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THE NEXT WAVE IN ERP IMPLEMENTATION

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ABSTRACT

Although the benefits of ERP are obvious, the risks and costs associated with it are very high. Some problems in implementing ERP system are documented, but the real challenge comes from the Internet and E-business. ERP is an enterprise wide system whose purpose is to achieve internal efficiency, while E-business cuts across different enterprises and extends the individual value chain into an Internet based, dynamic process aimed at maximizing external efficiency. To survive the E-business challenge, the arguably single, and also the best, solution for ERP systems is to integrate with E-business applications, which we call ERP II. By properly resolving the issues of integration via newly emerged technologies, and embracing the extended function of mobile-commerce, ERP II will continue to flourish in the next century.

BACKGROUND OF ERP

Enterprise Resource Planning (ERP) is a set of applications that provide automated support in traditional business processes such as inventory control, material requirements planning and order processing. The essence of ERP is “integrating the resource of the entire ‘enterprise’ from an information standpoint.” (Jacobs *et al.* 2000) Integration means more than “linking”, “combining”, or simply “putting together”. The duplication of information is eliminated, time is saved and operational efficiency is improved. Integration in an ERP system is not limited to information; it may also involve business re-organization.

The reader may wonder what the difference between a common central database and an ERP system is. Jacobs *et al.* (2000) answered the question in a very simple way. In a central database, information goes from different functional areas to the central database where they can be shared, while in an ERP system, functions are linked one to another and to the database (See Figure 1). This means that a complete ERP package cuts across different business functions such as Manufacturing, Finance, Accounting, Marketing, etc. The essences of ERP are information sharing (which is the same as a common central database) and process integration (the unique character of ERP systems). Only when based on these two ideas can ERP achieve

real resource optimization and thus by extension, cost reduction and revenue enhancement.

PROBLEMS WITH CURRENT ERP SYSTEMS

While ERP benefits are somewhat obvious, reaping those benefits is not easy. Several high profile ERP project failures have made companies more prudent in making the decision to implement.

One obstacle is ERP’s high cost; the cost of an ERP suite ranges from \$2 million to \$130 million (Norris *et al.* 2000). This is enough to prohibit many companies from entering the door. Nevertheless, this only accounts for a fraction of the total cost of implementing an ERP system. Inappropriately choosing an unbearably expensive ERP can lead to complete failure. Trying to be everything to everyone has made ERP systems such as SAP AG’s R/3 notoriously complicated, and installing the software often forces users to change their internal processes.

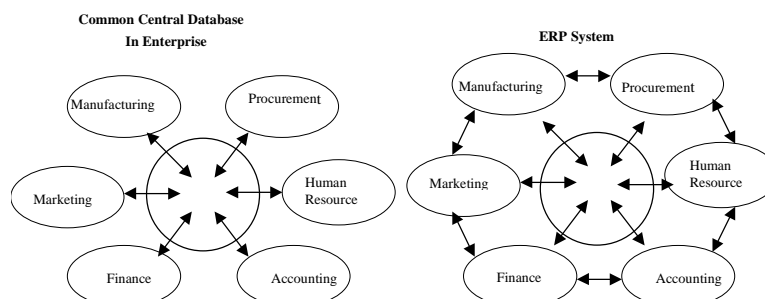
Implementing a big ERP package will be about half technology issues, and half organizational and human issues. Documented factors that lead to failure are lack of top management commitment, lack of project marketing and end user training, poorly defined business processes, inexperienced project managers, rushed deadlines, many complex tasks, wrong team members, unmotivated teams, communication breakdowns, and political issues.

ERP II: FACING UP THE INTERNET AND E-BUSINESS CHALLENGE

After Y2K, a cold wind blew through the ERP software market. The Internet revolution and the surprising speed with which e-business began to change the way business was done caused many users to cool on rushing to implement traditional ERP systems, and profits of some of the software vendors seem frozen at year-ago levels. It appears that ERP will disappear under the deluge of E-commerce and Internet development.

