Communicating and Coordinating:
Occasions for Information Technology in Loosely Coupled Organizations

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ABSTRACT

This article uses the theory of loose coupling to explain failure in the adoption of a technology that was supposed to improve collaboration across one organization's internal boundaries. The research details an interpretive case study of a single organization, MacGregor Crane, in which relatively autonomous individuals are connected only loosely in terms of their daily interactions. The company implemented Lotus Notes® in an attempt to increase collaboration. However, this effort failed because employees in various units, particularly engineering, were reluctant to share information across unit boundaries. In light of these findings, it is suggested that the successful implementation of a collaborative IT within a loosely coupled organization should involve the reconsideration of the organizational members' roles and functions.

Keywords: communication; coordination; loose coupling; organizational change; organizational consequences of IT

INTRODUCTION

Managers increasingly are concerned with facilitating the creation, storage, dissemination, and application of organizational knowledge. Successful use of information technology (IT) in an organization rests upon an organization that possesses a supportive culture characterized by high trust, willingness to share information, and commitment to organizational goals. To this end, typical barriers to the successful adoption of IT in organizations can be found in political friction between organizational roles (Orlikowski, 1992).

This article is based on a study conducted at MacGregor Crane, an organization in the business of developing and constructing shipboard cranes. MacGregor Crane includes a number of organizational members who work largely in parallel with one another. MacGregor Crane fits the general description of a loosely coupled system, a description that underlines how organizational members have great latitude in interpreting and implementing directions despite the presence of other organizational members. Weick (1979) stresses the autonomy of individuals and the looseness of the relations linking individuals in an organization. Whereas

loosely coupled systems are characterized by both distinctiveness and responsiveness (Orton & Weick, 1990), a potential downside for loosely coupled systems is poor collaboration among organizational members. The IT project initiated at MacGregor Crane was aimed at dealing with this problem.

The use of IT for coordination is more complex than is suggested in the academic and practitioner literature (for a discussion, see Kling, 2002). Coordination, as the management of dependent activities (Malone & Crowston, 1994), is central to organizing, and as more and more organizations become flat and outsourced, many organizations look to new technologies to help them organize. Looking for solutions to the problems of lack of collaboration among organizational members, MacGregor Crane turned to IT as a possible solution. MacGregor Crane decided to launch a project aimed at delivering a collaborative technology, Lotus Notes®, which was expected to increase collaboration both within and across professional boundaries.

The goal of this article is to explain an organization's failure to successfully implement a technology targeted at increasing collaboration among organizational members. More specifically, our core research question asks, "Why was MacGregor Crane unsuccessful in fostering collaboration supported by Lotus Notes®?" We suggest that loose coupling (Meyer & Rowan, 1976; Weick, 1979) is a particularly appropriate theory to answer this question, as MacGregor Crane fits the general description of a loosely coupled organization.

The article is structured as follows. The second section discusses organizational change, collaborative technology, and loosely coupled systems. In the third section, details about our inquiry at MacGregor Crane are provided. More specifically, this section describes the selected site and the research approach, followed by an account of MacGregor Crane's Lotus Notes® implementation. A discussion of the case study findings is presented in the fourth section, followed by concluding remarks in the fifth section.

REVIEW OF THE LITERATURE

The relation between IT and organizational change always has been a central concern for IT practitioners and academicians. While new IT shapes organizational behavior and structure, the role and meaning of IS is shaped largely by organizational circumstances. The two are inextricably intertwined; there is a reciprocal relationship between ITs and organizations, each shaping the other (DeSanctis & Poole, 1994; Kling & Iacono, 1989; Monteiro & Hanseth, 1995). In other words, contemporary organizations are entangled with technology. One cannot understand organizations without understanding technology, nor can they understand technology without understanding organizations. Clearly, IT has the capacity to enable change in various ways: the ways in which organizational work is executed (DeSanctis & Poole, 1994); the effectiveness and efficiency of an organization (Fiedler et al., 1995); the knowledge demanded for the execution of various tasks (Ehn, 1988); the organizational and occupational structure of work (Barley, 1986; Kling & Iacono, 1984; Orlikowski, 1996); and the possibilities for collaboration (Zuboff, 1988). Collaboration and coordination as a type of organizational change often associated with the use of IT is of interest here.

