

Chapter I

Socio-technical Aspects of ERP Implementation: The Central Role of Communication

Dov Te'eni, Tel-Aviv University, Israel

Abstract

The development and appropriation of ERP is a collaborative effort that relies on communication for its success. This case study demonstrates how communication is affected by the organizational context and how communication affects ERP success. Actual incidents of communication breakdowns clarify the impacts of communication gaps and communication complexity on mutual understanding and on relationships between communicators. Furthermore, the case study shows how communication gaps affect critical success factors of ERP, such as commitment and involvement, user acceptance and monitoring and feedback. An important implication is that communication in ERP has to be structured and managed. The qualitative methodology employed relies on an analysis of the recorded communication between the actors so that for the researcher, communication also tells the story of the collaboration between the ERP actors. It appears that communication complexity and breakdowns can serve as diagnostic tools that should alert management to take corrective action.

Introduction- Motivation and Objectives

Enterprise-wide systems accentuate the need for a multidimensional analysis of organizations. The reason for this is that these systems are designed to support organizational processes that build on interdependencies between workers, coordination, and collaboration. Technology is only one part of a sociotechnical system within an organizational context. Moreover, these kinds of systems are mainly designed to support existing networks of agents and subsystems and, therefore, necessarily involve changing and restructuring work. This further complicates the people side of the system.

Consider, for example, the interplay between the technical division responsible for implementing the system and the user groups expected not only to use the system once it is implemented but also to actively participate and collaborate during its development. The conflicting interests of these parties and the political side effects more often than not create devastating barriers to success. In ERP systems, as compared with applications more limited in scope, the number and complexity of agents and functions and the interplays between them are usually very high, as are the political stakes at hand. In particular, the effective communication between all agents involved in the process is crucial because of the complexity of the process and the late visibility of the outcomes (on the average, an ERP implementation lasts around 21 months and exhibits profits only 31 months after implementation). Our main observation from the case study described here is that ERP implementation must incorporate mechanisms for effective communication.

The once popular sociotechnical systems approach prided itself on taking a more comprehensive view than the prevailing technical perspective practiced at the time. This view was more sensitive to multiple perspectives in the organization and to the issues related to organizational change (Pasmore, 1988). This chapter applies this approach, concentrating on the communication between actors as perhaps the most profound aspect of social systems.

Why the communication perspective? Al-Mudimigh, Zairi, and Al-Mashari (2001) also examined ERP implementation as a sociotechnical challenge in which communication plays a central role in securing the essential processes for successful implementation. Furthermore, several empirical studies found communication between participants of ERP projects to be an essential element in processes leading to successful implementation. For example, implementation entails knowledge transfer that necessarily relies on complex communication (Lee & Lee, 2000). Communication has been considered one of the critical success factors of ERP (Holland & Light, 1999). Our research goal is to uncover how communication, when effective and ineffective, affects the process of implementation.

As a whole, this chapter does two things: (a) it describes an actual ERP implementation process using a research framework that explains the role of communication in ERP success, and (b) it prescribes tools for managing the communication process, which were devised to overcome the communication problems experienced. The next part of the chapter provides a background to the case study, advances a new conceptual framework of communication in ERP, and applies the framework to make sense of the findings. The chapter concludes with lessons learned about how to manage communication complexity, so as to enhance ERP success.

Background

The ERP project takes place in a state university in Israel with around 24,000 students. In January 2004, the second functional area, namely, the student information system (SIS) was launched. The human resources (HR) module has been in operation for 13 months but is far from being complete, and development is going on side by side with operations. The project initiated in 1998 with a general study called the Blueprint for ERP in the University, followed by a detailed analysis and design specifications produced in 2001. The overall budget for SIS and HR is around \$7 million.

