Chapter 2
The Development of Enterprise Resource Planning Systems

Chapter Objectives

• Identify the factors that led to the development of Enterprise Resource Planning (ERP) systems
• Describe the distinguishing modular characteristics of ERP software
• Discuss the pros and cons of implementing an ERP system
• Summarize ongoing developments in ERP

ERP Systems Implementation

PART 3
SAP

- Systemanalyse und Programmentwicklung (SAP) was formed in Mannheim, Germany, in 1972 by five former IBM systems analysts
- SAP’s goal was to develop a standard business software product that could be configured to meet the needs of a company
- SAP’s founders wanted
  - Data to be available in real time
  - Users to work on a computer screen, not with paper
- Lofty goals, indeed, in 1972

SAP

- SAP’s founders had to develop their first software package at night on their first customer’s computer
  - Computers were not commonly available in 1972
  - They were huge
  - IBM PC did not become available until 1980
- The first software package was referred to by various names, including R, RF, R/1
- A more integrated software package, called R/2 was released in 1982
  - R/2 was still a mainframe computer package
  - By 1988, R/2 had some market share (1,000 systems sold) in a fairly new market

SAP R/3

- SAP R/3 was developed from 1988 to 1992
  - Client/server software
  - Can operate on both Windows NT and Unix
  - Scalable: because it was a client/server system, it could easily be scaled up as a company grew
    - Add servers to the system
  - an open architecture system
    - Allows other software companies to develop compatible products
    - Makes integrating hardware like bar code scanners, PDAs, cell phones, etc., easier
ERP Vendors

- Consolidation is currently taking place in the ERP software business
  - PeopleSoft purchased ERP vendor J.D. Edwards in 2003
  - Oracle, after a long battle, acquired PeopleSoft in 2005
  - SAP and Oracle are now the two largest ERP vendors
  - Microsoft is challenging SAP and Oracle to sell ERP systems to small- and medium-sized businesses

SAP R/3 Enterprise

- SAP’s R/3 latest software version is called release 4.7 or Enterprise
- R/3 Enterprise uses a central database to share data between the primary functional areas of:
  - Marketing and Sales
  - Production and Materials Management
  - Human Resources
  - Accounting and Finance

Data Flow between Functional Areas

![Data Flow Diagram](image)
SAP R/3 Modules

- Sales and Distribution (SD) module
  - records sales orders and schedules deliveries
  - pricing, how and where to ship products, how the customer is to be billed, for example
- Materials Management (MM) module
  - acquisition of raw materials from suppliers (purchasing)
  - handling of raw materials inventory
- Production Planning (PP) module
  - production is planned and scheduled
  - actual production activities are recorded

SAP R/3 Modules

- The Quality Management (QM) module
  - helps to plan and record quality-control activities, such as product inspections and material certifications
- The Plant Maintenance (PM) module allows planning for preventative maintenance of plant machinery and managing maintenance resources
- The Asset Management (AM) module helps the company to manage fixed-asset purchases (plant and machinery) and the related depreciation.
- The Human Resources (HR) module facilitates employee recruiting, hiring, training, payroll and benefits.
- The Financial Accounting (FI) module records transactions in the general ledger accounts. It is used to generate financial statements for external reporting purposes

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SAP R/3 Modules

- The Controlling (CO) module is used for internal management purposes.
  - In CO, the company’s manufacturing costs are assigned to products and to cost centers, so that the profitability of the company’s activities can be analyzed
  - The CO module supports managerial decision-making
- The Project System (PS) module allows for planning and control of special projects like Research and Development or Marketing Campaigns or low-volume, highly complex projects like aircraft or ship construction
- The Workflow (WF) module is a set of tools that can be used to automate any of the activities in R/3

Other Vendors of ERP

- Also use a modular approach
- Also provide sets of modules customized for a particular industry sector
  - Retail
  - Banking
  - Etc.
ERP Implementation

- For a variety of reasons, many companies choose to implement only certain modules of an ERP system
- Generally, it is easier to integrate business processes when one ERP vendor supplies all modules
- Data transfer between different ERP systems or an ERP system and a legacy software system is frequently done with batch programs, which eliminates real-time data accuracy
- Software upgrades can also be problematic between different systems
- Because of these difficulties, a company that chooses to use multiple systems should make sure it is done for valid reasons

ERP Implementation

- Primary task in implementation is setting configuration options in the ERP software
- With SAP, it has been estimated that there are about 8,000 configuration settings possible
- (Probably, there are more now in 2008)
- Configuration settings customize the software so that it fits the company’s needs
- Example: Tolerance groups in Financial Accounting
  - To minimize the risk from unauthorized transactions, tolerance groups can be established to limit the dollar value of transactions that can be posted by different employee groups

Tolerance Group Setting

- Leaving the group blank means this is the default tolerance group
- Limits for single document and item in a document
- Limits on how much an entry can differ from the value that is supposed to be entered
Best Practices

- Before ERP, IS people designed software to reflect a company’s business practices.
- With ERP software, the software developers have used their experience with a number of companies to develop “best practices.”
- Best Practices represent the way an ERP company feels a particular business transaction should be carried out to maximize efficiency.
- While customers can customize their ERP systems to represent their own particular way of doing business, straying too far from “best practices” might mean that they will not get the benefits the ERP integration promises.

