Engenharia Organizacional:  
Consciência Organizacional e Gestão da Mudança

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Dedico este trabalho à minha família e amigos.
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, over the years, with the definition of best practices, which allow organizations to continuously adapt to the changing business requisites. However, the main difficulty of managing change relies in the human factor and the unpredictable phenomena that it brings.

The emergent changes that spring within the carefully detailed plan, usually induce a sense of resistance to change. This resistance to the uncertainty towards the future, must be strongly battled within the organization, by conveying the necessary information, so employees can understand the decisions made and clarify 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 address the informational needs of an organization, and the governance model necessary to manage change. We propose a methodology for change management that advocates the development of a self-awareness within the organization, gathering employees’ context information and aggregating 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, a public foundation that was carrying out an ERP implementation project, therefore, facing deep business processes transformations that had to be managed and supported.
Resumo

No ambiente organizacional dos dias de hoje, é fundamental perceber as várias faces da mudança, o que se tem demonstrado uma tarefa árdua. A falta de uma receita para ultrapassar as fases de mudança, foi substituída, ao longo dos anos, pela definição de boas práticas, que permitem às organizações adaptarem-se à constante mudança dos requisitos de negócio. Contudo, o maior foco de dificuldade em gerir a mudança, baseia-se essencialmente no factor humano da mudança e nos fenómenos imprevisíveis que ele acarreta.

As mudanças emergentes que surgem no seio de planos cuidadosamente detalhados, geralmente induzem a uma sensação de resistência à mudança. Para lutar contra esta resistência face ao desconhecido, deverá ser fornecida a informação necessária para que os empregados possam compreender as decisões tomadas e de que forma é que o seu trabalho será alterado. Este conhecimento acerca do modo como a organização funciona, permite o desenvolvimento de uma consciência global em cada indivíduo, transformando-se numa Consciência Organizacional.

Nesta tese, abordamos as necessidades informacionais da organização e o modelo de governação necessário para controlar o processo de mudança. Propomos uma metodologia de gestão da mudança, que promove o desenvolvimento de uma consciência organizacional, recolhendo informação sobre o contexto de acção dos empregados e agregando essas actividade em processos de negócio. O estudo inclui a aplicação da abordagem proposta numa organização real, o INATEL, uma fundação pública que estava no decurso da implementação de um ERP, e por isso, debatia-se com profundas reestruturações nos seu processos de negócio.
Palavras Chave

Keyw ords

Change Management
Organizational Self-Awareness
Governance
Implementation Project
Methodology
4 Proposed Approach

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Introduction

You do not really understand an organization until you try to change it.
– Kurt Lewin

Understanding the various sides of organizational change has always been an endless quest. Over the years, many formulas have been developed and improved. However, none of them is flawless nor haven’t been found incomplete in some aspect. This happens because the difficulties in accomplishing organizational change are not technological, but social. Deep changes are covered with anxiety and fear, and these are strong emotions that need to be relieve, before change can take place.

In this introductory chapter, it will be explained the motivation for the thesis, the goals and objectives of the work conducted, the methodology adopted throughout the research, and finally, how the document is structured.

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. This event takes a great importance when an organization is trying to implement a new system or a new policy, and resistance forces are emerging amongst employees, who refuse to deal with the intrinsic transformations around them.

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.

Being the main subject of this thesis, first it is necessary to understand and clarify the scope in which the change management process will be considered.
1.1.1 Change Management to Support Change

In every organizational change, new situations emerge spontaneously between the detailed and carefully planned change process, altering the development process, and consequently its outcome, leading more often than not to the project’s failure. This fact has given a negative connotation to every attempt at implementing some kind of organizational change, since it rarely proceeds as planned.

Although traditional literature emphasizes rational decision and planned change, Yates and Orlikowsky differentiate three types of change: planned, emergent, and opportunistic (Yates, 2006). According to Yates, emergent change “is seen as ongoing — not something that ends after a discrete time period designated as implementation, but something that emerges from the interactions of people as they use the technology in a particular setting.” While opportunistic changes occurs whenever there is a deliberated decision to support an emergent change, which is perceived as an opportunity instead of an obstacle.

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. Instead of trying to control change, the management process must be adjusted to new conditions and new situations that arise, supporting the organizational transformations and aiding the individuals’ orientation towards change.

1.1.2 The Difficulties in Organizational Change

In today’s ever-changing organizational environment, the way individuals work is constantly evolving. 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. When new situations appear, employees must deal with them and try to adapt. Decisions are made at an operational level, where employees participate in the process and understand their causes and implications.

On the other hand, deep organizational changes are planned at a management level and usually employees are kept in the dark about the decisions made. These decisions will ultimately affect the way individuals work, and this lack of top-down communication leads to uncertainty about the future, which leads to discomfort and fear, and finally results in resistance to change.

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).
This resistance can be caused by a variety of human feelings, since in many organizational changes, both employees and managers enter a vortex of psychological distress and anxiety, originated essentially by fear for the unknown that lies ahead. These fears translate in different doubts and concerns, depending on the individual’s mindset and hierarchical position.

Some of the more common concerns are based on: surprise, “They never told me I would have to do this differently!”; uncertainty, “How will this affect my work?”; insecurity, “Will I became obsolete?”; inertia, “Why should I change the way I work?”; lack of participation in the decision-making process, “They never asked what I thought, so why should I do this?”; sense of defeat, “This will never work!”; and lack of information and knowledge, “I simply don’t understand it!”.

Therefore, it is essential to find a way of turning this doubts into convictions and bring the necessary information into the table.

1.1.3 The Importance of Decision Downloading

Generally in organizations, employees know what they are doing (their daily tasks) and how they accomplish those tasks. However, they often don’t know why they are doing it, i.e., what are the causes and effects of their work in the organization as a whole. If they don’t comprehend why they are doing something, they will tend to resist to every attempt of change, since in their own point of view, it makes no sense.

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). This effort has a considerable importance, since those uninvolved in the decision will have a different viewpoint and will lack the perspective on its reasons. Most employees may find the decision incomprehensible, not obvious and not reasonable, this happens because they didn’t have the access to critical facts and didn’t undergo the analytical process that lead to the decision.

To be considered a robust decision downloader, one must be open to discuss with others the following key topics: a) how the decision was made b) why it was made c) what alternatives were considered d) how it fits in with the organizational mission e) how it impacts the organization f) how it impacts employees.

There is no doubt that employees main concern will be centered in the last topic (“how it impacts employees”), however the implications in their daily work will be deeply related to the impact in the organization. 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.
1.1.4 Information as a Key Factor to Change

It is a given fact that information is crucial for business, therefore, companies spare no efforts to gather information about the environment, for example about customers, products, competitors, etc. Despite this hunger for information, most organizations forget to gather information about themselves, and how they operate.

Without this information, it is impossible to formulate organizational knowledge, that on one hand, assists managers in making the right decisions when regarding change, and on the other hand, facilitates employees in understanding the decisions made, the implications in their work, resulting in the organizational awareness previously referred.

In order to serve its purpose, this Information needs to be available to everyone in the company and should be in a format and language specific to the recipient.

In spite of all these factors, most change management methodologies are focused on the requisites and implementation phases, and often disregard the human side of change. The project team can have the requisites all right and accomplished a perfect implementation, but if employees don’t use the new system, it will be worthless. Therefore, it is vital to give them all the information they need, so they can realize what benefits change can bring, and not focus on the upcoming difficulties.

1.2 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.

Only after understanding the overall problem, employees can start recognizing the purpose of the change process, and most of all, start supporting it. Although, their understanding of the problem is crucial for an effective change management, it is certainly not enough.

As people tend to resist to change, it becomes necessary to make them comfortable with the transformation process. This can be accomplished, by not only instructing them about the changes in their daily work, but also assuring that the information they require will be available when needed. To achieve this goal, it is essential to conduct a gap analysis, identifying which activities stay unaltered and which will be modified. The analysis must provide the necessary information to develop procedure manuals that actually aid employees in identifying and executing their new tasks.

To accomplish the proposed goals, the work was carried out in a real organization (INATEL), which was undergoing a deep organizational change triggered by the implementation of an Enterprise Resource Planning (ERP) System. This project involved the whole organization and required the definition and implementation of new business processes. By being inserted in an actual change process, was possible to evaluate the specificities and ordeals of the described change management activities.

1.3 Research Methodology

The methodology adopted in this thesis involved two main phases. One, regarding the definition of the research goals and the investigation of related work. And the other, composed by fieldwork and document analysis, which allowed the elaboration of a case study.

The definition and development of the case study involved a document exploratory analysis phase, to understand the impact that the process changes would have on the organization in study (INATEL)
and on the way its employees did their work, and a collaboration phase, as a member of the CEO/INOV team in the change management process.

The vast documentation collected about INATEL, helped to create a context to the overall problem. However, the lack of organization in those documents illustrated the symptomatic of a common problem in public (and private) organizations, concerning organizational knowledge management. These documents included several organizational structure representations (most of them outdate), reports conducted by external consulting companies and government directives, stating the urgency of implementing ERP and CRM systems on INATEL, and steering meeting minutes and presentations, where the evolution of the project was discussed.

Apart from the document analysis, there was an important observation and collaboration component, by attending project meetings and working alongside with the change management team, this opportunity of integrating a field team in the project, allowed to gain a significant perspective and understanding of the personal conflicts between the different project stakeholders.

1.4 Structure of the Document

This thesis is divided in the following chapters:

Chapter 1 - Introduction. This is the present chapter, in which are described the motivation for the thesis, the research goals and the methodology used in the work conducted.

Chapter 2 - Background and Related Work. In this chapter is given an overview about the state of the art in the field of Organizational Engineering and in methodologies for Change Management. It is also carried out a general review about the work conducted in the CEO Department of INESC, that influenced this thesis, in particular the developments made in the Organizational Self-Awareness concept.

Chapter 3 - Problem Context and Evaluation Method. The third chapter includes a description of the problem’s background, specifically, the circumstances that led to the INATEL case study. This chapter has also a description of the method used to evaluate the approach, according to the characteristics of the case.

Chapter 4 - Proposed Approach. This chapter contains a detailed explanation of the approach for change management proposed and followed throughout the case study. It describes the phases in which the approach is divided, and what is necessary to accomplish them.

Chapter 5 - INATEL Case Study. In this chapter is described the Case Study in INATEL. It reports the various problems that occurred and what was done to solve them.
**Chapter 6 - Case Study Analysis.** In this chapter the followed approach is analyzed, according to the case study, and is asserted the contribution of Organizational Self-Awareness in the Change Management process.

**Chapter 7 - Conclusions.** The final chapter contains the conclusions about the work conducted in this thesis and the proposals for future work.
Background and Related Work

“Whatever we do must be in accord with human nature. We cannot drive people; we must direct their development... The general policy of the past has been to drive; but the era of force must give way to the era of knowledge, and the policy of the future will be to teach and lead, to the advantage of all concerned.”

– Henry Gantt

In today’s dynamic organizational environment, the use of best practices is crucial to continuously adapt to the changing business, in order to maintain competitiveness. Organizations are feeling the need for accurate representations about their processes, technology and people, so they can manage effectively. However, such representation is not easy to attain, and in this context, Organizational Engineering provides the concepts that allow modeling the various aspects of the organization.

In this chapter is given an overview about the notion of Organizational Engineering and the related concepts. It is also presented the developments made by the CEO department of INESC in this topic. Finally, a set of methodologies for change management in implementation projects are described and compared against one another.

2.1 Organizational Engineering

2.1.1 Organizational Engineering: The Discipline

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 analyze various aspects of changing businesses (Tribolet & Sousa, 2004).