In an ERP project, there are many stakeholders. Some are considered front stage players, including the decision makers, the builders, and the users. Others, meanwhile, are backstage players who are important for understanding the context. In addition, there are other players, such as an organizational consultant, who will be introduced later, to explain our findings. It is important to listen, as we do, to all these players, but only the central front-stage players are listed below:

- The university's top management consists of the provost and the general director.
- The university's IT committee chair, is appointed jointly by the provost and general director.
- The CIO (chief information officer) is in charge of all administrative and academic computing.
- The HR director oversees both administrative HR and academic HR.
- The student director oversees all administrative services to students, from initial inquiries to graduation and alumni services.

Table 1: List of events constituting the ERP life cycle

| Date of event | Subsystem HR or Student | Event |
|----------------|-------------------------------|--|
| January 1998 | University | University wide ERP application blueprint – Preparation |
| September 1999 | Student | Analysis of student services – Preparation |
| October 2000 | HR | RFI published – Preparation |
| April 2001 | University | Oracle chosen – Preparation |
| March 2002 | HR | Gap analysis - Prioritization of Gaps for Stage I - Design |
| June 2002 | Student | RFI published – Preparation |
| December 2002 | HR | Launch HRIS Stage I – Implementation |
| February 2003 | HR | Top management issues new principles of HR for HRIS – Analysis |
| August 2003 | Student | SIS committee chaired by Student director submits specification – Analysis |
| September 2003 | Student | Begin deliberations on SIS – return to Preparation |
| December 2003 | HR | Initial post-implementation report on HRIS – Implementation |
| January 2004 | HR | Top management review of HRIS and decision on stage II – Implementation |
| January 2004 | Student | Top management decision to continue with SIS – Preparation |

The ERP module was the first module to be implemented and was conducted as an independent project. The project manager is an IT professional who reports to the CIO. A senior user and the senior implementer joined the project manager to form a project management team. In addition, a project steering committee consists of the CIO and the user sponsor. The project steering committee reports to a top steering committee.

A detailed description of the ERP project and the university is given in Appendix 2-A. Table 1 depicts the ERP life cycle to date. Each entry (row in the table) shows an event that signifies a product of the respective stage in the life cycle and also designates the relevant subsystem. These five stages of the life cycle (preparation, analysis, design, implementation, and appropriation) are explained below. Two “mini” life cycles can be identified - one for HR and one for student services. At this time, only the first four stages are noted in the table, as the appropriation stage has not yet begun. A couple of peculiarities are immediately evident from the table. First, the analysis stage of HR appears after implementation commenced. Unfortunately, the need for analysis became clear when

implementation came to a halt due to users' complaints. Second, at some stage after analysis was already underway, a call in the organization for reassessment of the ERP project triggered a return to preparation. Both of the peculiarities and other incidents are examined below.

Notice that the two mini life cycles for the HR and student modules are entangled.

Framework

ERP as a collaborative effort relies on social interaction and effective communication. The research framework advanced here seeks to integrate ERP with communication. ERP is characterized by two aspects that are important in understanding the role of communication in ERP. One is the ERP life cycle, and the other is the notion of ERP critical success factors. Two associations are claimed: communication facilitates several critical success factors, and different communication patterns are associated with different stages of the ERP life cycle.

Enterprise Resource Planning

Life Cycle of ERP

Different perspectives of ERP bring different models of the life cycle. Newell, Huang, and Tansley (2002), for example, used the innovation diffusion perspective to analyze social interaction in ERP projects. Innovation diffusion is characterized by four iterative stages: agenda formation (accepting the original idea and preparing for its implementation), design (designing a fit between the ERP and the organizational processes), implementation (adapting the system and the organizational processes according to the design), and appropriation (turning into routine the new ERP supported work). In contrast, the systems development perspective stresses the practice of analysis as well as design. Sieber, Siau, Nah, and Sieber (2000) used a four-stage characterization of an ERP project in an American university: preparation (defining the overall scope and requirements), analysis (defining current and future business functions and user needs), design (analyzing the fit-gap between future functions and ERP functionality and designing the ERP interfaces and outputs), and implementation (configuring the ERP system and user training). The stages of implementation and design are similar in both views. However, the preparation stage in the systems develop-

ment perspective is broader than the parallel stage of agenda formation. Integrating both perspectives can be seen to be more complete. The integrated life cycle includes five stages: preparation, analysis, design, implementation, and appropriation.

