UNIVERSITY OF SOUTHERN MINDANAO

Enterprise Resource Planning

Chapter 2

The Development of Enterprise Resource Planning Systems

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Objectives

After completing this chapter, you will be able to:

- 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

Introduction

- Efficient, integrated information systems are very important for companies to be competitive
- An Enterprise Resource Planning (ERP) system can help integrate a company's operations
  - Acts as a company-wide computing environment
  - Includes a database that is shared by all functional areas
  - Can deliver consistent data across all business functions in real time

The Evolution of Information Systems

- **Silos**
  - Information systems configuration used until recently
  - Companies had unintegrated information systems that supported only the activities of individual business functional areas
- Current ERP systems evolved as a result of:
  - Advancement of hardware and software technology
  - Development of a vision of integrated information systems
  - Reengineering of companies to shift from a functional focus to a business process focus

Computer Hardware and Software Development

- Computer hardware and software developed rapidly in the 1960s and 1970s
- First practical business computers were the mainframe computers of the 1960s
- Over time, computers got faster, smaller, and cheaper
- Moore's Law
  - Number of transistors that could be built into a computer chip doubled every 18 months

Computer Hardware and Software Development (cont'd.)

- Advancements in computer software
  - 1970s: relational database software developed
    - Provide businesses the ability to store, retrieve, and analyze large volumes of data
  - 1980s: spreadsheet software became popular
    - Managers can easily perform complex business analyses
  - The computer hardware and software developments of the 1960s, 1970s, and 1980s paved the way for the development of ERP systems.

Early Attempts to Share Resources

- By the mid-1980s, telecommunications developments allowed users to share data and peripherals on local networks
  - **Client-server architecture**
- By the end of the 1980s, the hardware needed to support development of ERP systems was in place
- By the mid-1980s, **database management system** (**DBMS**) required to manage development of complex ERP software existed

The Manufacturing Roots of ERP

- Manufacturing software developed during the 1960s and 1970s
  - Evolved from simple inventory-tracking systems to **material requirements planning (MRP)** software
- **Electronic data interchange (EDI)**
  - Direct computer-to-computer exchange of standard business documents
  - Allowed companies to handle the purchasing process electronically

Management's Impetus to Adopt ERP

- Hard economic times of the late 1980s and early 1990s caused many companies to downsize and reorganize
  - Stimulus to ERP development
- Inefficiencies caused by the functional model of business organization
  - Silos of information
  - Limits the exchange of information between the lower operating levels

Management's Impetus to Adopt ERP (cont'd.)