To accomplish this task, OE focuses on the relationships and dependencies between business strategy, business processes and the supporting information systems. It deals with both the representation of all organizational components, and the identification of best practices and business patterns.

In order to address the main issue of this thesis, it is vital, on one hand, to understand what type of information should be made available and, on the other hand, how it should be represented. Thus, to
identify these organizational knowledge needs, one must first comprehend what employees do in their daily work. 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 et al., 2005).

2.1.2 Organizational Representation Through Business Processes

When organizations began to look at their business according to processes, instead of being solely divided in departments with little communication between them, they began to understand the real implications involved in the organizational change and the overall enterprise performance, with relation to IT alignment.

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).

To achieve this kind of consciousness, it is imperative to have an accurate and clear definition of the existing business processes in the organization. Hence, this definition will allow recognizing the informational requirements that employees have when executing their actions.

2.1.3 Business Process Definition

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.

There are several definitions of the business process concept in today’s literature. Some of them are listed below.

- Processes are the structure by which an organization does what is necessary to produce value for its customers (Davenport, 1993)
- The manner in which work is organized, coordinated, and focused to produce a valuable product or service (Laudon & Laudon, 2006);
- A business process is a set of value adding activities that operates over input entities producing output entities (Sousa et al., 2005);
- A business process takes an input or inputs and generates an output, which is of value to the customer. […] Business processes exist solely for the purpose of creating a satisfied customer – they have no other valid reason to exist (Hammer & Champy, 1994);
A business process is a collection of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how the work is done within an organization, in contrast to a product’s focus on what. A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly defined inputs and outputs: a structure for action (Sparx Systems, 2007);

From the definitions above, it is clear that business processes are customer oriented, and according to Davenport, taking a process approach implies adopting the customer’s point of view (Davenport, 1993). This orientation allows employees to understand the complete value chain, and more important, what is involved in their activities. Moreover, business processes have also well defined inputs and outputs, and an ordered set of activities that add value the recipient. A process cannot exist by itself. It must be embedded in an organizational structure and usually span several functions, implying a horizontal view of the business. Business processes must have, also, clearly defined boundaries and constraints that apply to the organization in achieving its goals. These constraints are known as business rules and can be expressed in a formal language. Business rules relate to the operational level and can provide tactical detail about how a strategy will translate to actions.

2.1.4 The Importance Of The As-Is Model

The As-Is model is the representation of the organization’s existing business processes, or in other words, is the way business activities are executed in the current situation, before any change or improvement. This model poses as a common knowledge repository of the organization (Castela & Tribolet, 2004b), as it allows representing the way people work and their roles within the organization.

The As-Is model comprises not only the activities of a process, but also the order by which they are executed, the resources that are consumed and produced, the business actors of that process, and the information systems that support it (Castela & Tribolet, 2004a). This description allows to understand the alignment between processes and organization’s goals, by clarifying the internal and external factors that influence the business.

By representing how the organization executes its processes, the As-Is model can be used both by employees, in their daily operations, and management, to identify critical points of improvement, using the models as a knowledge base for strategic planning and quality management. Thus, the As-Is models must be continuously updated, whenever an organizational change occurs, in order to reflect the real state of the organization. Only with this dynamic representation, it is possible to use the As-Is model as a foundation for enterprise decision-making.
2.2 Modeling an Organization

Design and Modeling business processes, information and people requires a serious of rules, in order to maintain the coherence and comprehensibility of the representations created. As organizations get more complex, this representations tend to move towards chaos, and in response to that, Enterprise Architectures have proven to be very efficient in ordering organizational models.

2.2.1 The Contribution Of Enterprise Architectures

The concept of business process, per se, is not enough to portrait the reality of the organization. It is necessary to define a set of unambiguous concepts and methodologies that are independent of who is doing the analysis and at the same time are complete enough to represent all aspects of the organization. In this context, appears the notion of 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).

According to the definition used in ANSI/IEEE, an architecture can be viewed as: "The fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution."

Thus, enterprise architecture is about understanding all the different elements that make up the enterprise and how those elements inter-relate (Schekkerman, 2004). It poses as a strategic information asset base, comprising the business mission, the information and technology necessary to perform the mission, and the transitional processes for implementing new technologies in response to the changing mission’s needs.

2.2.1.1 The Zachman Framework

The field of enterprise architecture essentially started in 1987, with the publication in the IBM Systems Journal of an article titled "A Framework for Information Systems Architecture," by J.A. Zachman. In that paper, Zachman laid out both the challenge and the vision of enterprise architectures that would guide the field for the next 20 years.

The challenge was to manage the complexity of increasingly distributed systems. As Zachman said: "The cost involved and the success of the business depending increasingly on its information systems
require a disciplined approach to the management of those systems” (Zachman & Sowa, 1992).

Zachman’s vision stated that business value and agility could best be realized, by a holistic approach to systems architecture that explicitly looked at every important issue from every important perspective.

The enterprise-architecture framework proposed by John Zachman, originally described as an information systems architecture framework, is actually more of a taxonomy, than a framework, in the sense that it provides a generic classification tool for organizing architectural artifacts, such as design documents, specifications and models, instead of defining a set of practices or presenting a strategic planning methodology. According to John Zachman: “The [Enterprise Architecture] Framework as it applies to Enterprises is simply a logical structure for classifying and organizing the descriptive representations of an Enterprise that are significant to the management of the Enterprise, as well as to the development of the Enterprise’s systems” (Zachman, 1987).

Although the Zachman Framework was designed for architecting Information Systems, it was initially explained using the building industry as an analogy, showing that it could be used to classify descriptive representations of any complex object, including planes, buildings or enterprises.

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 (Figure 2.1), 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).

**Planner’s perspective** corresponds to the organizational Scope, defining the context that establishes the universe of discourse, and identifying what should be modelled in the remaining perspectives.

**Owner’s perspective** comprises the Enterprise (business) model. It deals with the conceptual view of the end product and the owner’s expectations, from a business perspective, for the operating enterprise.

**Designer’s perspective** deals with the logical view of the end product and defines the System model, which will enable the business model.

**Builder’s perspective** refers to the Technology model, and the builder’s plan for applying technology to the system model.

**Subcontractor’s perspective** corresponds to a set of Out-of-context models, identifying the actual solutions that have been implemented, according to the builder’s plan.

**Functioning enterprise** concerns the specification of systems operation and maintenance.
Figure 2.1: Representation of the Zachman Framework matrix.
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).

Each column of the Zachman Framework represents an abstraction from the real-world enterprise, and describes the focus of the artifact according to six basic interrogatives: what, how, where, who, when and why.

The *what* (things), refers to the enterprise data and their relationships. The *how* (processes) corresponds to the functional description of the enterprise. The *where* (network) comprises the location of the enterprise components. The *who* (people) identifies who does the work and the chain of command. The *when* (time) corresponds to the events. The *why* (motivation) comprises the objectives, goals and strategies.

This dimension is independent of the first and the intersecting cells of the Framework correspond to models, which, if documented, can provide a holistic view of the enterprise.

Albeit the purpose of this thesis is not to develop a complete enterprise architecture, the taxonomy presented by the Zachman framework will help to understand the different viewpoints and informational needs of each group of employees. By differentiating the levels of detail in the organizational representation, it is possible to convey a simpler and more comprehensive way of addressing the enterprise in its entirety, and therefore, making the knowledge’s transfer process easier.

### 2.2.2 The CEO’s Research Work

The Center for Organizational Design and Engineering (CODE) of INESC, previously named Centre for Organizational Engineering (Centro de Engenharia Organizacional - CEO), has been conducting an extensive research in the OE discipline, focusing mainly on organizational contexts, and developing key case studies.

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 et al., 2006). The framework is described below.

#### 2.2.2.1 CEO Framework

In order to accomplish this task, the CEO Framework establishes five architectural components: Organizational Architecture, Business Architecture, Information Architecture, Application Architecture, and Technological Architecture, as depicted in Figure 2.2. The modelling language used in this framework is
UML, and each architectural component is individually represented and organized as a UML package, each comprising its own model elements.

Figure 2.2: Fundamental concepts within each of the enterprise architecture views (Sousa et al., 2005).

**Organizational Architecture** deals with the aspects directly related with the organization. It includes the enterprise mission, vision, strategy, as well as organizational units, policies and human resources.

**Business Architecture** results from the implementation of business strategies and the definition of processes. Thus, the main concept within this sub-architecture is the business process. In this model, a business process is a set of value adding activities that transform input entities into output entities. From this architecture will be derived the information systems that operationally support the business.

**Information Architecture** describes what the organization needs to run its processes as described by the business architecture, i.e., which information entities are necessary to support the business.
These information entities are independent from systems and technology. The Information Architecture provides a high-level logical representation of all key elements of the organization and the relations between them.

**Application Architecture** will support the business requirements and provide an efficient way to manage organizational entities. To accomplish this, the application architecture must be derived from the business and information architectures. This sub-architecture does not refer which technology or specific software should be used, instead, it defines which application services are required to ensure the support of processes and organizational entities.

**Technological Architecture** represents the technologies that will support the applications defined in the previous architecture, as well as the infrastructures and environments required to deploy those applications. The technological architecture must cope, not only with specialized technological perspectives, but also with the continuous technological evolution.

The CEO framework describes how to create each of the five sub-architectures that model the entire organization. However, in this thesis we will focus mainly on the Business and Information architectural types, to represent what the organization does and how it does it, and which informational artifacts are needed to accomplish each activity.

### 2.2.2.2 CEO Framework Concepts

The framework is based on three fundamental concepts (1) entities, (2) roles and (3) activities, and the relations between these three concepts are portrayed in Figure 2.3. **Entities** are the relevant things that compose an organization. Entities are nouns that have a distinct, separate existence (concrete or abstract), therefore, it can be a person, machine, place or concept. They can be classified according to its attributes and methods, and may present intrinsic properties, describing the entities in isolation, or extrinsic properties, derived from their relations with other entities. **Roles** represent the observable behaviour of an entity, within a collaboration context. Roles describe the extrinsic properties of entities, and are organized in role models, describing their structure and the way they collaborate, in order to fulfil a task. The role model may also specify constraints. **Activities** are organizational verbs. An activity is an abstraction representing how a number of entities collaborate through roles to produce a specific outcome.

![Figure 2.3: Relationships between Activity, Role and Entity (Sousa et al., 2006)](image-url)
The described method of representation is powerful enough to depicted the way an organization works, although, it lacks the focus on the individual members, the way they accomplish their tasks and their behaviour within it. In most organizations, a single employee is not responsible for the entire set of activities of a given business process. Instead, he/she performs the tasks of only certain activities of multiple business process. This fact contributes to a narrow vision of the organization, with a lack of integration with the whole. To cover this crucial issue, the CEO started to research the importance and impact of emerging an organizational self-awareness.

2.2.3 The Field of 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, et al., 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 et al., 2007).

Thus, it is necessary to acquire information about every aspect of the organization. This kind of knowledge is separated in two distinct categories, the tacit knowledge, related to the individual’s personal experiences, and the explicit knowledge, defined and specified in a formal language. However these two types of knowledge are not totally separate but are mutually complementary entities. They interact with into each other in human creative activities by individuals or groups (Nonaka et al., 2000).

According to Nonaka, the Externalization is the process of articulating tacit knowledge into explicit knowledge. This is fundamental to provide the means to create an organizational knowledge base, with the experiences and know-how of employees. On the opposite side, we have the Internalization process, which consists on embodying explicit knowledge into tacit knowledge. Providing a way of training new employees, and also instructing existing staff on new practices and conveying a broader awareness about every aspect of the organization.