Collaborative Technology Implementations

Many scholars that are interested in organizational communication and coordination have focused on interfirm networking and the IT infrastructures that support them. While it is accepted that innovation tends to occur in highly interacting and collaborative organizations (Miles & Snow, 1986) it also should be noted that innovation is dependent on a well-working integration of technological resources (Kodama, 1995).

The impacts that result from the implementation of collaborative technology have been investigated quite frequently by both practitioners (Kiely, 1993; Schlack, 1991) and academics (Brown, 2000; Karsten, 1999; Orlikowski, 1992; Tung & Tan, 2000; Van-

denbosch & Ginzberg, 1996-1997; Wong & Lee, 1998). Lotus Notes®, as a widespread collaborative technology, has gathered much coverage. Notes provides electronic messaging to improve communication; it provides shared databases to improve collaboration; and it supports calendaring and group scheduling to improve coordination. Vandenbosch and Ginzberg (1996-1997), in their review of collaborative technology implementations, claimed that only a few studies have acknowledged the positive impact of these technologies on organizational collaboration. Perhaps surprisingly, these authors contend that "most studies have not found substantive effects" (Vandenbosch & Ginzberg, 1996-1997, p. 68). From their review, Vandenbosch and Ginzberg (1996-1997) concluded that four factors are necessary for the implementation of such technologies in order to enhance collaboration: (1) organizational members must have a need to collaborate; (2) organizational members must understand the technology and how it can support collaboration; (3) the organization provides appropriate support for the adoption, implementation, and continued use of the technology; and (4) the organizational culture supports collaboration.

In another thorough and more recent account of the research that has been conducted on the impacts of collaborative technology, Karsten (1999) reviewed 18 case studies involving the implementation of Lotus Notes®. After studying these implementations according to many dimensions, Karsten concluded that the four criteria put forward by Vandenbosch and Ginzberg (1996-1997) are not strong indicators of the extent to which Lotus Notes® may lead to collaboration or not. More particularly, Karsten (1999) stated that, although these factors may be considered as "lessons that can be helpful in planning implementation projects, … the evidence provided by the case studies did not support the conditions nor the belief in the inherent collaborative model [of Notes]." Rather, Karsten (1999) rather emphasizes other issues that are likely to influence the relationship between collaborative IT and collaboration, among which are the difference between technology as a product and technology-in-use (Orlikowski, 2000; Orlikowski et al, 1995) and the kind of care needed in bringing about desired changes (Ciborra, 1996).

Both Orlikowski (2000) and Ciborra (1996) emphasize the need to understand the organizational context, and to this end, loosely coupled organizations present us with a particular challenge. We need to understand the complexities involved in enacting communication and collaboration and the forces working for and against this. In order to do this, we turn our attention to the theoretical perspective of loose coupling.

Loosely Coupled Systems

Organizational theorists refer to the relationships between two separate organizational entities as coupling. Coupling refers to how events in one organizational entity affect another organizational entity. Weick (1979) has discussed coupling as being based upon the number of variables shared between two separate entities; coupling may be tight or loose, depending on the importance and commonality of variables.

Viewing organizations as loosely coupled systems underlines how individual participants have great latitude in interpreting and implementing directions. In his description of loosely coupled systems, Weick (1979) stresses the autonomy of individuals and the looseness of the relations that link individuals in an organization. The central information activity is resolving the equivocality of information about the organization's environment. This sense making, as described by Weick (1995), is done largely retrospectively, since one cannot make sense of events and actions until they have occurred. Current events are compared with past experience in order to construct meaning:

[T]he goal of organizations, viewed as sense making systems, is to create and identify events that recur to stabilize their environments and make them more predictable. A sensible event is one that resembles something that has happened before. (Weick, 1995, p. 170)

The enacted environment is seen as an output of the meaning-construction process and serves as a guide for future action. However, once the environment has been enacted and stored, people in the organization face the critical question of what to do with what they know. While shared interpretations in an organization are a compromise between stability and flexibility, some equivocal features still remain in the stored interpretations. Equivocality is central in all organizing, and people in organizations are:

people who oppose, argue, contradict, disbelieve, doubt, act hypocritically, improvise, counter, distrust, differ, challenge, vacillate, question, puncture, disprove, and expose. All of these actions embody ambivalence as the optimal compromise to deal with the incompatible demands of flexibility and stability. (Weick, 1979, p. 229)

Clearly, this is very different from mainstream organization theory, and Weick (1976) states that "people who are steeped in the conventional literature of organizations may view loose coupling as a sin or something to be apologized for" (Weick, 1976, p. 6).

