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Enterprise Systems for Organizational Decision Support: A Research Agenda

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Introduction

In recent years, most major organizations have implemented enterprise systems from such vendors as SAP, Oracle, Peoplesoft, Baan, and J. D. Edwards. Historically, the emphasis of these systems has been on enhancing transaction-oriented business processes. Using the integrated, enterprise-wide knowledge store within enterprise systems for decision support is garnering an increased attention from enterprise system vendors and from third party software developers. Despite the recent interest in decision support from enterprise system practitioners, little research exists that connects enterprise systems to the field of decision support systems. This paper outlines the foundations of this connection along with an agenda to advance this line of research.

Results of this research characterize the current state of the art on the frontier of organizational decision support and enterprise systems and provide indications of emerging issues and unsolved problems. For researchers, this investigation offers a basis for conducting further studies on organizational decision support, enterprise systems, and the relationship between them. For practitioners, results offer insights into current practice, emerging issues, and problem areas. For vendors, results offer guidance for product development by formalizing the connection between enterprise systems and decision support and by identifying areas of concern and promise among practitioners. For educators and students, this research offers a means for structuring the consideration of the decision support aspect of enterprise computing along with indications of practitioner views on the subject.

Organizational Decision Support Systems

Computer-based systems that support the decision making efforts of multiple participants are known as multiparticipant decision support systems (MDSSs). The most widely recognized type of MDSS is a group decision support system (GDSS). Another category, organizational decision support systems (ODSSs) is not as well known. GDSSs typically support groups comprised of members that have few functional or authority role differences, few restrictions on communication channels, and relatively simple governing regulations (Holsapple and Whinston, 1996). ODSSs, on the other hand, are designed to accommodate a wider range of differences in functional

expertise and authority, and more complex regulations and communication channels. For example, ODSS users may work in different functional areas of an organization or could have positions at different hierarchical levels. As organizational computer systems become interconnected, system users are increasingly likely to represent the diversified roles that more closely fit ODSSs than GDSSs. Enterprise system users, with varying roles and responsibilities but with a common base of knowledge and tools for decision making, seem to fit the ODSS category.

Much of the research on ODSS has been conceptual in nature, focused on identifying the characteristics of ODSSs and contrasting them with those of group and individual DSSs. A notable case study of an ODSS is the Enlisted Forces Management System (Walker, 1990; 1992). Research on this system details structured techniques for developing an ODSS. Much of the early conceptual research on ODSS is summarized in an article by George (1991). It establishes the foundations of ODSS, reviews architectures that have been proposed, and examines classifications of ODSS technologies that researchers suggested.

In another study, George, et al. (1992) identify three ODSS architectures that can support the emerging organizational trends of downsizing, outsourcing, and teamwork. The authors identify five major classes of ODSS technologies: communication technologies, coordination technologies, filtering technologies, decision making technologies, and monitoring technologies. After establishing this taxonomy of ODSS technologies, the authors categorize the importance of each technology in supporting the three organizational trends. In the lone ODSS empirical study, Santhanam et, al. (1998) examine ODSS impacts on individuals and organizations in order to discover the factors most important to successful management. While the study is notable, it suffers from a small sample size of seventeen. The authors note the difficulty in identifying potential subjects due to the unclear meaning of an ODSS. To date, research on ODSS has focused primarily on systems that have been built "in house" excluding commercial systems. As a result, few implementations can be found for use in case studies or empirical research.

Enterprise Systems

Enterprise systems have been among the fastest

growing and most important developments in IT in the 1990s. Davenport (1998) states that "while the rise of the Internet has received most of the media attention in recent years, the business world's embrace of enterprise systems may in fact be the most important development in the corporate use of information technology in the 1990s." To date, however, little academic research on the topic has been published. As a result, much of the foundation for the use of enterprise systems for supporting decisions must be gleaned from practitioners and trade publications.

Like many newer fields in information technology, the definition of enterprise systems tends to vary. While most people in the field refer to these systems as enterprise resource planning (ERP) systems, the term is somewhat misleading. A recent APICS panel discussion that explored ERP definitions concluded that the systems tend to be defined by the offerings of the vendors. Thus, as SAP expands the scope of its software, the notion of ERP software expands as well. For this study, we use the terms ERP and enterprise systems interchangeably.