To accomplish this continuous knowledge conversion and communication, it is crucial to develop the proper collaboration context, promoting information exchange. Since, there is no knowledge creation without context, in the sense that this is a key element, essential to interpret the information.

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 particular-
ities 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.

### 2.2.4 A Framework Towards Organizational Self-Awareness

Working systems involve people engaging in activities over time, not only with each other, but also with machines, tools, documents, and other artifacts (Zacarias, Pinto, & Tribolet, 2007). Thus, work practice modeling is essential to (1) identify performance issues not detected by tasks models, and (2) assessing the alignment between task design and actual execution.

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.

Another important concept of this framework is the notion of Agent, which is regarded as physical and animated resources with special capabilities that enable them to (1) reform, coordinate and change activities, (2) provide, consume, manage and change resources and (3) monitor, coordinate and change their own activity and the activity of other agents (Zacarias, Magalhaes, et al., 2007).

This agent-centric representation provides a way of capturing and representing the actual implementation of organizations, particularly, the behaviors of specific individuals, performing specific tasks, in specific circumstances (Zacarias et al., 2008). In other word, it allows uncovering individual and collective work practices, instead of the static models acquired by process-centric and role-based representations.

The other modelling primitive defined within this framework is called context. Its intent is to capture the grain level of detail about human behaviour in and around organizations. Figure 2.4 depicts the relation between the five concepts of the proposed framework: activities, resources, agents, roles and contexts.

While, activities and resources are part of the organization's design, contexts emerge from execution. The notion of context also influences the concept of role, since the specific role played by agents is determined by a given context. In this framework, contexts are regarded as (1) networks of agents linked by actions and resources, (2) states of affairs and (3) a set of rules (Zacarias et al., 2008).

The basic architecture of the framework previously described can be viewed in Figure 2.5, where agents play and switch between a set of activity or resource-related roles (Zacarias, Magalhaes, et al., 2007). The three layers in which the architecture is divided comprehend the Action layer, which captures the interaction patterns between agents; the Deliberation layer, which captures activity coordinators and
trigger rules that change agent commitments; and the Change/Learn layer, which represents the activity and resource designer roles of agents.

According to Zacarias, even though the framework can be used for different organizational levels, the work conducted focuses on individuals and inter-personal behaviours and resources. By representing individual work practices we can, not only, identify how individuals implement tasks, but also reflect how people manage their activities.

In order to collect the necessary information for modelling the described framework, it was developed a bottom-up and context-based approach. This methodology allows acquiring the actions of a group of subjects, to identify and analyse action-layer behaviour, infer decision-making layer behaviour, and acknowledge but not capture change/learn behaviour (Zacarias et al., 2008).
Figure 2.6 depicts an overview of the 6 activities of the proposed approach; (1) bootstrapping, (2) action capture, (3) context discovery, (4) Context visualization (5) context analysis and (6) context integration.

In this thesis we will focus on the top 3 activities represented in Figure 2.6, namely the Bootstrapping, Context Discovery, and Action Capture. The activity referred as bootstrapping includes a brief observation period, in which is gathered and defines a set of actions and resource types. This basic set is then discussed and validated by the observed subjects, which can be individuals or teams. The bootstrapping process is the starting point for the action’s acquisition.

In the action capture activity, actions are registered in chronological order and described as organizational sentences. These sentences are triples subject-verb-object (Zacarias et al., 2008), where the subject relates to the agent, the verb identifies the action and the object describes the resources used/produced. This type of modelling differs from the traditional modelling approaches that describe tasks, activities or processes with predicates, lacking the subject.

Once captured and analysed, actions and resources will be grouped according to their context. This context identification will allow other employees, who also know and recognize the context at hand and also have a broader view of the process, to infer the tasks and activities where those actions should be included. The organizational knowledge that each employee have, is extremely important when analysing sets of registered actions, because they know, at some extent, who the subject is, what he/she is doing when executing that specific action and, more important, why he/she is doing it.

2.3 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
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).

2.3.1 Overview of Change Management Methodologies

In the next sections are presented three methodologies that can be considered, in an information system implementation point-of-view, as change management methodologies. All of them define a set of stages and phases with the objective of supporting deep transformations in the organization, while improving, in a more or less radical manner, the existing business processes.

2.3.1.1 Total Quality Management

Total Quality Management (TQM) is an incremental management strategy to improve the quality in all organizational processes, by involving both management and employees. It is a holistic approach, aiming for customer satisfaction, involving the organization as a whole, for creating and implementing a continuous improvement process. It focuses on competitiveness, effectiveness and flexibility through planning, organizing, and understanding all the activities and tasks undertaken by people within an organization (Currie & Hlupic, 2000).

As defined by the International Organization for Standardization (ISO): “TQM is a management approach for an organization, centred on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society.”

The main goal of TQM is to “do the right things, right the first time, every time”, with zero defects and aiming for cost reduction. To accomplish this task, TQM advocates five key principles: (1) Management Commitment, in planning, deploying, monitoring and revising process change; (2) Employee Empowerment, by training teams, promoting employee’s suggestions, and measuring individual and group efforts, in order to enable recognition; (3) Fact Based Decision Making, with the use of statistical process control; (4) Continuous Improvement, enabling a cross-functional process management, with systematic measure and standard improvement; and (5) Customer Focus, improving service relationship with both internal and external customers, never compromising quality.
2.3.1.2 Business Process Reengineering

Business Process Reengineering (often referred by the acronym BPR) is described by Hammer and Champy as “the fundamental reconsideration and the radical redesign of organizational processes, in order to achieve drastic improvement of current performance in cost, services and speed” (Hammer & Champy, 2003).

According to BPR, Organizations should look at their business processes from a clean slate approach in process redesign (Teng et al., 1998) and understand how to improve the efficiency and effectiveness of those processes.

Hence, the key rhetorical question of reengineering is: “If I were re-creating this company today, given what I know and the current level of technology, what would it look like?”

This is not an easy task, therefore, many methodologies have been developed to address BPR projects (Davenport, 1993), (Hammer & Champy, 2003), (Muthu & Hossein Cheraghi, 1999), and many studies have compared those methodologies. The following methodology is a consolidation of different perspectives and approaches to the redesign of a business enterprise, using BPR.

This methodology (Muthu & Hossein Cheraghi, 1999) comprises five phases: (1) Prepare for Reengineering, where a cross-functional team is established and the strategic plan and purpose is formulated; (2) Map and Analyse As-Is Process, the main objective of this phase is to identify disconnect and value adding processes that can be reengineered, and estimate both the resources required and the associated cost; (3) Design To-Be Process, here are produced the necessary To-Be models that will be used to improve the current situation, while satisfying the strategic goals of the enterprise; (4) Implement Reengineering Process, this is the implementation phase and where the As-Is and To-Be models will be used to facilitate the transition; and (5) Improve Process Continuously, this phase is essential for the success of any BPR project, since it is necessary to monitor the progress and results of the implemented processes, in order to improve them accordingly.

Before the reengineering team can proceed to redesign the process, they need to understand how it is currently done. The effort given to phase (2) brings some controversy to the table. While, some BPR proponents (Hammer & Champy, 2003) argue that analysing the current enterprise limits the creative process and is a misuse of valuable time, others defend that an As-Is analysis is crucial, before starting to design the To-Be model. Albeit, there is a consensus that the most relevant aspect of BPR is to enable a radical improvement, although it doesn’t mean a complete disregard for the current processes.

After spending time and effort on analysing the current processes and designing the To-Be models, it is imperative to prepare the organization for change. This is where most BPR projects fail. To facilitate the transition, the organization must run a culture change program, along with all the planning and preparation. After “winning the hearts and minds of everyone involved” (Muthu & Hossein Cheraghi,
1999), it is necessary to enable a rapid implementation of the information system that is required to support the reengineering business process.

BPR has earned a bad reputation due to a great number of failures in reengineering projects. This happened because, contrary to organization’s belief, BPR doesn’t provide a miracle fix for the lack of performance. Instead, it requires a great effort in process design and a strong and motivated leadership to succeed. Some of the critiques to the BPR approach are based on the drastic transformation of business processes, starting with a clean slate, and disregarding the current who and how of processes. Also, the lack to provide an effective way to focus the improvement efforts, has given room to approaches defending gradual and incremental changes. Hence, TQM and BPR have always been considered mutually exclusive, but they can be used simultaneously, complementing each other. BPR can use TQM tools and techniques to ensure a continuous improvement of the reengineered processes.

### 2.3.1.3 Business Process Management

Business Process Management (BPM) is the discipline of defining, analysing, enacting and optimizing business processes throughout their lifecycle to achieve enterprise goals. The key objective of BPM is to align the organization with its client needs, which is accomplished by aligning the processes with the organization’s overall strategic goals (Hill, 2007).

BPM promotes not only an increase in process efficiency and effectiveness, but also advocates innovation, flexibility and integration with technology. While BPR practitioners attempted to design the perfect process, and implement it in a radical, clean slate approach, BPM promotes an iterative methodology for making incremental process improvements (Leeming, 2005), (Aalst et al., 2003), therefore, enabling more frequent adjustments.

BPM has a strong focus, both on people and technology. Instead of a simple process automation leading to staff reduction, the objective is to understand the interactions and dependencies among people, systems and the information they rely on to perform their tasks better (Hill, 2007). This is accomplished by technology, as Business Process Management Suites (BPMS), which empower workers to find ways of improving the processes and sharing their innovations easily.

The BPM lifecycle is divided in 5 iterative stages: (1) Planning, this stage consists in defining and prioritizing a short list of candidate BPM projects, identifying key players, whose input is critical to project success, and establishing the governance to ensure that the BPM project stays on track throughout all of the iterative stages of the cycle; (2) Model and Design, here the current processes are modelled and analyzed from a technological point of view, searching for critical points, that are candidates for improvement and automation; (3) Develop and Deploy, In this stage the business needs are mapped onto the supporting technologies and the business rules will ensure that these systems are properly integrated,
providing key indicators, such as real-time metrics; (4) Manage and Interact, with the solution running, users will start to interact with the system, being able to manage its performance and effectiveness; and (5) Analyze and Optimize, in this stage the BPM solution is continuously monitored and the retrieved information is analyzed, in order to identify potential improvements for the iterative process.

2.3.1.4 Comparison Between Methodologies

Doubtlessly, the need for a change management methodology is critical to any project aiming an organizational transformation. By using a specific method, the organization can define and follow a plan of action for implementing the necessary changes. However, it doesn’t mean that the plan will have to be strictly followed. The key importance of planning, resides in the fact that it involves a deep reflection on the problem, which will reveal the critical factors that need to be addressed, leading to the definition of strategies to solve them.

Each of the previous methodologies have their own specificities and should be used in accordance to the type of change intended and also the organization’s culture. Table 2.1 presents a comparison between the three change management methodologies described in this chapter, according to its benefits and improvements to the business.

2.3.2 The Transition Process

Although adopting a methodology for implementing change is fundamental, it is surely not enough to guarantee the project’s success. This happens because such approaches tend to neglect the dynamics of personal and organizational transition that can determine the outcome of any change effort (Bridges & Mitchell, 2000), (Kotter, 1998). More often than not, a change process is regarded as a straightforward process: establish a task force to lay out what needs to be done, when, and by whom, then the organization “just” have to implement the plan.

The plan typically has the current situation (As-Is), the vision where the organization wants to be in the future (To-Be) and the path to follow. In these terms, implementing change should pose as a simple process. However, many organizations fail in the implementation process, even though they have correctly planned the whole process. So why don’t people just do it?

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.