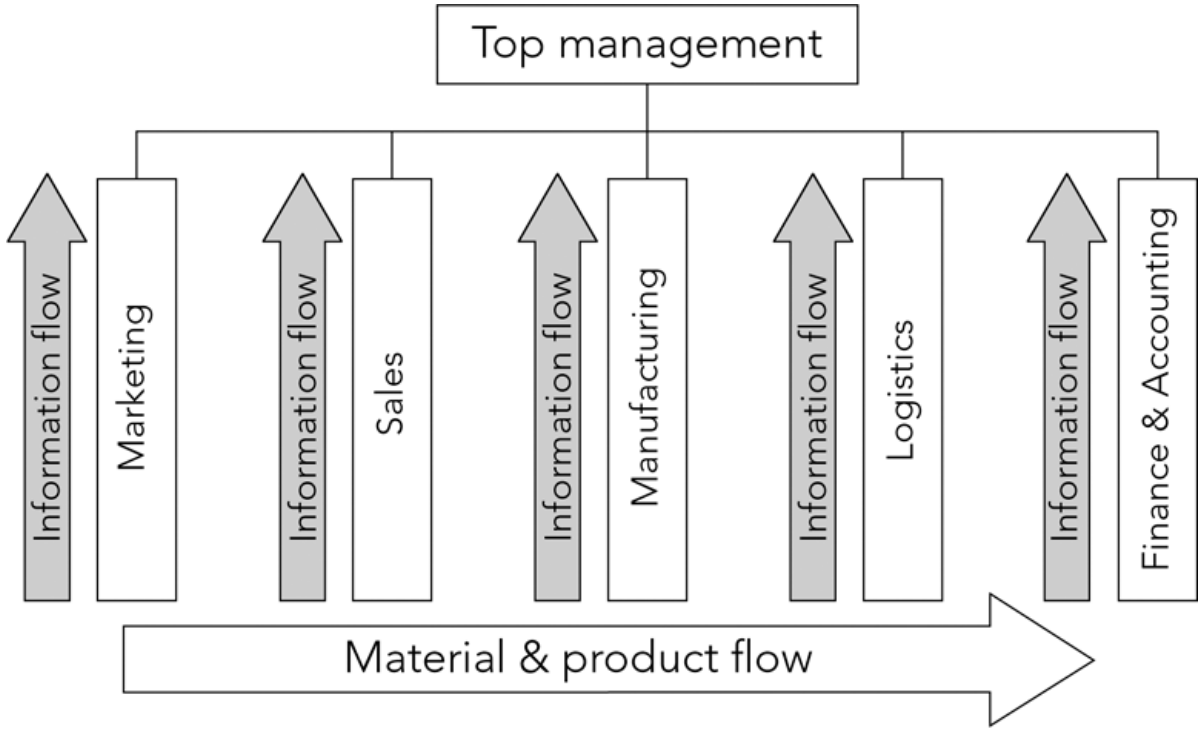

Figure 2-2 Information and material flows in a functional business model

Management's Impetus to Adopt ERP (cont'd.)

- Functional model led to top-heavy and overstaffed organizations incapable of reacting quickly to change
- Process business model
  - Information flows between the operating levels without top management's involvement
- Further impetus for adopting ERP systems has come from compliance with the Sarbanes-Oxley Act of 2002
  - Requires companies to substantiate internal controls on all information

Management's Impetus to Adopt ERP (cont'd.)