The ERP market, however, still has life in it. This is attributed to the birth of a brand new ERP system— ERP II. By integrating legacy ERP systems with E-business applications, both

Figure 1. The difference between ERP and common central database



ERP vendors and companies that implemented ERP have found a way to face up to the challenge of the Internet.

The Internet has created new ways for suppliers, manufacturers, retailers, and customers to communicate and do business. However, this should not be interpreted as the obsolescence of ERP, or that the internal efficiencies achieved by ERP systems are no longer crucial. The internal efficiencies that can be achieved by ERP system can be used as a basis for efficient communications with customers and business partners in the Internet economy.

The e-commerce game is not as simple as once thought – establish a website, activate it and then continue to upgrade it. In short, the lack of an internal efficiency support system such as ERP is one of the reasons why many dot coms are currently in dilemma, and losing money at every transaction.

To achieve the goal of integration, ERP II vendors, consultants and implementing organizations must address the following problems:

- **Information Sharing.** ERP systems have traditionally focused on internal operations, such as human resources, financial, and manufacturing. Each application is generally accessed by a limited number of users. But the fast growth of E-commerce is placing demands upon corporations to make more of that information available to more internal users, as well as authorized outside customers and vendors.
- **Optimization Focus.** ERP forces optimization of business processes within the company, while E-business advocates optimization across different companies' value chains. From a total value chain perspective, optimizing only business processes within the company can be sub-optimal. There is a need to integrate across value chains using the Internet. For this to be viable, ERP vendors have to make significant internal changes to their packages.
- **Internet Substitute.** The Internet poses another enormous challenge. The old idea that a single ERP system can solve all of one's problems is decaying under the weight of the Internet. The functionality now provided by ERP vendors, such as payroll processing and transportation management, could gradually be usurped by scrappy Internet companies that will provide separate components that can be linked together on one interconnected network. With this, the advantage of an integrated ERP system will be partially eclipsed.
- **Technology Obstacle.** Many of the existing ERPs cannot support interactive e-commerce because of a variety of incompatible hardware, software, and data descriptions. Since they were intended to link application systems inside enterprise boundaries, many existing ERP infrastructures were designed to support only certain EDI exchange and data translations. Such enterprise applications cannot be used as a foundation for an e-commerce infrastructure, which must link web-based e-commerce and traditional processing systems by open standards.

THE SOLUTION

The Internet and E-business have changed organizational structures from self-sufficiency to interdependency, and so have enterprise information systems. To deal with the challenge of the Internet and E-business, an individual ERP system must be able to "talk" to other ERP systems and other kinds of information systems as well as individual customers. Integrating ERP systems with E-business systems is the next step in ERP evolution.

- General architecture

The idea is to place the ERP applications at the heart of

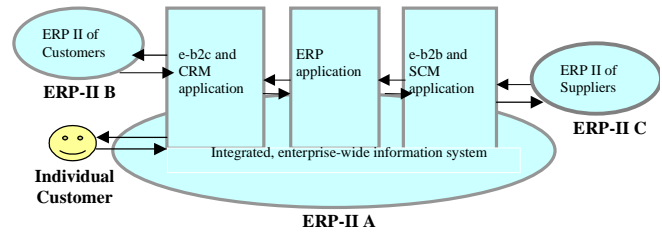


Figure 2. ERP II system architecture

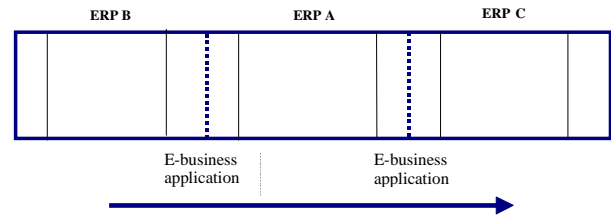


Figure 3. Integrated ERP value chain

the company's systems and to integrate legacy applications, other critical business systems, and external applications (business partners' and customers' systems). In this scenario, the ERP system becomes a business-services framework, a central information repository, and a data-distribution facility to gain both internal and external efficiency and effectiveness (see Figure 2).