ERP for Midsize Companies

- By 1998, most Fortune 500 companies had installed ERP systems.
- ERP companies began to focus on midsize companies (1,000 or fewer employees).
- Midsize companies in Europe have an estimated $50 billion annual IT budget.
  - IT budget for US midsize companies is even larger.
- To capture the midsize market, SAP developed Industry Solutions—preconfigured versions of its R/3 software for specific industries such as:
  - Oil and gas, automotive, banking, chemicals, etc.
- Application hosting also makes ERP more attractive for midsize companies.

Best of Breed Approach

- Some companies have chosen a Best of Breed approach, where they implement ERP modules from different vendors based on actual or perceived advantages.
- The Best of Breed approach may become obsolete due to implementation challenges:
  - Software must be written to connect different systems.
  - Upgrading modules is more complicated with multiple vendors.
  - Real-time data integration is frequently not available.
Implementation Challenges

- A number of companies in the 1990s experienced lengthy and challenging implementations
- Dell cancelled an SAP implementation
- Owens-Corning had a lengthy implementation
- FoxMeyer Drug blamed its bankruptcy, at least in part, on a troubled SAP implementation
- SAP responded by creating Accelerated SAP (ASAP), an implementation methodology and set of tools to aid implementation efforts
- The latest version of ASAP is called Solution Manager

New SAP Products

- Business Warehouse (BW) gives users great flexibility in analyzing data and developing custom reports
- BW simplifies the integration and analysis of data from multiple sources, both SAP and non-SAP
- Customer Relationship Management (CRM) helps manage customer interactions so that they are coordinated and consistent
- Also allows for analysis of sales data to identify trends and opportunities
- Advanced Planner and Optimizer (APO) helps coordinate production planning and scheduling between multiple facilities and with suppliers and customers
- NetWeaver provides a comprehensive platform to connect R/3 to the Internet

Choosing Consultants and Vendors

- ERP systems are so complex, one person cannot fully understand a single system, much less be able to compare systems effectively
- A team, including external consultants, is probably needed to select the best ERP system for a company
- A team made up of consultants and company experts is needed to determine how to configure ERP software properly
ERP Software Benefits

- Global integration, including currency exchange rates
- Reduced IT maintenance: single system is easier to maintain
- Provides information so that a company can be managed, not just monitored

ERP System Costs

- The cost of an ERP system:
  - Depends on the size and complexity of the software package, which is a function of the size of the firm
  - Includes new hardware required to run the system
  - Includes consultant and business analyst fees
  - Includes the time required for implementation (disruption of business)
  - Includes training costs (cost to develop and deploy training plus employees’ time away from their job)
- A large company, with over 1,000 employees, can spend from $50 million to $500 million on a complex implementation

Is ERP for everyone?

- A business must analyze its own business strategy, organization, culture and operations before choosing an ERP approach
- A company may not be ready to implement ERP
  - The company’s business processes may not be well defined or managed
  - If a company is not prepared to make its processes more efficient, then it will not gain the benefits an ERP system can provide
Is ERP software inflexible

- ERP software is designed around best practices, so companies are encouraged to adapt their processes to the way ERP software works
- With SAP, companies can customize the software by creating custom capabilities using its Advanced Business Application Programming (ABAP) language
  - SAP is an open-source product, meaning that the customer has access to the software’s source code

Returns from the ERP Investment

- ERP eliminates redundant effort and duplicated data, resulting in reduced personnel needs
- ERP systems can help produce goods and services more quickly, resulting in increased sales volume
- An ERP system may be required to compete with competitors who have effectively implemented ERP systems
- ERP systems can reduce frustration resulting from the inability to get accurate and timely data
- More accurate and timely data can improve external customer relations
- The payoff from ERP systems can occur over many years, when other factors may also affect the company, making the return hard to calculate

Return on Investment (ROI)

- ROI is the value of a project’s benefits divided by the project cost, adjusted to include the time value of money
- The ROI for an ERP system is difficult to calculate
  - Many intangible costs and benefits
  - Some companies have not tried to determine the ROI of their ERP implementation—they just considered it a necessity
  - Some firms, like Pitney Bowes, have seen a return almost immediately
  - Some firms, like Toro, have taken some time before they have seen a tangible return
Implementation Problems

- Some executives naively hope ERP systems will cure fundamental business problems
- Some executives and IT managers don’t take enough time for proper analysis and planning for implementation
- Some executives and IT managers skimp on education and training
- Sometimes the ownership of the implementation project is not given to the employees who will use the system
- Top executive support is not always given
- The organizational change process is not managed well

Evolution of ERP Systems

- ERP systems have only been in common use since the 1990s
  - ERP is still a young technology, and future developments are hard to predict
- Additional capabilities are being added to core ERP applications
  - Customer Relationship Management (CRM)
  - Supply Chain Management (SCM)
  - Strategic Enterprise Management (SEM)
  - Internet connectivity

ERP and the Internet

- ERP developers continue to include Internet connectivity into their ERP applications
- SAP’s latest Internet initiative is NetWeaver, a development system to simplify the integration of the Internet with the R/3 system
- ERP systems, in combination with the Internet, have lead to the development of e-commerce
Maximizing ERP Value

- To maximize the value of their ERP systems, companies should:
  - Integrate: ERP systems must be integrated throughout the company to share data effectively
  - Optimize: Many implementations were rushed to avoid the Y2K problem. Companies can gain value by using their ERP systems to improve their business processes
  - Informate: Hard work is required to effectively use the rich information provided by ERP systems

End of Chapter 2 Part 3

ERP Systems Implementation