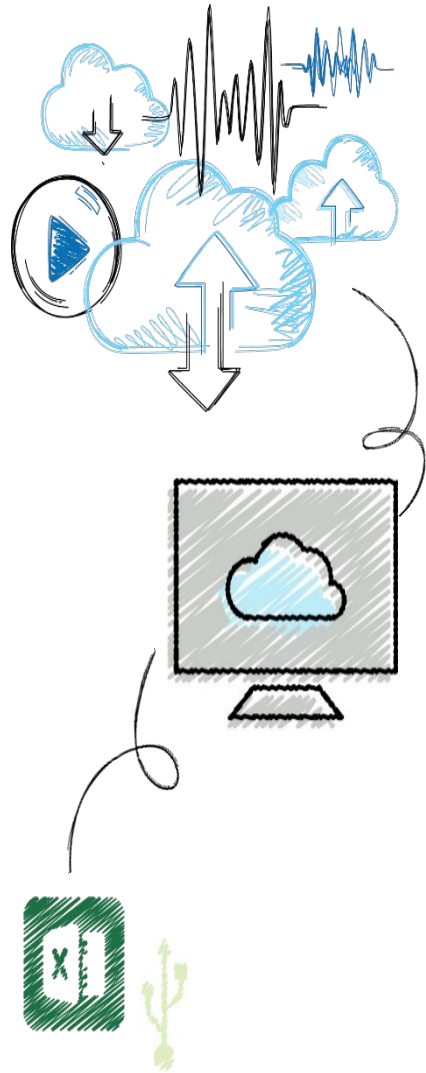# Principles of Information Systems, Thirteenth Edition

Chapter 8

Enterprise Systems
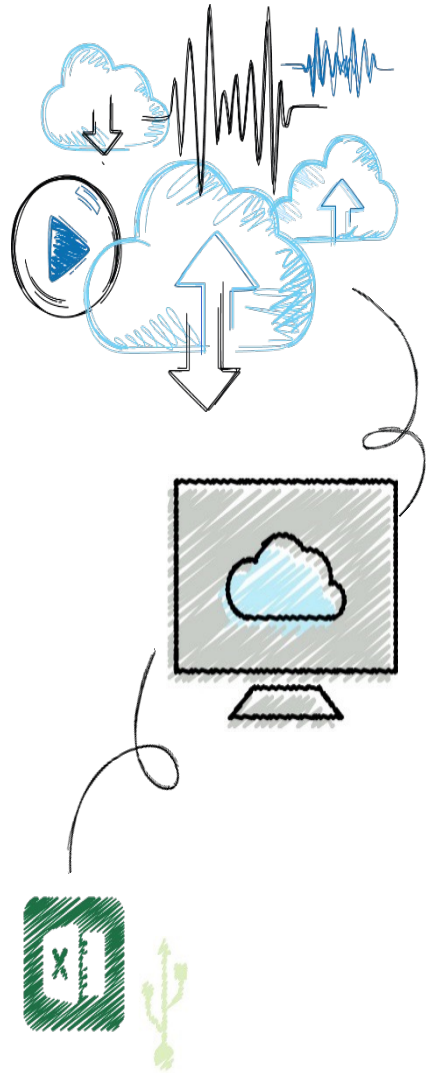
Objectives

After completing this chapter, you will be able to:

Identify the basic activities and business objectives common to all transaction processing systems

Describe the transaction processing systems associated with the order processing, purchasing, and accounting business functions

Identify the basic functions performed and benefits derived from implementing an enterprise resource planning system, customer resource management, and product lifecycle management system

Objectives

After completing this chapter, you will be able to (cont'd):

Describe the hosted software model for enterprise systems and explain why this approach is so appealing to SMEs

Identify the challenges that organizations face in planning, building, and operating their enterprise systems

Identify tips for avoiding many of the common causes for failed enterprise system implementations

Transaction Processing Systems

- Transaction processing systems (TPSs):
  - Capture and process detailed data necessary to update the organization's records about fundamental business operations
  - Include order entry, inventory control, payroll, accounts payable, accounts receivable, general ledger, etc.

