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Abstract

Information systems planning is a critical management challenge today. A new approach to information systems planning might help managers address this challenge. Organizational learning theory may offer such an approach. The objectives of this study were to illustrate principles of organizational learning in the context of information systems planning, thus to confirm its relevance to such planning, and finally to stimulate further research on its effectiveness in planning. Structured interviews with fourteen managers and project team members, an email survey of 52 physicians, reports, and other documents from an information systems planning project in a large university-affiliated medical center provided the basis for the research. The research illustrates seven principles of organizational learning in information systems planning.

Introduction

Information systems management is simultaneously growing more challenging and more important (McNurlin and Sprague, 1998). This is becaused information technology is changing very rapidly in ways that affect competitivenss. It is also because organizational survival is becoming increasingly dependent on information technology. As a result, planning the effective use of information technology can be a matter of organizational life and death. Information systems planning is thus a very critical information systems management problem (Galliers *et al.*, 1994; Reponen, 1998).

Organizational learning theory can contribute to the amelioration of this problem. It represents an increasingly important area of research that examines how organizations learn and thus increase their competitiveness, innovativeness, and effectiveness (Ang *et al.*, 1997). In fact, the processes of decision making and planning have been viewed as learning processes themselves (De Geus, 1988), thus suggesting that all businesses learn all the time. Organizational learning is also important because it may provide the only sustainable competitive advantage that will enable businesses to compete in the long run (De Geus, 1988).

Information systems planning has been characterized as an interactive learning process for the use of information technology in organizations (Reponen, 1998). Such a characterization recognizes the importance of organizational learning. It reaffirms that information systems planning must be centered on organizational issues and not merely technology (Baets, 1998).

The objective of this paper is to illustrate some principles of organizational learning in the context of information systems planning from a case study at a large, university-affiliated medical center. By doing so, it seeks to confirm the relevance of organizational learning to such planning, and thus stimulate further research on the effectiveness of organizational learning techniques in the area. The theoretical background to the research appears in the next section. The research methodology follows. Some preliminary findings about organizational learning in information systems planning conclude the paper.

Information Systems Planning and Organizational Learning

Information systems planning is the process of identifying a portfolio of computer-based applications to support an organization's business plan and to help it realize its business goals (Lederer and Sethi, 1988). Much research has focused on the improving the process. Studies have thus investigated the alignment of information systems strategy with business strategy (King, 1988); the identification of opportunities to gain competitive advantage using information technology (Porter and Millar, 1995); the analysis of internal processes and data dispersion through the organization (Brancheau and Watherbe, 1986; Goodhue *et al.*, 1992); the impact of the environment (Salmela and Lederer, 1996); plan implementation (Gottschalk, 1997; Lederer and Salmela, 1996; Reponen, 1998); and the role of organizational learning (Ang *et al.*, 1997; Baets, 1998; Reponen, 1998).

Organizational learning is the process by which the organization's knowledge and value base change, leading to improved problem-solving ability and capacity for action (Probst and Buchel, 1997). It has been identified as an important element in the resolution of problems in the organization, mainly those related to the strong competitive pressures of the market and to changes in technology. It emphasizes the collective learning generation of double loop feedback by the continuous

questioning of presuppositions (Argyris, 1993). The organizational learning process is modeled as a continuous development, centered on five subjects: a personal mastery, mental models, shared vision, team learning, and systemic thinking (Senge, 1990). The use of creative techniques (Altier, 1999; Couger, 1995; Kao, 1997) and dynamic non-linear thinking (Baets, 1998) play an important role in creating a learning environment.

In the past few years, organizational learning has drawn the attention of both managers and scholars (Argyris, 1993; Schein, 1992; Senge, 1990). This focus on learning gives rise to a cognitive approach, in which individuals' beliefs and insights are viewed as critical influences on organizational effectiveness. More recently, some researchers are developing studies to understand how organizational learning may be used in information systems planning (Ang *et al*., 1997; Baets, 1998; Galliers *et al*., 1994; Kim, 1993; Reponen, 1998).

Research Method

Case study was the research method. It was chosen because it allows the in-depth analysis of an organization. It also permits in-depth analysis of different internal areas and activities associated with a particular process. This facilitates the creation of in-depth knowledge of the impacts and consequences of the process (Babbie, 1989).

Case study is becoming a widely used method of investigation in the social sciences. It is considered a scientific method when it is articulated under a broader research perspective, based on a solid theoretical foundation (Lee *et al*., 1997). It is especially appropriate in initial investigations of an area such as this one.

Site

The case study was done at a U.S. university-affiliated medical center, referred to here as the UMC. The UMC is the largest medical center in eastern and southern portion of its state. It is also the largest employer in the region with 6,200 employees. It has more than 473 hospital beds, more than 20,600 patients annually, a yearly budget of nearly $275 million, and assets of over $325 million.