Given the vast amounts of money being spent on implementing enterprise systems, organizations must have clear purposes for implementing enterprises. But do these purposes include improving organizational decision making? Indications are mixed. Stair and Reynolds (1999) cite "providing access to data for operational decision making" as one of four advantages of ERP. In a survey of 168 SAP implementations, Cooke and Peterson (1998) list the top eight reasons why companies implemented SAP. Of these, only "to integrate operations or data", was remotely relevant to decision making. Lonzinsky (1998) provides a list of seven objectives that organizations seek in implementing new software packages. Again, the objectives only indirectly refer to decision making. For example, clauses within the objectives include "making data available in real time where the company needs it" and "manage indicators that permit evaluating market performance."

Others provide more convincing evidence that decision support benefits can be achieved through the use of enterprise systems and decision support technologies. In an interview with Kevin Parker, senior vice president of Fujitsu Ltd., Krantz (1998) inquired about using ERP data for decision making. He replied that ERP systems "can help look at revenue and profitability by customer, by channel ... to see the impact of any pricing and inventory decisions." He also noted the ability to slice and dice information and to experiment with payment terms to see the impact on cash flow or revenue. Nylund (1999) reviews an emerging class of software called business performance management which aim to extend ERP for business analysis. Systems such as Harmony Software enable executives to "tap directly into disparate ERP-

based production systems and compare the extracted data with industry best-practice and internal benchmarks." Enterprise vendors Baan and Peoplesoft are developing similar products. In a review of enterprise software market directions, Krantz (1998) notes that five vendors have "software that lets CEOs see in precise detail what's going on in the field and factory." He notes that these "decision support applications allow a company to optimize operations." Finally, the enterprise system market leader SAP is developing three application modules to support decision making: The SAP Business Information Warehouse (data warehouse), SAP Information Database (knowledge management application) and SAP Strategic Enterprise Management (executive information system). As these products mature, the benefits of their use for organizational decision making should become more evident.

Enterprise systems seem to be following the pattern of traditional business support systems evolution. Early systems developed for transaction processing were augmented by management information systems with report generation capabilities. Eventually, decision support systems evolved to provide ad-hoc, customized and analytical knowledge to decision makers. Similarly, early enterprise systems such as SAP's R/2 focused on transactions for integrated record keeping. The next generation of software with client-server platforms and graphical interfaces enhanced these capabilities but did not provide analytical tools for decision makers. Recent advances should move these systems into the realm of true decision support systems. As Kirkpatrick (1998) notes, "the first generation of ERP systems... told you what happened in your business. This new breed of decision support systems answers the question 'What should be happening?'"

Thus, a new era is dawning for both enterprise systems and organizational decision support. Along this horizon, there are many questions to be answered. First, what are the reasons why organizations adopt enterprise systems? Are these systems introduced with the intent of supporting decision making or is decision support merely a by-product of system implementation? Second, what decision support benefits do organizations realize by implementing enterprise systems? Do these benefits match those that were expected prior to implementation? How can systems be enhanced to better support decision making? Third, what are the current limitations of enterprise systems for supporting organizational decision-making? Are the limiting factors technical or organizational in nature or are they due to resource limitations? This research-in-progress aims to advance a line of research to answer these questions. To do so, we undertake an empirical investigation to gather user

perceptions of the purposes, benefits and limitations of using enterprise systems for organization decision support.

Objectives and Methodology

The central objective of this research-in-progress is to explore the relationship between ODSS and enterprise systems by: a) developing an ODSS perspective that readily accommodates decision support aspects of enterprise systems, b) establishing a generic architecture that identifies the major decision support elements of such systems, and c) using this perspective and architecture to guide a study of decision-support practices and possibilities among enterprise system adopters. The methodology entails both conceptual and empirical elements. An extensive literature review serves as a basis for the synthesis, refinement, and extension involved in framework and architecture creation. The result is a relatively comprehensive identification of issues and factors of potential importance to developers of decision-support facilities for enterprise systems as well as to scholarly researchers exploring the ODSS-enterprise system relationships. These results will guide the creation of a survey instrument.

Two series of surveys are planned. Initially, qualitative feedback will be gathered to gain insight into decision-support characteristics of enterprise systems. This initial survey may lead to framework and architecture modifications. Its results will also help shape and refine a more detailed survey instrument. The second phase will entail the distribution of more standardized items from which statistical conclusions can be made. From these results, observations can be made regarding the current state of enterprise systems and organizational decision support leading to directions for vendors to make product improvements, for practitioners to examine implementation and usage practices, and for researchers to recognize areas that require further investigation.

References

Available upon request from the contact author.