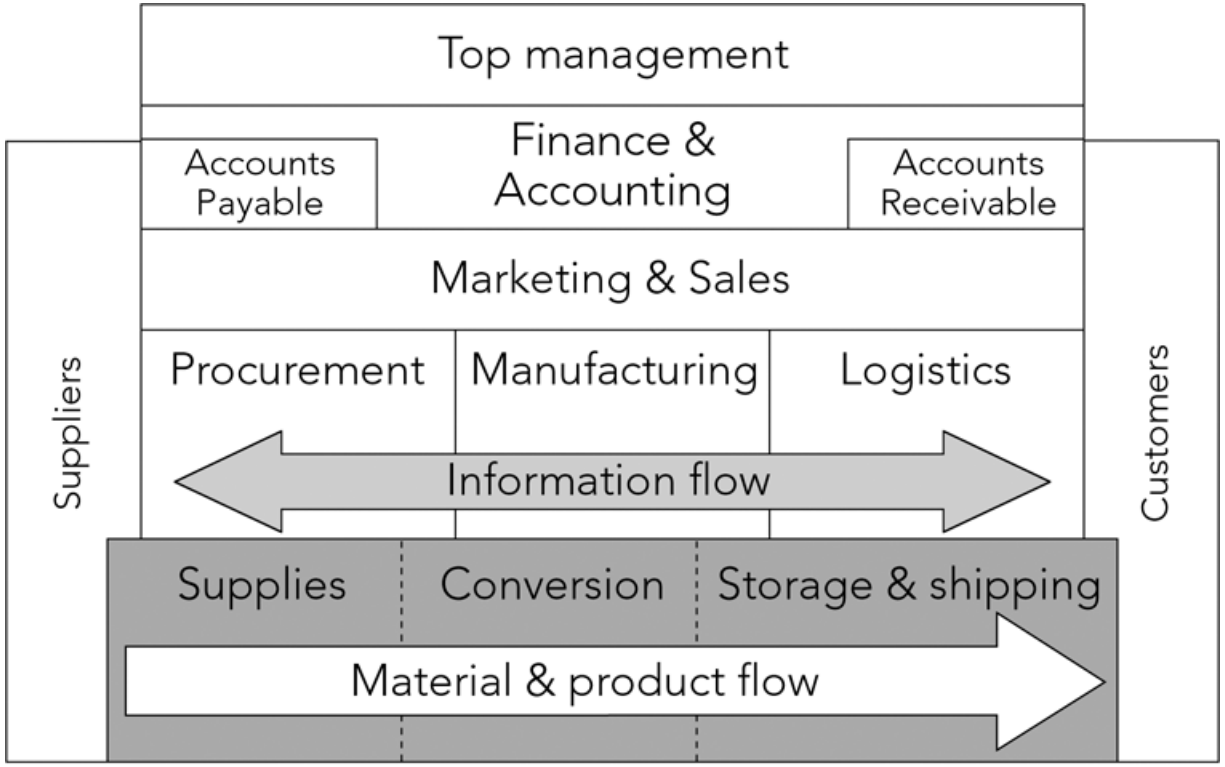

Figure 2-3 Information and material flows in a process business model

ERP Software Emerges: SAP and R/3

- 1972: five former IBM systems analysts in Mannheim, Germany formed *Systemanalyse und Programmentwicklung* (Systems Analysis and Program Development, or SAP) (Dietmar Hopp, Claus Wellenreuther, Hasso Plattner, Klaus Tschira, and Hans-Werner Hector)
- IBM controlled the computer market with its 360 mainframe computer, w/c had only 512k of main memory
- SAP's goals:
  - Develop a standard software product that could be configured to meet the needs of each company

SAP Begins Developing Software Modules

- During their work for German chemical company ICI, Plattner and Hopp had developed the idea of modular software development
- Software **modules**: individual programs that can be purchased, installed, and run separately, but that all extract data from the common database
- 1982: SAP released its R/2 mainframe ERP software package

SAP Begins Developing Software Modules (cont'd.)

- 1980s: sales grew rapidly; SAP extended its software's capabilities and expanded into international markets
- By 1988, SAP had established subsidiaries in numerous foreign countries. Launched a joint venture with consulting company Arthur Anderson, and sold its 1,000th system.
  - SAP became SAP AG, a publicly traded company.

SAP R/3

- 1988: SAP began development of its **R/3** system to take advantage of client-server technology
- 1992: first version of SAP R/3 released
- SAP R/3 system was designed using an open architecture approach
- **Open architecture:** third-party software companies encouraged to develop add-on software products that can be integrated with existing software

New Directions in ERP

- Late 1990s: Year 2000 (or Y2K) problem motivated many companies to move to ERP systems
- By 2000, SAP AG had 22,000 employees in 50 countries and 10 million users at 30,000 installations around the world
- By 2000, SAP's competition in the ERP market:
  - Oracle
  - PeopleSoft
- Late 2004: Oracle succeeded in its bid to take over PeopleSoft

New Directions in ERP (cont'd.)

- PeopleSoft
  - Founded by David Duffield, a former IBM employee
  - Today, PeopleSoft, under Oracle, is a popular software choice for managing human resources and financial activities at universities
- Oracle
  - SAP's biggest competitor
  - Began in 1977 as Software Development Laboratories (SDL)
  - Founders: Larry Ellison, Bob Miner, and Ed Oates

New Directions in ERP (cont'd.)

- SAP ERP
  - Latest versions of ERP systems by SAP and other companies allow:
    - All business areas to access the same database
    - Elimination of redundant data and communications lags
    - Data to be entered once and then used throughout the organization

New Directions in ERP (cont'd.)

