UNIVERSITY OF GLOBAL VILLAGE

Department of Business Administration
University of Global Village

Management Information System (MIS)

Course Code	**:**	BBA 324	**Total Credit**	**:**	3 **(**Three**)**
			CIE Marks	**:**	90
Semester End Exam (SEE) Hours	**:**	03	SEE Marks	**:**	60

Course Learning Outcomes (CLOs): after completion of this course successfully, the students will be able to……

CLO1	Describe the role, dimensions, and approaches of information systems in transforming business operations.
CLO2	Analyze how information systems enhance business processes, collaboration, and teamwork across management levels.
CLO3	Evaluate the use of information systems to gain competitive advantage while addressing ethical and social concerns.
CLO4	Design IT infrastructure and database solutions to improve business performance and decision-making.
CLO5	Apply telecommunication and security measures to protect organizational information resources.
CLO6	Utilize enterprise systems and e-commerce technologies to address digital market opportunities and challenges.

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Course plan specifying Topics, Teaching time and CLOs

Serial No.	Content	Hours	CLOs
1.	The Role of Information Systems in Business Today	4	CLO 1
2.	Global E-Business and Collaboration	6	CLO 2
3.	Organizations and Information Systems	6	CLO 3
4.	IT Infrastructure	6	CLO 4
5.	Telecommunications And Networking in Today's Business World	6	CLO 5
6.	Securing Information Systems	4	CLO 5
7.	Enterprise Systems	6	CLO 6
8.	E-Commerce: Digital Markets, Digital Goods	4	CLO 6

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Course plan specifying content, CLOs, Teaching Learning, and Assessment Strategy Mapped with CLOs:

Week	Content	Teaching Learning Strategy	Assessment Strategy	Corresponding CLOs
01 &2	**The Role of Information Systems in Business Today:** The Role of Information Systems in Business Today; How Information Systems Are Transforming Business; Management Information Systems; Information Systems; Perspectives on Information Systems; Dimensions of Information Systems; It Isn’t Just Technology: A Business Perspective on Information Systems Complementary Assets: Organizational Capital and the Right Business; Contemporary Approaches to Information Systems	Class Lecture, Open discussion	Question & Answer (Oral) Class Test Written Test	CLO 1
3 & 4	**Global E-Business and Collaboration** Business Processes and Information Systems; Business Processes; How Information Technology Enhances Business; Processes; Types of Business Information Systems; Systems for Different Management Groups; Systems for Linking the Enterprise; Systems for Collaboration and Teamwork; Business Benefits of Collaboration and Teamwork; Building a Collaborative Culture and Business Processes; Tools and Technologies for Collaboration and Teamwork	Class Lecture, Open discussion	Question & Answer (Oral) Class Test Written Test	CLO 2
5 & 6	**Organizations and Information Systems:**	Class Lecture,	Question & Answer	CLO 3

	Using Information Systems to Achieve; Competitive Advantage, Using Systems for Competitive Advantage; Management Issues; Understanding Ethical and Social Issues Related to Systems; Ethics In An Information Society; The Moral Dimensions Of Information Systems	Open discussion	(Oral) Class Test Written Test	
7,8 & 9	**It Infrastructure** Infrastructure Components; Contemporary Hardware Platform Trends Contemporary Software Platform Trends; Management Issues; Organizing Data in A Traditional File Environment; The Database Approach to Data Management; Using Databases to Improve Business; Performance and Decision Making; Managing Data Resources		Question & Answer (Oral) Class Test Written Test	CLO 4
10 & 11	**Telecommunications And Networking in Today's Business World** Communications Networks; The Global Internet; The Wireless Revolution	Class Lecture Open discussion,	Question & Answer (Oral) Class Test Written Test	CLO 5
12 & 13	**Securing Information Systems** System Vulnerability and Abuse; Business Value of Security and Control; Establishing A Framework for Security and Control Technologies And Tools for Protecting Information Resources	Group Assignment	Question & Answer (Oral) Class Test Written Test	CLO 5
14 & 15	**Enterprise Systems** Supply Chain Management Systems; Customer Relationship Management Systems; Enterprise Applications; New Opportunities and Challenges	Class Lecture Debriefing	Question & Answer (Oral) Class Test Written Test	CLO 6

16 & 17	**E-Commerce: Digital Markets, Digital Goods** E-Commerce and The Internet; E-Commerce: Business and Technology; The Mobile Digital Platform and Mobile E-Commerce; Building an E-Commerce Presence	Class Lecture Open discussion,	Question & Answer (Oral) Class Test Written Test	CLO 6

Reference Books:

Management Information Systems: Managing The Digital Firm by Kenneth C. Laudon & Jane P. Laudon

1) Assessment Strategy: Group Discussion, Class tests, Case Study, Term Paper, Presentation.

2) Marks distribution:

a) Continuous Assessment:

- Class attendance is mandatory. Absent of 70% of classes; disqualify the student for final examination only authority recommendations will be accepted with highly reasonable causes.
- Late submission of assignments is not allowed. Late submission of assignments
- will be only taken with highly reasonable causes and a 20% mark will be deducted.
- To pass this course students will have to appear in mid-term and final examinations.

b) Summative:

CIE- Continuous Internal Evaluation (45 Marks)

Bloom's Category Marks (out of 45)	Tests (25)	Assignments (15)	Quizzes (05)	External Participation in Curricular/Co-Curricular Activities (5)
Remember			05	
Understand		05		
Apply	08			5
Analyze	09			
Evaluate	08	05		
Create		05		

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SEE- Semester End Examination (60 Marks)

Bloom's Category	Tests
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	10
Create	10

3) Make-up Procedures: Dates for exams will be strictly followed. No makeup exam (Normal case), for exceptional cases university rules and regulations should be followed.

Week-Based Content Distribution

Week	The slides are expected to cover
1.	1 to 20
2.	21 to 40
3.	41 to 60
4.	61 to 80
5.	81 to 100
6.	101 to 120
7.	121 to 140
8.	141 to 160
9.	161 to 180
10.	181 to 200
11.	201 to 220
12.	221 to 240
13.	241 to 260
14.	261 to 280
15.	281 to 300
16.	301 to 325
17.	326 to 355
Note: Follow the page number from the PDF starting from slide 1. Besides this, the course teacher is expected to share knowledge with students using indexed research articles.	

Chapter 1

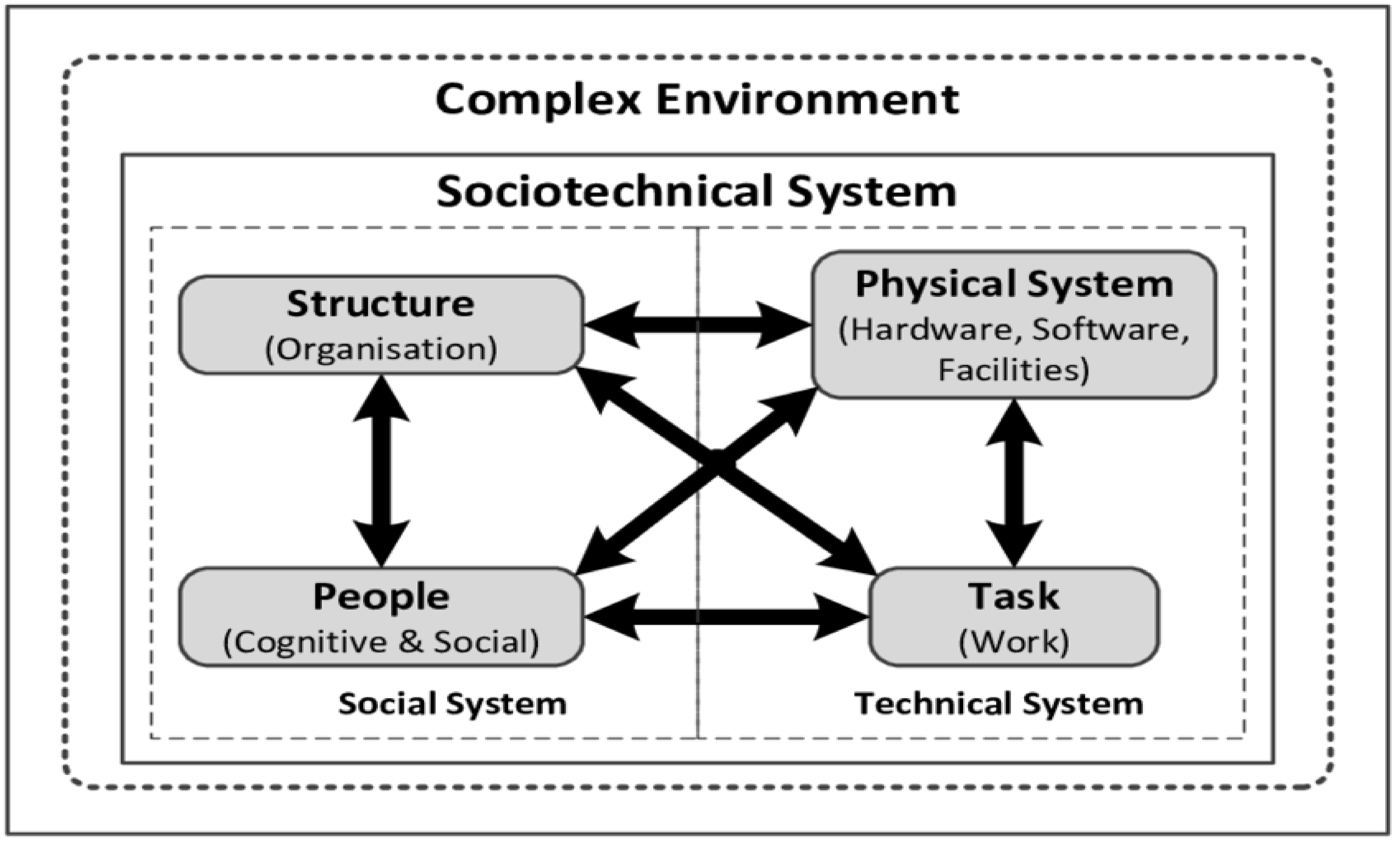
INFORMATION SYSTEMS IN BUSINESS TODAY

Learning Objectives

- Understanding the effects of information systems on business and their relationship to globalization.
- Explain why information systems are so essential in business today.
- Define an information system and describe its management, organization, and technology components.

Learning Objectives (cont.)

- Define complementary assets and explain how they ensure that information systems provide genuine value to an organization.
- Describe the different academic disciplines used to study information systems and explain how each contributes to our understanding of them.
- Explain what is meant by a sociotechnical systems perspective.