Meyer and Rowan (1976) express fears that loose coupling often can lead to decoupling. Decoupling involves the valuing of ceremonial practices over efficiency. Management in a decoupled atmosphere will use tactics of avoidance, discretion, and overlooking to assure that individual participants maintain face. These values sometimes can be valued more highly than efficiency.

Loosely organized systems can suffer from a lack of shared context and, thus, a lack of shared interpretations among organizational members on various work-related issues. Organizations with a high degree of heterogeneous and specialized workforce, working in geographically dispersed teams, may suffer the most from this lack of shared context. If not dealt with in a proper manner, this can become an obstacle for organizational innovation. One possible way to deal with this is to create a shared context virtually by means of new IT. The role of IT in such an arrangement is that of a boundary object, as described by Bowker and Star (1999):

Boundary objects are those objects that both inhabit several communities of practice and satisfy the informational requirements of each of them. ... [*They*] *are weakly structured in common use and become strongly structured in individual-site use.* (1999, p. 297)

As boundary objects, IT applications may be used in loosely coupled organizations as tools for promoting better coordination. The concept of loose coupling can be a potentially fruitful set of ideas to draw from when trying to make sense of collaborative technology (i.e., here, a boundary object). Accordingly, we propose to investigate the current case while taking into account the theoretical perspective of loose coupling. We expect that this perspective will be useful in understanding the organizational change related to collaboration and coordination within the organization under study.

CASE: MACGREGOR CRANE

Selected Site

MacGregor Crane is one of many companies that agreed to be studied by the first author's research group. MacGregor Crane was founded at the end of the 17th century to manufacture industrial products. It now develops and manufactures shipboard cranes and delivers them around the world. MacGregor Crane focuses exclusively on hydraulic cranes, which gradually have replaced electric cranes and now totally dominate the world market. MacGregor Crane decided early to focus on hydraulic cranes and has had good results during the last few years.

At the start of our inquiry, MacGregor Crane had 235 employees at its headquarters (of a total of 250 employees in the whole organization). The most important professional roles assumed by its employees included management, accounting, sales, and engineer-

ing[1]. Organizational members perceived these professional roles as very distinct from one another. Ties between these organizational roles were loose in that limited collaboration existed across professional boundaries. Within professional boundaries, however, ties were stronger; people in the same professional role generally collaborated and agreed on key issues. Thus, MacGregor Crane resembles an organization that Weick (1979) considers a loosely coupled system. As suggested by Orton and Weick (1990), loose coupling combines the contradictory concepts of connection and autonomy and, thus, should be regarded as a dialectical concept (Van de Ven & Poole, 1995).

Research Approach

In order to preserve a dialectical interpretation, it has been suggested that greater familiarity with a few systems was more valuable than lesser familiarity with many (Orton & Weick, 1990). With this in mind, a case study supported by a qualitative approach (Eisenhardt, 1989; Miles & Huberman, 1984) was conducted at MacGregor Crane. This case study was grounded in the interpretive epistemology (Klein & Myers, 1999; Walsham, 1995). According to Walsham (1993), this approach to information systems research is predominantly "aimed at an understanding of the context of the information system and the process over time of mutual influence between the system and its context" (p. 14). Hence, a basic ontological assumption is that there is no fixed relationship between information technology and organization. Rather, it is assumed that the dynamics of technology and organization unfold in an ongoing mutual shaping process, which never is determined by any single factor alone.

The question of generalizability often has been a problematic issue for qualitative researchers (Johnson, 1997). In that respect, Walsham (1995) argues that the nature of generalization in interpretive study is clearly different from what it is in the positivist tradition. He identified four types of generalization, among which the development of rich insight constitutes one[2]. Walsham (1993) also maintains that generalizability, in the context of small numbers of case studies, relies on the plausibility and cogency of the logical reasoning used in describing the results from the cases and in drawing conclusions from them. In the present case, generalizability thus will be established by the plausibility and cogency of the analysis upon which rich insight will be generated.

Data collection techniques included document analysis and semi-structured interviews. Documents were analyzed to provide the researchers with a better understanding of MacGregor Crane's business situation. Two types of documents were considered. First, an overall IT-strategy document was made available to the researchers. Second, documentation with regard to the Lotus Notes® implementation (project documentation, user manual, training manual, etc.) also were studied. These documents provided sufficient knowledge in order for the researchers to ask informed questions during the interview process.