Its vision is to be a Top 20 academic health care center recognized nationally and internationally for excellence in teaching, research, and patient care. One of the critical success factors in its strategic plan is to create and effectively utilize information technology to support it in achieving its vision. It thus began an information technology strategic planning project, and initiated the Integrated Clinical Information System (ICIS) project (a major project in the plan) to begin building a foundation for a computer-based patient record and ultimately a full electronic medical record.

The principal goal of the information technology strategic planning project was to identify the required changes to the information technology environment in order to position and establish a support structure to meet the strategic challenges of UMC. The kickoff of planning project was in August 1998, and the ICIS planning portion was finished in January 2000.

Data Sources

Data collection came from primary and secondary sources. Primary sources were interviews and an e-mail survey.

Fourteen individual in-depth, semi-structured interviews were done from a script of questions that evolved as the interviews progressed. The initial script was developed based on organization learning theory and refined successively with the help of two information systems planning researchers. Three pre-test interviews were performed. One was with a staff member directly involved in the project, and two were with staff in the human resources area of the organization. As a result, a few minor changes were made in the script.

The perceptions of 52 physicians regarding the project were collected via e-mail, using four open-ended questions. The questions asked about expectations and concerns about the ICIS acquisition and implementation process, the impact of ICIS on jobs, and potential actions to maximize ICIS's usefulness.

Secondary sources complemented the interviews and e-mail survey. Documents were collected from the organization itself and from consultants on the planning project. They included the information systems strategic plan; the business case for the plan; internal reports and data from the consultants; agendas, reports, and internal communications of the project; and information posted on the project web page.

The use of different methods and information sources permitted triangulation of the data (Denzin, 1978). Their use provides a more complete, holistic, and contextual portrayal of the phenomena under study (Jick, 1979) and would improve the researchers' understanding of the phenomena.

Selection of Subjects

The initial criterion for selection of the interviewees was based on the unit of analysis and the objectives of the study. The unit of analysis was the ICIS project. Hence, subjects were ICIS committee coordinators and team members from management, the information technology area, and the human resources area. The sample was thus not chosen randomly. In fact, it incremented during the interviews. Nine interviews were forecast and fourteen performed.

In addition, data were collected from 52 UMC physicians. The physicians represented virtually all UMC departments. They were selected because of their critical role in implementation.

The study population thus represented all the various groups and committees involved in the ICIS project. This would provide the best perspective to achieve the objective of the study.

Lexical, content, and document analysis are underway. In the content analysis, the answers are coded, and categories identified. Then, answers will be analyzed by interviewee group (e.g., physicians, nurses, managers, information systems professionals, and human resource professionals). Analysis will ultimately consider both manifest and latent content in the interviews, documents, and quantitative data. However, a cursory examination of the interviews suggests some preliminary findings.

Some Preliminary Findings

The UMC case study illustrates various principles of organizational learning in information systems planning. Examples follow.

- **Organizational structure change stimulates creativity and learning**

According to organization learning theory, organizational structure change is an important preliminary process to stimulate the use of creative techniques and in fact, manage an entire change process (Argyris, 1993; Kao, 1997). One way to alter behavior and thus stimulate their use is through abrupt organizational change (Argyris, 1993).

The reorganization of the information technology areas at the UMC was an abrupt change to prepare for the strategic information systems planning. A new Learning Center was created to stimulate new ideas and use creative techniques, several information technology departments were combined into a single department, and a Vice Chancellor position was created to head the new united department. The new position was highly visible and had great support. It thus gave the Vice Chancellor a strong political role in the organization. This was important to the planning process because it enabled him to deal with the many issues of the diverse user groups in the medical center. The case thus illustrates the importance of some abrupt change to start the process of learning and to create an environment in which to learn.

- **The leadership role is critical**

The organizational learning literature highlights the importance of the manager's leadership (De Geus, 1997; Senge, 1990; Swieringa and Wierdsma, 1995). A participatory management style at the highest levels is needed to insure an effective participatory approach throughout the organization. Managers must understand organizational learning techniques and their application.

The ICIS project members interviewed and physicians surveyed indicated that the UMC Chancellor, the Vice Chancellor, and the project leader had a highly participatory management style. In fact, throughout the project they all used such organization learning techniques as simulation techniques, brainstorming, and strategic environment scenarios. The use of these techniques was viewed as contributing substantially to the planning process.

- **The planning process is a learning process itself**

The organizational learning approach does not differentiate planning from learning (De Geus, 1988). Its theory describes the planning process as a major opportunity to develop an organizational learning environment in a firm. This approach (i.e., planning as learning) is expected to create a strong, long-term commitment (Argyris, 1993; De Geus, 1997).