Hence, while change is something external, in the sense that it represents a new procedure, a new
Table 2.1: 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>
</tr>
</tbody>
</table>
information system or a new policy, transition is internal, it refers to a psychological and emotional reorientation that people have to undergo before change can occur. The common issue relies on the fact that transition happens much more slowly than change. While it is easy to set up a new machine or install a new information system, making people use it, is rather more demanding.

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

The first thing people must do is *Say Goodbye.* They have to leave the old practices in order to embrace the new ones. This is often a difficult task, since they are asked to give up and let go of the things they are good at, and that they have done almost all their lives.

The second phase of transition is *Shifting into Neutral.* At this time people find themselves in a neutral zone. They should let go of the old habits, but haven’t quite understood what the new reality will be. In this phase some people tend to rush into a new situation, while others try to move back into the past. Thus, it is vital to provide employees with information about what is going to really change, and how it will affect the way they work.

The third and last phase is *Moving Forward.* In this phase people are expected to behave in a new way, using the new systems and working along with the new procedures. In most projects, there is pressure to rush people into this phase, so the transition process goes faster. This often leads to fail, as people will become frightened and confused about the new procedures. In these cases, no one will want to take the lead, and will probably wait to see how others are going to handle it.

![Graphical representation of the transition phases](image)

Figure 2.7: Graphical representation of the transition phases (Bridges & Mitchell, 2000).

Figure 2.7 depicts the time required to undergo the transition process, according to the level of management. While senior managers tend to move through the change process more quickly, employees at lower levels need more time to understand the whole process, and consequently will have more difficult to undergo the transition period.
Problem Context and Evaluation Method

“It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.”

– Niccolò Machiavelli

In every prospect of organizational change, there is a clear opportunity for improvement. The type of change and improvement depends deeply on the organizational context where everything is going to happen, and it is often seen as a problem that must be dealt with caution. In this chapter it will be presented our context problem, i.e., the organization where the work was conducted and what initiated and driven the change process.

This chapter is an introduction to the case study, and attempts to give the background for the proposed approach of chapter 4. It will also include the description of the evaluation method to be used when analyzing case study in chapter 6.

3.1 Problem Context

The work conducted on this thesis had an important practice component in an organizational environment. Being in the middle of a change management process is essential to give a deeper perception of all the phenomena involved, and how different individuals of the organization manage conflicts and cooperate with each other to undergo change. As asserted before, each organization has a unique way of facing change, since it is more a social process than a technological undertaking.

In this case, the institution in which the case study is based is INATEL, that recently become a public foundation. The event that triggered the change process, was the implementation of an Enterprise Resource Planning (ERP) system, that would be used to manage almost every aspect of the organization. In the next sections, it will be presented a background of INATEL, its characteristics as an organization, what lead to the decision of implementing the ERP and how the project’s preparation begun.
3.1.1 INATEL Background

INATEL (Instituto Nacional para Aproveitamento dos Tempos Livres dos Trabalhadores) is a public foundation, with administrative autonomy, and competences in providing social and cultural services to its associates, such as social and senior tourism and thermals, cultural activities and sports occupation, both on Portugal mainland and its autonomous regions (Azores and Madeira). INATEL has near 250,000 individual members and 3,500 collective associates. Its recreational facilities comprise 14 holiday camps, 3 camping parks, 3 rural touristic houses, a theatre and other sports and cultural centers, all of each can be used by its members.

In order to fully comprehend all the project implications it is necessary to understand the logical structure and the department division of INATEL.

3.1.1.1 Logical Structure

INATEL’s administration comprises a General Council, an Administration Board and an Auditing Commission. The General Council is composed by a representative of each governmental department in areas related to labour, finances and culture, and has the function of approving the annual activity plans and the annual budget. INATEL’s Administration Board is composed by a president and two vice-presidents, who are responsible for defining the objectives and general orientation of INATEL, by elaborating annual activity plans and coordinating the overall services provided by the institution, assuring an efficient financial and asset management. The Auditing Commission has the function of revising the execution of the activity plans and auditing the financial accounting of INATEL.

INATEL is divided in 21 delegations and sub-delegations directly dependent on the Board of Directors. Four primary departments coordinate the administrative, cultural, sportive and recreational activities, which are: the General Secretary Office, the Cultural Department, the Sports Department and the Tourism Department; each department is coordinated by a director, and is structured in divisions, each of which directed by a chief division.

Given that INATEL is a public institution, its annual budget must be approved by the government’s Account Court. Therefore, it is vital to define all of the projects requisites the right way, in order to prevent unnecessary project delays, due to budget overrun, since it has to be revised and validated by the auditing commission and the Account Court.

3.1.1.2 Legacy Systems

Since 1990, INATEL has been trying to overcome its management and control deficiencies, by implementing several information systems. However, a lack of an IS integration plan, has created numerous
information isles, which were manually merged, leading to frequent errors and being highly inefficient.

Due to this specific implementations, INATEL has a vast number of information systems for each area, the main applications are: BaaN, a simple ERP used in Financial/Accounting; SCG, Central management system, used for handling associates and travels; NewHotel, NewStock, NewPos, used for managing the hotel units; and GespXXI, used for managing the camping parks.

In the tourism division more than 95% of the activities were done without the use of computerized systems, or at most were used only simples applications like MS Word and MS Excel. The SCG had the function of a final repository, and the BaaN was used in accounting and financial activities, with no integration with each other.

### 3.1.2 Previous Work

Over the last years, several public and private consulting companies conducted management and strategic analysis, proposing changes to INATEL’s organizational structure, and recommending the adoption of a more enterprise like culture and practice, due to the dire change of INATEL’s statutes.

A report from a consulting company stated the necessity of implementing a content management system, preferentially integrated with an ERP, in order to gain operational efficiency. Along with the ERP implementation, INATEL should also acquire a CRM system, to better manage information from its clients and associates. INA, which is the National Institute for Public Administration responsible for developing knowledge, innovation and processes of change for the Portuguese public sector, also conducted a series of consulting analysis, aiming the development of a Logical Information Systems Architecture, representing INATEL’s organizational model. This IS Architecture was an important step in managing information, applications and business processes, however, it didn’t undergo any update since it was created in 2005.

The report from the Quality Program for the Ministry for Social Security and Labour (PQMSST) described the deficiencies of INATEL’s information systems, making reference to the decentralization level and lack of integration between applications. To solve these problems, the report suggested that the SCG should be made accessible to the largest number of employees and delegations, exploring its capabilities and using it as a way of sharing information. It also proposed a system integration project, with BaaN, NewHotel and NewStock, and the implementation of a CRM.

### 3.1.3 System Selection

As explain in the previous section, most of the studies proposed, not only an overall systems integration, but also a CRM system implementation, to manage associates’ information more efficiently. There were
two main options to accomplish these tasks. On one hand, there was the possibility of integrating the existing systems, on the other hand it could be implemented a new system that met all the necessary requisites, including the CRM component.

To help making the decision, a business case was conducted by INA. Although, the study recognized that the updates done to the various information systems provided more coherent information, they were still requiring a great maintenance effort and permanent attention for punctual ruptures. Therefore, as a way to merge the various systems, three different scenarios were proposed:

1. Maintain and integrate the actual systems and complete them with more efficient solutions, focusing on the human resources management and the relation with the client.
2. Implement a new ERP, developed in Portugal and existing for 10 years, called Primavera.
3. Implement a complete management solution, developed in Europe and in growing usage in Portugal, including projects in the Portuguese Public Sector through the Ministry of Finance, called SAP.

Of these three options, the one that guaranteed better technical integration and support, as well as lower operation costs, despite a higher initial investment, was the implementation of the SAP system.

In addition to the report done by INA, the Ministry of Finance and Public Administration was carrying out an effort to implement a solution that would provide a fast generalization of the Public Accounting Official Plan (POCP) to the entire public and administrative sector. The solution should provide the following features: budget planning and preparation, financial and analytical accounting, asset and stock management, sales and billing and information management, among others.

The Ministry of Finance also wanted to include and develop other functionalities that allowed a central budget consolidation and a connection to the state treasury. Hence, it was in place a state program to streamline the information system support of the Public Administration, through the implementation of SAP at a lower cost. Furthermore, SAP benefitted organizations with modern accounting systems, such as BaaN. With all this facts taken into account, the decision was to implement the SAP system.

### 3.1.4 Project Scope

In December 2005 was signed a contract with SAP, for the acquisition and implementation of the SAP system in INATEL. The new ERP would provide the necessary means to manage INATEL’s assets and patrimony efficiently. In April 2006 the Account Court approved a contract rectification for the SAP acquisition, to include the CRM module.
Usually the implementation of an ERP, such as SAP, begins with the accounting and finance modules. However, INATEL was in a changing process to become a foundation, which would involve modifications in its accounting plan, so the administration board decided to begin the project with the CRM component. Figure 3.1 depicts the initial plan to implement SAP in INATEL.

Figure 3.1: Initial scope of INATEL’s project for implementing SAP.

The implementation project was divided in three phases, each with specific modules implementation, however this case study will only focus on the two initial phases. The first phase covered the following business areas: Associates Management, Travel Sales and Products/Services Purchases, Books Sales and Purchases, Call Center, Content Management and the creation of an Associate’s Portal.

The second phase of the project included the financial and logistics modules, and covered the following business areas: Finance Management, Cost and Benefit Centers Management, Decentralized/ Centralized Logistics and Hotel Logistics.

In relation to the existing applications, some of them were replaced, while others were integrated with SAP, due to their specificity and adequacy to the business. Among the preserved applications was: NewHotel, NewPos and GestXXI. The replaced applications were: SCG, BaaN (in execution till the end of phase two, in 2008) and NewStock (replaced in the Hotel Logistics phase).
3.2 ERP Implementation driving Change

As stated before, change can be triggered by a great variety of events, some are planned, while others are emergent. In our case study, the change process begins with the decision of implementing a new information system, the ERP from SAP. This new system, transversal to the whole company, would require deep modifications in the way employees worked. As the comic strip in Figure 3.2 clearly illustrates, an ERP implementation project must be carefully planned in order to avoid a disastrous failure. Thus, it is necessary to define, not only, a detailed plan about how the system is going to be customized, implemented, deployed and supported, but also how employees would learn to work with it, in order to actually use it.

![Comic strip from Dilbert regarding ERP implementations.](image)

In the following section it will be presented the ERP system from SAP and will also be detailed the ASAP methodology, used by their consultants when implementing the system. As will be described below, the ASAP methodology is an adaptation of the BPM lifecycle described on section 2.3.1.3, and takes into account all phases of the implementation process.

3.2.1 The SAP ERP System

The SAP ERP application is an integrated enterprise resource planning (ERP) software, manufactured by SAP AG, that targets business software requirements of midsize and large organizations in all industries and sectors.

SAP is an acronym for “System Application & Products” which creates a common centralised database for all the applications running in an organization. The application is assembled in such a versatile way that it handles all the functional department within an organisation. SAP’s applications are built around R/3 system which provide the functionality to manage product operations, cost accounting, assets, materials and personnel. The R/3 system of SAP runs on majority of platforms including windows 2000 and it uses the client/sever model.
SAP provides majority of enterprise applications that includes: SAP Knowledge Warehouse (KW), Product Lifecycle Management (PLM), Human Resource Management Systems (HRMS), Supplier Relationship Management (SRM), Supply Chain Management (SCM), Customer Relationship Management (CRM), Advanced Planner and Optimizer (APO) and Business Information Warehouse (BW).

3.2.2 ASAP Methodology

The ASAP (Accelerated SAP) is SAP’s standard implementation methodology. It contains a Roadmap, a step-by-step guide that incorporates a multitude of tools, accelerators and useful information to assist all team members in implementing R/3. Quality checks are incorporated at the end of each phase to easily monitor deliverables and critical success factors.