Interviews were conducted in two separate rounds. First, 11 interviews were conducted during a two-month period in 2000. Interviewees included managers, controllers, engineers, marketers, salespeople, and one secretary. These interviews included questions regarding the start of the project, the use of the Lotus Notes® application, and the problems that were encountered. A second round of interviews was conducted during another two-month period in 2004, with 20 interviewees. These interviews included questions related to the reasons behind the abandonment of the Lotus Notes® application (at this point, Lotus Notes® had been replaced with an html-based intranet). The interviewees from this second round were the same as in the first round plus additional engineers and sales personnel. Each interview from both rounds lasted between 30 and 60 minutes and was tape recorded and later transcribed.

The content of all the interview transcripts then was read in order to identify issues and topics as they were framed by organizational members. These issues and topics then were analyzed and aggregated in order to arrive at a set of themes that were common or recurring.

All the data were then reexamined and recategorized in terms of this new set of common themes. Such an iterative analysis of data and themes allowed us to reflect better on the experiences and interpretations of the organizational members involved in this implementation. Our analysis offers insight into the dynamics behind this software implementation.

The Implementation

Just like many companies in its industry, MacGregor Crane used cross-functional teams for product development and, to some degree, also for sales and marketing. These teams were composed of members from multiple functional units who joined and left the team based on their level of interest and required input. This was not considered a problematic issue in the past, but as each functional unit became more and more specialized, the need for better coordination grew to be urgent. Because organizational members from different departments were involved to greater and lesser degrees as an idea moved through various stages of development, information needs varied for each unit and each individual involved in the process. In order to keep all projects moving, people joining a project team were required to gain knowledge of the current project quickly and efficiently. The Lotus Notes® implementation project was launched in order to deal with communication and coordination issues and to provide the organization with a shared context. While this implementation project covered a long period of time, it can be subdivided in two distinct phases.

Project's Initial Phase

During the early phase of the project, from spring 1997 to August 1998, it was anticipated that the existing work procedures and practices could be improved in three specific ways by the use of the Lotus Notes®. First, the project manager perceived a need for better dissemination of general organizational information, such as news concerning new employees, new policies, or new deals for the organization. Overall, this objective was met successfully. Second, the project manager had identified a need for better collaboration among engineers. Because engineers were skilled in many different areas, the project manager's ambition was for engineers to learn from each other.

There are so many areas we can improve here, and I felt that initially, a good start would be to focus on improving the way in which we handle information at this place. This is particularly important when it comes to information concerning the development work; after all, it is the core of things here.

Although most engineers claimed that Lotus Notes® would be useful to their work, they could not clearly explicate how this would be the case. Engineers were used to handling unstructured information. When asked to describe parts of their work routines and reasons behind decisions in the development process, engineers had much difficulty doing so. Rather than identify the most important factors they were considering in their work, they instead would provide a series of examples of individual circumstances with no easily identifiable underlying procedures. Still, although engineers had difficulty articulating how Lotus Notes® had increased the extent to which they collaborated with one another, they asserted that this goal had been met successfully.

A third way that Lotus Notes® was expected to improve work procedures was by increasing support to the salespeople. For some time, the project manager had discussed the need for more efficient technical support for the salespeople. The project manager had perceived that sales personnel needed access to more updated and more detailed technical information in their meetings with potential clients. With better information, the project manager speculated, salespeople would be better informed about the needs of each one of their potential clients, which, in turn, would significantly increase their chances of selling products to the client base. As one salesperson said:

We [the salespeople] have seen how we can improve our work and our sales if we only had more support from the engineers. I'm not sure how that would work, we will need to sort that one out ... but we need to deal with this to stay competitive.

This goal, however, was not met. The engineers did not welcome this idea of sharing technical knowledge about the company's products, at least not in a formal way imposed by the technology. Although none of the engineers raised critical comments against the idea as it was presented, they did not contribute with any substantial information for this purpose through Lotus Notes® and were cautious about such initiative. One of them commented:

I'm not saying that we're against this idea; I'm just saying that we need to be careful before we embark on a path when we really can't say where we are going to end up. I'm all for new technology — I'm an engineer! But I mean ... we need to consider the consequences, and as far as I can tell, nobody has really done that yet.

At the end of the day, we do need to produce something. Clearly, we need to discuss things and plan ahead and the like ... but we also need to produce, we cannot just talk about it.

