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INTRODUCTION

Enterprise-wide integration or Enterprise Resource Planning (ERP) is becoming the mantra of firms and organizations that need to integrate their business processes within the firm and in some instances with other firms such as suppliers when supply chain management is a strategic objective. Without Information Technology (IT) much needed integration of different functional areas would be very difficult, if not impossible, to mesh these seemingly disparate functional areas and processes into a tightly stitched web-like structure that shares business processes information. Integration is creating a leaner, flatter, and meaner company that is more responsive to its environment (Hammer, 1990). This new process of integration is believed to be more effective, less costly, and provides strategic competitive advantage over other competitors.

Integration involves the business process structure with the use of critical mass technology for integration of hardware, software, communication, and security characteristics to bring together projects and tasks that require shared information. Each infrastructure element is integrated within a firm, its functional areas, subsidiaries, suppliers, and customers. The purpose of this paper is to ponder on the disparate issues emerging in the solutions and practices of enterprise-wide integration or resource planning.

THE GOAL OF ENTERPRISE RESOURCE PLANNING

The goal of Enterprise Resource Planning is to offer firms integration capability through technology. These goals listed below (www.eil.utoronto.ca/enteng.htm) are by no means the only ones:

- Process Innovation
- Continuous Improvement
- Quality Function Deployment
- Activity Based Costing
- Time Based Competition
- Business Process Re-Engineering

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Obviously, an enterprise design that optimizes each of the above activities, and any other similar goals, from their own perspectives and at the same time globally optimizes the firm's objectives is the ideal design. It should integrate different tasks and projects within a company or with suppliers, outsourcers, and customers. Knowledge-based tools and the likes can facilitate the planning, design, and implementation of enterprise-wide integration technology (www.eil.utoronto.ca/enteng.htm). Simple and well-understood standardized interface designs for the end user are paramount in the successful deployment of enterprise applications.

TECHNOLOGY-BASED SOLUTIONS

Physical data integration requires data sharing both horizontally as well as vertically within an organization. Integration can be provided at the infrastructure and functional level (sis.cdc.com/integration/enterprise). Infrastructure integration emphasizes such things as data, hardware, software, communication, and security attributes. Functional level integration includes development of applications to provide transparency in finance, marketing, operations, product development engineering, human resources, logistic distribution, and strategic planning and management. Of course, related and core functional areas are first integrated since they are less complex to integrate as compared to diametrically positioned and focused functional areas. The integration movement has its genesis with the introduction of computer integrated manufacturing (CIM) in the early 1960s (Markland, Vickery, & Davis, 1998). Later the automation of manufacturing also expanded into business processes efficiency such as Material Requirement Planning (MRP) and later MRP-II that integrates financial related information in the product production, inventory control, and expected delivery dates. According to Markland, "During the late 1970s and early 1980s the techniques for helping to plan capacity requirements were tied with MRP. Tools were developed to support the planning of aggregate production levels and the development of the anticipated build schedule. Systems to aid in executing the plans were incorporated: shop-floor control systems for the "in-house factory" and vendor scheduling for the "outside factory." Furthermore, Wallace (1985), in his book *MRPII: Making it Happen,* pointed out:

> The expanded MRP system became known as closed loop MRP, because it provided feedback from the execution functions to the planning functions so manufacturing could change plans when necessary. Eventually, practitioners expanded closed loop MRP to provide the ability to translate to operating plan (expressed in manufacturing terms, such as units and gallons) into financial terms (dollars) and the capability to simulate the effects of various plans in terms of both units and dollars. The new system, called manufacturing resource planning (MRPII), was a comprehensive approach for the effective planning of all their resources of a manufacturing organization.

ERP solutions are very much about process rather than specific tools as Clevett and Franklin (1998) pointed out. Further they argue that ERP should focus on the processes of " . . . setting objections, determining what data to collect, making assumptions about the deployment of a new enterprise applications assessing the validity of the data that is collected, and evaluating the results in light of the assumptions that are required in order to predict network performance under

conditions that may not exist in reality." Now there are competing integration suite software in the marketplace. These include: SAP, BAAN, SSA, JD Edwards, Marcam, PeopleSoft, etc. These and similar software are used to integrate corporate enterprise level planning systems by automating different process operations and collection of data. The competitive global market pressures are inducing managers to migrate from stand alone hodgepodge incompatible systems to well integrated systems by the systems mentioned above. The main objectives of these and similar software is to integrate business processes, improve information sharing across functional areas, suppliers, and increase customer satisfaction by providing accurate and timely information.