- A TPS provides valuable input to:
  - Management information systems
  - Decision support systems
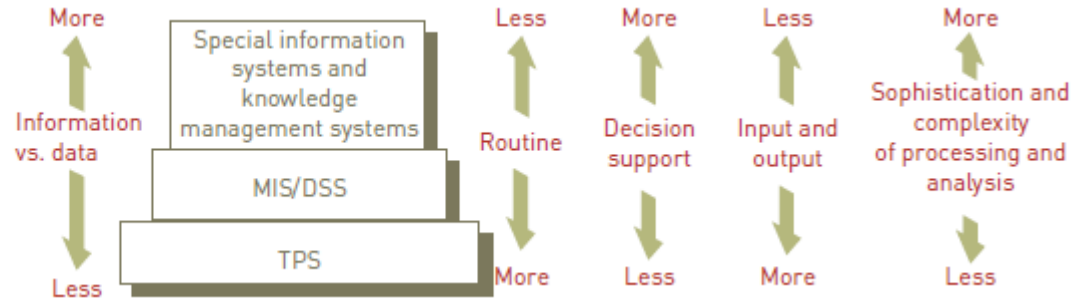 - Knowledge management systems

FIGURE 8.1

TPS, MIS/DSS, and special information systems in perspective

A TPS provides valuable input to MIS, DSS, and KM systems.

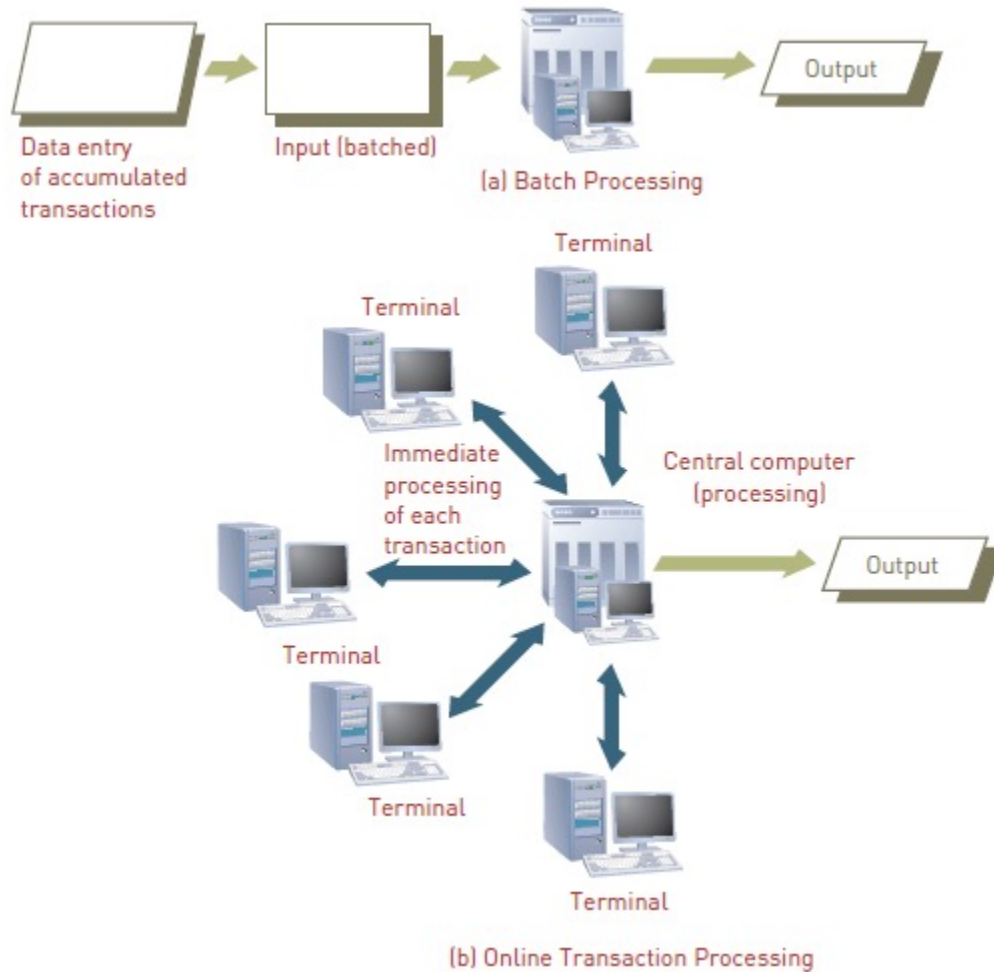|					
More		Less	More	Less	More
Information vs. data	Special information systems and knowledge management systems	Routine	Decision support	Input and output	Sophistication and complexity of processing and analysis
	MIS/DSS				
	TPS				
Less		More	Less	More	Less