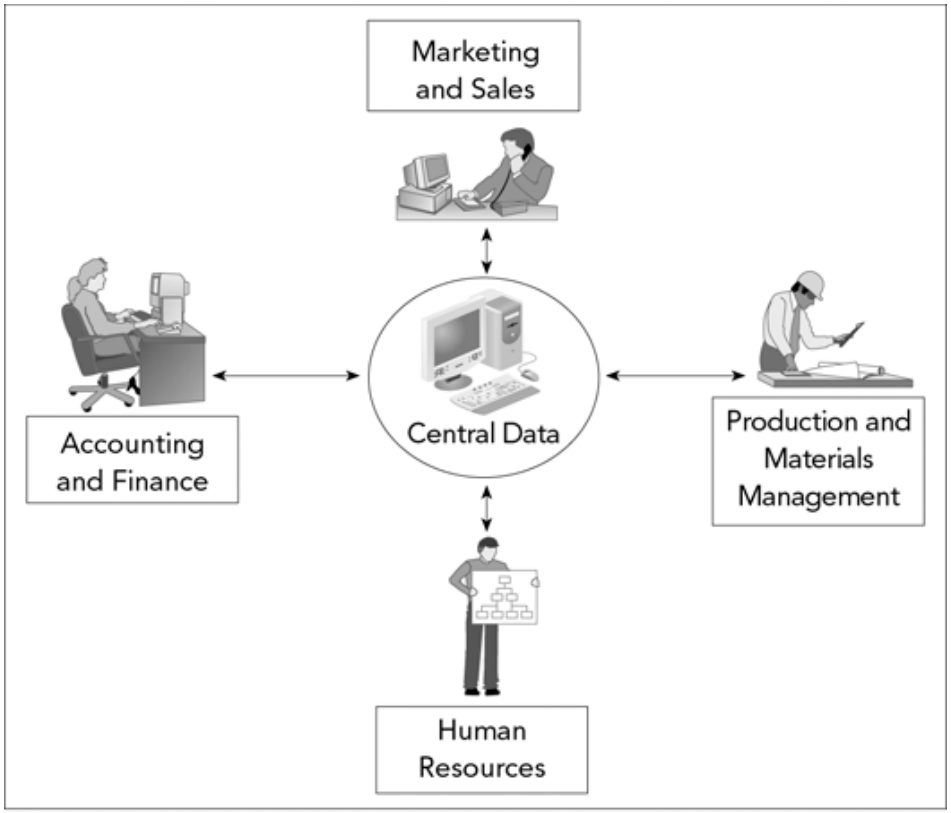

Figure 2-4 Data flow within an integrated information system

New Directions in ERP (cont'd.)

- Current SAP ERP system: SAP ECC 6.0 (Enterprise Central Component 6.0)
  - Sales and Distribution (SD) module
  - Materials Management (MM) module
  - Production Planning (PP) module
  - Quality Management (QM) module
  - Plant Maintenance (PM) module
  - Asset Management (AM) module

New Directions in ERP (cont'd.)

- Current SAP ERP system: SAP ECC 6.0 (Enterprise Central Component 6.0) (cont'd.)
  - Human Resources (HR) module
  - Project System (PS) module
  - Financial Accounting (FI) module
  - Controlling (CO) module
  - Workflow (WF) module

New Directions in ERP (cont'd.)