The ASAP methodology adheres to a specific roadmap that addresses the following five general phases:

**Phase 1. Project Preparation:** In this phase the implementation strategy and scope are defined, resources are assigned, and the project team is identified and mobilized. During this phase the team goes through the initial planning and preparation for the SAP project, identifying the primary focus areas that need to be considered. Also, the project work environment is set up.

**Phase 2. Business Blueprint:** The purpose of this phase is to achieve a common understanding of how the company intends to run SAP to support its business. The result of this phase is a Business Blueprint (BBP), which is a detailed document with the entire business processes that will be supported on SAP, and the implementation requirements. The client must approve the BBP in order to continue to the next phase.

**Phase 3. Realization:** The purpose of this phase is to implement the business process requirements defined in the BBP. In this phase the system is configured, knowledge transfer occurs, extensive unit testing is completed, and data requirements for migration are defined.

**Phase 4. Final Preparation:** In this phase occurs the final integrating tests, the legacy systems are migrated to SAP, and users are trained to operate with the new system. The Final Preparation phase also serves to resolve all crucial open issues.

**Phase 5. Go-Live and Support:** This is the final phase of the ASAP methodology and represents the transition from a project-oriented, pre-production environment to live production operation. In this phase the new system is activated, transactions are monitored, and post-implementation support is provided.
The ASAP methodology defines a set of milestones for every work path, to track the progress of each phase, and ensures effective communication between the project team, the client project team, and the project management, by conducting weekly update meetings. These meetings are used not only to update on project status, but also to identify any issues or risk areas that may threaten the project. Project quality is verified near the completion of each phase, ensuring that all the requirements for the next phase have been met.

### 3.3 Evaluation and Analysis Method

To analyze the case study previously introduced, we must confront the benefits of the proposed approach, which is described on chapter 4, according to the following 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.

Since the case study concerns the implementation of an ERP, it will also be analyzed according to the critical success factors of an ERP implementation. Thus, it will be analyzed to what extent does the approach facilitates and improves the change management process. The following section describes the most common Critical Success Factors (CSF) in this area.

### 3.3.1 Critical Success Factors for ERP Implementations

An ERP system implementation is not an inexpensive or risk-free venture. The organizational change it carries can cause the project failure if not correctly managed. Thus, it is necessary to understand and identify the implementation problems that can occur and which factors are critical for accomplishing such an undertaking. Numerous authors have identified a great amount of Critical Success Factors for implementing an ERP, below are described the most relevant ones (Akkermans & Helden, 2002), (Somers & Nelson, 2001).

**Clear Understanding of Strategic Goals and Objectives.** An ERP implementation always has a strong business objective and is usually attached to a vision of how the company operates. The company’s goal can be to satisfy customers, reduce costs, empower employees or improve control
management. In this initial phase is imperative to clearly define the project goals, expectations and deliverables in an operational point of view, in order to specify the general directions of the project. The triple constraint of project management specifies three often competing and interrelated goals that need to be met: scope, time and cost goals.

**Top Management Commitment.** Successful implementations also require a strong leadership, commitment, and participation by top management. This is one of the most important factors when a project begins, since extremely important business decisions must be made when implementing an ERP. The roles of top management include not only communicating the corporate IT strategy to all employees, but also establishing reasonable goals for the project, understanding the capabilities and limitations of IT.

**Steering Committee.** To make an ERP succeed, it is necessary to involve all the project stakeholders in the form of a management group, called steering committee. A steering committee usually consists of administration, senior management from across the different corporate functions or departments, project management and representatives of the implementation team. This committee must frequently meet, to understand everything that is happening with the project implementation and to ensure that all major decisions are based on actual facts. This will not only convey an overall vision of the project progress to all concerned, but also ensure the adequate control over the team’s decisions.

**Project Management.** To ensure a great project management is necessary to develop both a work plan and a resource plan, and careful tracking of the project progress. This will ensure that the project scope and objectives, initially defined, are accomplished within the budget, which otherwise could jeopardize the project progress and complicate the implementation. Project management importance is well documented and numerous methodologies and management tools exist, as explained in section 2.3.1.

Customization increases the scope of an ERP and adds time and cost to an implementation. Thus, it is essential to assess the business requisites to correctly define the trade-off between system customization and processes reengineering. Effectively manage both is vital to keep the implementation on schedule and guarantee the project success. Therefore it is necessary to select the right project manager as well as the right team members, which should not only be technologically competent but also understand the company and its business requirements.

**Organizational change management.** The existing organizational structure and processes found in most companies are not compatible with the structure, tools, and types of information provided by an ERP. Even the most flexible ERP system imposes its own logic on a company’s strategy, organization, and culture. Thus, when implementing an ERP, organizations are frequently forced to redesign certain business processes or developing new ones to support the business objectives.
using the new system. This organizational transformation requires the corresponding realignment between organizational structures, policies, processes and employees.

Most companies significantly underestimate the efforts involved in change management. This usually happens, because many chief executives view the implementation of an ERP as merely a technological challenge. However, ERP systems introduce a large-scale change that can cause resistance, confusion, redundancies, and errors. Thus, it is imperative to properly prepare employees for the imminent changes, embracing the opportunities provided by the new system. Hence, an effective change management process is essential to handle and control the problematic issues and also change the corporate culture.

**Use of Consultants.** Organizations must be conscious about their own limitations, when implementing an ERP system. To overcome these shortcomings it is essential to bring to the project the knowledge and expertise necessary to guarantee its success. With this in mind, many organizations use consultants to facilitate the implementation project. Consultants may be involved in various stages of the implementation: performing requirements analysis, recommending a suitable solution, and managing the implementation. However, it is critical for the organization to keep control over the project, benefiting from the experience and guidance given by consultants.

**Data Accuracy and Conversion.** A fundamental requirement for the effectiveness of ERP systems is the availability and timeliness of accurate data. When loading the data into the new system is vital to convert all the disparate data structures into a single, consistent format, in order to avoid serious implementation delays. Conversion can be an overwhelming process, if not thoroughly managed. It is necessary to develop a migration plan, defining what needs to be included in the new system and what needs to be omitted, in order to ensure the data consistency and uniformity.

ERP systems also require that everyone in the organization must work within the system, not around it. Thus, it is necessary to establish an organization-wide commitment in using the new system, as a mean to motivate employees in changing their work routines to accommodate the new system.

**Extensive Education and Training.** Training is essential for the success of an ERP implementation, since employees, who do not understand how the system works, will invent their own processes using parts of the system they are able to manipulate. Hence, ERP implementation requires a critical mass of knowledge to enable people to solve problems within the framework of the system. To provide this kind of knowledge, many companies use consultants to help during the implementation process, creating opportunities to enhance employees’ skills.

**Multi-site Issues.** Multi-site implementations always carry additional challenges that must be correctly handled. The effort level depends on two main factors: (1) the degree of process and product consistency across the remote sites, and (2) the need or desire for centralized control over information,
system setup, and usage. Another issue resulting from multi-site implementations is related with the cutover strategy. The organization must choose between an approach where the implementation take place simultaneous in all facilities or a phased approach, with a pilot implementation in one facility. This is one of the most difficult decisions to be made. In one hand there is the pressure to do a simultaneous implementation in order to recover the investment sooner. On the other hand, a phased approach, although will take longer, can be better monitored and managed, and the project team can learn lessons from each phase, improving the overall project success.

**Dedicated Resources.** The resources allocated to the project are also a critical factor of concern when implementing an ERP, since an organization’s failure to commit the required financial and human resources may jeopardize the project progress. Therefore, the resource requirements must be defined in the initial phases, with the administration’s commitment that they will be met along the project.

**Interdepartmental Communication and Cooperation.** A key factor for successfully implementation of ERP systems requires a corporate culture that emphasizes the value of sharing common goals over individual pursuits. Thus, the cooperation between departments is vital not only to learn from others experiences and improve the implementation process, but also to convey an organizational culture change. To accomplish the later is essential to stimulate interdepartmental communication (Sarker & Lee, 2003).

**Management of Expectations.** The success of an implementation is always related to the expectations that the company has for a certain system. Information system failure as been defined as “the inability of an IS to meet a specific stakeholder group’s expectation”. Therefore, it is imperative to correctly define the measurements by which the project is considered to achieve its goals.
“Managers construct, rearrange, single out, and demolish many ‘objective’ features of their surroundings. When people act they unrandomize variables, insert vestiges of orderliness, and literally create their own constraints.”
– Karl Weick

In the previous chapter were presented a serious of issues that ought to be address, in order to successfully implement the new information system in INATEL. This project presented as a challenge, both to the implementation team and the organization itself. While reading about other case studies, regarding change management in ERP implementations, one of them stood out because of the accurate description it presented. The mentioned paragraph follows:

“Traditional system training does not work very well for SAP implementation because this is not only a technology change but also a change in work process, culture, and habits, and these are very difficult things to change. You are talking about changing attitudes and job roles that have been ingrained in employees’ minds for years and in some cases, decades. System training will overwhelm less sophisticated users and they will think, ‘O my God, I have no clue what this computer thing is all about, I don’t know what to do if the screen freezes, I don’t know how to handle exceptions, I’m sure to fail.’ Training should not focus on how they should use the system, but on how they should do their own job using the system. In our case, it was a regular on-the-job training rather than a system training, and employees approached it as something that would help them do their job better.” (Bhattacherjee, 2000)

The emphasis given to the importance of providing employees with the necessary knowledge is the main concern and objective of the approach presented in this chapter. In order to undergo the transition process, described in section 2.3.2, employees must understand how to perform their job using the new system. In the following sections the Proposed Approach is defined.

4.1 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, we attempted to describe it in a generic way, so it could be adopted in other scenarios of change.
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.

The SAP ERP is customizable to a certain extent, however this is done at a very high cost. Hence, organizations usually prefer adapting their business processes to the ERP, which results in a deeper organizational change. With this problem at hand, the CEO/INOV team was involved in INATEL’s change management project, to help the organization deal with the emerging transformations.

The defined approach has 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.

### 4.1.1 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. Their task was audit the implementation team, to assure that the system was being implemented according to the initial requisites, verify if the business processes were correctly defined, and document the change process. Figure 4.1 depicts the relation between the Administration Board, the Governance Board, the Implementation team and the Change Management team.
At least every month the steering committee, composed by all stakeholders, would meet and the problems, risks, doubts and breakthroughs of the project would be discussed by everyone present. This would allow for the various departments to acknowledge what was being accomplished in the other departments, involving them dynamically in the process, since one of the problems it wanted to solve, was the poor communications between departments.

The directors of the various departments would then communicate to their staff the decisions made and what was expected for them to do. This would then lead to the necessity of having an operational team, aiding the department staff into accomplishing their work.

### 4.1.2 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 information granularity.

Hence, the process began with the gathering of information about employees tasks, acquiring the context of each individual. Then, a set of tasks would be aggregated into activities, and after that a flow would be define for those activities, creating a business process. These was accomplished by employees...
with the assistance and support of the CEO/INOV team. For each department, were created workgroups with elements of various functions, to provide different viewpoints of the same process.

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 depicted in figure 4.2, and are described in the following sections.

Figure 4.2: Representation of the 4 phases of the approach for operational support.

### 4.1.2.1 Phase #1 - Create an As-Is Representation

Since, a representation of the actual state of the organization, didn’t existed, the first step was to create one. Hence, the methodology adopted in this first phase, and depicted in Figure 4.3, is composed by five main stages: (1) Scope Definition, (2) Process Information Collection, (3) Work Meetings for Process Modelling, (4) Creation of Business Processes Diagrams, and (5) Systematization of the Collected Information and Business Process Integration.

