CHAPTER 1

INTRODUCTION AND MOTIVATION FOR THE STUDY: INTRODUCTION AND MOTIVATION

1.1 Background and Scenario

Information Systems (IS), which provide crucial support to processes and organizational activities, have been occupying scholars especially since the 1970s. Studies have investigated issues such as system design (e.g. see Benbasat and Taylor, 1978; Avidson and Fitzgerald, 2003), system adoption and implementation (e.g. see Markus, 1983; Newell et al., 2005), strategic management of systems (e.g. see Galliers and Sutherland, 1991; Niederman, Brancheau, and Wetherbe, 1991), and exploitation and alignment of systems with business objectives (e.g. see Reich and Benbasat, 2000; Sabherwal and Chen, 2001), and some have tried to link technology to organizational performance, innovation, and competitive advantage (e.g. see Gelderman, 1998; Weill, 1992). While engineers and hardware/software experts have focused on technological characteristics, scholars in the social sciences have highlighted problematic issues related to the relationship between humans and machines. The present research is in this latter

tradition; I focus on a particular category of large IS, that is Enterprise Resource Planning (ERP), and concentrate on issues related to their implementation and usage.

ERP systems are founded on the development of a common IT infrastructure and common business processes to support the integration of an organization's entire business activity (Markus, Tanis, and Fenema, 2000). Use of ERP has spread rapidly since the late 1990s – especially in large organizations where the need for efficiency and effectiveness is crucial. An effective implementation process to exploit the benefits of an ERP system is considered crucial (Duplaga and Astani, 2002; Holland and Light, 1999). However, research shows that ERP implementation is often very difficult (Scott and Vessey, 2002; Soh, Klein, and Tay-Yap, 2000), one of the key reasons being that the "best practice" in ERP does not fit all work flows and business processes in many organizations (Wagner and Newell, 2004; Kallinikos, 2004).

From a project manager's point of view, the most important consideration in implementing an ERP system is a clear strategy and associated implementation plan (Mandal and Gunasekaran, 2003). However, empirical work has demonstrated that it is difficult *a priori* to build a strategy for ERP implementation and some analytical studies propose *to-do* lists to sort out the problems that arise after the go-live phase (Holland and Light, 2001). An alternative approach is to focus on issues that might influence or contribute to making the implementation *process* more effective (Nicolaou, 2004).

In most ERP system implementations, the organization needs to change existing work practices to adapt to the new process (Davenport, 1998). On the one hand, managers may be drawn to adopting an ERP in order to merge existing organizational knowledge and experience, and pursue efficiency through the potentially greater rigidity and control provided by a standardized system. These characteristics tend to be associated with ERP systems "promoted as systems that will improve organizational efficiency through both enhanced information capture and organizational redesign around defined best practices" (Newell et al., 2003: 27). On the other hand, new knowledge (necessary for the organization to learn to exploit the potential of an ERP system) is more likely to be captured with less rigid systems and informal and flexible practices (Starbuck, 1992). This suggests that ERP implementation depends on the ability of organizations to *learn* how to adapt to the simultaneous requirements for efficiency and flexibility.

1.2 Alpha Co. Case Study and Research Approach

In this dissertation I describe and analyze a case study of a worldwide organization (Alpha Co.) with headquarters in Massachusetts, USA. Since 2001, Alpha has been involved in the ongoing implementation of a large scale CRM (Customer Relationship Management) system and has experienced a number of problems which are described and commented on in this thesis. Although this PhD dissertation is organized in sections which –in the classical research paper style –include literature review and theoretical framework, description of and justification for the methodology used, findings, and a discussion, my aim is to provide a *narrative*. Starting from the premise that this study is explicitly interpretive, I want to communicate to readers my direct experience at Alpha Co., my perception of how different *stories,* which represent the phases and steps in the appropriation of the technology, emerged, and my subjective understanding of how conflicts were resolved and difficulties overcome.

