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A Dialectic of System and Job

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Abstract

In this paper, we describe a key finding from a case study of an SAP R/3 implementation – a pattern of organizational change involving a dialectical interplay between the characteristics of the information system and those of the jobs of the users of the system. Analysis of the case study data revealed a shift in constraints and flexibility between the information system and individual jobs as a result of the enterprise-wide system implementation.

Introduction

Enterprise-wide system (EWS) is the umbrella term for integrated sets of business applications that allow companies to manage almost all aspects of operations. Some companies have realized dramatic gains in productivity and speed by implementing EWS packages (Davenport 1998), and analysts claim that nearly every sizable manufacturer in the United States and Europe either has EWS, is acquiring EWS, or is considering acquiring it soon (Deutsch 1998). Despite the popularity of EWS and high expectations for the benefits of these packages, high risks accompany the high payoffs potentially attainable. About half of EWS projects fail to achieve hoped-for benefits because managers significantly underestimate the efforts involved in managing change (Appleton 1997). The consequences of these failures are considerable, given the millions of dollars and many years of effort that these projects can require.

The business processes embedded in an EWS allegedly represent best practices, and conformance to these practices can necessitate profound organizational change - whole departments must be retrained, jobs redefined, and procedures discarded or rebuilt from scratch (Deutsch 1998). Because the successful implementation of an EWS is contingent upon an accurate assessment of the associated organizational changes (Appleton 1997), there is a need to investigate the organizational consequences of EWS. The case study and findings reported in this paper represent an exploratory investigation of the organizational impacts of EWS. A key discovery that emerged from analysis of the case study data was a dialectical interplay of flexibility and constraints of the system and job that shifted as a result of the EWS implementation. Although further investigation

of this phenomenon is required, a potential consequence of this discovery might be the incorporation of this understanding in change management practices for EWS implementation.

Case Overview

The case study was conducted in the summer of 1998 at a Fortune 100 manufacturing and distribution company. The company had implemented SAP R/3 in one of its major divisions at the end of 1996, and a subsequent enterprise-wide SAP initiative was abandoned early in that project. At the time of the study, SAP was about to go into production in a second division, in addition to the implementation of a corporate-wide SAP HR system. The objective of this exploratory study was to investigate the impacts of the adoption of enterprise software on organizational knowledge.

The CIO, three senior managers from corporate-level functional departments (Customer Service, Production and Inventory Planning, and Accounting) and three senior managers from IT support organizations were interviewed. Interview sessions were approximately 2 hours, and were conducted by two of the authors following a semi-structured format. Interview questions focused primarily on the impacts of the EWS on jobs, working knowledge, and creativity and innovation. One researcher took traditional notes during the interviews and the second researcher used the diagrammatic technique of cognitive mapping to capture the thought structures of the interviewee on the topics discussed. All interviews were taped; some interviews were transcribed, while others were used to produce more detailed cognitive maps. The triangulation strategy used in the research - multiple sources, interviewers, and methods for data capture and data analysis - was adopted to add rigor, breath, and depth to the investigation (Flick 1992).

Data Analysis & Dialectic Approach

In our data analysis, we focused on discovering patterns and meanings in the data. To aid in this analysis, composite cognitive maps containing all of the input on a particular topic were also generated and analyzed. The recurring pattern, or "gestalt", that emerged from the data was a dialectic of system and job that was the locus of a fundamental shift in flexibility and constraints as a result

of the implementation of the EWS. The figure on the following page contains selected interview excerpts that illustrate the dialectic discovered during the data analysis.

Dialectic reveals the dynamic nature and development of contradiction (Soo 1981). Under this approach, the emphasis is on the different forces, or contradictory entities, that compete with each other. This type of analytical perspective has been shown to be particularly powerful in explaining unexpected or contradictory organizational outcomes (Ford and Ford 1994; Poole and Van de Ven 1989; Van de Ven and Poole 1995). For example, Robey and Boudreau (1999) recommend the use of dialectical theories to study the organizational consequences triggered by information technology. A dialectical perspective can be used to capture a rich expression of the complexity of the social and technical changes resulting from the implementation of EWS; it can, therefore, be more insightful than other, more deterministic, perspectives.

Findings

Prior to the adoption of EWS, the original enterprise information system was composed of many different systems. Because these systems were the products of many independent development projects, they could be characterized as loosely coupled components of the enterprise system. In addition, these systems were flexible. The organization had a large degree of control over these independent system components, and there was wide latitude to modify and adapt these systems to both internal shifts in the organization's needs, and demands arising from changes in the organization's environment.