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.
To accomplish the following phases, users were divided in three distinct groups. One group (1) would register every important tasks and actions of their daily work. With this information, another group (2) would aggregate the tasks in order to define the activities of a given business process. The requirement was that the employee executing this function should have a profound knowledge about the way the process was actually executed, in order to understand the context where those actions resided. A third group (3) would use the previous defined activities, and also establish the existing decision points, to give them a sequential order.

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. This process of defining tasks, was based in the Zachman Framework (section 2.2.1.1), and employees would describe a given task according to the person who executed it (who), where it was executed (where), the resources used (what), in which occasions it was executed (when) and a clear description about how the task was performed (how).

Initially, this activity was done in MS Excel, through pre-formatted spreadsheets. These spreadsheets had the necessary fields to represent a given task. Employees had to fill out the forms, which would provide important information to infer the activities they represented.

the CEO/INOV team then developed a web-based portal to replace the Excel spreadsheets (Rolo, 2007). In this portal, each collaborator had a personal account, in which they could register their daily actions. This information would then be used to identify the activities of each process, the same way it was done with the spreadsheets. The advantage of using the portal was the possibility
to share this information with the whole organization. The aggregation of tasks into activities and the initial business modeling was done in work meetings.

3. **Work Meetings for Process Modelling** – The meetings were coordinated by the CEO/INOV and included the various work-teams. These meetings promoted the discussion of the different points of view in the workgroup. 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.

After defining the business process, the work-teams would create a graphical representation and submit it for validation in the web portal. Everyone involved in the process would validate the representation created, in order to guarantee its accuracy. Figure 1, of the Appendix, depicts the BPMN representation used in the business process representation (section 2.1.3), while Figure 2, of the Appendix, demonstrates an example of an As-Is model of a business process.

One of the tasks that was delaying the business process definition, was the creation of the graphical representations. This delay was due to two main issues:

- First, even though employees had a vast familiarity with the processes they were defining, they didn’t have the modelling experience to identify what should be represented and what shouldn’t, and also they weren’t used to recognize, a priori, every decision point of a given process. Hence, the importance of the work meetings.
- Secondly, the most knowledgeable employees were also those, who had been working in INATEL for many years, and were less familiarly with computers and graphical representation tools, such as MS Visio. Therefore, having more difficulty in creating the correct As-Is model diagrams.

To overcome this problem, a new Portal component was developed to assist the modelling phase. This application would be integrated with the web portal, to automate the generation of the processes’ diagrams. This application had an interface in the web portal, where the sequence and flow of activities can be set, and the decision points can be defined (which can be viewed in Figure 3 of the Appendix). After the process’ activities are correctly ordered, the application generates a graphical representation of the process, with the use of Graphviz, an open source graph visualization software (An example of a automatic generated diagram can be seen in Figure 4 of the Appendix). Although the diagram generated is not as eye-catching as one made in MS Visio, it had the advantage of being generated in real time. This particularity allowed conducting a meeting where the process representation was iteratively improved, by showing employees the diagrams.
generated, which could easily be validated by them. With this system, the time required to define the As-Is process was highly reduced.

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.

### 4.1.2.2 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, as shown in Figure 4.4: (1) an analysis of the As-Is diagrams; (2) infer the changed activities; (3) Definition of the To-Be Processes; and finally (4) the Creation of the new Business Processes representation.

![Phase 2: To-Be Model](image)

Figure 4.4: Representation of the second phase of the approach.

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/INOV 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 (an example of a To-Be representation can be viewed in Figure 5 of the Appendix).

The primary goal of the CEO/INOV team was to transfer knowledge about business process definition to the various division teams. This would empower them with the necessary tools and expertise, to become autonomous and responsible for the processes representation. During the SAP implementation project, the CEO/INOV team helped to developed the To-Be models and documented all relevant aspects in order to manage change.

The result of this phase was a set of diagrams similar to the ones created in phase #1, but representing how processes were going to be executed with the new information system. It attempted to initiate a business architecture (section 2.2.1), representing the various activities of a given business process, giving employees a clear notion of what was going to change.

This representation, 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.

4.1.2.3 **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 is represented in Figure 4.5. This phase was composed by the following five stages: (1) Analysis of the To-Be Diagrams; (2) Gathering Information about the new system; (3) Link the new System’s Information with the Activities; (4) Create the Procedure Manuals; and lastly (5) the Procedure Manuals were inserted in the HelpDesk Portal.

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. In Figure 7 of the Appendix it is shown an example of a Procedure Manual created in INATEL.

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 (Figure 6 of the appendix, shows the initial site of the HelpDesk Portal created for INATEL).

Because INATEL has several delegations throughout Portugal, there was the problem of a multi-site deployment of the SAP system. To cope with this issue it become necessary to develop a way of propagating the organizational information and SAP procedure manuals to all delegations, so that every employee would benefit with the work conducted. Hence, it was created an intranet HelpDesk portal with all the manuals and diagrams produced and FAQ sections. This HelpDesk portal would allow to lessen the impact of the new system’s deployment and operation, easing the work-load on the change management team, after the SAP system was in use in all delegations. Since, it represented the first resource of information, users should use in case of any problem related to the system’s operation, which would reduce the number of phone calls from employees asking for assistance in using SAP.

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 2.2.3), revealed to be extremely beneficial in the change
management process.

4.1.2.4 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 this 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, in Figure 4.6 are shown the following stages: (1) Substitute the As-Is Representations for the To-Be; (2) Definition of Business Process owners; (4) Evaluate the new Activities workflow; and then it would (4) Initiate a new iterative cycle.

![Phase 4: Update Representations](image)

**Figure 4.6: Representation of the fourth phase of the approach.**

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 later 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. This 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.

With the tools implemented on INATEL in the former phases, such as the information gathering web portal, the diagram generator and the HelpDesk portal, allied with the knowledge transferred by the CEO/INOV team in the whole process, INATEL would be able to continuously update the business process representations and procedure manuals, adding the necessary information to the HelpDesk Portal. However, it is crucial to embed this process in the culture of the organization, where employees will have the initiative and motivation to update and improve the representations of business processes. This phase was not applied in the case study.

### 4.2 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 depict in Figure 4.7, 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.

![Figure 4.7: Summary of the Governance Model for the Proposed Approach.](image)

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 to 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 4.1 clarify the different work-teams, according to their activities and required knowledge, for the various phases of the Proposed Approach in Figure 4.2.

Table 4.1: Description of the WorkTeams to specify during the Approach.

<table>
<thead>
<tr>
<th>Work Group</th>
<th>Performed Activities</th>
<th>Characteristics</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Team (1)</td>
<td>Information Gathering</td>
<td>Employees from an operational level, who know how tasks are executed</td>
<td>- Insert information about the performed tasks into the portal;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Describe the context in which the task is executed (place, system, person, resources, etc.).</td>
</tr>
<tr>
<td>Work Team (2)</td>
<td>Activities Aggregation</td>
<td>Employees with a more broad knowledge of the activities that form a given process</td>
<td>- Aggregate the various tasks into activities;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Infer the tasks’ context and grouping the activities of a specific process.</td>
</tr>
<tr>
<td>Work Team (3)</td>
<td>Business Process Definition and Representation</td>
<td>Employees with some modeling knowledge and a clear understanding of the business processes</td>
<td>- Define the flow of activities in business process;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Infer the decision points between activities;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Create a graphical representation of business process (As-Is).</td>
</tr>
<tr>
<td>Key-Users</td>
<td>To-Be Representation and Procedure Manuals Development</td>
<td>Employees with knowledge in business process definition and with training in the new information system</td>
<td>- Use the As-Is representations and the knowledge about the new system;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Define new processes (To-Be);</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Create graphical diagrams of the new business processes;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Create the procedure manuals of the new system.</td>
</tr>
</tbody>
</table>

Finally, Figure 4.8 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 different granularities, and share this information with the whole organization through an intranet Portal.
Figure 4.8: Systematization of the Change Management Approach according to the information created.
“Everyday action of organisational members produce, reproduce and change their organising structures”
– Wanda Orlikowski

Implementing an Enterprise Resource Planning (ERP) system frequently requires a deep organizational change that must be effectively managed to achieve the project success. This change is driven by a necessity of a business process reengineering to accommodate the new ERP system, which will inevitably transform the way people work.

More often than not, this process change generates a resistance force, resulting in the project failure. Hence, it is crucial to manage and mitigate the negative influences within the organization, by conveying a sense of urgency and establishing a deep organizational culture in the employees. The later can be accomplished by making people aware of their contribution to the success of the organization, which is the main concern of the Organizational Self-Awareness discipline.

This case study will tell the story of an ERP (SAP) implementation in a public institution (INATEL), describing the numerous challenges that the project team had to face, and more important the way those problems were (or not) solved. Albeit, there was an effort to maintain a global perspective, this case study will be focused on the work of the CEO/INOV team in helping the organization to manage change.

5.1 Preparing for Change

The ERP implementation enforced a profound organizational transformation that, although necessary, carried a series of challenges that had to be managed and controlled, to ensure the project success.

INATEL’s administration board, aware of the risk and conscious that the transformation was not only inevitable but also essential, decided in May 2006 to solicit the collaboration of Professor José Tribolet, Cathedratic in Information Systems, to convey its recommendation about the viability of the SAP project.

The advice provided by the Professor stated that the project should go forward, since it was clear that INATEL needed a centralized ERP, moreover in the imminence of changing its statutes to become a
foundation, in addition, the contract was already signed, therefore, it was time to prepare for change.

More than just an ERP implementation project, it was an opportunity for a deep transformation of the way the organization functioned, which rose key issues about procedure changes. With all these problems in mind the project “Novo INATEL” began with a governance methodology for the change process. It was created the Governance Board, composed by INATEL’s administration board, the directors of the departments involved in the project, the SAP team, and the change management team. This more operational team was composed by INATEL’s employees and CEO/INOV collaborators, and had the mission of verifying and validating the execution of the SAP implementation process, reporting directly to the Governance Board.

The project was scheduled to begin in July 2006. However, an administration change postponed it to September of the same year. Hence, in September 15th of 2006, the project started with a steering meeting, where the SAP team presented its implementation plan, which would beginning with the Business Blueprint elaboration. In that meeting was decided that none of the BBP’s components would be approved, unless the respective department director explained it to the governance board. This was crucial to the project, since it would ensure the BBP’s accordance with the operational requisites.

The change management team had the responsibility to guarantee a formal documentation of the overall project, in a clear and understandable language to all INATEL employees, and in a graphical and textual representation suitable for their activity and position.

5.2 Implementation Challenges

The SAP implementation project was divided in two phases, regarding different business areas of INATEL. The first phase covered the front-office area, including a Portal, CRM (Client Relationship Management) system and Content Management support. The second phase regarded the back-office area, covering finances, logistics and stock management.

The following sections will describe the events that occurred within these two implementation phases. Figure

5.2.1 First Implementation Phase (Front-office)

In Figure 5.1 are represented the main incidents that happened during the implementation of the Front-Office Project (part1). The timeline portrays the period during July 2006 and February 2007.

The change management team had the responsibility to guarantee a formal documentation of the overall project, in a clear and understandable language to all INATEL employees, and in a graphical and textual representation suitable for their activity and position.
After clarifying the project scope and defining the implementation strategy, the project shifted to the second phase of the ASAP methodology (described on section 3.2.2), with the elaboration of the Business Blueprint. SAP’s project team began with workshops to collect business information, such as key data, business processes and business entities to represent on SAP, such as clients, associates, sales and purchases structures.

