Chapter 4.21

Enterprise Resource Planning and Integration

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INTRODUCTION

Enterprise resource planning (ERP) is a state-of-the-art approach to running organizations with the help of comprehensive information systems, providing support for key business processes and more general, for electronic business (e-business). ERP has evolved from earlier approaches, in particular, materials requirement planning (MRP) and manufacturing resource planning (called MRP II) in the 1980s. The focus of MRP and MRP II was on manufacturing firms. The essential problem that MRP attacked was to determine suitable quantities of all parts and materials needed to produce a given master production schedule (also called a "production program"), plus the dates and times when those quantities had to be available. Application packages for MRP have been available from the 1960s on. In the beginning, they were mostly provided by hardware vendors like IBM, Honeywell Bull, Digital Equipment, Siemens, etc. MRP was later expanded to closed-loop MRP to include capacity planning, shop floor control, and purchasing, because as Oliver Wight (1884) puts it: "Knowing what material was needed was fine, but if the capacity wasn't available, the proper material couldn't be produced" (p. 48).

The next step in the evolution was MRP II (manufacturing resource planning). According to the father of MRP II, Oliver Wight, top management involvement in the planning is indispensable. Therefore, MRP II expands closed-loop MRP "to include the financial numbers that management needs to run the business and a simulation capability" (Wight, 1984, p. 54).

Enterprise resource planning (ERP) has its roots in the earlier MRP II concepts, but it extends those concepts substantially into two directions. ERP takes into account that other types of enterprises than those producing physical goods need comprehensive information system (IS) support as well, and even in the manufacturing industry, there are more areas than those directly related to the production of goods that are critical for the success of a business.

BACKGROUND OF ERP

The key issue of ERP is integration (Langenwalter, 1999). While stand-alone solutions—sometimes quite sophisticated information systems—for various areas of a business have been available before, ERP takes a holistic approach. Instead of isolated views—on procurement, on manufacturing, on sales and distribution, on accounting, etc.—the focus is now on integrating those functional areas (Scheer & Habermann, 2000). The need for integrated systems has been recognized by many, but Germany-based SAP AG was the first to put them into reality. SAP's early success as worldwide market leader comes largely from the fact that this company actually designed and implemented business-wide integrated information systems. The lack of integration of information systems has created a variety of problems. The most serious ones are the following:

- Redundancy (i.e., the same information is stored and maintained several times)
- Inconsistency (i.e., information about the same entity stored in different places is not the same)
- Lack of integrity (i.e., databases where such information is stored are not correct)

Mistakes, wrong decisions, and additional work are some of the consequences resulting from these problems. Consider, for example, data about customers. Such data are often entered and maintained in a sales and distribution information system (customer orders), then again in the dispatching system (delivery orders), and perhaps once more in a financial accounting system (invoices). Not only is this redundant and means additional work, but also the same attributes may even stand for different things. For example, an "address" field in the sales and distribution system may represent the address of the customer's procurement department, whereas "address" in the dispatching system is the place where the goods have to be delivered.

Integration of information systems can be considered from several perspectives: from the data, the functions, the operations, the processes, the methods, and the software perspectives. The most important aspects are data integration, operations integration, process integration, and software integration:

- **Integration** of data means that data models and databases are unified so that all departments of an enterprise use the same data entities, with the same values.
- **Integration** of operations requires connecting individual operations, or steps of a business process, with preceding or succeeding operations, respectively.
- **Integration** of processes means that interfaces between different business processes are explicitly considered (e.g., connections between order processing and flow of material control).
- **Integration** of software means that different programs (e.g., information systems for different business functions, can run together and use each other's data and operations.

Those aspects of integration have always been considered important requirements for effective business information processing, but how does one actually obtain enterprise-wide integrated information systems?

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