Not only is the ERP life cycle iterative, but also each module of the ERP follows a “mini” life cycle. For instance, in Table 1, the HR module and the student module each follow a sequence of stages constituting two “mini” life cycles that overlap within the overall ERP project life cycle. This point is important, because it opens communication flows between actors of different ERP modules situated at different stages of their respective mini life cycles. The next section relates the life cycle to success and builds on this relationship to identify the role of communication.

ERP Critical Success Factors

Several researchers compiled lists of critical success factors (CSFs) for software projects, in general, and ERP, in particular. It would seem that CSFs for ERP include the factors critical to IT projects in general. At the same time, ERP projects add or emphasize factors that are particularly sensitive to the unique size, scope, and impact on the organization associated with ERP in comparison with other IT projects. However, the definition of ERP success is problematic. Success may well change from one stage in the ERP life cycle to another and from one stakeholder to another, and so will the problems hindering success (Markus, Axline, Petrie, & Tanis, 2000). This chapter concentrates on the role of communication enabling the particular processes critical to each stage of the life cycle. So, for example, the problems identified by Markus et al. (2000), such as inappropriate software modifications, lack of system integration, and coordination with consultants in the early stages of the life cycle, can be alleviated by better communication between the actors involved. Our perspective, therefore, is to concentrate on the communication needed at different stages to enable different processes and overcome different potential problems.

Our approach is similar to the framework for ERP implementation advanced by Al-Mudimigh et al. (2001), which ties the different critical success factors to the various processes that occur at different organizational levels through communication, making communication a critical success factor. This chapter builds on previous studies that identified critical CSFs and mapped them to different stages or stakeholders. For example, Holland and Light (1999) distinguished between factors that are strategic (core resources to accomplish long-term goals) versus tactical (business activities to accomplish short-term goals). Strategic CSFs include business vision, legacy systems, ERP strategy, top management support, and project management. Tactical CSFs include client consultation and accep-

tance, personnel, monitoring and feedback, and communication. The following section digs deeper into the role of communication in ensuring success.

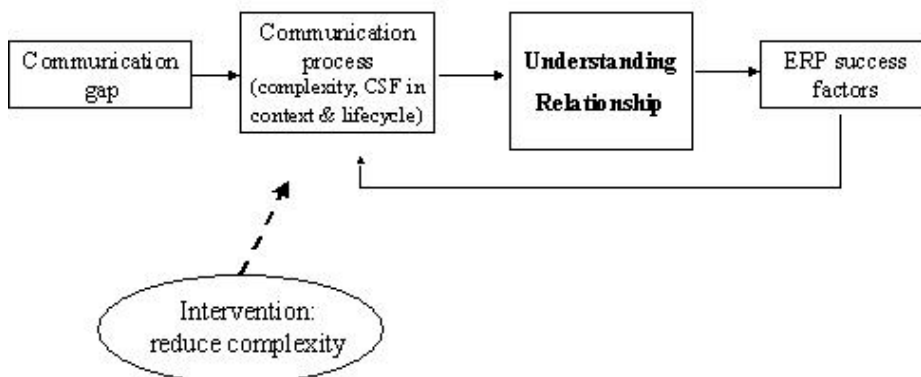
Communication

Communication in IT Projects

Several studies identified communication between stakeholders as one of the major elements for successful implementation. Communication is associated with several critical success factors, such as user and management involvement and project monitoring, but it also has been considered as one of the critical success factors (Holland & Light, 1999). The quality of interaction and the mutual understanding between those involved in implementing IT has long been considered as a key factor in the success of IS projects (Churchman & Schainblatt, 1965; Ginzberg, 1981; Kwon & Zmud, 1987). Poor communication among three groups of stakeholders in particular, namely, IT professionals, users, and management, is a major cause of IT implementation failures (Ewusi-Menash, 1997).