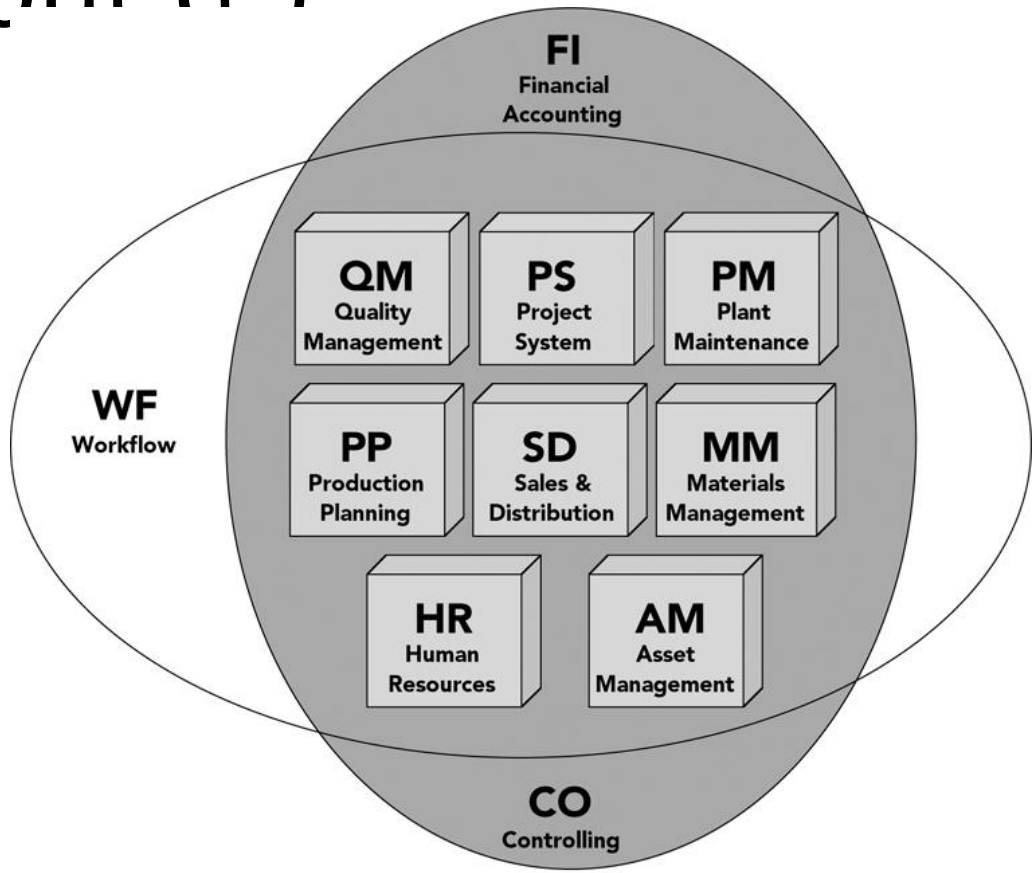

Figure 2-5 Modules within the SAP ERP integrated information systems environment (Courtesy of SAP AG)

SAP ERP Software Implementation

- Not all companies that use SAP use all of the SAP ERP modules
- Company's level of data integration is highest when it uses one vendor to supply all of its modules
- Configuration options allow the company to customize the modules it has chosen to fit the company's needs
- Any large software implementation is challenging – and ERP systems are no exception.

SAP ERP Software Implementation (cont'd.)

- Tolerance groups
  - Specific ranges that define transaction limits
  - SAP has defined the tolerance group methodology as its method for placing limits on an employee
  - Configuration allows the company to further tailor tolerance group methodology
  - Could indicate a shortage, or an overabundance in an order.

SAP ERP Software Implementation (cont'd.)