Traditional Transaction Processing Methods and Objectives

- Batch processing system
  - Business transactions are accumulated over a period of time and prepared for processing as a single unit or batch
  - Essential characteristic: the delay between an event and the processing of the related transaction to update the organization's records

- Online transaction processing (OLTP)
  - Data processing in which each transaction is processed immediately
  - At any time, the data in an online system reflects the current status
  - Many organizations find that OLTP enables them to provide faster, more efficient service
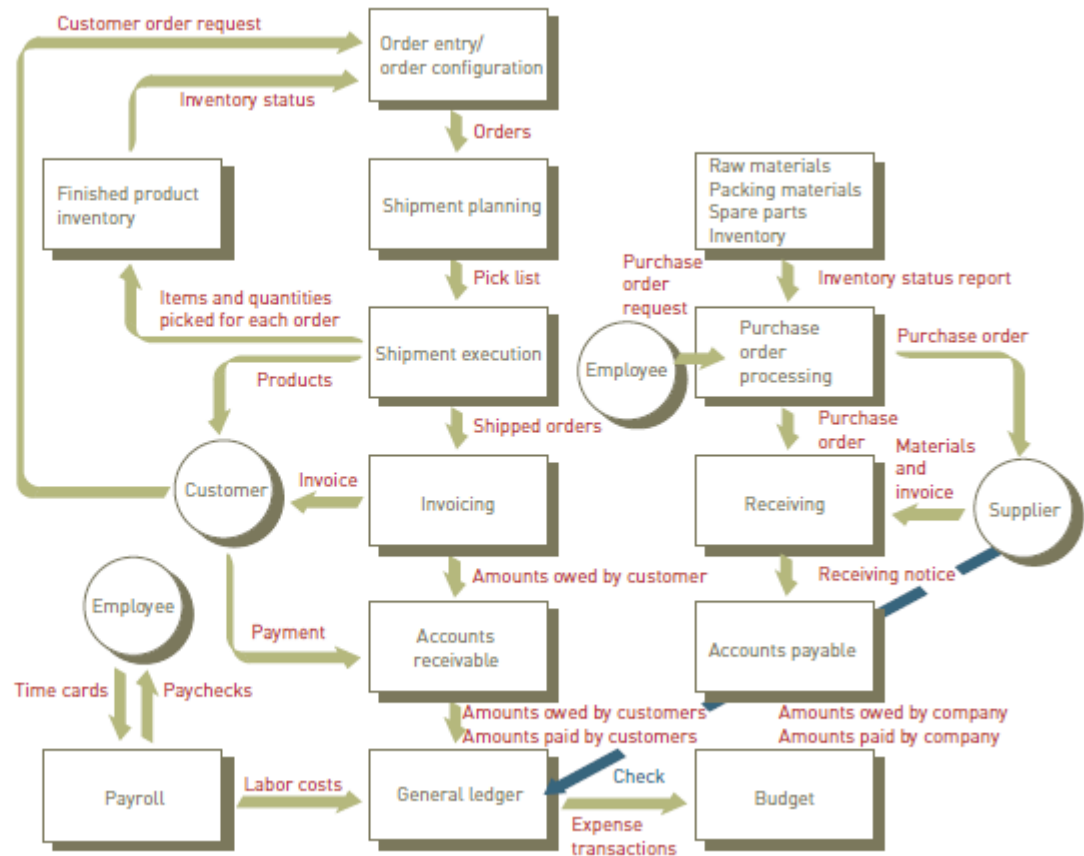
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FIGURE 8.2

Batch versus online transaction processing

(a) Batch processing inputs and processes data in groups. (b) In online processing, transactions are completed as they occur.

FIGURE 8.4
Integration of a firm's TPS
When transactions entered into one system are processed, they create new transactions that flow into another system.