I spent some 18 months in Massachusetts during which time I conducted a number of interviews and observations at Alpha. I exploited over 1,500 items of documentation, including slides, and official reports of steering and working committees, and I analyzed and interpreted these data from the point of view of the organizational learning literature. Since my research includes both direct field work and existing documentation, this study can be described as longitudinal and retrospective.

I approached the study with an open mind –that is, I did not focus on a specific theme based on the existing literature. Also, I did not formulate hypotheses and my intention was not to test or verify any particular constructs or theory. However, I was a good listener and close observer of what was happening at Alpha and I was very determined about my research aims. I started out with some clear research question (which were modified over time, and generated a number of research sub-questions), and I was firmly persuaded that my work would help to fill important gaps in the research on failures in ERP implementation. While all these aspects are discussed in the course of the book, below I set out some preliminary insights on my research objectives, research question, and the contribution of this dissertation.

1.3 Research Aims

The main objective of my research study was to dig deeper into the issue of technology appropriation, from a subjectivist perspective. Specifically, I wanted to understand the extent to which an interpretive approach to this research topic could fill some of the gaps in the literature on ERP implementation. Although much has been written about ERP implementation (and its failures) and a number of issues have emerged and been clarified, technology appropriation – especially in relation to large and multi-unit organizations –continues to be problematic.

Consistent with Lynne Markus's (1983; 2000) vision, I believe that ERP appropriation is a process of continuous evolution with no absolutely final design being possible or warranted. From this perspective, ERP implementation is best viewed not as a one-time process, but rather as a series of implementation and practice-use cycles, each of which encompasses different degrees of reflection and learning such that the system becomes more embedded and better adapted to the context as the organization progressively appropriates the technology. Thus, I approach this study focusing on the long-term and iterative process of mistakes made and lessons learned which should end up with the accumulation of knowledge about how to deal with technology.

According to the epistemological and ontological approach in Walsham (1993), I believe that understanding technology appropriation cannot be reduced to a deterministic analysis of organizational factors or variables that influence successful adoption of an ERP. On the contrary, I believe that the implementation phase of a large scale information system should be also seen through a different analytical lens and with the knowledge that technology can be seen as a subjective construct of human beings. For this reason, in line with Newell et al.'s (2003) opinions, I believe that it is not possible to set down established best practice or a series of steps that explain how to implement an IS; instead, I argue that looking at the different meanings given to IS by organizational actors is useful to: a) understand implementation failures; and b) learn how to exploit technology. However, I do not reject positivist studies of ERP implementation. In fact, consistent with Trauth and Jessop (2000), I believe in the possibility to integrate some of the findings from the positivist school with the results qualitative studies.

1.4 Research Questions

In order to synthesize the above discussion of my research philosophy contextualized in an ERP implementation, and having clarified my research aims, I can formulate a first broad and clear research question related to my case study:

How is Alpha experiencing ERP implementation over time?

In the course of my research, which, as presented so far, might seem grounded and exploratory, I developed some research sub-questions that emerged from my research activity "in the field" and my study of the literature on organizational learning, which highlights that technology implementation is affected by processes of continuous and iterative learning. Such learning processes should be seen through the lens of absorptive capacity –studied from a process view perspective. Also, the theory on loosely coupled systems and ambidextrous learning are reviewed and incorporated within this construct. Finally, a broad discussion of "prior knowledge" and the extent to which it affects absorptive capacity is developed, and a rejuvenated conceptualization of this construct is presented according to the evidence from the field work.

A Process View of Absorptive Capacity –During my field work it became clear that learning is a process which in some way is related to the development of capabilities. After an in depth review of the literature on the creation and sharing of knowledge through organizational capability I was able to isolate the construct of absorptive capacity (Cohen and Levinthal, 1990) as an interesting way to understand how learning cycles develop in organizations. Absorptive capacity is a construct that is used mainly in the deterministic approach. In turn, I reviewed this construct, identifying research gaps, and make a reframing of the main concepts of the theory. This enabled an unpacking of and renewed conception of the idea of absorptive capacity which I applied to the reading and discussion of my results. A research sub-question is developed about *what is the contribution of absorptive capacity to the implementation phase of an ERP system?* Working within an interpretive perspective my data analysis is addressed to understanding how such capability develops, rather than to trying to discover whether there are relationships between

some of the antecedents to absorptive capacity and some of its outcomes. However, interactions between absorptive capacity and prior knowledge emerged from the field-work and the conceptualization of such finding was incorporated in the revised version of the construct proposed in Chapter 5.