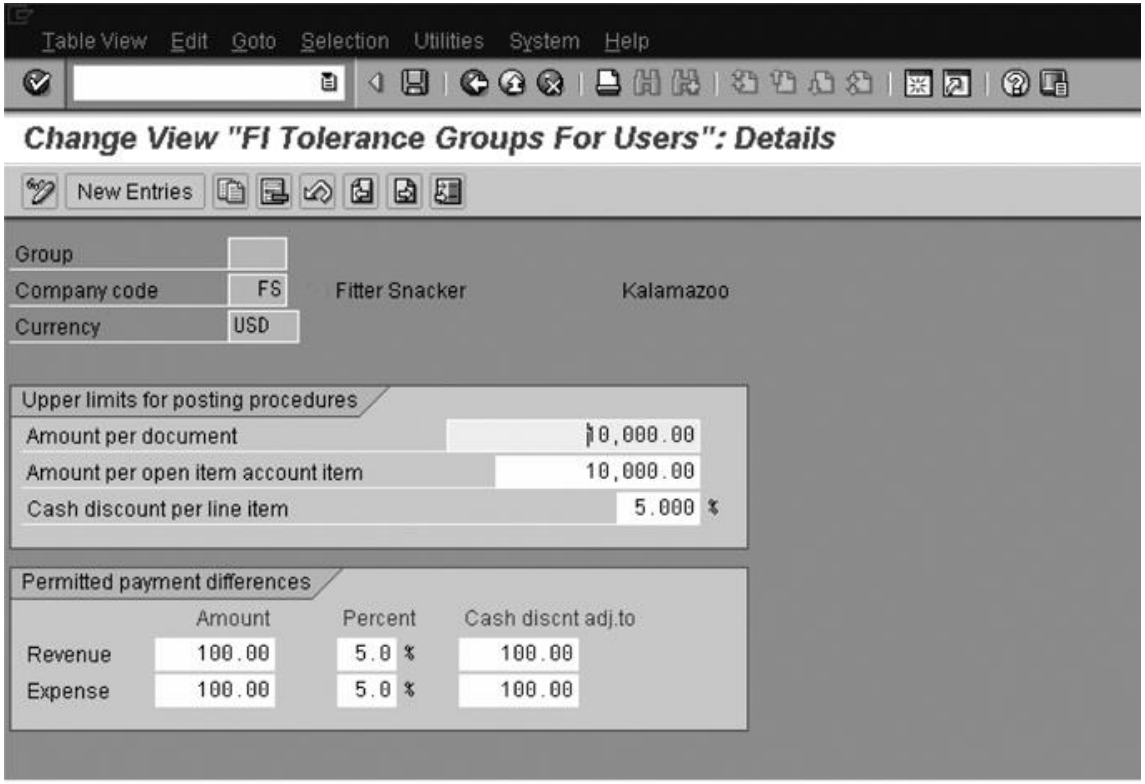

Figure 2-6 A customization example: tolerance groups to set transaction limits

SAP ERP Software Implementation (cont'd.)

- Features of SAP ERP
  - First software that could deliver real-time ERP integration
  - Usability by large companies
  - High cost
  - Automation of data updates
  - Applicability of best practices
    - **Best practices**: SAP's software designers choose the best, most efficient ways in which business processes *should* be handled

ERP for Midsized Companies

- By 1998
  - Most of the Fortune 500 companies had already installed ERP systems
  - ERP vendors refocused their marketing efforts on midsized companies
- SAP All-in-One
  - Single package containing specific, preconfigured bundles of SAP ERP tailored for particular industries
  - Can be installed more quickly than the standard ERP product

ERP for Midsized Companies (cont'd.)

- Application hosting
  - Third-party company provides the hardware and software support
  - Makes ERP systems like SAP more appealing to midsized companies
- SAP and Oracle are facing competition from smaller providers of ERP software

Responses of the Software to the Changing Market

- In mid-1990s, many companies complained about the difficulty of implementing SAP R/3 system
- SAP responded by developing Accelerated SAP (ASAP) implementation methodology
  - Eases the implementation process
- SAP continues to extend capabilities of SAP ERP with additional, separate products that run on separate hardware and extract data from the SAP ERP system

Choosing Consultants and Vendors

- One person cannot fully understand a single ERP system
- Before choosing a software vendor, most companies:
  - Study their needs
  - Hire an external team of software consultants to help choose the right software vendor(s) and the best approach to implementing ERP

The Significance and Benefits of ERP Software and Systems

- More efficient business processes that cost less than those in unintegrated systems
- Easier global integration
- Integrates people and data while eliminating the need to update and repair many separate computer systems
- Allows management to manage operations, not just monitor them
- Can dramatically reduce costs and improve operational efficiency

Questions About ERP

- How much does an ERP system cost?
- Should every business buy an ERP package?
- Is ERP software inflexible?
- What return can a company expect from its ERP investment?
- How long does it take to see a return on an ERP investment?
- Why do some companies have more success with ERP than others?

How Much Does an ERP System Cost?

- Size of the ERP software
  - Corresponds to the size of the company it serves
- Need for new hardware that is capable of running complex ERP software
- Consultants' and analysts' fees
- Time for implementation
  - Causes disruption of business
- Training
  - Costs both time and money

Should Every Business Buy an ERP Package?

- Some of a business's operations, and some segments of its operations, might not be a good match with the constraints of ERP
- Sometimes, a company is not ready for ERP
- ERP implementation difficulties result when management does not fully understand its current business processes and cannot make implementation decisions in a timely manner

Is ERP Software Inflexible?

- Many people claim that ERP systems, especially the SAP ERP system, are rigid
- Options for customization offered by SAP ERP
  - Numerous configuration options that help businesses customize the software to fit their needs
  - Programmers can write specific routines using **Advanced Business Application Programming (ABAP)**
- Once an ERP system is in place, trying to reconfigure it while retaining data integrity is expensive and time-consuming

What Return Can a Company Expect from Its ERP Investment?