- Organizations expect their TPSs to:
  - Capture, process, and update databases
  - Ensure that the data is processed accurately and completely
  - Avoid processing fraudulent transactions
  - Produce timely user responses and reports
  - Reduce clerical and other labor requirements

- A TPS includes:

  - Order processing systems
    - Processing flow begins with receipt of customer order, then finished product inventory is checked to see if sufficient inventory is on hand to fill the order
    - Product pick list is printed at the warehouse and inventory is adjusted
    - Customer invoice is created and copy included in the customer shipment

  - Accounting systems
    - Must track the flow of data related to all the cash follows that affect the organization

  - Purchasing systems
    - Systems that support the purchasing business function
    - Inventory control, purchase order processing, receiving, and accounts payable

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Transaction Processing Systems for Entrepreneurs and Small and Medium-Sized Enterprises

- Many software packages:
  - Provide integrated transaction processing system solutions for small and medium-size enterprises (SMEs)
  - Are easy to install and operate with a low total cost of ownership
 - Have an initial cost of a few hundred to a few thousand dollars

TABLE **8.2** Sample of integrated TPS solutions for SMEs

Vendor	Software	Type of TPS Offered	Target Customers
AccuFund	AccuFund	Financial reporting and accounting	Nonprofit, municipal, and government organizations
OpenPro	OpenPro	Complete ERP solution, including financials, supply chain management, e-commerce, customer relationship management, and retail POS system	Manufacturers, distributors, and retailers
Intuit	QuickBooks	Financial reporting and accounting	Manufacturers, professional services, contractors, nonprofits, and retailers
Sage	Sage 300 Construction and Real Estate	Financial reporting, accounting, and operations	Contractors, real estate developers, and residential builders
Redwing	TurningPoint	Financial reporting and accounting	Professional services, banks, and retailers

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- The transaction processing cycle
  - Data collection
  - Data editing
  - Data correction
  - Data manipulation
  - Data storage
  - Document production
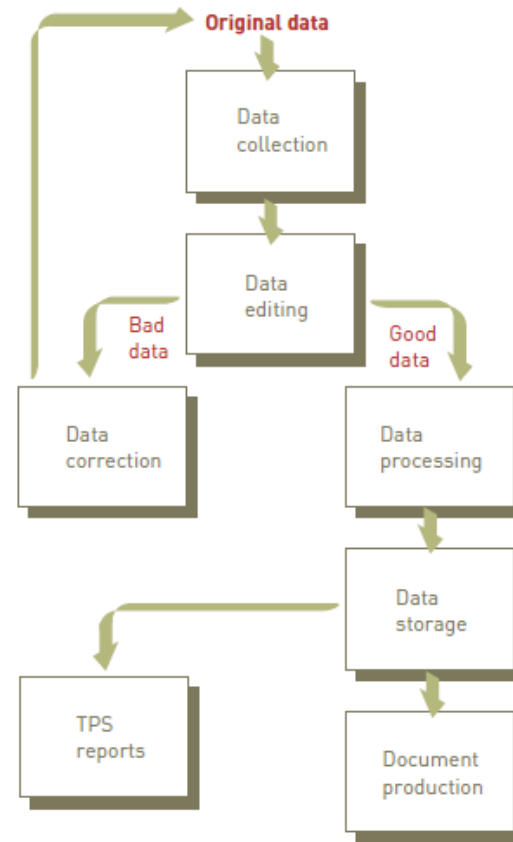
FIGURE 8.5

Transaction processing activities

A transaction processing cycle includes data collection, data editing, data correction, data processing, data storage, and document production.

Data Collection

- Capturing and gathering all data necessary to complete the processing of transactions

- Data collection can be:
  - Manual
  - Automated via special input devices

- Source data automation
  - Involves capturing data at its source and recording it accurately in a timely fashion with minimal manual effort and in an electronic or digital form so that it can be directly entered into the computer
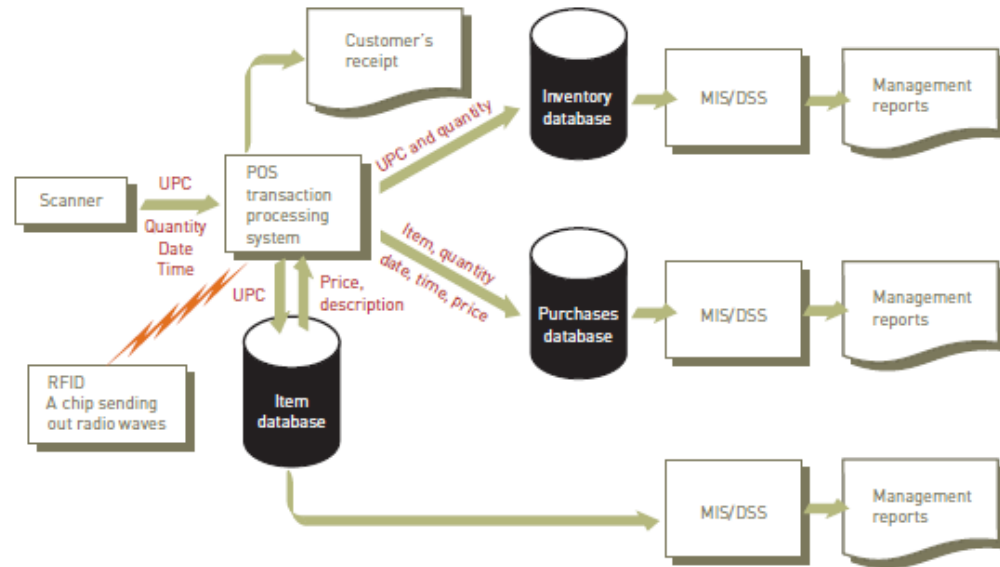 - Example: a scanner reading a UPC code