Overall, there had not been additional collaboration between engineers and salespeople. This was disappointing, as the dissemination of general organizational information and the improved collaboration between engineers through the use of the Lotus Notes® had been quite successful. Emphasizing the first two goals that had been met successfully, the project manager expressed his positive feelings over the initial period of the project. The failure to increase collaboration between the engineers and other organizational members was rationalized by a potential lack of resources for the project. Generally satisfied with the Lotus Notes® experience, the project manager felt compelled to pursue the project and to step up its ambitions:

I felt we had come a long way with a limited budget. Now, I would say it would be reasonable to assume that we would come even further with more resources available for the project.

The management agreed to set up a proper budget for the continuation of this implementation project, and a consultant was hired to work full time on this project. During the next phase, the goal was to push the Lotus Notes® experience further and to focus on the collaboration among organizational units.

Project's Later Phase

During the project's later phase, which started in August 1998 and ended in November 1999, the idea of increasing collaboration between engineers and other organizational members was reinstated, although somewhat reformulated. Again, expectations were materialized through three particular goals. First, there was a desire to have the sales personnel reporting customers' reactions and comments to the engineers. In this case, the assumed flow of collaboration was from the sales personnel to the engineers; that is, reverse to what it was in the initial phase of the project. The planned effect, therefore, was to have salespeople supporting the engineers with information about how their products were received on the market. Nevertheless, the engineers again resisted taking part in such collaboration. Their resistance was based on their fundamental belief that external opinions could have only marginal influence on the development of cranes; what mattered were issues concerning functionality and safety. As noted by one of the engineers:

We are responsible for our products and ... you have to consider that we are dealing with high tech equipment to be used in milieu where people rely on the safety and the functionality of our equipment. Our customers cannot begin to understand all the issues involved in

the development of cranes, and the same can be said about our salespeople. If we were to ask the market or the customers about how to develop our products, I wouldn't want to be on a construction site where that crane was used! Functionality and safety go together, you can't separate them in the development process. We need to put these issues in focus, and if we don't, well, then we're not doing our jobs.

Thus, the engineers did not welcome the idea behind the proposed collaboration. The position the engineers took on this issue came as a surprise to the other organizational members involved in the project.

A second way Lotus Notes® was expected to foster collaboration was through the sharing of key ratios between accounting personnel and sales personnel. Among the accounting group at MacGregor Crane, there were very explicit ideas about what key ratios were important and how they should be interpreted and acted upon. Key ratios were measures of success, or lack of success, in various organizational areas. For example, an important key ratio measured the sales success for specific products. Although the implementation of Lotus Notes® should have resulted in MacGregor Crane having more detailed and up-to-date information about its sales through these key ratios, the expected collaboration between accountants and sales people was not realized. Lack of shared norms along with resistance from the sales personnel to share information contributed to this setback.

Finally, a third way of cultivating collaboration was to increase partnership between accountants and managers. The project manager believed that it would be beneficial if all managers could get access to more timely information. Most managers shared his opinion and, thus, welcomed the idea of being able to act more quickly, informed by timely information. However, despite the fact that such timely information eventually became available on Lotus Notes®, managers did not take advantage of it. The project manager believed that this had to do with the managers' minimal experience with IT. Even though the technology was available for all managers, they did not use it in any substantial way.

Overall, the later phase of the project encompassed efforts that did not result in any actual changes. The project was based on the idea that an increased collaboration among key organizational roles would contribute to the organization's capability to reach its goals. This collaboration was resisted, though, from the engineers, from the sales personnel, and from the managers, as they all perceived that their work practices would be changed in a way with which they did not feel comfortable. The project as a whole is summarized in Table 1. For each phase of the project, three domains of organizational change are highlighted with their associated expectations and outcomes.

Epilogue: Project Termination and Technology Rejection

In November 1999, MacGregor Crane realized that they were not going to establish any deep collaboration among organizational units mediated by the Lotus Notes® application. In order to enable a certain degree of information flow among organizational members, an html-based intranet was launched. It was developed in a hierarchical structure reflecting the organizational structure at MacGregor Crane. The current design has been more or less the same since March 2001, when the organizational units got their own links in the intranet.

One person from each department was selected to be in charge of keeping the information related to the department up to date. All suggestions for changes had to go through this person. While e-mail addresses were included in the intranet, there are no other means of interaction available.