The research framework depicted in Figure 1 attempts to explain the connection between communication and ERP. It builds on a general model of organizational communication advanced by Te'eni (2001). The model characterizes a communication process that has an input, namely, the communication gap existing between the sender and receiver prior to the communication, and two outputs, namely, the mutual understanding between the sender and receiver and the relationship between them after the communication has taken place. The impact of communication depends on its context, which in our case is the ERP project,

Figure 1



and the direct impact of interest is on the CSFs of ERP implementation. Furthermore, the communication process is characterized by the communication complexity and the reactions to the complexity, as well as its impact on the particular CSF and particular life cycle relevant to the communication process. Communication complexity is an abstract concept that helps to model a particular situation of communication and thereby identify appropriate interventions. For example, high communication complexity in the communication between consultants and users may require a higher investment of time and effort to better understand one another by learning each other's perspectives. Potentially, a better understanding of the different perspectives may reduce the problem of inappropriate modifications of the ERP package at the design stage.

What does the literature tell us about the various links in Figure 1? Beginning with the end of the process, the links show that communication impacts ERP success by facilitating CSFs, when communication is effective, or hindering CSFs, when communication breaks down. In particular, effective communication is crucial if users are to accept and become involved in ERP. It is also crucial in making a visible management commitment to the project, in enabling monitoring and corrective action in ERP project management, and in promoting creativity in ERP analysis and design (Cooper, 2000; Siau & Messersmith, 2003).

Social interaction and communication among the various actors in the organization is aimed not only at understanding better what needs to be done and how best to do it, but also at building relationships, involvement, and commitment, which are all necessary for effective implementation (Al-Mudimigh et al., 2001). Moreover, communication between actors occurs throughout the ERP life cycle. In Figure 1, the product of communication is thus characterized as both mutual understanding and relationship. The communication process leading to understanding and relationship is subject to communication complexity, the result of the need to ensure effective communication with limited resources under uncertain and problematic conditions (Te'eni, 2001). For example, a lack of feedback in communication, uncertain and ambiguous communication, and a lack of trust between communicators will increase the complexity of communication. This, in turn, impinges on mutual understanding and relationship.

One of the major factors of the organizational context to affect the communication process is the physical or psychological communication gap between communicators. In particular, communication gaps between IT professionals and users and between management and IT professionals increase the complexity of communication and lead to poor communication. Previous research showed how different backgrounds of system analysts and users create communication blocks that interfere with mutual understanding (Tan, 1992). This becomes even more problematic when the users come from diverse professional backgrounds (Cramton, 2001). Inaccuracies and ambiguities raise the probability for different meanings than intended, and this probability grows when the

backgrounds of the sender and receiver differ (Eckert, 2001). For example, one specific difference is the language gap between professionals and management (Applegate, McFarlan, & McKenney, 1999) and a similar gap between IT professionals and users (Ohira, Yamamoto, Takada, & Tansley, 1999). These gaps make it more likely that different stakeholders will perceive different connotations of the same message, making mutual understanding even more difficult (Burgoon & Ruffner, 1978). Furthermore, even the stereotypical perceptions of IT professionals as having poor interpersonal skills have interfered with actual communication and relationship building (Bashein & Markus, 1997).

Communication in ERP

The scope, size, and wide impact of ERP generate a high level of communication complexity. This means that it is all the more important to manage this complexity by reducing the communication gap, structuring communication, and monitoring it (this is shown in Figure 1 as an arrow from “intervention” and is elaborated upon in the conclusion of this chapter). To better understand communication failures in ERP and their impacts on its success, communication is tied to the two aspects of ERP discussed above, that is, critical success factors and the life cycle. The link between communication and ERP forms the basis of the methodology that was used, as discussed below.

Different stages of the life cycle involve different forms of communications. Newell et al. (2002) argued that social networks are leveraged so as to bond within groups and bridge across diverse groups, with different emphases on either bonding or bridging in different stages of the ERP life cycle. For example, in the initial stages of the project, bonding within the project team is crucial, while in the later stages, bridging between the users and IT professionals becomes more important. Moreover, different factors become more or less critical to success at different stages of the life cycle. In the preparation stage, management commitment and involvement rely on the way management communicates effectively with users and IT professionals. In analysis and design, the involvement of users and the communication between them and IT professionals are vital in order to correct analysis and user acceptance. Thus, our framework for analysis is one that views communication about critical success factors at different stages of the life cycle.