Before EWS, there were tighter constraints on individuals in their performance of their jobs. The loosely coupled system limited these individuals to a local view of business processes and information - a closely bounded view of the organization determined by the functional limits of the technology. These boundaries also limited the scope or effects of individual decisions and actions. Individuals had a relatively small "reach" in terms of their ability to influence elements of the organization beyond their functional departments. Decisions and actions were also more programmed because the systems had been carefully tailored to the organizational functions. These constraints also limited the opportunities for each individual's creativity and innovation.

After the adoption of EWS, the enterprise information system was largely composed of a single, integrated system. This software package was composed of subsystems that were tightly coupled and designed to work closely as a system. The organization lost a large portion of its control over the independent system components. Although the components of the EWS could be affected by the parameter settings, these parameters offered a much more limited range of adaptation than was the case with tailor-made system components. In addition, the parameters had to be consistent across the subsystems. This limited range meant that there was a substantial loss of flexibility in the organization's enterprise systems.

Under the EWS there were fewer constraints on individuals in their performance of their jobs. The tightly coupled system more commonly offered an expanded, global view of the organization. Knowledge that was formerly localized in the organization now became more widely accessible. The integrated and consistent components enabled individuals to operate with a broader scope of influence. They could "see" more of the organizational information and "affect" more organizational processes with their decisions and activities. The individual empowerment rose, as they obtained greater responsibility and exercised wider latitude in their decision making. With this latitude came more opportunity for creativity and innovation, although new limits arose because of the constraints embodied by the selected set of system parameters in the EWS.

Learnings

An enterprise information system, whether composed of discrete components or an integrated package, is partly defined by a tension between the constraints imposed on the system and the individuals who interact with the system. Using discrete, customized components as an enterprise system opens more possibilities for achieving information system flexibility through the adaptation of the software components. In this setting, however, the jobs of individuals are more constrained and localized.

The tension between the constraints of system and individual job continues to exist in settings where an EWS has been introduced. However, the locus of the constraints shifts or "flips" from the individuals to the systems. Using an EWS opens more possibilities for achieving job flexibility through expanded individual awareness, influence, creativity and innovation. Nevertheless, in this setting, the tightly coupled, integrated system is more constrained and inflexible.

The conventional wisdom in EWS is that organizations lose flexibility in organization. The organization must adopt certain business processes assumed by the vendor's EWS software. One implication of the discoveries in our research contradicts this wisdom by suggesting that the members of the organization will actually achieve greater flexibility, albeit in a different form. The expansive scope of information available to individuals within the EWS enables them to respond to problems and opportunities more directly, effectively and possibly with more innovation because they are more

likely to be aware of the range of effective actions available and the ultimate effects of each of these actions. While the overall business process may become largely prescribed by the vendor EWS, the ability of individuals to adapt their behavior and innovate in their actions within those processes, given a conducive organizational culture, will be improved by the EWS.

Another implication of this discovery is the possibility that a restoration of the system flexibility may mean the restoration of individual constraints. EWS vendors are introducing advanced modeling tools to enable more effective and timely tailoring of the packages. One effect of this "advance" may be the restoration of the close links between the system and the individual's localized job. This could inadvertently restore the original tension between system and individual. In other words, the restoration of system flexibility may imply the restoration of the original individual constraints. If these constraints restore the localized individual view and activity scope, they may eliminate the expanded individual awareness, influence, creativity and innovation. Improving the system flexibility may even lead to a decline in the flexibility of the organization as a whole.

[References available upon request from (first) author.]

Interview Comments Illustrating Tightened System Constraints

"If we have a business process that SAP does not support, we end up having to go outside with a totally manual process. In the past, we could get in and change the code - modify the code - and fill those requirements. Now, we go in and say 'OK, how do we make SAP do this?' And if you can't, you end up with a manual process off to the side. So, the constraints shifted."

"What we have to do is get creative and see if there's some way to do it within the confines of the system. And, if not, we end up putting in maybe a partial solution with some manual workaround. Or it may be even a totally manual workaround."

Interview Comments Illustrating Expanded Job Flexibility

"The person's job is less programmed. And the reason for that is that people are doing more. For instance - go back to the customer service rep example. Very programmed before. Strict edits. Pound in the order. There was only one way to do that job. Now with the expanded definition and accountabilities of that job, there's far less that's programmed."

"It used to be a very mundane kind of manual job down there, and certainly now the analytical skills that are required demand creativity, demand innovation."