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FIGURE 8.6

Point-of-sale transaction processing system

The purchase of items at the checkout stand updates a store's inventory database and its database of purchases.

Data Editing

- Data editing
  - Checking data for validity and completeness to detect any problems

- Examples
  - Quantity and cost data must be numeric
  - Names must be alphabetic
  - Codes associated with an individual transaction are edited against a database containing valid codes

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Data Correction

- Systems should provide error messages that alert those responsible for editing the data
  - Error messages should specify the problem so proper corrections can be made
- Data correction involves reentering data that was not typed or scanned properly

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Data Processing

- Performing calculations and other data transformations related to business transactions including:

  - Classifying data

  - Sorting data into categories

  - Performing calculations

  - Summarizing results

  - Storing data in the organization's database for further processing

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Data Storage

- Data Storage
  - Involves updating one or more databases with new transactions

- After being updated, this data can be further processed and manipulated by other systems

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Document Production

- Document Production involves generating output records, documents, and reports
  - Hard-copy paper reports
  - Displays on computer screens (soft copy)
- Results from one TPS can be input to another system
- Most TPSs provide other useful management information, such as:
  - Printed or on-screen reports that help managers and employees perform various activities
  - Reports required by local, state, and federal agencies
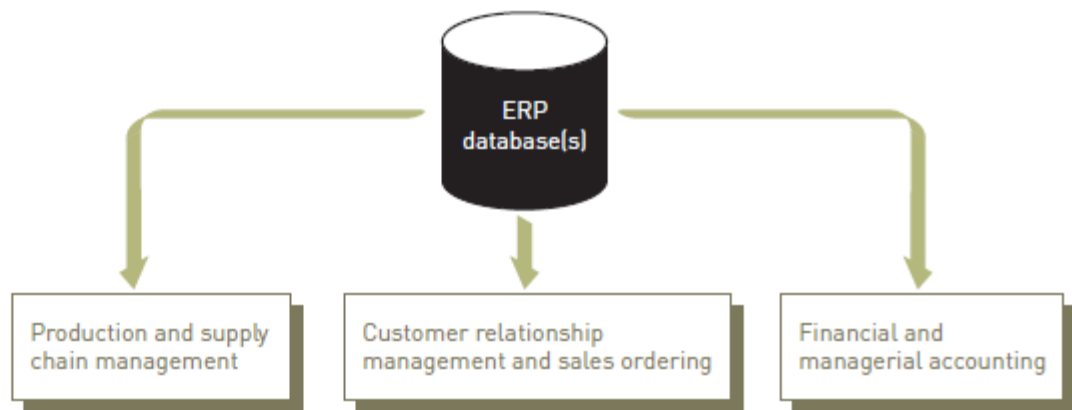
Enterprise Systems

- An enterprise system is central to individuals and organizations of all sizes
  - Ensures that information can be shared across all business functions and all levels of management to support the running and managing of a business

- The ultimate goal is to satisfy customers and provide significant benefits by reducing costs and improving service

- Businesses rely on enterprise systems to perform daily activities in areas such as:
  - Product supply and distribution
  - Sales and marketing
  - Human resources
  - Manufacturing
  - Accounting and taxes

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Enterprise Resource Planning

- Enterprise resource planning (ERP)
  - A set of integrated programs that manage a company's vital business operations for an entire organization

- Business process
  - A set of coordinated and related activities that takes one or more kinds of input and creates an output of value to the customer of that process

FIGURE 8.7
Enterprise resource planning system
An ERP integrates business processes and the ERP database.