Urquhart (2001) took a similar approach in studying the interaction between analysts and clients. She used three interrelated themes to make sense of the conversations she recorded: management of the communication process (i.e., how the issues to be discussed were formed and presented), professional relationships between the stakeholders as affecting and being affected by the

interaction, and the organizational context of the interaction and IS development project. The current study reported in this chapter can be seen as an extension of Urquhart's work, inasmuch as it builds on the notion of communication gap and the idea of different models for different stages. It goes beyond that to model communication complexity and its impact on mutual understanding and on relationships, by looking at the content and the form of the communication. Importantly, Urquhart observed that the organizational context almost invariably remained implicit and did not surface when tasks and information requirements were analyzed. Our interpretations of the communication will be in keeping with this - an attempt to consider the unsaid context.

Moreover, our communication networks span multiple stakeholders, most of whom are users, IT professionals, and managers. This complicates communication, i.e., increases the communication complexity. The communication between actors found at different stages of the life cycle is also considered. Scott and Wagner (2003) show how different time frames of an ERP project, in effect a time related communication gap, create communication problems. The ERP life cycle helps organize and focus the communication but also turns the flood light on the communication at the different stages of the life cycle. Thus, the two dimensions, stages of the life cycle, and the different stakeholders as communication partners, determine the communication network in the ERP implementation.

The picture of communication in the university (Figure 2) shows multiple circles of communication (drawn as ellipses). Horizontal communication occurs within

Figure 2



circles and between circles at the same level (the informal communication between users in different modules); vertical communication occurs across levels.

To sum up, the research framework (Figure 1) serves as a lens that helps us to interpret the communication patterns and impacts in the current case study. The communication process is characterized by the critical success factor it addresses, the life cycle stage, and the complexity of the communication. This process is affected by the initial communication gap, and it affects mutual understanding and relationships. Finally, mutual understanding and relationship impact on the CSFs of ERP. The direct impact on understanding and relationship and the indirect impact on ERP success feed back to affect the communication process.

Methodology

The study attempted to look back at a period of just over 3 years from October 2000 until January 2004. The author and a research assistant engaged in a participative study that has been going on for 14 months. The author acts as the chair of the university IT committee. The research assistant, who is a seasoned system analyst with experience in ERP projects, performed the structured interviews explained below.

The main data collection methods include unstructured interviews with those involved in the ERP project and semistructured interviews conducted to review the postimplementation stage of the HR module. The format of the semistructured interview is given in Appendix 2-B. Users and developers received similar questionnaires, with adaptations for language and technical questions. Managers were also asked about cost benefit considerations. The forms in Appendix 2-B served as the basis for the interview, but the interviewer was instructed to expand the interview when she felt she could reveal interesting information. Of the developers, six people were interviewed, including one consultant. Eleven users and six managers were also interviewed, many of them twice.

Another source of information is a large archival set of documents about the products and processes of the ERP projects. Products are the concrete outputs of work teams throughout the project life cycle, such as the blueprint, detailed requirement specifications, and gap analysis. Process documentation includes documents describing processes such as protocols, appointments of committees, and people and evaluations of the process written by a consultant and user groups.

The research is qualitative and open in the sense that it seeks to document and attempts to model all the important phenomena encountered in the study. In particular, the research looks for concepts that emerge from interactions among social actors involved in the ERP project. The above discussion about communication in ERP helped to organize the data and mold interpretations (for a discussion of this approach, see Klein & Myers, 1999). First, the data collected in the interviews and the archives were organized as communication acts about critical success factors, according to stages in life cycle (either HR or student). The communication was then examined within its organizational context, as supplied by the author, and interpreted in terms of communication gap, complexity, mutual understanding, and relationships. Practically, it is often easier in modeling organizational communication to detect ineffective communication (communication breakdowns or signs of high complexity, such as requests for repeated communications) than effective communication (Te'eni, 2000). Finally, major interpretations of critical communications were made and further refined until the researchers were content with the representation of the case essentials.

