since they were the ones that really knew how the activities were executed and what was necessary to perform them. This would provide, to the implementation and deployment phases, an accurate state of INATEL, regarding its business processes. Using this representation, it was possible to assess the activities that were going to change with the ERP implementation, helping INATEL defining new and improved business processes, designated To-Be processes.

As stated by (Bhattacherjee, 2000), employees’ training should not focus on how they should use the system, but on how they should do their own job using
the system”, this was one of the fundamental aspects in which the approach was based. The As-Is and To-Be representations were crucial to manage the change process till the deployment of the new system. After that, it was necessary to redefine INATEL’s procedures and break with the old habits of INATEL employees so they could start to use the new system.

To accomplish this task, the CEO/INOV team, along with the key-users already with SAP training, developed a series of simple but highly detailed procedure manuals, describing step-by-step how employees should perform their work using the new ERP. To make this information available to all the organization, an intranet HelpDesk portal was created, containing all the representations of the new business processes, along with the respective procedure guides. This simple, but important tool presented an important knowledge asset to INATEL’s operations.

6 Conclusions and Future Work

Throughout this thesis we tried to evaluate the difficulty of accomplishing organizational change, not as a inherent resistance to change, but as a innate anxiety about the uncertainty that change brings. We believe that this anxiety can be surpassed if the necessary information is given to employees.

We propose a methodology for supporting the change management process. The described method comprises a management component, concerning a steering committee and a governance board. The method also defines an operational support component, that would have the task of creating a representation of the organization and procedure manuals that would guide employees in their new assignments.

We describe the case study where the methodology was applied successfully. INATEL is the public organization where the case took place. The change management process described was driven by the implementation of the SAP ERP system. We conducted an analysis of the case study regarding how the proposed approach help to manage the changes driven by the implementation project.

We also assess the benefits of conducting an approach towards organization self-awareness in such cases. We conclude that developing an awareness of the employees position within the organization, has great benefits in conveying the necessity for change, in reducing the doubts about which activities the new system will change, and ease the overall change management process.

Other procedure and technological developments can be accomplish as future work, the main concepts follow:

- Evaluate the best approach for maintaining the business models updated, by iterating the phases of the methodology, defining a responsible for the process, and generating new representations;
- Develop a way of register employees’ activities automatically, without the need for user input.
Define an automatic alert system, that gives a warning if it detects that a given activity, of a process, is being accomplished in a different way, than it was supposed to.

Develop a portal available to every employee, to use as a organizational knowledge base.

Much can still be done to automate the various activities of developing organizational-self awareness, but first it is necessary to convey its importance in creating knowledge and employees’ commitment to accomplish the goals of the organization.

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