Complex Environment
Sociotechnical System
Structure
(Organisation)
Physical System
(Hardware, Software,
Facilities)
People
(Cognitive & Social)
Task
(Work)
Social System
Technical System

The Role of Information Systems in Business Today

- How information systems are transforming business
  - Increase in wireless technology use, Web sites
  - Increased business use of Web 2.0 technologies
  - Cloud computing, mobile digital platform allow more distributed work, decision-making, and collaboration
- Globalization opportunities
  - Internet has drastically reduced costs of operating on global scale
  - Presents both challenges and opportunities


www
HTML5
CSS3
js
Cloud
XML
flat
PHP
header
.com
.org
footer
.net
database

The Role of Information Systems in Business Today

Information Technology Capital Investment

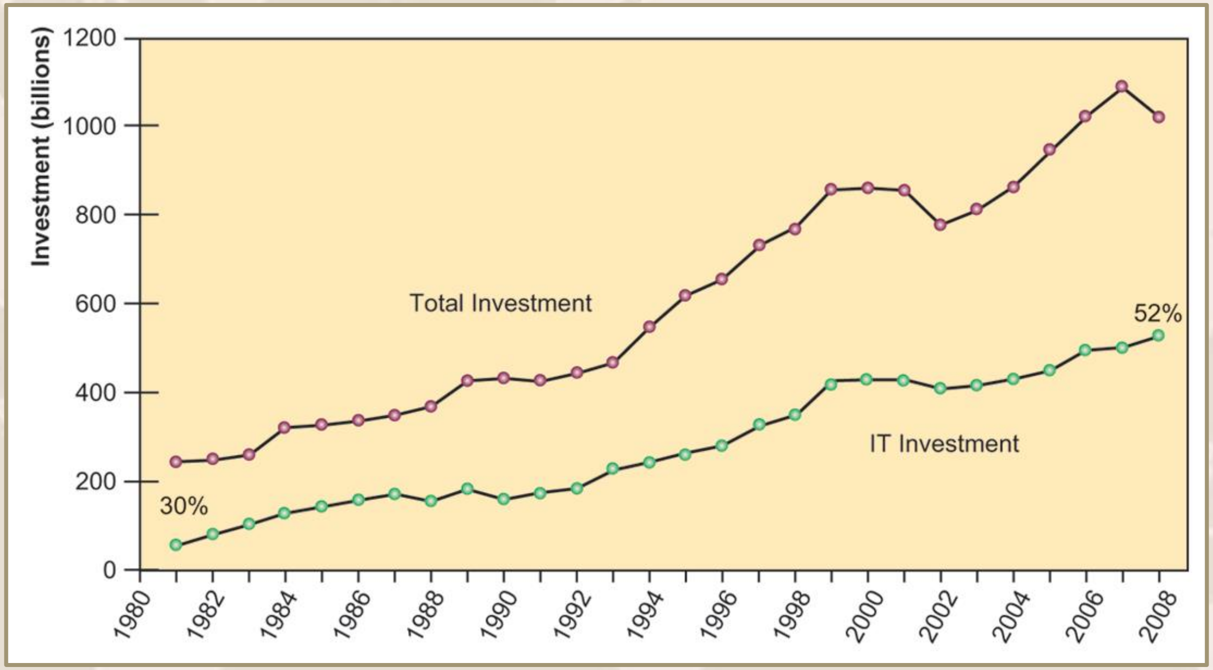


FIGURE 1-1 Information technology capital investment, defined as hardware, software, and communications equipment, grew from 32 percent to 52 percent of all invested capital between 1980 and 2009.

The Role of Information Systems in Business Today

- In the emerging, fully digital firm
  - Significant business relationships are digitally enabled and mediated
  - Core business processes are accomplished through digital networks
  - Key corporate assets are managed digitally
- Digital firms offer greater flexibility in organization and management
  - Time shifting, space shifting

The Role of Information Systems in Business Today

- **Growing interdependence between ability to use information technology and ability to implement corporate strategies and achieve corporate goals**
- **Business firms invest heavily in information systems to achieve six strategic business objectives:**
  1. Operational excellence
  2. New products, services, and business models
  3. Customer and supplier intimacy
  4. Improved decision making
  5. Competitive advantage
  6. Survival

The Role of Information Systems in Business Today

- Operational excellence:
  - Improvement of efficiency to attain higher profitability
  - Information systems, technology an important tool in achieving greater efficiency and productivity
  - Walmart’s RetailLink system links suppliers to stores for superior replenishment system

The Role of Information Systems in Business Today

- **New products, services, and business models:**
  - **Business model: describes how company produces, delivers, and sells product or service to create wealth**
  - **Information systems and technology a major enabling tool for new products, services, business models**
    - Examples: Apple’s iPod, iTunes, iPhone, iPad, Google’s Android OS, and Netflix

The Role of Information Systems in Business Today

- **Customer and supplier intimacy:**
  - **Serving customers well leads to customers returning, which raises revenues and profits**
    - Example: High-end hotels that use computers to track customer preferences and use to monitor and customize environment
  - **Intimacy with suppliers allows them to provide vital inputs, which lowers costs**
    - Example: J.C.Penney's information system which links sales records to contract manufacturer

The Role of Information Systems in Business Today

- **Improved decision making**
  - **Without accurate information:**
    - Managers must use forecasts, best guesses, luck
    - Leads to:
      - Overproduction, underproduction of goods and services
      - Misallocation of resources
      - Poor response times
    - Poor outcomes raise costs, lose customers
  - **Example: Verizon’s Web-based digital dashboard to provide managers with real-time data on customer complaints, network performance, line outages, etc.**

The Role of Information Systems in Business Today

- **Operational excellence:**
  - Improvement of efficiency to attain higher profitability
- **New products, services, and business models:**
  - Enabled by technology
- **Customer and supplier intimacy:**
  - Serving customers raises revenues and profits
  - Better communication with suppliers lowers costs
- **Improved decision making**
  - More accurate data leads to better decisions

The Role of Information Systems in Business Today

- Competitive advantage
  - Delivering better performance
  - Charging less for superior products
  - Responding to customers and suppliers in real time
  - Examples: Apple, Walmart, UPS

The Role of Information Systems in Business Today

- **Survival**
  - **Information technologies as necessity of business**
  - **May be:**
    - Industry-level changes, e.g. Citibank’s introduction of ATMs
    - Governmental regulations requiring record-keeping
      - Examples: Toxic Substances Control Act, Sarbanes-Oxley Act

The Role of Information Systems in Business Today

The Interdependence Between Organizations and Information Technology

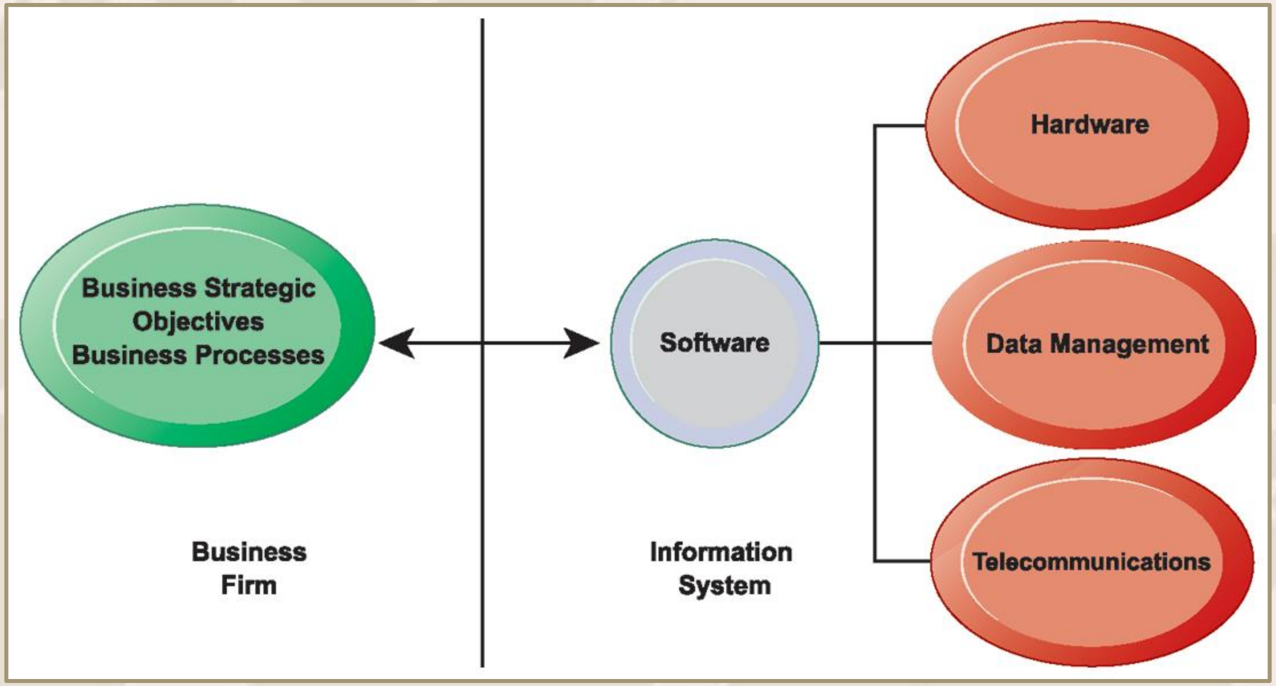


Figure 1.2 In contemporary systems there is a growing interdependence between a firm's information systems and its business capabilities. Changes in strategy, rules, and business processes increasingly require changes in hardware, software, databases, and telecommunications. Often, what the organization would like to do depends on what its systems will permit it to do.

❖ Perspectives on Information Systems

- **Information system:**
  - **Set of interrelated components**
  - **Collect, process, store, and distribute information**
  - **Support decision making, coordination, and control**
- **Information vs. data**
  - **Data are streams of raw facts**
  - **Information is data shaped into meaningful form**