On Loosely Coupled Systems –The idea of considering organizational units as *systems* – borrowing the concept from Karl Weick (1979) –and entities, that can be more or less coupled, emerged after the first year of my field work at Alpha. At the same time as analyzing some of the data collected in summer 2008, I was digging more deeply into some of the implementation problems that had occurred in the company's different organizational units, and was realizing that while all units had encountered problems in dealing with the technology, the issues were often not only different but even completely opposite. For instance, the Sales Department – whose employees were dynamic, flexible, innovative, creative, and decentralized from the headquarters –hated the CRM when it first went live in 2001, because they felt they were living in a "Big Brother" world and because of their preconceived ideas of the technology. They saw the role of the new IS as conflicting with their need to decentralize decision making and work within a MBO (management by objective) perspective. This, as far as I could see, was the main reason why the Sales Department managers were reluctant to use Bubble (the pseudonym I use in this book to refer to Alpha's CRM system). The Finance Department managers were more rational, and more precise, and not only accepted the rigidity imposed by the ERP system, but found it difficult to understand why this rigidity could not be extended to manage exceptions, e.g. process variations. Thus, it was clear that I needed to treat different organizational units as systems that could be loosely or tightly coupled and I began to read and interpret my data through the lens used by Orton and Weick (1990), who found evidence of conflictual relations between flexibility and efficiency. This raised the following research question: *how does Alpha face loosely vs. tightly coupled systems in implementing technology?*

On ambidextrous learning –Extending their 1990 article, Orton and Weick highlight the tensions between connecting multiple systems at the expense of flexibility, and allowing autonomy at the expense of efficiency of the system, tensions that existed in Alpha and became evident when I

examined the characteristics of ERP systems (rationalization of processes) and the willingness to have autonomous and decentralized processes in some boundary spanning organizational units (exploratory activities). Reading Orton and Weick through the lens of ambidexterity I formulated an additional research question: *How can Alpha learn how to exploit and explore the potentials of its ERP system?* This research question is underpinned by the idea that in ERP implementation there is a conflict between efficiency and flexibility especially when ERP is applied as a large scale IS. A search for efficiency is likely to drive the implementation of an ERP in the sense of providing the rationale for its adoption and configuration; flexibility is likely to be essential for developing the exploratory capabilities required to switch from a go-live condition of understanding the basic functionalities to full exploitation of its potential usability. This question is linked to the research question related to absorptive capacity.

Reconceptualization of Absorptive Capacity: Passive Learning, Dis-learning, and Unlearning/Relearning –In the final part of my dissertation, I show that it cannot be taken for granted that long-term technology experience and practice embed awareness of technology in organizations (although long-term learning processes are often required to assimilate new knowledge). In other words, from the case study of Alpha it emerged that time was not the remedy for first time implementations of ERP. In fact, in the period 2001 up to 2004 –the year that the management considered abandoning Bubble, Alpha had experienced a negative learning curve in terms of understanding how to exploit the ERP system. I conceptualize *passive learning*, *dis-learning*, and *unlearning/relearning*, three processes that I link to the capacity of a firm to identify, assimilate, and exploit new external knowledge –that is, I reframe the absorptive capacity construct linking passive learning, dis-learning, and unlearning/relearning within the three main stages of Cohen and Levinthal's (1990) original construct. I illustrate that, at Alpha, such learning processes were essential for developing the antecedents to absorptive capacity (i.e. prior knowledge) and call for some re-discussion in light of my findings. The idea that some "negative learning" should be considered is rather unexplored in the literature and particularly in the area of IS. For example, Schwab (2007) identified how organizations did not give time for innovations to affect performance before evaluating the new practices, leading to superstitious learning (Barley, 1988; Levitt and March, 1988). However, as Schwab himself points out, there is only very limited literature to-date on how organizations learn from innovation in the post-

implementation period. As a consequence, my results both integrate with the current debate on knowledge absorption and learning, and also make a contribution by hinging at a different role or view of the antecedents to absorptive capacity. Evidence from my case study of Alpha and a broader development of this concept are provided throughout this book.