Findings

The most critical communications for representative stages in the life cycle are summarized below chronologically. They are reported here as interpretations of events in light of the research framework depicted in Figure 1. Corrective actions taken to improve communication are reported alongside the event.

User involvement and acceptance in the design stage. In the design stage of HR, communication between the HR major users and the IT professionals, both the computing center personnel and the implementers from Oracle, broke down. The joint forums, those of both the core project team and the project steering committee, ceased to function as forums for exchanging ideas. This is an extreme example of poor communication, namely, no meaningful communication between users and developers. Part of the organizational context was a change of HR directors, which created a vacuum of leadership that led to a weak positioning of HR personnel in their negotiations with IT. Although both parties wanted to communicate, they found it too difficult. The relationships between HR and IT quickly deteriorated and made communication between them nearly impossible. Moreover, during the gap analysis, HR people could not cope with the complexity of the technological solutions, leaving them unable to understand how the system will affect the way they perform their jobs. The feeling of uncertainty further complicated communication. Like previous reports of user-analyst communications, the users wanted to talk about the impact on the processes, while the IT people concentrated on the implications for technology (Urquhart, 1999).

In practice, users did not sign on user acceptance tests, and the IT group, who was determined to progress according to the project timeline, took full responsibility for the specification and prioritization of work requirements that emerged from the gap analysis. The most concrete impacts on the ERP process were the lack of user acceptance, hardly any user involvement, and a growing resistance to change.

The correction of this communication breakdown occurred only later, when the project began to suffer at the implementation stage. When the users found it difficult to work with the system, an organizational consultant initiated a reassessment, which in effect was a return to the analysis stage (see Table 1), to reformulate HR processes. It then also became clear that communication between all parties must be organized and managed. The CIO and HR director joined the discussions to ensure effective communication. The top steering committee learned about it much later, only when a formal meeting triggered by the IT committee presented the consequences of the communication breakdown. Clearly, the vertical communication to top management was ineffective. The impact of poor communication on ERP success was severe: there were large monetary costs for delays and an unacceptable level of service to university personnel who did not receive their appointments in time. Once these consequences were fully understood, top management insisted on a tighter management structure for the project that would exercise tighter control on the communication and control.

User involvement and management commitment in the preparation stage. In the second repeat of the preparation stage in student services, communication between the users and IT professionals turned sour. This became clear at emotionally loaded meetings, where discussions seemed to lead to nowhere, and personal rather than substantial exchanges dominated. The political context, never mentioned explicitly in formal meetings, involved a power struggle at the university that called into question the previous decision to adopt ERP. The student services director chaired a committee (appointed 11 months after Oracle was selected as the ERP platform) to issue a new RFI (request for information), resulting in two main contenders: Oracle and a local software house.

The news that management appointed the student director to consider alternatives for the SIS was quickly seen as a lack of commitment on behalf of management to the total solution of a unified ERP. In the absence of a university wide communiqué from top management and a *de facto* low level of visible involvement of top management, the perception of low commitment to ERP persisted and grew despite contradictions.

At the same time, communication between the users and the local contender blossomed, while communication with the Oracle kept on failing. Communication took place, and all involved invested time and effort in ongoing communication

and in several days of workshops. However, the initial willingness to listen and learn turned to frustration and marred the personal relationships between users and IT professionals, including the university computing staff.

One of the main reasons for communication failures was the complexity of the materials. The workshops of the local vendor were, in effect, concrete demonstrations of a system working in a similar university. On the other hand, the Oracle workshops were abstract descriptions and screen shots of the original Australian software adapted to a British university. Users can relate to concrete examples, even if they differ from their own processes. Users find it difficult to appreciate abstract notions and potential capabilities. IT professionals can easily appreciate the powers of a rule generator, which is a subsystem of the ERP software, to generate rules for HR decisions such as benefits. IT professionals can easily see how a rule generator can cope with new regulations, but users find it impossible to accept that a rule generator is sophisticated enough to allow them to adapt the system to cope with unique requirements.