- ERP eliminates redundant efforts and duplicated data; can generate savings in operations expense
- ERP system can help produce goods and services more quickly
- Company that doesn't implement an ERP system might be forced out of business by competitors that have an ERP system
- Smoothly running ERP system can save a company's personnel, suppliers, distributors, and customers much frustration

What Return Can a Company Expect from Its ERP Investment? (cont'd.)

- Cost savings and increased revenues occur over many years
  - Difficult to put an exact dollar figure to the amount accrued from the original ERP investment
- ERP implementations take time
  - Other business factors may be affecting the company's costs and profitability
  - Difficult to isolate the impact of the ERP system alone
- ERP systems provide real-time data
  - Improve external customer communications

How Long Does It Take to See a Return on an ERP Investment?

- **Return on investment (ROI):** assessment of an investment project's value
  - Calculated by dividing the value of the project's benefits by the project's cost
- ERP system's ROI can be difficult to calculate
- Peerstone Research study
  - 63 percent of companies that performed the calculation reported a positive ROI for ERP
  - Most companies felt that nonfinancial goals were the reason behind their ERP installations

Why Do Some Companies Have More Success with ERP Than Others?

- Usually, a bumpy rollout and low ROI are caused by *people* problems and misguided expectations, not computer malfunctions
  - Executives blindly hoping that new software will cure fundamental business problems that are not curable by any software
  - Executives and IT managers not taking enough time for a proper analysis during planning and implementation phase
  - Executives and IT managers skimping on employee education and training

Why Do Some Companies Have More Success with ERP Than Others? (cont'd.)

- Usually, a bumpy rollout and low ROI are caused by *people* problems and misguided expectations, not computer malfunctions (cont'd.)
  - Companies not placing ownership or accountability for the implementation project on the personnel who will operate the system
  - Unless a large project such as an ERP installation is promoted from the top down, it is doomed to fail
  - ERP implementation brings a tremendous amount of change for users

Why Do Some Companies Have More Success with ERP Than Others? (cont'd.)

- For many users, it takes years before they can take advantage of many of an ERP system's capabilities
- Most ERP installations do generate returns

The Continuing Evolution of ERP

- Understanding the social and business implications of new technologies is not easy
- ERP systems have been in common use only since the mid-1990s
- ERP vendors are working to solve adaptability problems that plague customers
- Demand for new ERP installations is still going strong

Additional Capabilities within ERP

- Sales production
  - Customer Relationship Management (CRM) applications
    - Increase the efficiency of the sales force
- Data analysis
  - **Data mining:** statistical and logical analysis of large sets of transaction data, looking for patterns that can aid decision making
- Internet connectivity
  - Web services

The Internet

- Now, users often need to access that central database directly from the Internet
- ERP developers have been incorporating Web-based systems with their ERP products
- **Electronic commerce** (or **e-commerce**)
  - Conduct business over the Internet
  - Another activity that ERP systems can help manage

The Internet (cont'd.)

- **Web services**, or **service-oriented architecture (SOA)**
  - Web services: software that enables systems to exchange data without complicated software links
  - Web services make ERP systems easier to manage, especially when interfacing with other applications and the Web
  - Shift from traditional ERP client-server system to service-oriented architecture is gaining momentum

Summary

- Speed and power of computing hardware increased exponentially, while cost and size decreased
- Early client-server architecture provided the conceptual framework for multiple users sharing common data
- Increasingly sophisticated software facilitated integration, especially in two areas: A/F and manufacturing resource planning

Summary (cont'd.)

- Growth of business size, complexity, and competition made business managers demand more efficient and competitive information systems
- SAP AG produced a complex, modular ERP program called R/3
  - Could integrate a company's entire business by using a common database that linked all operations
- SAP R/3, now called SAP ERP, is modular software offering modules for Sales and Distribution, Materials Management, Production Planning, Quality Management, and other areas

Summary (cont'd.)

- ERP software is expensive to purchase and time-consuming to implement, and it requires significant employee training—but the payoffs can be spectacular
  - For some companies, ROI may not be immediate or even calculable
- Experts anticipate that ERP's future focus will be on managing customer relationships, improving planning and decision making, and linking operations to the Internet and other applications through service-oriented architecture