ERP database(s)

- Production and supply chain management
- Customer relationship management and sales ordering
- Financial and managerial accounting

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TABLE **1.7** Primary components of an ERP system for a manufacturing organization

Module	Business Functions Addressed
Supply chain management	Manages all activities involved in sourcing and procuring raw materials, converting raw materials to finished product, warehousing, and delivering finished product to customers
Customer relationship management	Automates and integrates the sales, marketing, and customer service functions to capture and store customer and prospect contact information, account data, and sales opportunities in one central location
Product lifecycle management	Manages product information throughout the entire life cycle of a product from ideation, design and manufacture, through service and remaining product disposal—across all departments, contractors, and suppliers
Maintenance, repair, and operations	Automates and supports activities involved with the planning and scheduling of maintenance and repairs for any sort of mechanical, plumbing, or electrical device, along with the tracking of inventory and ordering of necessary parts and supplies
Accounting	Tracks the flow of data related to all the cash flows that affect an organization; manages functions related to setting up and maintaining the general ledger, accounts payable, accounts receivable, and payroll
Human resource management	Supports activities related to previous, current, and potential employees of the organization; provides tools for workforce analysis and planning, hiring, training, job and task assignment, performance evaluation, salary administration, managing employee benefits, retirement, and outplacement

Advantages of ERP

- Improved access to quality data for operational decision making
  - i.e., provide a global view of operational/planning data

- Elimination of costly, inflexible legacy (old) systems

- Improvement of work processes
  - i.e., streamline core business operations

- Opportunity to upgrade and standardize technology infrastructure

- Ensure compliance

- Improve customer service

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Leading ERP Systems

- ERP vendors are classified as:
  - Tier I vendors – target large multinational firms with multiple geographic locations and annual revenues in excess of $1 billion
  - Tier II vendors – target medium-sized firms with annual revenues in the $50 million to $1 billion range operating out of one or more locations
  - Tier III vendors – target smaller firms with annual revenues in the $10 million to $50 million range that typically operate out of a single location

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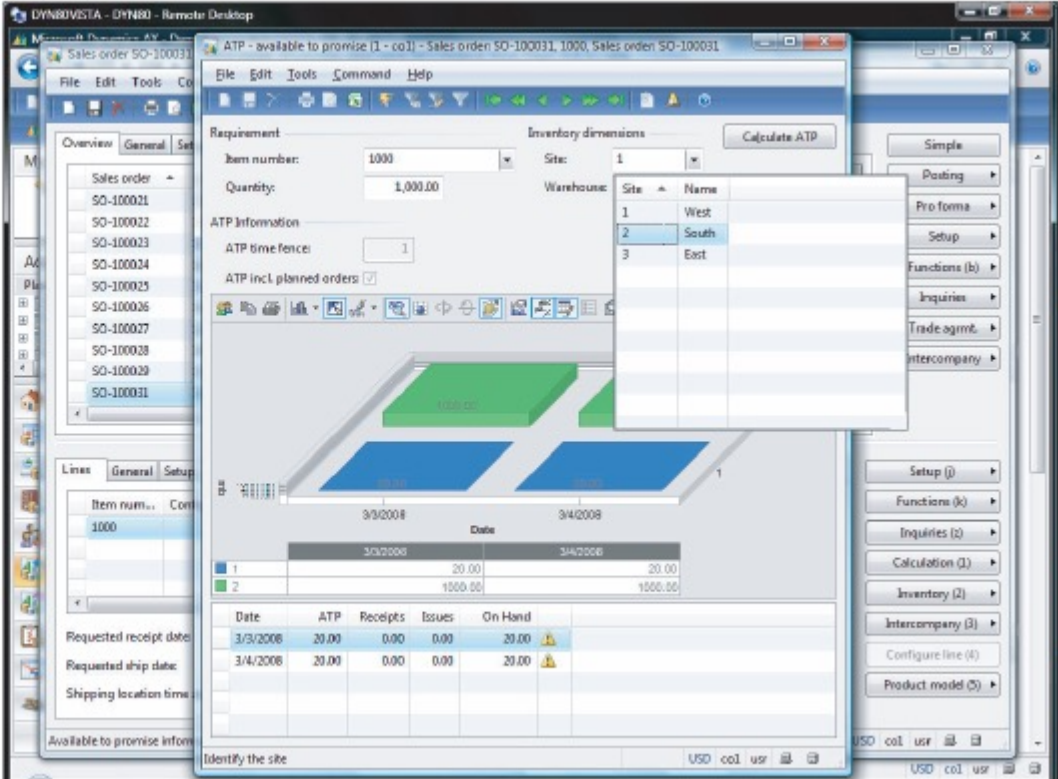
FIGURE 8.8

ERP software

Microsoft Dynamics is an ERP solution that is very popular among small businesses.