These activities were essential to develop the Business Blueprint, but they required extremely important management decisions, to align the system with the business areas. As a result, the steering meetings acted as important decision-making sessions. They were fundamental to convey the directors an understanding of what was happening in the different departments, giving an organization-wide view of the project’s progress.

However, these department-specific discussions were difficult to manage at the beginning, with some directors claiming that discussing so many issues at the same time, turned the meetings rather confusing and unproductive.

Early in the project, the CEO/INOV team warned about the quality and coherence of the existing data that was being transferred to the SAP system, stating that was crucial to define consistency rules for the data migration. This issue was being disregarded by the project’s team, and, as you will see, would become a serious problem when the system was ready to be deployed.

At the end of October 2006, SAP consultants had already defined 85% to 90% of the relevant business processes, albeit, with some crucial business decisions pending. These delays in the BBP approval were being aggravated by the absence of some department directors in the steering meetings.

In this phase of the project, the CEO/INOV team began to collect activity logs, through MS Excel.
sheets, to be used in business activities definition and to create the diagrams representing the business processes. The CEO/INOV team also presented INATEL the possibility of installing System Architect, as a knowledge repository and a dynamic application for modelling the organization, but it was never executed.

In middle January 2007 began the third phase of the SAP methodology - Realization (section 3.2.2). Although some of the BBP components were still in the process of being approved, the key-users’ training was then scheduled to March 2007. While in February began the integration project between NewHotel and the SAP system, and the development of a CRM portal for SAP, which was taking too long, and only in the end of February all the components of the BBP are finally approved.

To assist the change management process, the CEO/INOV team had been elaborating, with each department team, the graphical representations of the business processes described in the BBP. This As-Is representation had, not only given a process and context view to employee, but also would be later compared with the To-Be models, to assess a gap analysis and to create the procedure manuals.

The CEO/INOV project began with the Tourism Division, due to its highly specific processes. It was also the division where the SAP implementation would cause the deepest changes. Moreover, the tourism division was one of the key areas in INATEL, and therefore it was critical to the project success.

In Figure 5.2 are represented the main incidents that happened during the implementation of the Front-Office Project (part2). The timeline portrays the period during March 2007 and November 2007.

Figure 5.2: Timeline presents the main occurrences in the Front-Office Implementation Project (part 2).

In March 2007, when was scheduled to begin the training sessions, some of the work-teams had to be redefined, due to organizational changes in INATEL. This was a common problem during the
As-Is modelling phase. When collaborators started to understand the concepts behind business process definition and representation, they would change to other delegations or go on vacations, delaying the projects at hand. The constant delays on the BBP approval for the tourism division, resulted in postponing the development phase, due to a shortage of available SAP consultants.

To continue supporting the change management process, the CEO/INOV team introduced a web-based portal, denominated CEO Portal, to improve the collection of activity logs and the As-Is definition, sharing this information with all the collaborators in this process. (The characteristics of the portal are explain in section 4.1.2)

Although the portal implementation was a success, there was an organizational problem that caused a regression in the log submission. This setback was due to the date and time field in the activity form, as employees perceive it as a mean to control their daily actions. To solve this issue, the Vice-President had to remember all the collaborators that the activity logs were a fundamental source of information to manage change and to support the creation of the processes representations, and they were not going to be used as a controlling mechanism.

In May 2007, the concerns about data conversion from SCG to SAP started to become critical. Because the data in SCG was incomplete, it was essential to define a data-loading model to ensure the coherence of the information. This problem needed to be very well planed, as it was crucial when deploying SAP.

The CEO/INOV team was also helping INATEL with the Content Management project, proposing an approach that consisted in organizing the information flow according to its processes. However, there were many problems related to activities’ inputs and outputs, frequently coming up with document redundancy and lack of normalization. The analysis carried out also revealed the existence of several information isles in each computer, depending solely on the person who executed the activities where the documents were used. To solve these problems was in course a document digitalization project throughout all INATEL.

In July 2007, the project entered on the fourth phase of the ASAP methodology – Final Preparation (explained on section 3.2.2). To ensure the success of this phase, it was imperative to give more time to key-users, so could receive the necessary training from SAP. This could only be accomplished by a good coordination of the workload in each department.

In September 2007, continued the problems with the data migration from SCG to SAP. To solve them, the migration plan was divided in three phases: in the (1) first phase the data would be analysed, in order to identifying which amendments could be made automatically, and which problems had to be solved manually. In the (2) second phase measures would be taken to update the data, with the use of the associates mailing list. For the (3) third phase, which would start after the system was deployed,
was necessary to define the fields that could be omitted in the migration to SAP, defining the initiatives to be taken for granting the data coherence.

INATEL had already realized that the SAP implementation presented an opportunity to redefine its procedures to ensure the consistency of the internal information, enforcing controlling mechanisms that would increase the data quality.

In October 2007, the migration to SAP of the associates’ information was complete and the project entered in the last phase of the ASAP methodology – Go Live. The system deployment was scheduled to November 5th and was given training to the key-users. Two weeks before the system went live, the project team realized that the procedure manuals weren’t done. The SAP contract explicitly stated that this was INATEL’s responsibility, so in this two weeks, the CEO/INOV team and INATEL’s change management team worked closely with the key-users, who have had training in the SAP system, in order to create the procedure manuals. To accomplish this task were used the new improvements in the CEO portal, such as the automatic graphical representation of processes (explained in the next section). To support the deployment phase, was also created a HelpDesk site, containing all the process diagrams and procedure manuals, to enlighten any doubts that could rise in the affected delegations.

In November 5th 2007, the SAP system was deployed with success in pilot divisions, running in parallel with the old system (SCG). This allowed to control and minimize the risks, of a full scale deployment. Three weeks later the old system was no longer necessary, and the system started to be deployed in the remaining divisions.

5.2.2 Second Implementation Phase (Back-office)

In Figure 5.3 are represented the main incidents that happened during the implementation of the Back-Office Project. The timeline portrays the period during October 2007 and June 2008.

The second implementation phase began in the end of October 2007, with the BBP definition, while the system’s deployment was scheduled for January 1st of 2008. However, one month later, the BBP approval was still pending. The implementation delays were caused essentially by the accounting division, which was under intensive work, due to the end of the year. The accounting director and his team were constantly absent of the steering meetings, in part because the director hadn’t fully understood the project implications in his department, resulting in a strong resistance force to the project’s progress. However, the accounting team had already been working closely with the CEO/INOV team in the business process definition, and they were comfortable with the coming changes.

In the next stages, the CEO/INOV team continued the representation of business processes, which was expanded to other divisions, such as Documentation, Accounting and Juridical. It also started the To-Be modelling phase for the Tourism division, with collaboration of the SAP team.
INATEL was also facing difficulties in managing stocks in the holiday camps, lacking the necessary control to ensure the accounting compliance, and the administration believed that this organizational problem was being solved by the implementation of the SAP system.

In the beginning of December 2007, INATEL’s administration already knew that the decree for changing to foundation wasn’t going to be issued, although, it wouldn’t influence a substantial part of the project implementation, therefore, in December 20th the BBP is approved. The main variations to the project, resulting from the change of INATEL’s statutes to a foundation, relied on the type of accounting realized and on the budget approval by the Account Court.

Due to the constant delays in validating the BBP and the lack of financial data necessary to load on SAP, the system couldn’t be deployed on January 1st, so it was rescheduled. During January and February 2008 the SAP system was being implemented and its deployment was now scheduled for May 15th. During this period the CEO/INOV team were assisting the key-users in creating the To-Be models.

In March 2008, the governance board decided that the BaaN would be executed in parallel with the SAP system, during the first weeks. It also decided that the old system would be managed by an external company and its execution controlled by the accounting division. In May, the CEO/INOV team and the change management team created the new procedure manuals, that would aid employees in using the new system.

The initial plan was to deploy the SAP system on May 15th. Although, when the financial data was being loaded into SAP, it was made clear that the asset’s value wasn’t accurate. This happened, because...
INATEL didn’t calculate the asset’s depreciation since 2006. The problem lead to a new delay and a consulting company had to be hired again to specify the asset’s true value.

At this time, the change management team and the CEO/INOV team were working in a HelpDesk portal, comprising the new process diagrams and the procedure manuals, described in section 4.1.2. This portal would reduce the impact of introducing SAP on INATEL’s operations.

Thus, in June 1st 2008, the system was deployed, with BaaN being executed in parallel with SAP. The sales and accounting modules were deployed in the head office along with all delegations at the same time. This management decision resulted in an increase on the effort needed to coordinate and support the system’s deployment. To help controlling the situation the CEO/INOV team and the change management team created the procedure’s manuals, putting them available in the helpdesk site. Slowly the delegations started performing sales on the SAP system using the manuals, however the support and remote assistance continued for some time.
Case Study Analysis

Most people, if you describe a train of events to them, will tell you what the result would be. They can put those events together in their minds, and argue from them that something will come to pass. There are a few people, however, who, if you told them a result, would be able to evolve from their own inner consciousness what the steps were which led up to that result. This power is what I mean which I talk of reasoning backwards, of analytically.

– Sherlock Holmes, in A study in Scarlet

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.

In this chapter will be conducted a case analysis based on the INATEL’s case study, described in the previous chapter. This analysis will focus on the evaluation methods described in section 3.3. It will assess the benefits of the followed approach in managing the difficulties occurred during the project, and will evaluate the case study according to the critical success factors of an ERP implementation.

6.1 Analyzing the Case Study

Before starting to analyze the case study, it is necessary to make a clear distinction between the private and public sector, regarding Information System implementations and the consequent organizational changes that it brings.

ERP implementations in the private sector have been highly studied and analyzed, over the last decade, resulting in well-established implementation plans. However, transposing this management plans and implementation recipes to the public sector have proven to be not that linear. This happens, not because of a technological or financial issue, but due the characteristics of the organizational culture.

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.

Another difference between public and private implementation projects, relies on the project team dynamics. While in the private sector, project teams tend to be small, 3-5 members. The public sector project team composition tends to be bigger, in order to accommodate representation from the many departments and divisions (Wagner & Antonucci, 2004). In INATEL’s case, it was no different. There was a team for each division, which had to be coordinated and instructed to properly define the business procedures of their area.

Apart from the differences stated, the best practices defined for private organizations are similar to those used in the public sector. Typically the public sector needs an additional time in the planning and design phases, to fully specify the business requirements, and to overcome the organizational and business complexity. The project team must also focus on the gap analysis between the actual process and the desired process, to correctly assess the level of changes demanded. This was one of key areas were the CEO/INOV team gave support.

6.1.1 Benefits of Organizational Self-Awareness

As stated in the motivation section of this thesis (section 1.1), the main factor responsible for employees’ resistance to change in implementation projects, like the one described in the case study, is the degree of uncertainty about the way their activities will be executed after the project is complete. These doubts, allied to the weak organizational culture of the public sector, and disbelief in the projects success, poses as an obstacle to the project’s success.

To analyze the case study, regarding the benefits of developing an organizational self-awareness amongst employees, we pointed out, in section 3.3, 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 described in section 4.1.2, and followed by the CEO/INOV team in INATEL, comprised a sensemaking approach, involving employees in developing a representation of the organization. Instead of merely define the business processes of INATEL, the CEO/INOV coordinated work-teams in the various divisions, giving them the means to accomplish these tasks by themselves. This would create, not only a deep organizational consciousness, but also a sense of responsibility for the work done, since the representations had to be validated by those who performed the activities.

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.