Perspectives on Information Systems

Data and Information

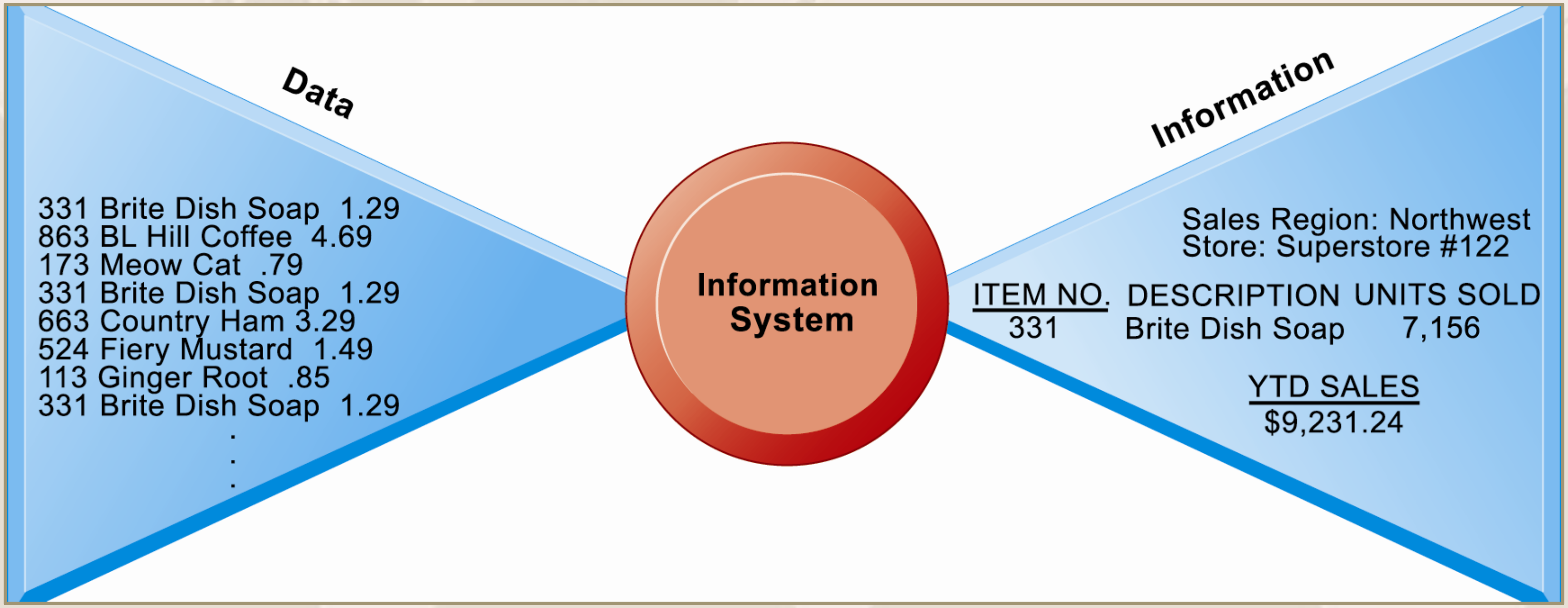


Figure 1.3 Raw data from a supermarket checkout counter can be processed and organized to produce meaningful information, such as the total unit sales of dish detergent or the total sales revenue from dish detergent for a specific store or sales territory.

Perspectives on Information Systems

- **Three activities of information systems produce information organizations need**

  1. **Input:** Captures raw data from organization or external environment
  2. **Processing:** Converts raw data into meaningful form
  3. **Output:** Transfers processed information to people or activities that use it

Perspectives on Information Systems

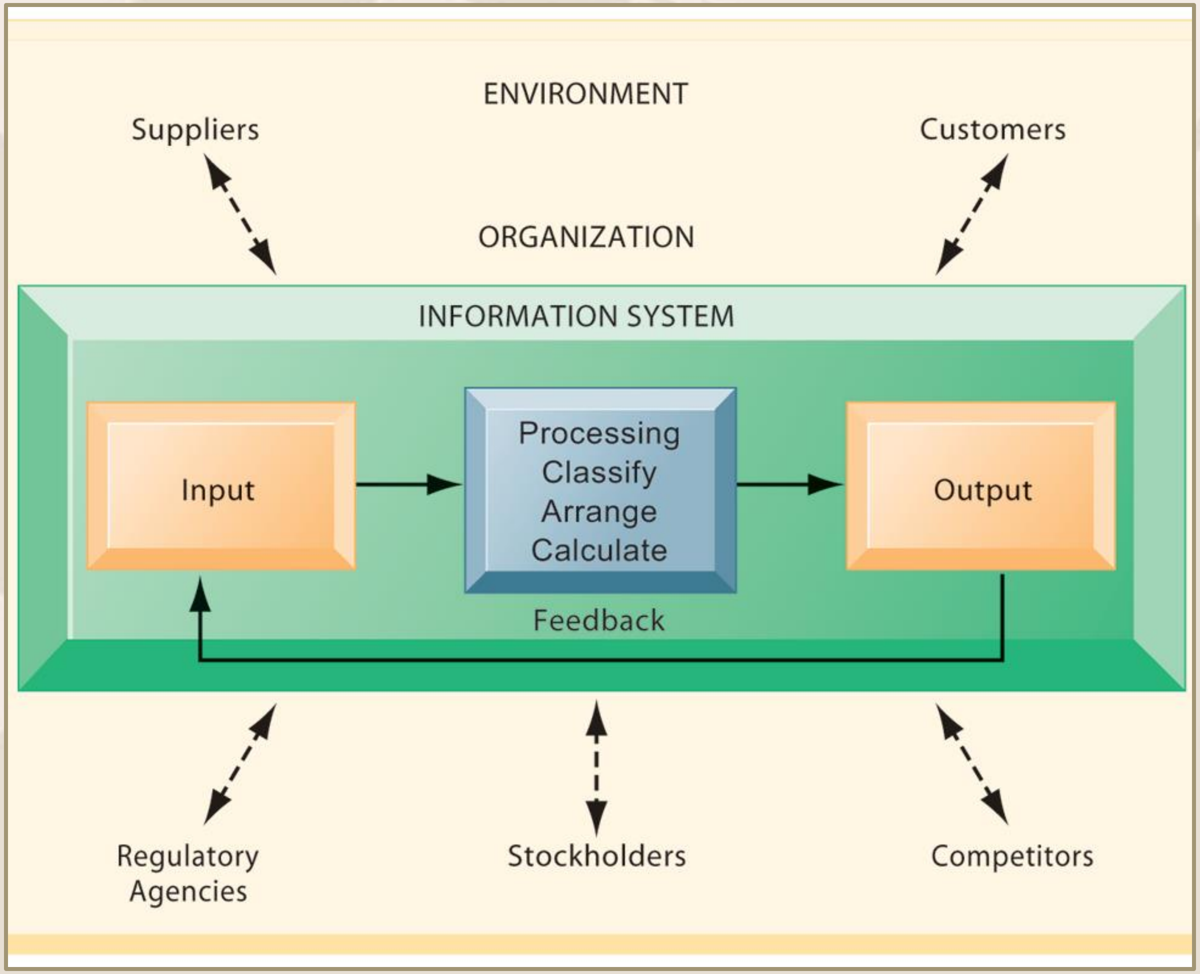
- **Feedback:**
  - **Output returned to appropriate members of organization to help evaluate or correct input stage**
- **Computer/Computer program vs. information system**
  - **Computers and software are technical foundation and tools, similar to the material and tools used to build a house**

Perspectives on Information Systems

Functions of an Information System

An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental actors, such as customers, suppliers, competitors, stockholders, and regulatory agencies, interact with the organization and its information systems.

Figure 1.4



Perspectives on Information Systems

Information Systems Are More Than Computers

Using information systems effectively requires an understanding of the organization, management, and information technology shaping the systems. An information system creates value for the firm as an organizational and management solution to challenges posed by the environment.

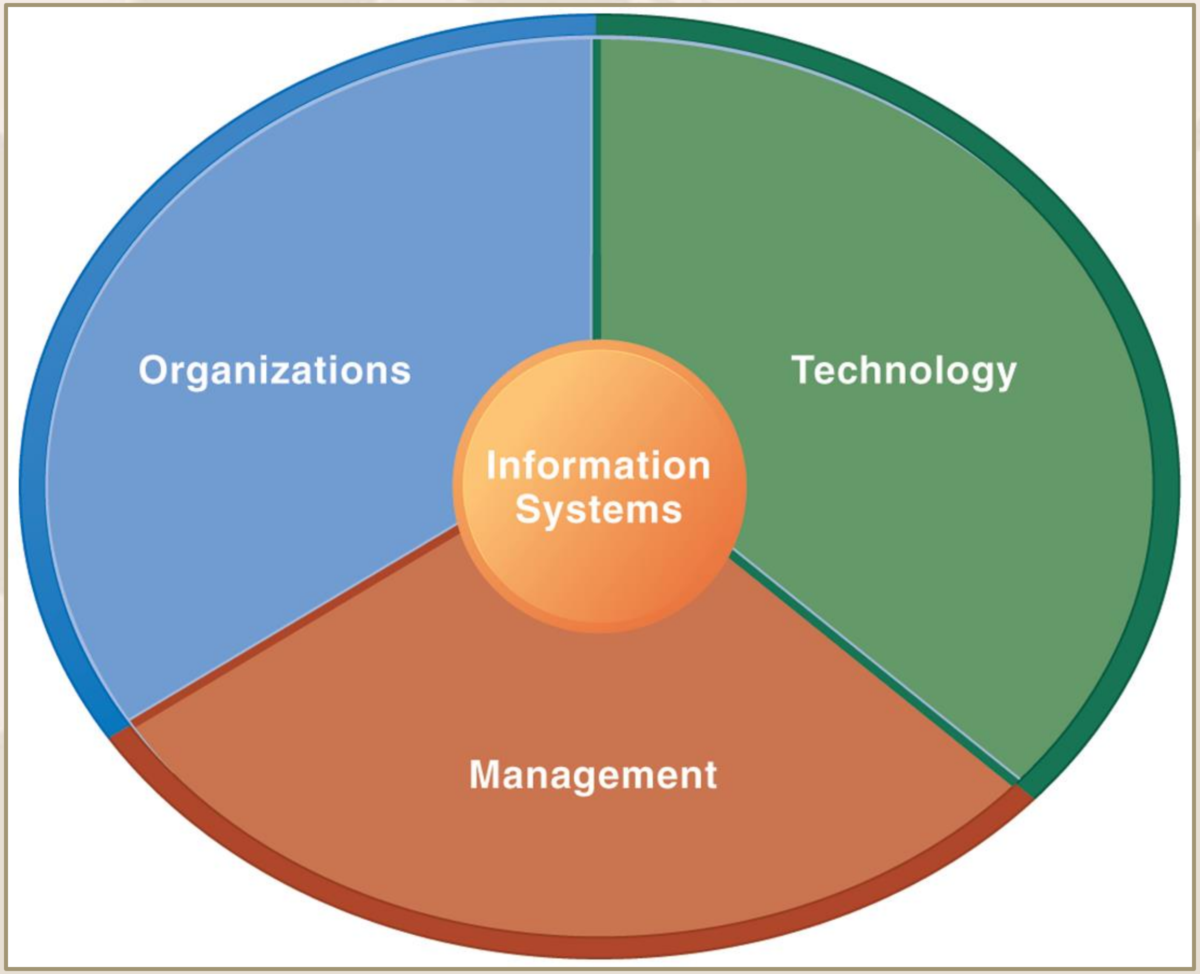


Figure 1.5

Perspectives on Information Systems

- **Dimensions of Information Systems tracking system**
  - **Organizational:**
    - Procedures for tracking packages and managing inventory and provide information
  - **Management:**
    - Monitor service levels and costs
  - **Technology:**
    - Handheld computers, bar-code scanners, networks, desktop computers, etc.