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Leading ERP Systems

- Large organizations were the first to take on the challenge of implementing ERP

- Lately, ERP software vendors created new solutions for smaller companies

- Cloud-based solutions are available

- ERP systems:
  - SAP
  - Oracle
  - Microsoft Dynamics 365

- Open-source ERP system: Odoo

- Vendor's ERP software may require customization to:
  - Integrate other business systems
  - Add data fields or change field sizes from those in the standard system
  - To meet regulatory requirements

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Supply Chain Management

- Supply chain management (SCM) is a system that includes planning, executing, and controlling all activities involved in:
  - Sourcing and procurement of raw materials
  - Converting raw materials to finished products
  - Warehousing and delivering finished product to customers

- SCM manages materials, information, and finances as they move from:
  - Supplier -> Manufacturer -> Wholesaler -> Retailer -> Consumer

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Supply Chain Management

- ERP systems do not work directly with production machines
  - How to fix the problem? Using data input devices such as barcode readers

- Retailers as well as manufacturers use demand forecasting to:

  - Match production to consumer demand

  - Allocate products to stores

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Customer Relationship Management

- Customer relationship management (CRM) system
  - Helps a company manage all aspects of customer encounters, including marketing, sales, distribution, accounting, and customer service

- The goal of CRM is to understand and anticipate the needs of current and potential customers

- CRM is used primarily in sales, marketing, and service organizations:
  - To capture and view data about customers and to improve communications

- CRM software:
  - Automates and integrates the functions of sales, marketing, and service in an organization

- Examples of CRM software:
  - Salesforce
  - Zoho CRM

- Price: per user per month

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Customer Relationship Management

Means of communication

Social media · Phone calls · Text messages · In-person contacts · Email · Customers · Customer data · Distribution · Sales · Accounting · Customer service · Marketing

Users and providers of customer data

FIGURE 8.10

Customer relationship management system

A CRM system provides a central repository of customer data used by the organization.

Customer Relationship Management

- Key features of a CRM system include:
  - Contact management
    - To store and manage customer contact information.
  - Sales management
    - The ability to organize data about customers and sales leads and then to prioritize the potential sales opportunities and identify appropriate next steps.
  - Customer support
    - The ability to support customer service representatives so that they can quickly, thoroughly, and appropriately address customer requests and resolve customer issues while collecting and storing data about those interactions.
  - Analysis
    - To identify the firm's "best customers," and determine how to retain and find more of them
  - Social networking
    - To enable businesses to monitor and engage with customers on social networking platforms

Customer Relationship Management

FIGURE 8.11

SAP Contact Manager

Contact management involves tracking data on individual customers and sales leads and accessing that data from any part of the organization.

Source: SAP AG

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Product Lifecycle Management

- Product lifecycle management (PLM)
  - An enterprise business strategy that creates a common repository of product information and processes
  - Supports the collaborative creation, management, dissemination, and use of product and packaging definition information

- Product lifecycle management (PLM) software
  - Provides a means for managing the data and processes associated with the various phases of the lifecycle of a product
  - The scope of PLM software may include computer-aided design, computer-aided engineering, and computer-aided manufacturing

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Product Lifecycle Management

Retire & replace → Sales & marketing → Research & development → Concept development → Product design → Prototype & test → Process design → Production & assembly → Product delivery & installation → Service & support