To users, functionality that cannot be seen is a gap that will require development in the future. Similarly, IT professionals see a report generator as a potential answer to 80% of all reports. However, users fail to be convinced. Moreover, users are less willing to accept promises when trust is low. Repeated sessions of illegible, frustrating communication produced mistrust, which in turn invalidated much of the abstract communication. Thus, communication complexity leads to misunderstanding and mistrust that hinder future communications.

There was poor communication between users and IT professionals characterized by little mutual understanding and bad relationships. In the context of seemingly low involvement from top management, this strengthened the users' resistance to the Oracle ERP solution. When the IT committee reexamined the issue of ERP and recommended committing to one package, users were completely against the solution, and special measures had to be taken to regain their tentative acceptance. The immediate result was a great loss of time and energy that reduced motivation to be involved, poor working relationships that will have to be mended, and a weakened commitment of the rest of the organization to follow suit in the ERP project. Once again, top management was asked to become involved and committed but also to communicate this commitment to all other stakeholders. Oracle was asked to redesign its workshops and entire communication, to make it concrete by investing time and money to produce new, tailor made demonstrations on the basis of prototypes with the users. This represents a complete change of mindset for the IT professionals.

Lack of involvement and lack of monitoring in the implementation stage. At the end of 1 year of operation, top management was receiving conflicting messages on how the HR module was being implemented. HR offices and two faculties already implemented the system (they were called the “distributed”),

and the other faculties planned to implement the system in the coming months. A decision on stage II of HR was about to be made. Meanwhile, the political context of the communication about the status of stage I concerned the reluctance and resistance from those opposed to ERP to spend more money than originally budgeted. Those opposed to the ERP project reported informally about serious problems in implementing the HR module. Informal communication, including sheer gossip within HR, floated around the corridors. In contrast, official reports stated that HR was implemented and would be made available to all faculties within 3-4 months.

At this time, a postimplementation review (PIR) finally began after months of delay. The PIR showed that the state of implementation was in poor shape. Some of the key users could not work effectively with the system, while many of the system options and messages were not understood, big backlogs in HR emerged, and frustration with the system was high. For key users in HR, the biggest worry was that the system would be distributed to other faculties before the lessons from the first two were implemented and before adequate instruction and support were guaranteed. Amazingly, a two page written report submitted as part of the PIR took an optimistic view, warning top management that more support and tutoring were needed. The stark difference between the written and oral reports made clear the need for both formal and informal communication lines in monitoring the project.

In effect, the PIR highlighted the need for a system of monitoring and feedback that was practically nonexistent. Monitoring and feedback are critical success factors that obviously rely on effective communication. The PIR is a structured form of communication that systematically draws out measures of implementation success, user involvement, performance with the system, communication and management, technical adequacy, levels of support and responsiveness, and special needs such as crucial missing features. In some cases, though, it seems that only a communication mechanism initiated by management will trigger the communication that is essential for ERP critical success factors, such as monitoring and feedback. Moreover, the results of the PIR triggered management to restructure the project management so that effective vertical communication could take place.

Between modules and between stages. Communication occurs between users in different departments and between people involved at different stages of the life cycle. This type of communication, often informal, is particularly vulnerable to communication failure due to the different perspectives and the different contexts in which the communicators work (Scott & Wagner, 2003). In other words, these differences create a communication gap that generates communication complexity. This, in turn, affects understanding and relationships. The main point about communication between IT professionals is to learn from experience and avoid repeating mistakes. Regular sessions involving people

from the different projects, including key users, provide important insights. On the other hand, informal communication from users in HR complaining about working with the system generated fear and resistance at the new user group at student services. Much of the informal communication filled a vacuum of information that people at student services expected to hear formally through organized meetings and written documentation. One recommendation is to create a short version of the PIR to distribute “lessons learned” in a systematic and open fashion among all users.