1.4 Contributions and Limitations of the Study

According to the interpretive perspective of my research study, identification of its contribution has been a long and grounded process which has occurred over time, in the course of my field work and the many conferences where I presented and discussed the ongoing results of my research. In the course of these activities I was able to figure out a number of important strengths and weaknesses of my research –and of this book.

In terms of my contribution to the literature, I make some progress towards clarifying certain areas in the work on organizational learning, namely seeing things from an interpretive perspective, providing a constructive critique of a broad part of past positivist research, and suggesting an original interpretation of the problem of technology appropriation. I develop a processual view of absorptive capacity in which human actions, the technology, and its use are interacting (Barley, 1986; Orlikowski and Robey, 1991; Walsham, 1993). My aim was to focus on the process by which absorptive capacity is developed and used rather than on its antecedents and outcomes. To achieve this, I jointly examined the two activities of knowledge exploration – which requires organizational flexibility and loosely coupled systems, and exploitation –which requires organizational rigidity and tightly coupled systems (Brown and Eisenhardt, 1997; Tushman, Smith, Wood, and O'Reilly, 2004; Vinekar, Sinkman, and Nerur, 2006), which constitutes my second contribution. In this way, I integrate the literature on loosely coupled systems with the literature on ambidextrous organizations –a conception that to my knowledge has not previously been developed in the literature –either theoretically or practically. I also develop an integration between the literature on ambidextrous organizations and absorptive capacity –which was (in my opinion) only touched on by Jansen (2005) in his PhD Dissertation, and the papers by Jansen, van de Bosch, and Volberda (2006) and Rothaelmer and Alexandre (2009) but which has never been treated as a non-positivist theory.

And my third contribution is development of the concepts of passive learning, dis-learning, and unlearning/relearning which represent a unique input to the organizational learning literature. Scholars who study increased learning processes often suggest that some characteristics of learning should be associated with learning sessions over the long term –experience which develops because people collaborate and learn from their mistakes. Moreover, past experience and accumulated knowledge are viewed as affecting the capacity to absorb and manage new external knowledge. What I highlight in developing this last contribution is that some of the issues identified by scholars as antecedents to and drivers of "good learning" (e.g. antecedents to absorptive capacity and learning capabilities in general) are not sufficient conditions to ensure achievement of the capacity to absorb, share, and exploit new knowledge. I found that Alpha needed to make mistakes along the whole "learning framework" (recognition, assimilation, and application) as depicted by Cohen and Levinthal (1990), and to experience both passive learning and dis-learning. In contrast with the literature, I argue that Alpha's prior knowledge initially was a hindrance and it was only by following its mistakes and learning from those mistakes that the acquisition of new knowledge was enabled (i.e. unlearning/relearning). The "new" prior knowledge gradually became a facilitator enabling the creation of a working IS.

My contribution to the practitioner community is aimed mainly at project manager and senior/upper manager level and focuses on principles rather than recommendations –consistent with my idea that it is impossible to establish a to-do list when interactions between technology and human beings are involved. What emerges from my book, sometimes explicitly sometimes implicitly, is that the implementation of large scale IS is a long term process and assuming that going-live means that the ERP system is "working" can lead to failure. Sometimes managers' expectations of ERP systems are simply unrealistic, especially if user training, double loop feedback by users, and change management dynamics are overlooked. Moreover, and here I base my thesis, managers very often overlook the fact that the technology –and the meaning given to it –varies from individual to individual; they fail to acknowledge that it can be seen as a subjective construction of the world. Thus, managers should consider that ideas about how to exploit an IS may be far from shared by the organizational actors, especially in the initial phases of its introduction. What I now understand from the experience of my case study is that ERP systems require a certain degree of process standardization (a point acknowledged and recognized in the literature and in practice), while different constructed meanings produce

diversity in their utilization and exploitation –with the result that very often the people involved neither use nor want to use the new technology, or are unable to exploit it collectively: in other words, it is very difficult to create a common view of a new technology.