Organizational members rarely gave any suggestions on the content and form of the intranet. As some of the respondents commented:

Since I came here, I have not really seen any changes being made really. I haven't been asked about it either. Well, they do send out e-mails where they ask us all to come up with

Table 1. Anticipated and unanticipated organizational outcomes

Period of Project	Domain of Organizational Change	Expectations	Outcomes
Project's Initial Phase	Organizational	Better dissemination of information	Better dissemination of information
	Engineering	Increased collaboration within professional boundaries	Increased collaboration within professional boundaries
	Sales and Engineering	Increased collaboration across professional boundaries through the conveyance of technical support	Insignificant increased collaboration across professional boundaries because of lack of buy-in from the engineers
Project's Later Phase	Sales and Engineering	Increased collaboration across professional boundaries through the conveyance of customer feedback	Insignificant increased collaboration across professional boundaries because of lack of buy-in from the engineers
	Accounting and Sales	Increased collaboration across professional boundaries through the standardization of key ratios	Insignificant increased collaboration across professional boundaries because of lack of shared norms and resistance from sales personnel
	Accounting and Managers	Increased collaboration across professional boundaries allowing more timely organizational action	Increased collaboration across professional boundaries because of lack of buy-in from the managers

suggestions. We have all received them, but I haven't replied.

I guess we are all so used to the way in which it is designed. I guess we are not really coming up with suggestions for how to change it. I sure am not. I am just used to seeing it in its current design.

By 2004, most organizational members seemed to feel that the current design was working well. The notion of the intranet being a digital version of what is already there seemed to be a dominant view among organizational members. Moreover, there were not many people that formulated any alternatives.

Security was another reason why the html-based intranet was not leveraged. Because of the diversity of people working at MacGregor Crane, many organizational units were concerned with keeping critical information out of the intranet. Some project members were not formal employees at MacGregor Crane, which led to a constant reflection over how much access to critical data was allowed:

Now that we are working with a number of outsourced businesses, we cannot give as much access to people [working in those businesses] as we give to people who work here. And you can't justify this by telling it like it is. I can't go telling some contractor that they can't get the information they are asking for since they will not be working here in three months, that we will be taking in someone else. I can't tell them things like that. So you constantly need to pay attention to information flows in relation to non-MacGregor people.

In general, the value of the Intranet was perceived as low. It constituted a bleak compromise to the Lotus Notes® alternative, one that did not offend any parties. Although on the surface MacGregor was using this technology with the potential of improving communication and coordination among its organizational units, it, in fact, failed to do so.

DISCUSSION

Overall, increased collaboration through Lotus Notes® was not realized, as the implementation project did not result in a system that was used in the way it was expected. It was clear that there were a lot of resources put into the project[3], but everyone involved in it described the final results as poor. Ironically, while there was wide support for the idea that Lotus Notes® was going to foster greater organizational collaboration and coordination, the many attempts to increase this were met with resistance every time it involved more than one organizational unit. Closer examination of our data revealed that such resistance was not that explicit to begin with. In fact, the engineers even expressed that more collaboration was welcome. Reflecting on this situation, the project manager commented:

Clearly, we were a bit naïve about all this. I mean, who is willing to stand up and say, "I don't think collaboration is such a good idea!" Turned out that none of the engineers did anyway. But that was their message, in effect, "We don't like this idea of collaboration at all!" Now, I don't want to point fingers at anybody, … but if they would have been more open about their opinions, we could have saved a lot of money.

In fact, it appears that many organizational members had a cautious reluctance to increase collaboration through information technology. These organizational members, however, did not communicate their apprehension to the project manager. As the project manager noted, questioning the underlying idea of increased collaboration was not something that was politically correct; that is, this was something the engineers felt uncomfortable vocalizing. There is something honorific behind a statement like increased collaboration, and to argue against this can be interpreted as an irrational act.