Every interviewee acknowledged that some learning occurred during the planning process. Almost everyone stated that the planning process itself was a highly visible learning process. Several said that one of the most important effects of the project was a new understanding about the future role of information technology at the UMC and about its connection to the UMC vision of being a top 20 academic health center.

This understanding promoted a high level of long-range commitment to the project. It also facilitated a very positive view about the importance of the project. The overwhelming majority of surveyed physicians and interviewed project members acknowledged that the learning process itself was the most important contribution of the planning project to the UMC culture. They frequently articulated such expressions as "this is the first time that this happened at UMC," "we are crossing the bridge," and "this is a very different way to manage changes in IS field here" to describe the project.

- **Triggers for learning can come from the internal or external environment**

Organizational learning theory has historically focused the internal environment as the instigation to learn (Probst and Buchel, 1997). It has suggested that internal turbulence, crises, and lack of resources are the basis of the instigation. The learning process typically begins with a gap between expectations and outcomes (Hedberg, 1981; March and Simon, 1958) and with an excess of capacity and an accumulation of resources (Cyert and March, 1963). Only recently, Baets (1998) highlighted the role of a dynamic external environment as a trigger to learn.

Interestingly, the overwhelming majority of UMC respondents stated that the main triggers for learning came from the external environment. They cited competitors, government, and insurers as specific examples.

- **Organizational learning contributes to the creation of a shared vision**

Organizational learning theory advocates the importance of a common understanding by all participants in a process (Morgan, 1996; Senge, 1990). This common understanding is referred to as a shared vision.

All of the respondents recognized the importance of a shared vision in the information systems planning process. Most interviewees appeared to understand that the organizational learning approach contributed greatly to achieving a shared vision about the role of information technology in the organization. However, some acknowledged that this was very difficult to achieve, and expressed that a common understanding of at least some key aspects could be sufficient. Probably the main challenge of any information systems planning project is the creation of the shared vision, and the main contribution of organizational learning was its creation at the UMC.

- **Creative techniques stimulate new ideas and thus greater participation**

Creative techniques have an important role in the organizational learning environment (Altier, 1999; Kao, 1997; Probst and Buschel, 1997). Sometimes a small amount of dynamic non-linear thinking can produce innovation in a project, and hence, the new ideas can result in more participation and commitment to it (Baets, 1998).

When asked about creative techniques, the respondents cited elements of the project regardless of whether or not they would normally be considered creative. Some that were cited are truly creative, such as the diverse communications via the web page and newsletters, simulation techniques, and group dynamic techniques (i.e., brainstorming). However, some respondents mentioned cost-benefit analysis, evaluation criteria, management style, team member collaboration, and consultants. These are not creative techniques, but instead long-established business techniques. It seems that any process - new to the participant - may appear as creative, and may stimulate more involvement in the project.

- **The evaluation of the learning process is a major challenge**

Organization learning theory identifies three different levels of learning: adaptive, reconstructive, and process (Argyris, 1993; Argyris and Schon, 1978; Probst and Buschel, 1997). Evaluation of the learning is very difficult, and traditional evaluation techniques are inappropriate (Probst and Buschel, 1997).

The use of the organizational learning approach helped the UMC reach its goals (adaptive learning), and change

its values and norms (reconstructive learning). This clearly resulted from a new management that strongly valued learning. However, a remaining major challenge is how to evaluate the process learning. Process learning consists of gaining insight into the learning process itself, and it thus means learning to learn (Probst and Buschel, 1997). Traditional techniques based on cost-benefit analysis are very useful, but fail to answer questions about the evaluation of the process learning. All respondents agreed that there currently was no evaluation of it, and most agreed that they needed to evaluate it, but did not know how.

Conclusion

Information systems planning is a critical management challenge today. A new approach to information systems planning - via the concerted application of organizational learning theory - might help managers address this challenge. The current study sought to illustrate some principles of organizational learning in the context of information systems planning and hence confirm its relevance to such planning. It thus identified seven accepted principles of organizational learning from the literature, and then showed how a particular information systems planning project applied them.

By doing so, it suggests to information systems managers that they might apply the organizational learning approach to their own information systems planning. This might help them better achieve their planning goals and contribute to improved organizational performance.

A final objective of this study was to stimulate further research on the effectiveness of organizational learning techniques in information systems planning. By confirming the relevance of organizational learning to planning, it thus raises several questions for future research and accomplishes this objective. For example, to what extent do information systems planning projects apply the techniques of organizational learning today? Do the techniques contribute to the success of such planning? If so, then in what particular ways do they contribute? Finally, could a new information systems planning methodology be developed that emphasizes organizational learning throughout the entire planning process?

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