So what! What can be learned from this research study? While the extent of the above contributions might be subjective since they are my interpretation of the data obtained through subjective observations and open interviews (consistent to Walsham, 1993; 2006), I can identify a major output which, in my opinion, emerges clearly from a reading of this book, that there is a *locus* of practitioners that constitutes the "so what!" point. In the preceding paragraph I highlight insights for practitioners: I believe that it is crucial to consider human beings' subjectivity in the context of new technology, especially when working on large-scale IS. My interpretive study has allowed me not only to write a broad and extensive story of my observation of an ERP implementation (which itself could constitute a meaningful contribution in terms of providing understanding for companies close to making the decision to introduce an ERP system into their structure), but also to point out that subjectivism is one reason why it is often difficult the predict the (mis)alignment between expectations. That is, not paying attention to the fact that individuals interpret information systems differently could produce ERP implementation failure. Thus, my work contributes to filling a gap in the research that focuses on ERP implementation, appropriation, and exploitation from a project management point of view.

In terms of the limitations of this study, I do not believe that the fact that it is based on only one case study should affect its representativeness, since my research and my philosophy, do not aim to provide a triangulation of truths, generalizations, and best practice. The aim is purely to document a real story of actual IS implementation and to provide some theoretical development along two tracks. Firstly, I draw on the prior literature in the positivist tradition and read the construct through an interpretive (and in the case of absorptive capacity, qualitative) lens. Secondly, I compare my findings with the previous findings, and highlight differences, similarities, and potential integrations.

A methodological weakness is that –since I was working as part of a team –I was not present at all the interviews and observations. Some I experienced through a reading of the transcriptions or

listening to the recording. A weakness –which I believe is peculiar of these types of studies –is that my study is limited to what was observed, to the (few) persons interviewed, and is an idiosyncratic reduction of reality due to the fact that my field research at Alpha lasted only 18 months. However, having more than one person engaged on this research allowed access to more data and provided opportunities to brainstorm with colleagues over the analytical lenses to be exploited for the case study.

1.3 Overview of the Doctoral Research

In this paragraph I provide a brief overview of the structure of this book, which is organized in six chapters: In Chapter 2 I provide a literature review of the main construct used in the discussion to understand the phenomena observed and integrate the prior literature with my findings. In Chapter 3 I develop a synthetic study of positivist vs. interpretive approaches to research and show what is the interpretive approach to IS. I base my arguments on the seminal book by Geoff Walsham (1993) *Interpreting Information Systems in Organizations*. I link the principles of interpretive research in IS with the process adopted in my field study and data analysis and interpretation. In Chapter 4 I present the main findings of my field research, I provide representative extracts from interviews and observations, and make some initial comments, with the aim of building a broad narrative of the Alpha case study and highlighting the sustainability of my arguments. In Chapter 5 I discuss the results of my research and their integration with the literature and I propose a reconceptualized model of the absorptive capacity construct in the light of my field-work. In Chapter 6 highlight the contributions and limitations of this study and offer suggestions for further research. Table 1 presents the structure of the dissertation and relates the chapters to my research activities.

TABLE 1

Dissertation Structure and Research Activities

Dissertation Structure	Title of the Chapter	Research Activities
Chapter 1:	Introduction and Motivation for the Study	-
Chapter 2:	Reviewing ERP Implementation from a Learning Perspective	Literature Review and Field-Work
Chapter 3:	Discussing Methodologies: Philosophical Concepts from Interpretive Studies in IS	Literature review; Transcription of Interviews/DOB and Data Analysis
Chapter 4:	Narrative of ERP Implementation: Research Findings	Conceptualization of Data Collection and Analysis
Chapter 5:	What Have We Learned? Case Study Discussion	Interpretation of Findings
Chapter 6:	Contributions and Further Research	-