These tools offer opportunities for system administrators to integrate different functional areas such as operations, marketing, finance, and distribution, company's suppliers and customers. These applications are complex and usually not easily deployed as part of the network applications if they are to add value to the overall firm capacity and efficiency for a smooth flow of information sharing and business processes improvement. In fact, there are instances where Fortune-500 corporations failed in the implementation of enterprise-wide systems. Some of the causes mentioned are poor planning and execution and lack of commitment of upper management to a complex project that initially may take more investment in resources without a measurable and immediate return on investment.

ENTERPRISE RESOURCE DATA MANAGEMENT

Enterprise data management typically includes (sis.cdc.com/integration/enterprise) some of the following characteristics:

- Automatic server disk space management

- Multilevel hierarchical storage systems

- User transparent file migration or retrieval

- Storage policy management interface

- Duplicate copies of separate media

- Common logical media device manager

- Desktop client file migration via network

For example, SAP R/3 system is a software for Client/Server computing environment/ According to SAP (1999), it allows customers to use "best practices" to face global competitive forces.

Systematic deployment of ERP solutions require long-term, well-accepted and proven methodologies in network planning. However, practical experience push most network administrators' tolerance to a costly analytical approval with practical judgment in order to reach decisions for quick deployment.

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Network Resource Planning is the process of preparing a wide area network to meet the needs of new applications and legacy applications. It can help identify bottlenecks, single points of failure, network growth requirements, and unwise use of band-width resources (Clewett & Franklin, 1998; sis.dcd.com/integration/enterprise). In their drive to become competitive, efficient, and global firms are increasingly migrating from legacy systems to Enterprise Wide Software solutions. According to Lozinsky (1998), "These products represent the future for companies that need to streamline their business processes and improve the sharing of information in order to compete in the rapidly evolving business world." However, the role of the Internet with its Business to Customer (B2C), Business to Business (B2B), Business to Government (B2G), etc., and other web-based cutting edge leading applications are now in the forefront of integration solutions and may displace the dedicated ERP solutions such as SAP/R3. BAAN, for example, is being sold or offered for merger for its failure to increase its market share and consistent loss of revenue for more than six quarters (*The Wall Street Journal*, 2000).

ERP DEPLOYMENT

System or network administrators should investigate or use research methodology on cost effective deployment strategies (Lozinsky, 1998; sis.cdd.com/integration/etnerprise). These strategies include:

- Identify factors for successful ERP projects;

- Baseline existing network using ERP;

- Profile the characteristics of the ERP application;

- Use capacity planning to predict future need.

The planning, design, deployment, and management of typical enterprise-wide management software requires complex data storage management solutions in a distributed network. Total integration of data and storage management is critical in rendering robust solutions to the enterprise. These include: architectural design, customization of leading ERP software such as SAP/R3. Total system integration services that integrate systems from multiple hardware and software vendors into complex open information networks that form the backbone of customized enterprise-wide solutions.

CONCLUSION

The paper discussed the complex issues involved in the arena of enterprise-wide integration. The Internet, which was not discussed in this paper, has played a major role in simplifying cutting edge practices of integration into a reality by reducing the cycle time of integrating processes by using popular web-based applications. The universal internet protocol such as TCP/IP has helped to solve the issue of incompatibility and has a potential in solving some of the prob-

lems that leading integration software face. However, web-based applications are still slow and chunky depending on band-width availability, particularly when dial-up ISP are used, and new technologies are being introduced continuously to improve access, speed, and quality of integration. The Internet technology is offering efficiencies for business process that was not possible in the past. Future advances in technology will make the issue of integration moot and firms will have to tackle other competitive issues such as quality, on-time delivery, just-in-time systems, pricing and product innovations that may impact their effectiveness in achieving their stated goals.

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