Perspectives on Information Systems

- **Technology dimension of information systems**
  - **Computer hardware and software**
  - **Data management technology**
  - **Networking and telecommunications technology**
    - Networks, the Internet, intranets and extranets, World Wide Web
  - **IT infrastructure: provides platform that system is built on**

Perspectives on Information Systems

- **Business perspective on information systems:**
  - **Information system is instrument for creating value**
  - **Investments in information technology will result in superior returns:**
    - Productivity increases
    - Revenue increases
    - Superior long-term strategic positioning

Perspectives on Information Systems

- **Business information value chain**
  - Raw data acquired and transformed through stages that add value to that information
  - Value of information system determined in part by extent to which it leads to better decisions, greater efficiency, and higher profits
- **Business perspective:**
  - Calls attention to organizational and managerial nature of information systems

Perspectives on Information Systems

The Business Information Value Chain

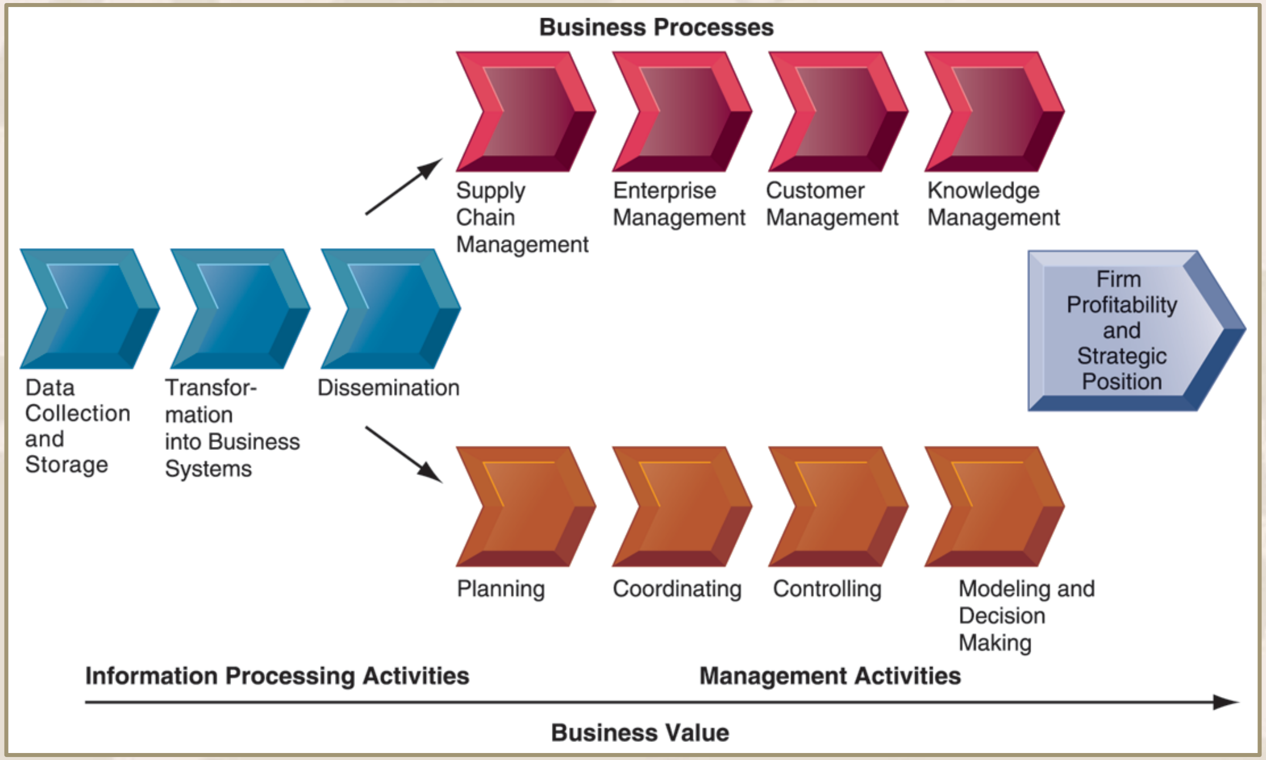


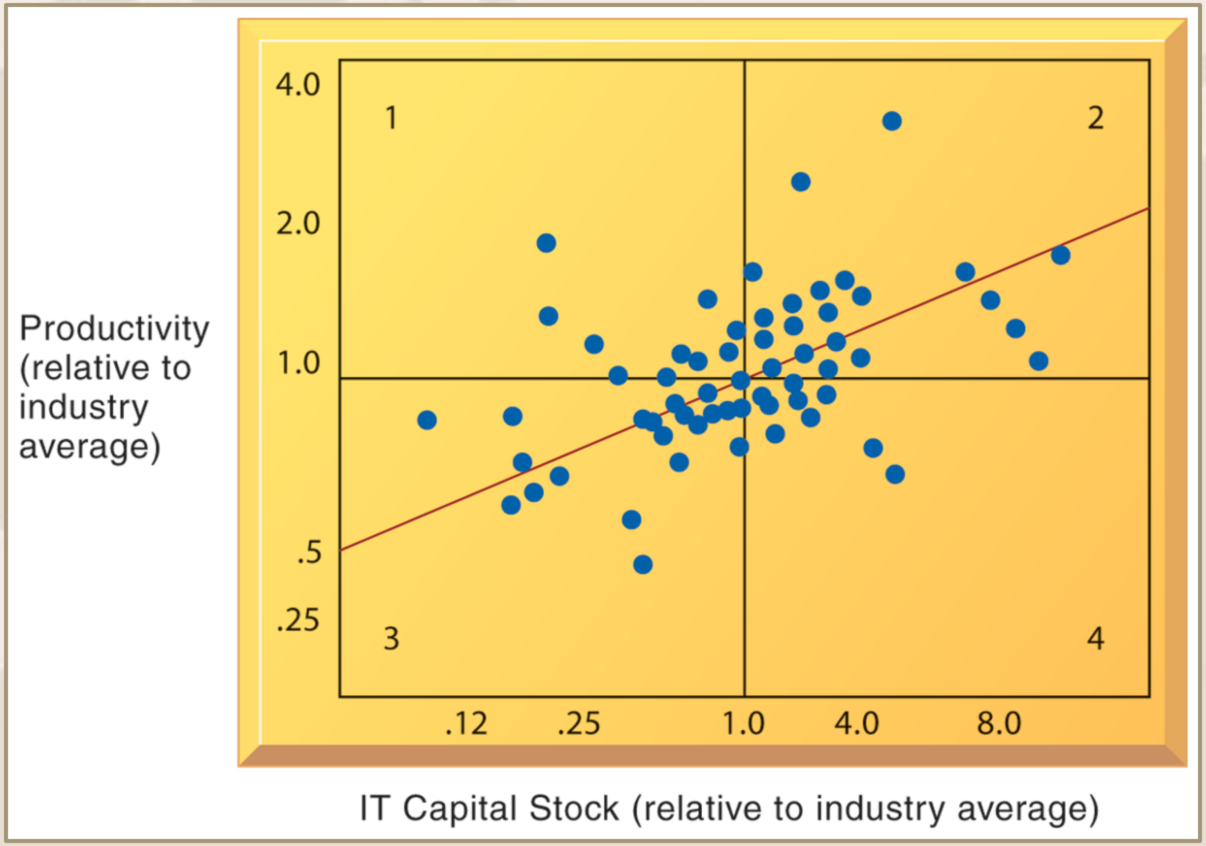
Figure 1-7 From a business perspective, information systems are part of a series of value-adding activities for acquiring, transforming, and distributing information that managers can use to improve decision making, enhance organizational performance, and, ultimately, increase firm profitability.

Perspectives on Information Systems

Variation in Returns On Information Technology Investment

Although, on average, investments in information technology produce returns far above those returned by other investments, there is considerable variation across firms.

Figure 1.8



Perspectives on Information Systems

- Investing in information technology does not guarantee good returns
- Considerable variation in the returns firms receive from systems investments
- Factors:
  - Adopting the right business model
  - Investing in complementary assets (organizational and management capital)

Perspectives on Information Systems

- Complementary assets:
  - Assets required to derive value from a primary investment
  - Firms supporting technology investments with investment in complementary assets receive superior returns
  - E.g.: invest in technology <u>and</u> the people to make it work properly

Perspectives on Information Systems

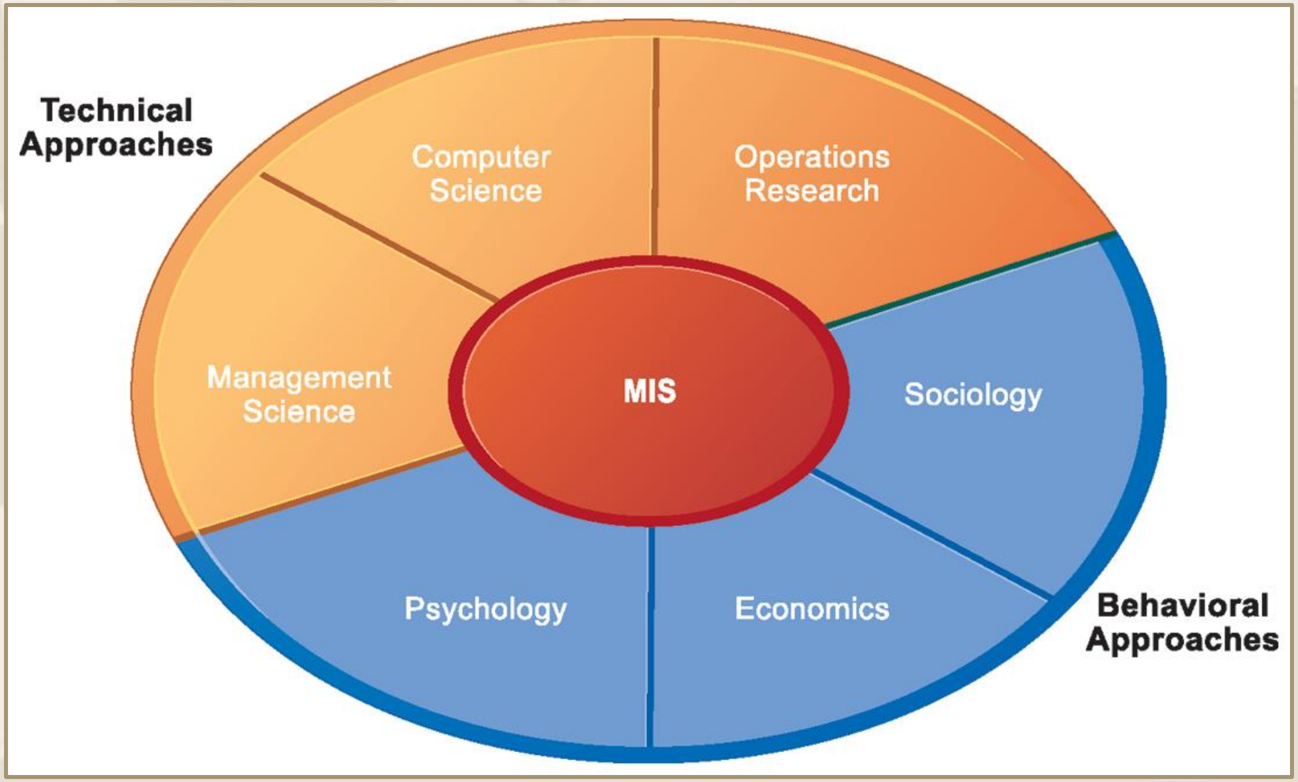
- **Complementary assets include:**
  - **Organizational assets, e.g.**
    - Appropriate business model
    - Efficient business processes
  - **Managerial assets, e.g.**
    - Incentives for management innovation
    - Teamwork and collaborative work environments
  - **Social assets, e.g.**
    - The Internet and telecommunications infrastructure
    - Technology standards

Contemporary Approaches to Information Systems

Contemporary Approaches to Information Systems

The study of information systems deals with issues and insights contributed from technical and behavioral disciplines.