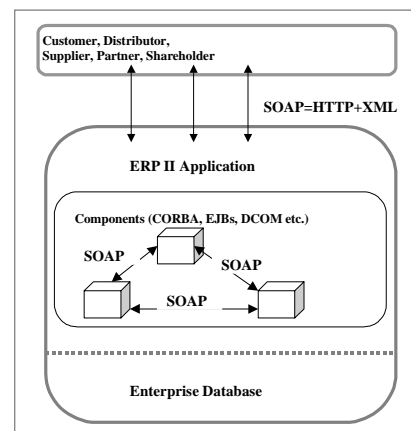
When viewed from within enterprises, the idea is to integrate one ERP system with other ERP systems, and thus create an extended value chain (see Figure 3).

In this scenario, the joint between ERP systems is dynamic, which means it dynamically provides the integration of two ERP systems via the Internet. A company can create an extended value chain that best suits its needs in real time by choosing or changing the "partner ERP system" to integrate. In all, the new ERP systems extend internal resource optimization to external resource optimization, and therein lies the real beauty of "integration".

- Extended function: Mobile-commerce

Currently an exponentially growing technology, wireless and mobile networking, has brought about a whole new way for companies to do business — mobile commerce. Mobile commerce has extended the function of e-commerce to previously unimagined dimensions. Wireless Application Protocol (WAP) hides the application differences from mobile users through proxy

Figure 4. The ERP II solution from technology perspective



gateways. In the future, e-business applications will be accessible everywhere by various devices such as PCs, TVs, PDAs and cellular phones etc (Varshney *et al.* 2000). Wireless technologies will find a broad range of applications in ERP systems.

- Technical Feasibility

Technical compatibility presents a great challenge in integration. Systems from different vendors or on different platforms may not work with each other very well, or at all. When it comes to integration of ERP and E-business, which typically involves communication across a variety of hardware and software systems, compatibility poses a threat to implementation. New technologies such as XML, SOAP, and standard component technologies such as COBRA, JavaBeans, and DCOM have been developed to cope with these difficulties. When properly applied, they can elicit a smooth interoperability between different platforms.

These middle-ware technologies provide the bridge both between ERP systems and other applications, and between ERP systems across enterprises through the Internet (see Figure 4).

- ASP—Another Choice

When speaking of ERP implementation today, we must consider the fast emerging ASP (application service provider) market. Traditional client/server ERP software has become extremely burdensome, as discussed earlier. For example, it is too expensive, it is too hard to implement, and it is too complex. This has given birth to the rise of the ASP market. Oracle, the big ERP vendor, has forged ahead in the ASP market. It provides a service allowing companies to rent expensive business applications on a hosted, per-user/per-month basis. Of course, outsourcing isn't a new trend. What is new, however, is the way in which the new service-based ERP solutions are delivered over the Web. Web-based services are more about communication and multiple company workflows than the data-intensive functions of traditional ERP software. It is highly possible that ASP will drive the market in the future. Data-quest predicts ASP revenues will soar to \$22.7 billion by 2003. An entirely new option is there for IT managers who are considering which ERP system to choose.

CONCLUSIONS

MRP systems arose from the need to link manufacturing and production functions, and the development of ERP brought business systems to the next level; integration of those processes with the rest of the enterprise. Now, after companies have integrated their internal processes, by taking advantage of the Internet, they look to the next vista, linking to customers and business partners

and external processes through wired and wireless networks. Regardless of what incarnations ERP may have gone through, the essence of enterprise software remains focused on maximizing efficiency (internal and external) and providing competitive advantage. This is the case for both MRP and ERP, as well as for the newly emerged E-business suite, ERP II.

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