Conclusion

The research framework in Figure 1 gives an overview of the communication process and its impact on ERP. The four incidents reported above highlight extreme scenes in a play composed of two mini-stories, HR and student services, closely interwoven within one organizational context. The impact of communication on ERP success is clearly substantial and cannot be left unmanaged. While every information system requires effective communication in development and appropriation, the complexity and political sensitivity of ERP is particularly high due to the scope, size, and impact of ERP systems. The research framework suggests several directions of intervention. Basically, these aim to reduce communication complexity and ensure effective communication.

First, the project needs to be organized so that there are clear forms of communication, both vertically (e.g., set periodic meetings of steering committees that successively report to their higher levels) and horizontally (e.g., open brainstorming among different user groups). Both formal and informal communication must be encouraged and monitored. Management should regard communication not only as a critical facilitator but also as a diagnostic tool that can detect problems and trigger corrective action. In the absence of structure, communication will deteriorate. Second, ongoing reports evaluating the system, such as the PIR described above, should be part of monitoring and feedback, which are necessary for effective ERP implementation. Without monitoring and feedback, projects will not succeed. Third, IT professionals should learn to speak the user's language. Moreover, they should be trained to see things from the points of view of users and managers. This is easier said than done, but perspective taking is one of the fundamental strategies for coping with communication gaps (Te'eni, 2001). No system can be developed to help users without effective communication between developers and users. Finally, management commitment and involvement need to be seen and heard, and actions speak louder than words. ERP projects must incorporate systematic and periodic

communication concerning user involvement and management involvement, because if it is not communicated, people interpret absence as lack of commitment.

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Appendix A

This appendix outlines the organizational structure of the university and other relevant information so that readers can understand the dynamics and political context of this ERP project. A particular aspect of the university is that it is organized around two distinct and independent branches: academic and administrative. The ERP is mainly geared toward supporting administrative activities, but these activities have an academic function and an administrative function. The two modules that are relevant to this case study are the HR (human resources) and student services functions.

The university is a state university with close to 24,000 students. The university grants first, second, and third degrees in a variety of scientific domains organized across six faculties. Each faculty is composed of departments and schools.

The university is governed by a board of governors, who appoint the president. The top academic officer is the provost, elected by the senate. The provost appoints a vice provost and the deans of the six faculties, upon the recommendation of the faculty members from the respective faculties. The president appoints a general director, who in turn appoints his or her chief business officers, including the CIO (chief information officer), the HR director, the student services director, and the finance director, who are key actors in the implementation of the ERP.

The university has one central campus and five small regional campuses. The central campus hosts 18,000 students. The university has centralized administrative functions. For example, no document to a student provided by the faculty or department is valid unless it is reissued by student services. Similarly, new employees are accepted by HR, and the relevant department must not negotiate terms with the employee.

The university began thinking about ERP in 1997 and commissioned a general study of its feasibility, which became known as the blueprint. The study was published in January 1998. The university decided to begin with the ERP project and chose HR and student services as the first two administrative departments. While HR is mainly an administrative function under the general director, serving academic and administrative personnel, student services are administered by the student director and are overseen by the vice provost. One of the urgent requirements in student services has been the ability to register for courses online.

Figure 3



Appendix B

Form of semistructured interview for users and developers:

Structured questions are asked about:

- Satisfaction with results and processes from the team's perspective and management's perspective
- Meeting deadlines and budget

Discuss the frequency and process of meeting, such as project leader, project teams, steering committee, and others.

Discuss the types of surveys conducted (SOW, functional specification, software testing, etc.).

Discuss your role and contribution to the project.

Identify three key issues that were managed well.

Identify three key issues that were mismanaged.

What were the extreme environmental factors that affected the project? Which risks were identified early, and how were they treated? Which were not identified, and can they be avoided?

Form of semistructured interview for managers:

In addition to the above, managers were specifically asked about project objectives and cost-benefit expectations of the project.