Figure 1.9



Contemporary Approaches to Information Systems

- Technical approach
  - Emphasizes mathematically based models
  - Computer science, management science, operations research
- Behavioral approach
  - Behavioral issues (strategic business integration, implementation, etc.)
  - Psychology, economics, sociology

Contemporary Approaches to Information Systems

- Management Information Systems
  - Combines computer science, management science, operations research and practical orientation with behavioral issues
- Four main actors
  - Suppliers of hardware and software
  - Business firms
  - Managers and employees
  - Firm's environment (legal, social, cultural context)

Chapter 2

GLOBAL E-BUSINESS AND COLLABORATION

VIDEO CASES

Case 1: How FedEx Works: Enterprise Systems

Case 2: Oracle's Austin Data Center Instructional Video 1: FedEx Improves Customer Experience with Integrated Mapping and Location Data

Learning Objectives

- Define and describe business processes and their relationship to information systems.
- Evaluate the role played by systems serving the various levels of management in a business and their relationship to each other.
- Explain how enterprise applications improve organizational performance.

Learning Objectives (cont.)

- Explain the importance of collaboration and teamwork in business and how they are supported by technology.
- Assess the role of the information systems function in a business.

Business Processes and Information Systems

- **Business processes:**
  - Workflows of material, information, knowledge
  - Sets of activities, steps
  - May be tied to functional area or be cross-functional
- **Businesses: Can be seen as collection of business processes**
- **Business processes may be assets or liabilities**

Business Processes and Information Systems

- **Examples of functional business processes**
  - **Manufacturing and production**
    - Assembling the product
  - **Sales and marketing**
    - Identifying customers
  - **Finance and accounting**
    - Creating financial statements
  - **Human resources**
    - Hiring employees

Business Processes and Information Systems

The Order Fulfillment Process

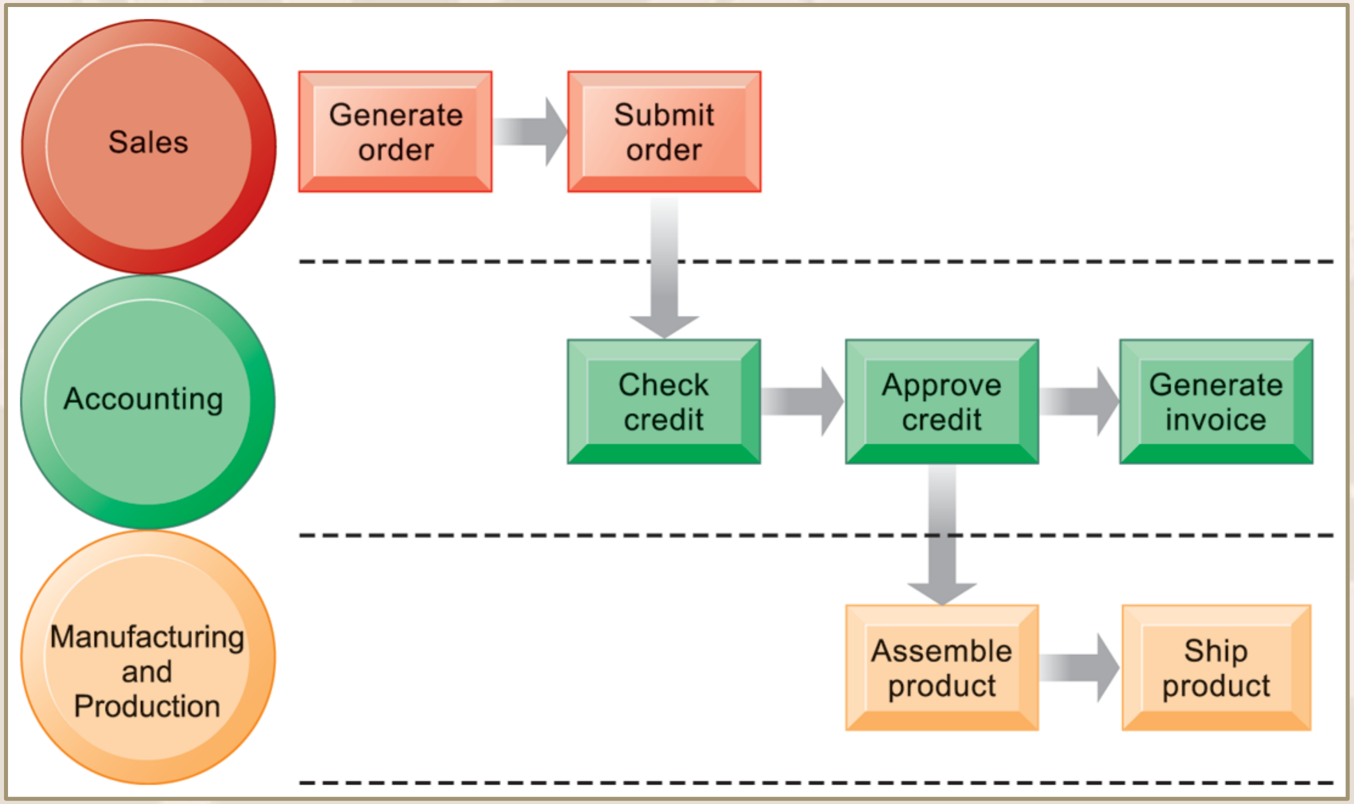


FIGURE 2-1 Fulfilling a customer order involves a complex set of steps that requires the close coordination of the sales, accounting, and manufacturing functions.

Business Processes and Information Systems

- **Information technology enhances business processes in two main ways:**
  1. **Increasing efficiency of existing processes**
     - Automating steps that were manual
  2. **Enabling entirely new processes that are capable of transforming the businesses**
     - Change flow of information
     - Replace sequential steps with parallel steps
     - Eliminate delays in decision making

Types of Information Systems

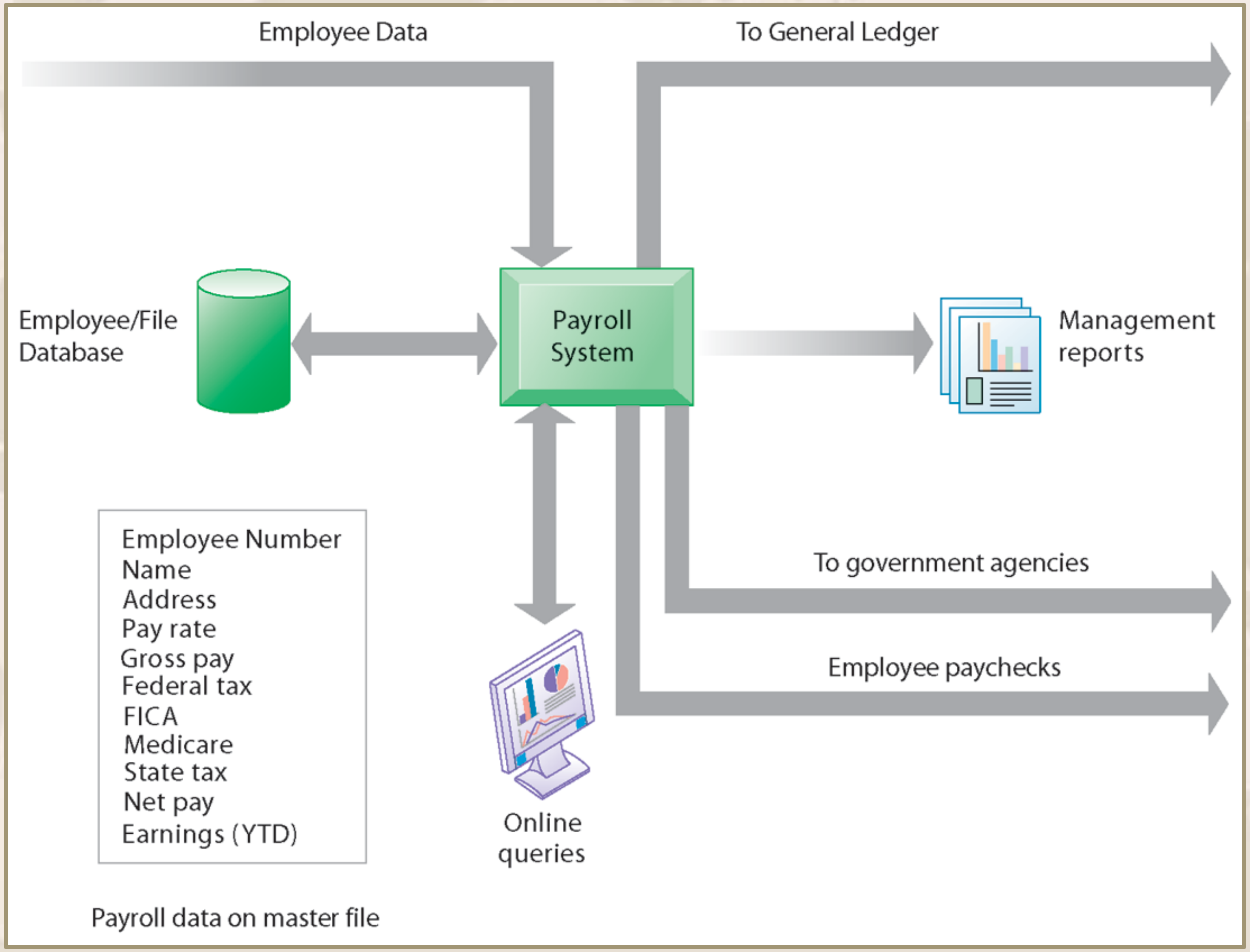
- **Transaction processing systems**
  - **Perform and record daily routine transactions necessary to conduct business**
    - Examples: sales order entry, payroll, shipping
  - **Allow managers to monitor status of operations and relations with external environment**
  - **Serve operational levels**
  - **Serve predefined, structured goals and decision making**

Types of Information Systems

A Payroll TPS

A TPS for payroll processing captures employee payment transaction data (such as a time card). System outputs include online and hard-copy reports for management and employee paychecks.