Why didn't the use of Lotus Notes® lead to further collaboration across professional boundaries? The four conditions suggested by Vandenbosch and Ginzberg (1996-1997) in

order to foster greater collaboration all were met to some degree. First, there was a strong need for collaboration, as it was in the nature of MacGregor Crane's business to use cross-functional teams for product development, sales, and marketing. Second, there was a mixed understanding of the technology in the organization. Among engineers and salespeople, there was a good understanding of the technology and how it could support collaboration, as training had been provided and faithfully attended by these groups. However, the management did not use the technology to any great extent, which hindered a wider collaboration. Third, there was firm support (at least at the explicit level) behind the implementation; the project manager was given additional resources that were necessary to pursue the project and to step up its ambitions. Finally, the collaborative culture at MacGregor Crane was relatively strong prior to the Lotus Notes® implementation, as organizational members were used to being part of teams involving multiple functional units that were dismantled and recreated over time. However, this collaborative culture was developed within professional teams, and there was not much collaboration between these teams either prior to or after the completion of the Lotus Notes® project. Overall, none of the four conditions proposed by Vandenbosch and Ginzberg (1996-1997) can be invoked to explain the lack of collaboration. This uncovers the often paradoxical character of organizational life, as it is not uncommon for IT to result in unpredictable organizational consequences. The unpredictable and ubiquitous nature of IT's organizational consequences forces us to introduce new ways of thinking about how to study, explain, and anticipate these consequences (for a discussion, see Robey and Boudreau [1999]). For this purpose, we turn our attention to the theoretical lens of loose coupling.

Organizational Collaboration in the Context of Loose Coupling

Loose coupling recognizes the needs of individuals within an organizational culture to adjust their understanding of the organization before they can adjust to their changed roles as individuals within the organization. This adjustment was not done by the different organizational groups at MacGregor Crane. The barriers to adjust their understanding of the organization and also their own role within the organization were especially evident among the engineering team. The organizational structure, to a large extent, was the product of engineering-centered processes. As many organizational members routinely mentioned, MacGregor Crane was an engineering firm since its inception. Thus, in resolving the equivocality of information about the role and meaning of Lotus Notes® (Weick, 1979), the role and meaning of the new technology was sought within the limits of the existing organizational structure. While the ambition from the project manager was to change the organizational structure, this organizational structure was the starting point against which organizational members would interpret and make sense of newly implemented technology. Through sense making (Weick, 1995), users compared the situations before and after the implementation of Lotus Notes® within the organization. It is clear that these users had great latitude in interpreting and implementing directions, albeit within the boundaries of existing organizational structure.

All organizational structures do not necessitate tight coupling, and some managerial initiatives, like decentralization, delegation, and professionalization, build some looseness and flexibility into such structures. For some organizations, this is a necessary structure, since managers may not have the basic understanding to closely supervise specialized employees. Looking at this project through the lens of loose coupling, we can appreciate the tension among the loosely coupled organizational roles. While one of the presumed strengths of a loosely coupled system is that it can adapt to its environment by relying on the collective intelligence of its constituent parts, this study illustrates how loosely coupled constituent parts also may resist change.

Loose coupling exists for a good reason, and any effort to intervene (to move toward

tighter coupling or further decoupling) (Meyer & Rowan, 1976) has to present the organization with rational arguments. While loose coupling often occurs because of a high degree of ambiguity in the decision tasks (March, 1994), efforts to disrupt such a situation by implementing a new IT application may be interpreted as inappropriate. This was the case at MacGregor Crane, most notably in the way in which the engineers resisted the project.

This tendency of resistance among the engineers was magnified by the way in which the project was managed. The project was managed in a top-down approach, guided by an overall ambition that was not reconsidered in light of organizational resistance. A more suitable approach to the lack of shared context typical of loosely coupled organizations requires increased acknowledgment of the needs and preferences expressed by all organizational roles.

The constituent parts of a loosely coupled organization could serve as the tentacles in the process of IT adaptation. This was not done at MacGregor Crane, as the implementation of Lotus Notes® was conducted so that managerial intentions were not changed in the process. Even in light of a seemingly obvious failing course of action, the original ideas were not questioned. A similar view was presented by Mintzberg (1994), who argued that strategies that emerge from the managerial mind may not be as efficient as those emerging for the organization's grass roots. He described top-down strategizing as intrusive and upsetting, as episodic exercises that are more likely to introduce discontinuities and errors than to serve the organization well. His basic argument is that organizations need to promote learning at the lowest levels in order to adapt to changes in the environment. The lowest levels in the current case are the loosely coupled elements (e.g., the various teams). Managers of the Lotus Notes® implementation were not sensitive to the various teams.

A reason for the lack of collaboration resulting from this implementation can be found in the way MacGregor Crane identified loose coupling as a problem with which to deal rather than as a resource from which to draw. From the point of view of grass root adaptation, loose coupling could be interpreted as a resource to exploit. Contrasting Weick's (1995) ideas of loose coupling with top-down, highly control-oriented managerial narratives on how to align strategy and infrastructure in modern corporations, Ciborra (2000) describes the ideas inherent in loose coupling as an organizational ideal. He argues that IT should not be imposed on loosely coupled elements but rather that the diversity inherent to organizations should be seen as a resource from which to draw.