The process definition methodology detailed in section 4.1.2, was composed by an information collection phase and a series of work meetings to ensure that everyone was comfortable with the process and to convey the right context for sharing experiences between work-team members. These meetings, coordinated by the CEO/INOV team, functioned as knowledge creation sessions, where tacit knowledge was converted in explicit representations of the organization, through externalization. By explicitly represent employees operational expertise, INATEL was taking the first steps in establishing an organizational knowledge base, essential for future management decisions.

It was clear, throughout the project, that when employees understood what was going to alter in their daily operations, they started to become more open to the overall change process. Since, one of the major risks in ERP implementations comes from employees refusing to use the new system, the improvements achieved in making employees comfortable with change, showed a positive impact in the project’s outcome.

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.

6.2 Case Analysis According to Critical Success Factors

The analysis through the Critical Success Factors allows to understand what should have been done to ensure the project’s success, and what fell short in the change management process. In the next sections is presented an individual analysis to each of the CSFs described in section 3.3.1.

Clear Understanding of Strategic Goals and Objectives. In any ERP implementation, it is fundamental that the strategic goals and objectives focus on the business requisites and include all stakeholders opinions. The decision-making process for choosing an organization-wide information system, like an ERP, should include every department, in order, to access the best solution that covered both management control and processes’ efficiency. However this wasn’t the case in INATEL. The SAP implementation was chosen more as a management tool, than by it’s accordance to the business characteristics, resulting in a growth of the effort needed for its implementation. Also the scope of the project was too wide, increasing the time and cost of the project (triple constraint). The administration wanted SAP to be used in almost every department, although, for some of them there were more suitable solutions in an operational viewpoint, for example in the travel and tourism division. Nevertheless, after the decision of implementing SAP was done and the project was commencing, the followed approach attempted to lessen the risks and effort needed, by encouraging the communication between departments and documenting the changes occurred.

Top Management Commitment. Since the beginning of the project, INATEL’s administration was involved in the implementation process. As a manner of fact, the administration conscious that it didn’t have the necessary knowledge about ERP implementations, asked for external consulting advices, showing a true concern about the project’s implications. However, with this case study was clear that the involvement of the administration is not enough in a project like this, It is also necessary to involve all the department directors in the decision-making process.

Steering Committee. The followed approach advocated the creation of a steering committee, composed by the administration, department directors, project implementation team and change management team. This Governance Board, in INATEL, was created in the beginning of the project and played an important role throughout the entire project, since it allowed to analyzed the project’s
evolution with the feedback of every department. In addition, by having every stakeholder at the
same table, it was easier to define the next steps and to control and mitigate the risks that emerged.

**Project Management.** The SAP implementation team used the ASAP methodology to manage the
project’s evolution, this method, as explained in section 3.2.2, promotes a quick implementation
process. However, the project met several delays, which increased the implementation period. In
some cases, the BBP had to be modified to include some functions that hadn’t been considered
in the initial plans, but were particularly important. Since, INATEL is a public institution these
changes, resulted in project delays, because the new contract had to be approved by the general
council and by the state auditing committee. To reduce the risk of having the BBP not satisfying
the business requisites, The CEO/INOV team worked closely with the various departments’
staff, and proposed that the department director explained in the steering meeting the BBP, which
would assure that he understood and validated it.

**Organizational Change Management.** The first thing decided in this project, was that it wouldn’t be
a merely information system implementation, but an opportunity for INATEL to improve drasti-
cally its business processes. Thus, to correctly manage the change resulted from the ERP imple-
mentation, a change management team was created in the beginning of the project. The approach
followed by this team, and described in detail in section 4.1.2, attempted to reduce the resistance
forces that usually go along with this type of organizational changes. To accomplish this task,
the CEO/INOV team played an important role in giving the knowledge, tools and information
to the work-teams, so they could understand how to use the new system in their daily job. The
change management team relied deeply in the information given by employees, about the way
they worked. However, when they suspect it was to control them, they became reluctant in col-
laborating, showing how important it is to make employees comfortable and reassured about the
change process.

**Use of Consultants.** Since the beginning of the project, INATEL felt the need to include external consul-
tants, to implement, manage and control the project. INATEL’s administration, early understood
that it lacked the resources and knowledge to implement this organization-wide application and at
the same time manage the resulting structural changes in the organization. Hence, while the SAP
team was responsible for implementing and deploying the ERP system, the CEO/INOV team
helped to promote the communication between departments, assisted employees in understanding
the transformations that the new system would bring, and documented the business processes
and the procedure guides.

**Data Accuracy and Conversion.** The Data migration process was one of the biggest problems INATEL
faced in the ERP implementation. The legacy data was highly incoherent, with several different
types of data structures and incomplete information. One of the objectives of implementing SAP
was to overcome this issue, however, transferring the data from SCG to the new ERP, presented itself as an arduous undertaking. For various occasions, The CEO/INOV team alerted the administration that with integrated systems, the information must be correct, otherwise the system won’t work properly. Still, this issue was always postponed, and only when a data migration plan was defined, the problem began to be solved.

**Extensive Education and Training.** INATEL’s administration understood the importance of the training component, conveying in the steering meetings a sense of necessity for users to learn how to use the new system. The SAP training in INATEL was divided in two phases. First, key-users were trained by SAP consultants, understanding how the system worked and how to perform the activities using the ERP. In a second phase, key-users would give training to the remaining INATEL employees. However, several problems occurred in the training sessions, such as the absence of employees due to their daily work, key-users with little knowledge about the system, and lack of physical space and technological resources. To help with these issues, the To-Be models and the procedure manuals, created with the assistance of the CEO/INOV team, allowed key-users to consolidate their knowledge about the system and to understand how to accomplish a given activity using SAP.

**Multi-site Issues.** Since INATEL has 21 delegations and several external facilities, this was clearly a multi-site implementation, bringing new challenges to the project. In the first phase of the project, INATEL chose to deploy the new system in pilot delegations, being able to easily control the operations. This helped to understand the primary critical points they had to be aware, when conducting a full system deploying. In the second phase of the project, the decision was to deploy the system in all delegations at the same time. This decision was due to the concern that in a phased approach the project would be delayed even more. This resulted in a greater effort of the project and change management team to assist all delegations. Although, the first phase had been important to give an idea about what could go wrong, every attempt brings new problems. To support the deployment phase, was created the HelpDesk portal, incorporating the procedure manuals. By making these guides available to the entire organization, employees could easily look for the operation they had to perform, look at the respective process diagram, and see which SAP screens and buttons they had to use.

**Dedicated Resources.** The human capital is the most important asset of an organization, and in an ERP implementation it is no different. The followed approach depended highly on the contribution and cooperation of employees. During the project, the CEO/TEAM worked along with several workgroups in order to create a representations of INATEL’s business processes. This necessity for having employees available to work in the change management process, usually poses as a problem. In some occasions during the case study, many employees weren’t available because of
their daily work, and the ones available simply didn’t have the required profile and know-how.

**Interdepartmental Communication and Cooperation.** The weak organizational culture in INATEL, was a reflect of the little communication and cooperation between departments, where each tried to solve the project’s problems individually. This was one of the issues the CEO/INOV team tried to overcome in the change management process. During the business process definition sessions, oriented by the CEO/INOV team, employees could see what was being done in the other departments, not only to motivate them, but also to make them understand that all departments were struggling with similar problems.

**Management of Expectations.** In the beginning of the project, as in many ERP implementations, the expectations were excessively high. INATEL’s administration had a vision of the new system, as a mean to control every aspect of the organization in real-time. However, soon the integration and data problems started to appear, creating uncertainty about the project’s outcome. The steering meetings helped to manage expectations, in the sense that got everyone involved in the project, where its evolution and risks were presented, and the following actions were decided.


Conclusions

“Learning organizations [are] organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together.”
– Peter Senge

Throughout this thesis we aimed to demonstrate that organizational-self awareness is crucial for establishing a “learning organization” (Senge, 1990), where its employees understand their contribution towards the organization’s goals. This knowledge gives them the necessary mindset to improve the processes and inter-relations within the organization.

In this chapter will be presented the research conclusions, and what was accomplished with this thesis. It is also proposed some concepts that can be developed and improved for future work.

7.1 Research Conclusion

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 started from the principle that if we reduce the employees uncertainty towards their future activities, change becomes more easy to achieve. Although, it does not present itself as a simple process, we were able to define a method towards this objective and apply it into an real organizational environment. Recalling the objectives defined in chapter 1, we state the following conclusions:

- Define and explicit a method to support organizational change, through providing key information to employees;

In chapter 4, 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, which would include de administration board and department directors, and would be
responsible for making the decisions regarding the project. 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.

The four phases of the methodology for operational support aimed the coverage of the various stages of creating and maintaining a representation of the organization. It included the (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.

- **Describe a Case study, regarding a real organizational environment, where the methodology is going to be applied;**

Chapter 5 describes 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. Since INATEL lacked any type of business process representation, we had to start from scratch. By giving employees the tools to gather information about the activities they daily executed, and after that conveying the knowledge of modeling concepts, it was possible to achieve a realistic representation of INATEL’s business processes. this would help INATEL’s employees to cope with change. The fourth phase of the methodology, described in section 4.1.2, was not applied in this case, since it was not included in the project.

- **Evaluate the methodology according to contributions it had to case study’s outcome;**

In chapter 6 is conducted an analysis of the case study regarding how the proposed approach help to manage the changes driven by the implementation project. It is evaluated not only by using the common successful factors of an ERP implementation, described in section 3.3.1, but also the contribute that it gives in promoting organizational self-awareness. We can conclude that the interaction with employees in the business process definition, creation of the To-Be models and the creation of the procedure manual, respond to several issues that appear during a deep change process.

- **Assess the benefits of organizational self-awareness in the change management process;**

In chapter 6, 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. This was accomplish by acquiring employees’ work contexts and assist them in representing the whole process.
Finally, the development of clear procedure guides, which were placed in an intranet portal, and available to every employee, allowed to explicit and expand the business knowledge throughout the organization.

Although the proposed approach has great benefits in managing change, it requires an additional effort of the organization, regarding the availability of human resources to accomplish the necessary activities, such as, information gathering, business process definition and modeling, and creation of the procedure manuals. Hence, organization must be conscious that these are extremely important activities, that with no doubt will help to improve the management capabilities and creates a reliable foundation for future decision-making.

7.2 Future Work

The study of developing self-awareness in organizations is still in an initial stage, and has much to benefit from case studies regarding the implementation of such techniques. The approach proposed in this thesis was applied and defined, having INATEL’s case study as a basis. Hence, we believed it can be further optimized if applied in other organizations and different change management environments.

The defined approach was applied as a support for the change management process, in response to an ERP implementation. Hence, for future work, we convey the possibility of using this approach, or even develop an extension, in order to initiate and assist a continuous business process improvement.

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. This can bring social issues, such as the perception of control, by management, that can lead to reverse effect, with employees not coping with the information gathering process;

- 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. This activity would then be analyzed, to assess if it should be considered in the business process representation, or if the process should not allow it to happen;

- Develop a portal available to every employee, to use as a organizational knowledge base. The portal would provides specific diagrams of business processes and procedure manuals, according to the profile and function of the user. This would allow to have representations of different granularities and different viewpoints for particular individuals.
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.


Appendices
Figure 1: BPMN Representations used to model business processes in INATEL.
Figure 2: Example of a created As-Is model in INATEL.
Figure 3: Extended functionality to define the Activities’ Flow of a Process in the CEO Portal.
Figure 4: Example of an automatic generated diagram through the CEO Portal.
Figure 5: Example of a created To-Be model in INATEL.
Figure 6: Initial page of the HelpDesk Portal in INATEL.
Figure 7: Example of a created Procedure Manual in INATEL.