FIGURE 2-2



Types of Information Systems

- **Management information systems**
  - **Serve middle management**
  - **Provide reports on firm's current performance, based on data from TPS**
  - **Provide answers to routine questions with predefined procedure for answering them**
  - **Typically have little analytic capability**

Types of Information Systems

How Management Information Systems Obtain Their Data from the Organization's TPS

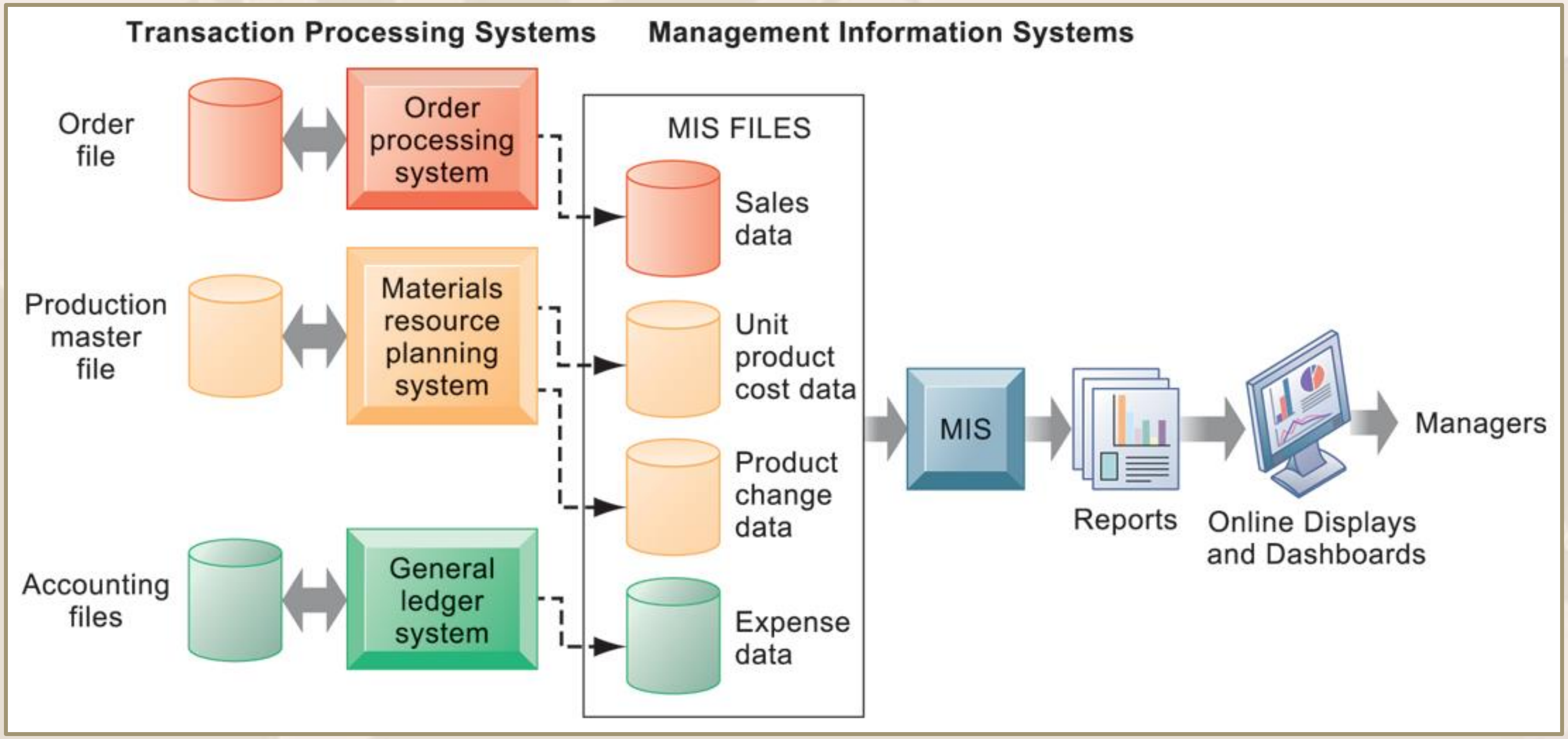


FIGURE 2-3 In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

Types of Information Systems

Sample MIS Report

Consolidated Consumer Products Corporation Sales by Product and Sales Region: 2011

PRODUCT CODE	PRODUCT DESCRIPTION	SALES REGION	ACTUAL SALES	PLANNED	ACTUAL versus PLANNED
4469	Carpet Cleaner	Northeast	4,066,700	4,800,000	0.85
		South	3,778,112	3,750,000	1.01
		Midwest	4,867,001	4,600,000	1.06
		West	4,003,440	4,400,000	0.91
	TOTAL		16,715,253	17,550,000	0.95
5674	Room Freshener	Northeast	3,676,700	3,900,000	0.94
		South	5,608,112	4,700,000	1.19
		Midwest	4,711,001	4,200,000	1.12
		West	4,563,440	4,900,000	0.93
	TOTAL		18,559,253	17,700,000	1.05

FIGURE 2-4 This report, showing summarized annual sales data, was produced by the MIS in Figure 2-3.

Types of Information Systems

- **Decision support systems**
  - **Serve middle management**
  - **Support non-routine decision making**
    - Example: What is impact on production schedule if December sales doubled?
  - **Often use external information as well from TPS and MIS**
  - **Model driven DSS**
    - Voyage-estimating systems
  - **Data driven DSS**
    - Intrawest’s marketing analysis systems

Types of Information Systems

Voyage-Estimating Decision Support System

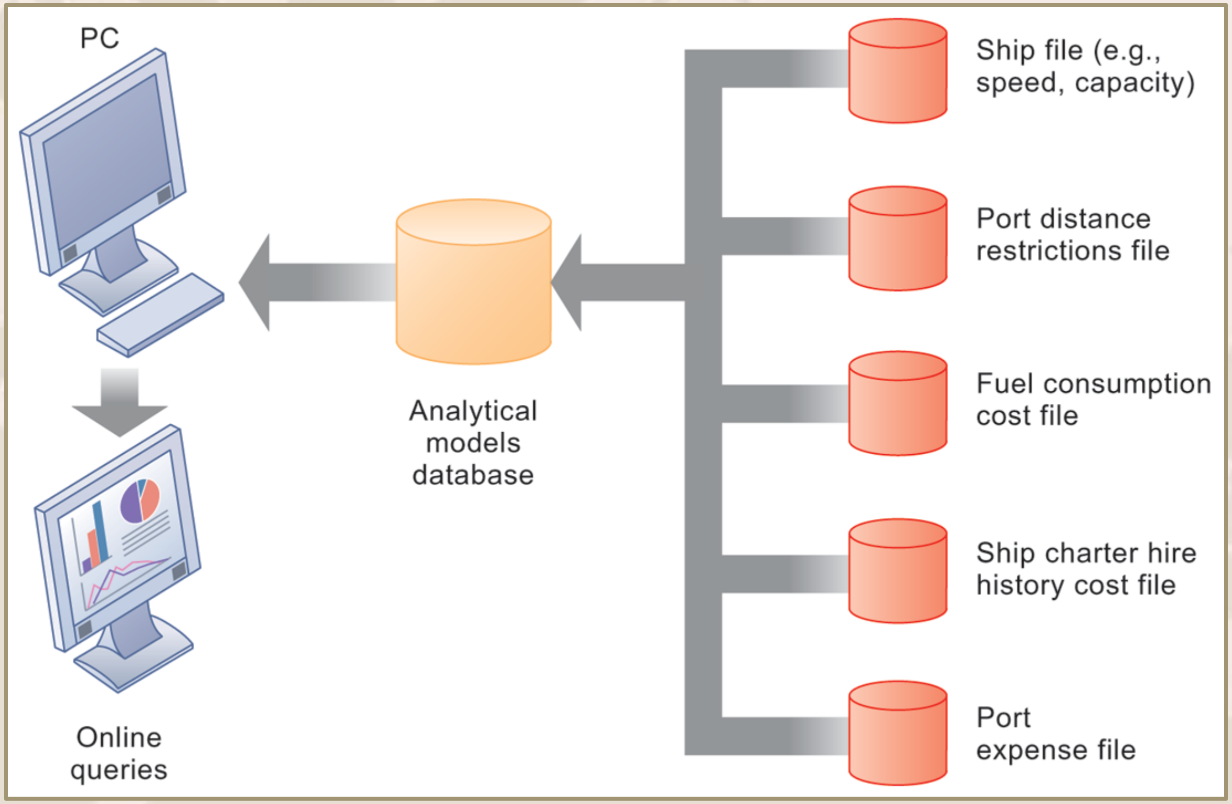


FIGURE 2-5 This DSS operates on a powerful PC. It is used daily by managers who must develop bids on shipping contracts.

Types of Information Systems

- **Business intelligence**
  - **Class of software applications**
  - **Analyze current and historical data to find patterns and trends and aid decision-making**
  - **Used in systems that support middle and senior management**
    - Data-driven DSS
    - Executive support systems (ESS)

Types of Information Systems

- **Executive support systems**
  - **Support senior management**
  - **Address non-routine decisions**
    - Requiring judgment, evaluation, and insight
  - **Incorporate data about external events (e.g. new tax laws or competitors) as well as summarized information from internal MIS and DSS**
  - **Example:** Digital dashboard with real-time view of firm's financial performance: working capital, accounts receivable, accounts payable, cash flow, and inventory

Types of Information Systems

- Systems from a constituency perspective
  - Transaction processing systems: supporting operational level employees
  - Management information systems and decision-support systems: supporting managers
  - Executive support systems: supporting executives

Types of Information Systems

- **Relationship of systems to one another**
  - **TPS:** Major source of data for other systems
  - **ESS:** Recipient of data from lower-level systems
  - **Data may be exchanged between systems**
  - **In reality, most businesses' systems are only loosely integrated (but they are getting better!)**

Types of Information Systems

- **Enterprise applications**
  - **Systems for linking the enterprise**
  - **Span functional areas**
  - **Execute business processes across firm**
  - **Include all levels of management**
  - **Four major applications:**
    - Enterprise systems
    - Supply chain management systems
    - Customer relationship management systems
    - Knowledge management systems

Types of Information Systems

Enterprise Application Architecture

Enterprise applications automate processes that span multiple business functions and organizational levels and may extend outside the organization.