PLM software supports the product development lifecycle

FIGURE 8.12
Scope of PLM software
Using PLM software, organizations can manage the data and processes associated with the various phases of the product life cycle.
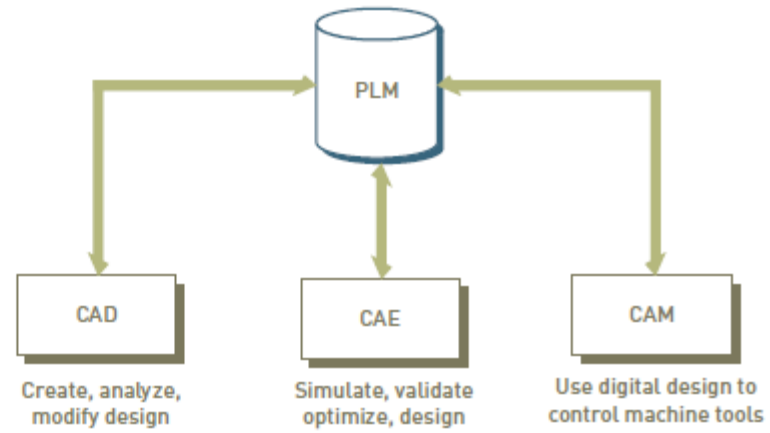
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Product Lifecycle Management

- Computer-aided design (CAD):
  - The use of software to assist in the creation, analysis, and modification of the design of a component or product

- Computer-aided engineering (CAE):
  - The use of software to analyze the robustness and performance of components and assemblies

- Computer-aided manufacturing (CAM)
  - The use of software to control machine tools and related machinery in the manufacture of components and products

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FIGURE 8.13

CAD, CAE, and CAM software

In manufacturing, the model generated in CAD and verified in CAE can be entered into CAM software, which then controls the machine tool.

PLM

CAD
Create, analyze, modify design

CAE
Simulate, validate optimize, design

CAM
Use digital design to control machine tools

Product Lifecycle Management

TABLE 8.5 Benefits of a PLM system

Benefit	How Achieved
Reduce time to market	• By connecting design, research and development, procurement, manufacturing, and customer service seamlessly through a flexible collaboration environment • By improving collaboration among the organization and its suppliers, contract manufacturers, and OEMs
Reduce costs	• By reducing prototyping costs through the use of software simulation • By reducing scrap and rework through improved processes • By reducing the number of product components through standardization

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TABLE 8.6 Challenges to successful enterprise system implementation

Challenge	Description
Cost and disruption of upgrades	Most companies have other systems that must be integrated with the enterprise system, such as financial analysis programs, e-commerce operations, and other applications that communicate with suppliers, customers, distributors, and other business partners. Integration of multiple systems adds time and complexity to an ERP implementation.
Cost and long implementation lead time	The average ERP implementation cost is $5.5 million with an average project duration of just over 14 months.
Difficulty in managing change	Companies often must radically change how they operate to conform to the enterprise work processes. These changes can be so drastic to longtime employees that they depart rather than adapt to the change, leaving the firm short of experienced workers.
Management of software customization	The base enterprise system may need to be modified to meet mandatory business requirements. System customizations can become extremely expensive and further delay implementation.
User frustration with the new system	Effective use of an enterprise system requires changes in work processes and in the details of how work gets done. Many users initially balk at these changes and require extensive training and encouragement.

- Tips for avoiding a failed implementation
  - Assign a full-time executive to manage the project
  - Appoint an experienced, independent resource to provide project over- sight and to verify and validate system performance
  - Allow sufficient time to transition from the old way of doing things to the new system and new processes
  - Allocate sufficient time and money training people
  - Define metrics to assess project progress and to identify project-related risks
  - Keep the scope of the project well defined and contained to essential business processes
  - Be wary of modifying the enterprise system software to conform to your firm's business practices

Hosted Software Model for Enterprise Software

- Many business application software vendors are pushing the use of the hosted software model for businesses

  - The goal is to help customers acquire, use, and benefit from the new technology while avoiding much of the associated complexity and high start-up costs

- Using the hosted software model enables businesses to:

  - Experiment with powerful software capabilities without making a major financial investment

  - Avoid employing a full-time IT person to maintain key business applications

TABLE **8.7** Advantages and disadvantages of hosted software model

Advantages	Disadvantages
Decreased total cost of ownership	Potential availability and reliability issues
Faster system start-up	Potential data security issues
Lower implementation risk	Potential problems integrating the hosted products of different vendors
Management of systems outsourced to experts	Savings anticipated from outsourcing may be offset by increased effort to manage vendor

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Summary

- An organization must have information systems that support routine, day-to-day activities and that help a company add value to its products and services

- An organization that implements an enterprise system is creating a highly integrated set of systems, which can lead to many business benefits

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