Related to the notion of knowledge intensity of the product, it was obvious that there existed a belief among MacGregor Crane's organizational members about core activities and peripheral activities among the loosely coupled elements of the company. Knowledge intensity, as defined by Ciborra (2000), depends upon (1) the number of actors, which are sources or recipients of product-related knowledge; and (2) the amount/complexity of the knowledge generated or required at each stage of the development, launch, and marketing of a product. Among the multiple stages of development of MacGregor Crane's products, the engineering stage was considered to be the most important (i.e., the core activity). Moreover, this activity solely involved the engineers and no other group. Thus, perhaps paradoxically, the ambition to control the IT project at MacGregor Crane along with the resistance to reconsider what organizational activities were central and what activities were peripheral contributed to the lack of collaboration resulting from the IT implementation.

Acknowledging the powerful dialectic between the needs of the organization and the needs of the individuals (or group of individuals), the idea of loose coupling underlines the dynamic relation between the loosely coupled elements on the one hand and the organization as a whole on the other. As opposed to the linear, push/pull structuralism of the top-down hierarchical organization, loose coupling facilitates dynamic grouping of staff and physical resources for specific purposes, followed by recoupling as

needs and purposes change. In consequence, it provides recognition of the needs of individuals and groups within an organizational culture to adjust their understanding of the organization before they can adjust to their changed role as individuals within the organizational culture. In light of this research's findings, we suggest that the successful implementation of a collaborative IT within a loosely coupled organization should involve the reconsideration of the organizational members' roles and functions. This did not happen at MacGregor Crane.

CONCLUSION

The problems in managing complex technology projects are not new; a number of studies have pointed to the difficulties of integrating coordination technologies into work practices, raising issues such as a lack of critical mass, inadequate training, inappropriate expectations, and structural and cultural problems (Markus, 1987; Orlikowski, 1992).

The later phase of the project was concerned with efforts that did not result in any actual changes, since the project as a whole was based on the idea that an increased collaboration among key organizational roles would contribute to the organization's capability to reach its goals. This collaboration was refused from the parties involved, since they all perceived that their work practice would be changed in a way with which they did not feel comfortable. In theory, collaboration was welcome among all organizational members, but in practice, people refused to change their work practices.

Thus, in this project, there were no well-controlled changes made when it came to the organizational adaptation of the Lotus Notes® application. MacGregor Crane faced a situation in which resources were put into an IT project that was not well controlled. The Lotus Notes® experience at MacGregor Crane underscores how IT and organization are connected to each other and how their roles and their meanings depend on this connection. This connection is of crucial importance; change one element and you also change the other. Out of this change, new meaning arises, which redirects the organization. This is something that needs to be recognized and to be put on the managerial agenda. At MacGregor Crane, this was not the case. Ironically, while MacGregor Crane identified a central problem for all loosely coupled organizations as a starting point for the Lotus Notes® project (the problem concerning coordination), it was this very problem that led to the overall project failure.

The loosening of the ties among organizational constituents presents us with a particular managerial challenge, and the theoretical perspective of loose coupling can be a powerful tool in the hands of IS researchers who are trying to gain a better understanding of the complexities involved in such situations. Nevertheless, it is not the only approach. Stucturation theory, or other theoretical approaches embedding a dialectical interpretation (Robey & Boudreau, 1999), also could have shed light on the organizational change triggered by collaborative information technology. However, we believe that, given MacGregor Crane's organizational structure, its investigation through the lens of loose coupling constituted a particularly good fit.

While more empirical work is necessary in order to completely understand IT adaptation, we believe that this article offers a useful beginning. Understanding the couplings among organizational elements — and the potential for collaboration among them — allows us to learn more about the limits of IT-related organizational communication and collaboration.

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ENDNOTES

1 It should be noted that the engineering role is formally described as being organized in design and development, production, and material administration. We chose to include these administrative units in the same role, as they all are concerned with engineering tasks and are not distinct roles in practice.

2 The other three types of generalization discussed by Walsham (1995) are generation of a theory, development of concepts, and development of implications (in particular, domains of action).

3 The project manager did not want to state precisely how many resources were put into the project; he only stated that it was way too much.

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