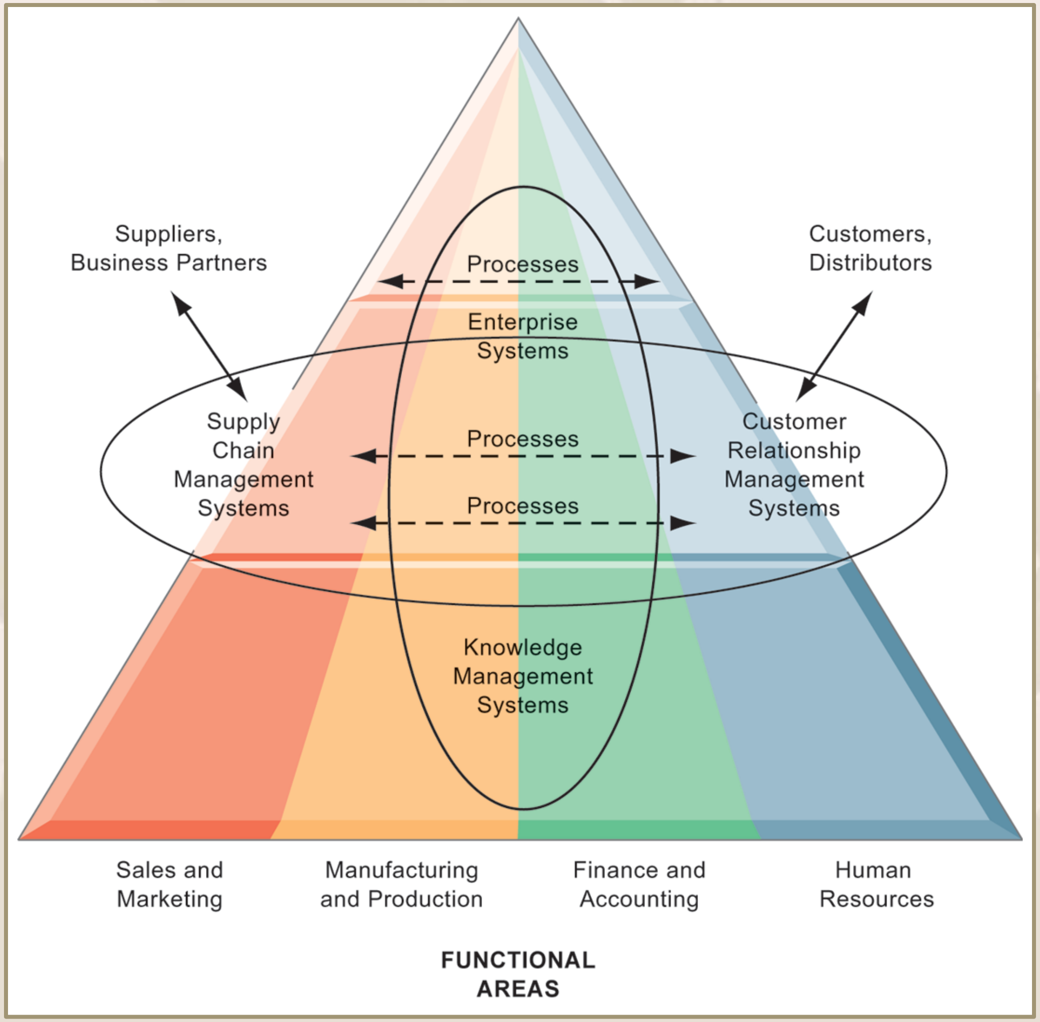


FIGURE 2-6

Types of Information Systems

- **Enterprise systems**
  - **Collects data from different firm functions and stores data in single central data repository**
  - **Resolves problem of fragmented, redundant data sets and systems**
  - **Enable:**
    - Coordination of daily activities
    - Efficient response to customer orders (production, inventory)
    - Provide valuable information for improving management decision making

Types of Information Systems

- **Supply chain management (SCM) systems**
  - **Manage firm's relationships with suppliers**
  - **Share information about**
    - Orders, production, inventory levels, delivery of products and services
  - **Goal:**
    - Right amount of products to destination with least amount of time and lowest cost

Types of Information Systems

- Customer relationship management systems:
  - Provide information to coordinate all of the business processes that deal with customers in sales, marketing, and service to optimize revenue, customer satisfaction, and customer retention
  - Integrate firm's customer-related processes and consolidate customer information from multiple communication channels

Types of Information Systems

- **Knowledge management systems (KMS)**
  - **Support processes for acquiring, creating, storing, distributing, applying, integrating knowledge**
    - How to create, produce, distribute products and services
  - **Collect internal knowledge and experience within firm and make it available to employees**
  - **Link to external sources of knowledge**

Types of Information Systems

- **Alternative tools that increase integration and expedite the flow of information**
  - **Intranets:**
    - Internal company Web sites accessible only by employees
  - **Extranets:**
    - Company Web sites accessible externally only to vendors and suppliers
    - Often used to coordinate supply chain

Types of Information Systems

- **E-business**
  - Use of digital technology and Internet to drive major business processes
- **E-commerce**
  - Subset of e-business
  - Buying and selling goods and services through Internet
- **E-government:**
  - Using Internet technology to deliver information and services to citizens, employees, and businesses

Systems for Collaboration and Teamwork

- **Collaboration:**
  - Short-lived or long-term
  - Informal or formal (teams)
- **Growing importance of collaboration:**
  - Changing nature of work
  - Growth of professional work – “interaction jobs”
  - Changing organization of the firm
  - Changing scope of the firm
  - Emphasis on innovation
  - Changing culture of work

Systems for Collaboration and Teamwork

- **Business benefits of collaboration and teamwork**
  - **Investments in collaboration technology can produce organizational improvements returning high ROI**
  - **Benefits:**
    - Productivity
    - Quality
    - Innovation
    - Customer service
    - Financial performance
      - Profitability, sales, sales growth

Systems for Collaboration and Teamwork

Requirements for Collaboration

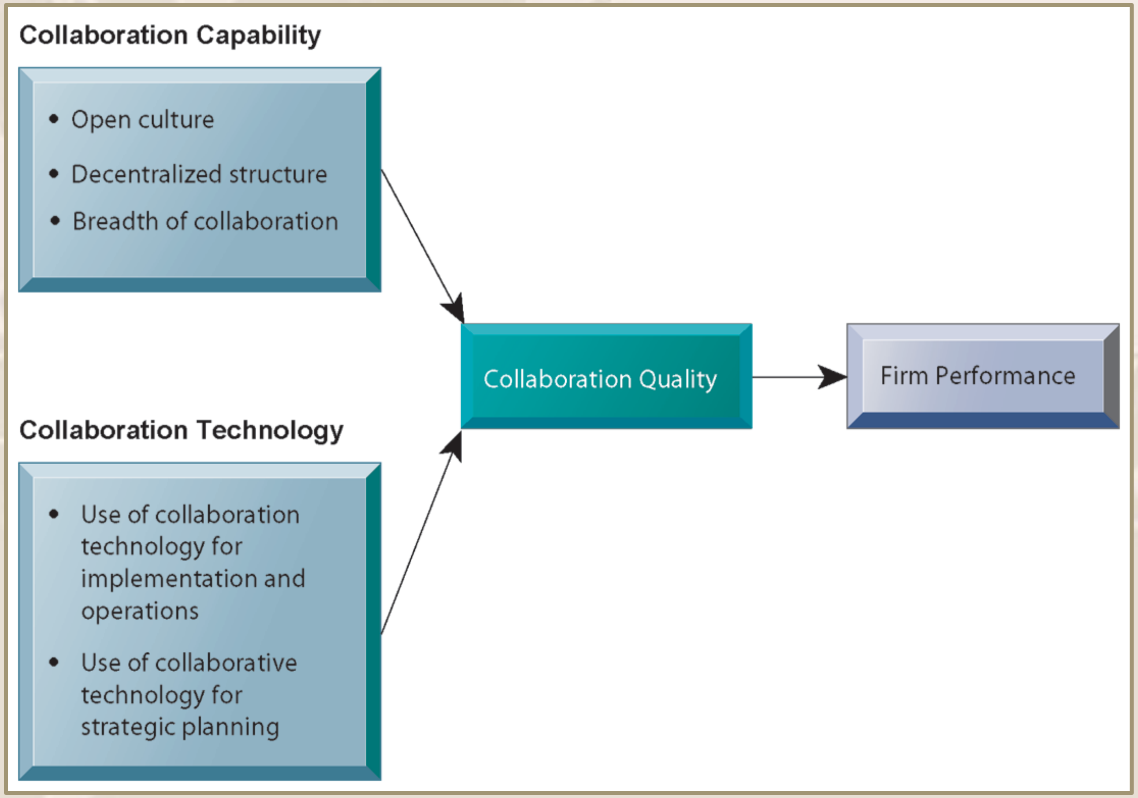


FIGURE 2-7 Successful collaboration requires an appropriate organizational structure and culture, along with appropriate collaboration technology.

Systems for Collaboration and Teamwork

- **Building a collaborative culture and business processes**
  - **"Command and control" organizations**
    - No value placed on teamwork or lower-level participation in decisions
  - **Collaborative business culture**
    - Senior managers rely on teams of employees
    - Policies, products, designs, processes, systems rely on teams
    - Managers purpose is to build teams

Systems for Collaboration and Teamwork

- **Technology for collaboration and teamwork**
  - **15 categories of collaborative software tools**

    Email and instant messaging White boarding
    Collaborative writing Web presenting
    Collaborative reviewing Work scheduling
    Event scheduling Document sharing /wikis
    File sharing Mind mapping
    Screen sharing Large audience Webinars
    Audio conferencing Co-browsing
    Video conferencing

Systems for Collaboration and Teamwork

- **Technology for collaboration and teamwork (cont.)**
  - **Social Networking**
  - **Wikis**
  - **Virtual Worlds**
  - **Internet-Based Collaboration Environments**
    - Virtual meeting systems (telepresence)
    - Google Apps/Google sites
    - Microsoft SharePoint
    - Lotus Notes

Systems for Collaboration and Teamwork

VIRTUAL MEETINGS: SMART MANAGEMENT

Read the Interactive Session and discuss the following questions

- **What are the advantages of using videoconferencing technologies? What are the disadvantages?**
- **What is telepresence and what sorts of companies are best suited to use it as a communications tool?**
- **What kinds of companies could benefit from using videoconferencing? Are there any companies that might not derive any benefits from this technology?**

Systems for Collaboration and Teamwork

- **Two dimensions of collaboration technologies**
  - Space (or location) – remote or colocated
  - Time – synchronous or asynchronous
- **Six steps in evaluating software tools**
  1. What are your firm's collaboration challenges?
  2. What kinds of solutions are available?
  3. Analyze available products' cost and benefits
  4. Evaluate security risks
  5. Consult users for implementation and training issues
  6. Evaluate product vendors

Systems for Collaboration and Teamwork

The Time/Space Collaboration Tool Matrix

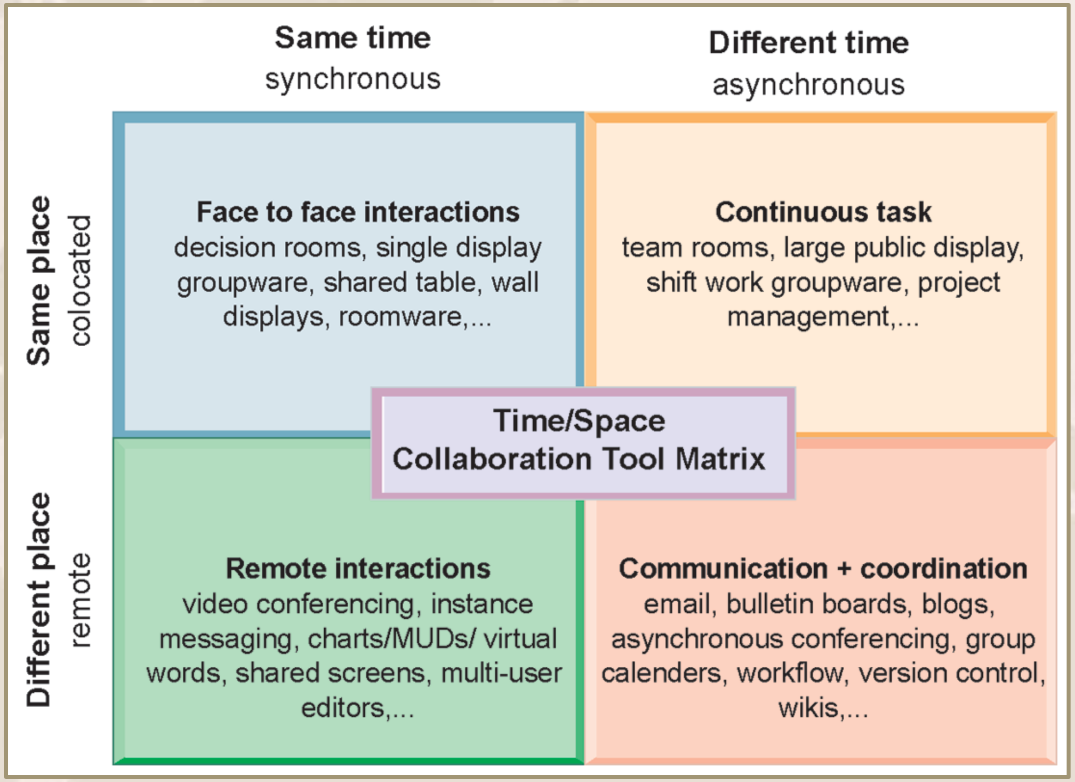


FIGURE 2-8 Collaboration technologies can be classified in terms of whether they support interactions at the same or different time or place whether these interactions are remote or co-located.

The Information Systems Function in Business

- **Information systems department:**
  - **Formal organizational unit responsible for information technology services**
  - **Often headed by chief information officer (CIO)**
    - Other senior positions include chief security officer (CSO), chief knowledge officer (CKO), chief privacy officer (CPO)
  - **Programmers**
  - **Systems analysts**
  - **Information systems managers**

The Information Systems Function in Business

- End users
  - Representatives of other departments for whom applications are developed
  - Increasing role in system design, development
- IT Governance:
  - Strategies and policies for using IT in the organization
  - Decision rights
  - Accountability
  - Organization of information systems function
    - Centralized, decentralized, etc.

Chapter 3

INFORMATION SYSTEMS, ORGANIZATIONS, AND STRATEGY

VIDEO CASES

Case 1: National Basketball Association: Competing on Global Delivery With Akamai OS Streaming

Case 2: Customer Relationship Management for San Francisco's City Government

Learning Objectives

- Identify and describe important features of organizations that managers need to know about in order to build and use information systems successfully.
- Demonstrate how Porter's competitive forces model helps companies develop competitive strategies using information systems.
- Explain how the value chain and value web models help businesses identify opportunities for strategic information system applications.

Learning Objectives (cont.)

- **Demonstrate how information systems help businesses use synergies, core competencies, and network-based strategies to achieve competitive advantage.**
- **Assess the challenges posed by strategic information systems and management solutions.**

Organizations and Information Systems

- Information technology and organizations influence one another
  - Complex relationship influenced by organization's
    - Structure
    - Business processes
    - Politics
    - Culture
    - Environment, and
    - Management decisions

Organizations and Information Systems

THE TWO-WAY RELATIONSHIP BETWEEN ORGANIZATIONS AND INFORMATION TECHNOLOGY

This complex two-way relationship is mediated by many factors, not the least of which are the decisions made—or not made—by managers. Other factors mediating the relationship include the organizational culture, structure, politics, business processes, and environment.

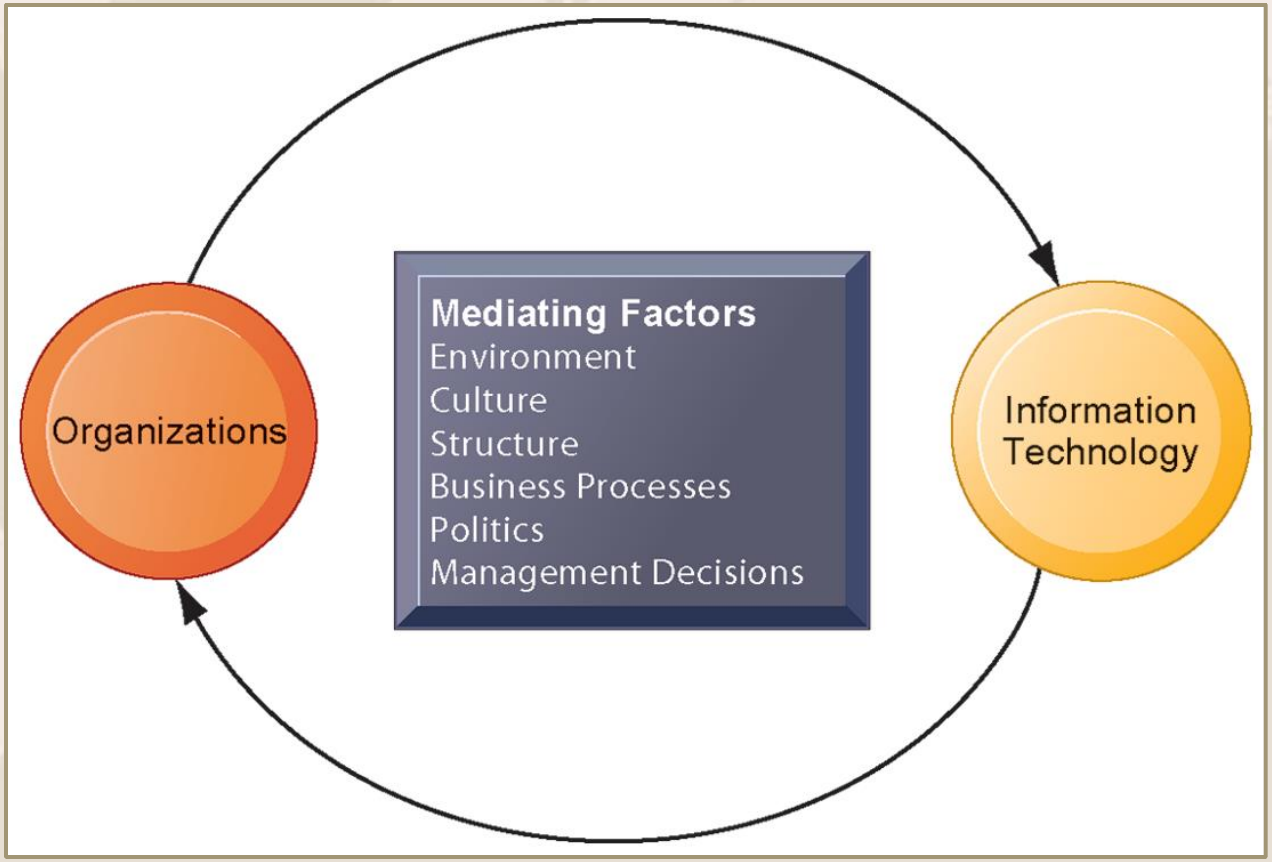


FIGURE 3-1

Organizations and Information Systems

- **What is an organization?**
  - **Technical definition:**
    - Stable, formal social structure that takes resources from environment and processes them to produce outputs
    - A formal legal entity with internal rules and procedures, as well as a social structure
  - **Behavioral definition:**
    - A collection of rights, privileges, obligations, and responsibilities that is delicately balanced over a period of time through conflict and conflict resolution

Organizations and Information Systems

THE TECHNICAL MICROECONOMIC DEFINITION OF THE ORGANIZATION

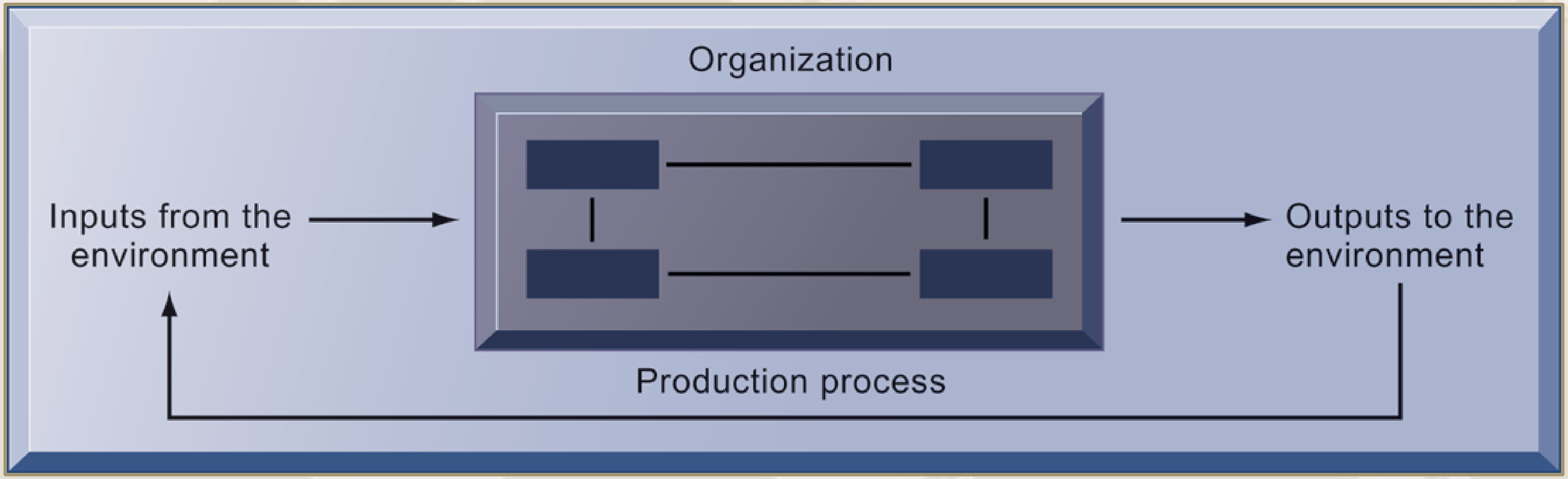


FIGURE 3-2 In the microeconomic definition of organizations, capital and labor (the primary production factors provided by the environment) are transformed by the firm through the production process into products and services (outputs to the environment). The products and services are consumed by the environment, which supplies additional capital and labor as inputs in the feedback loop.

Organizations and Information Systems

THE BEHAVIORAL VIEW OF ORGANIZATIONS

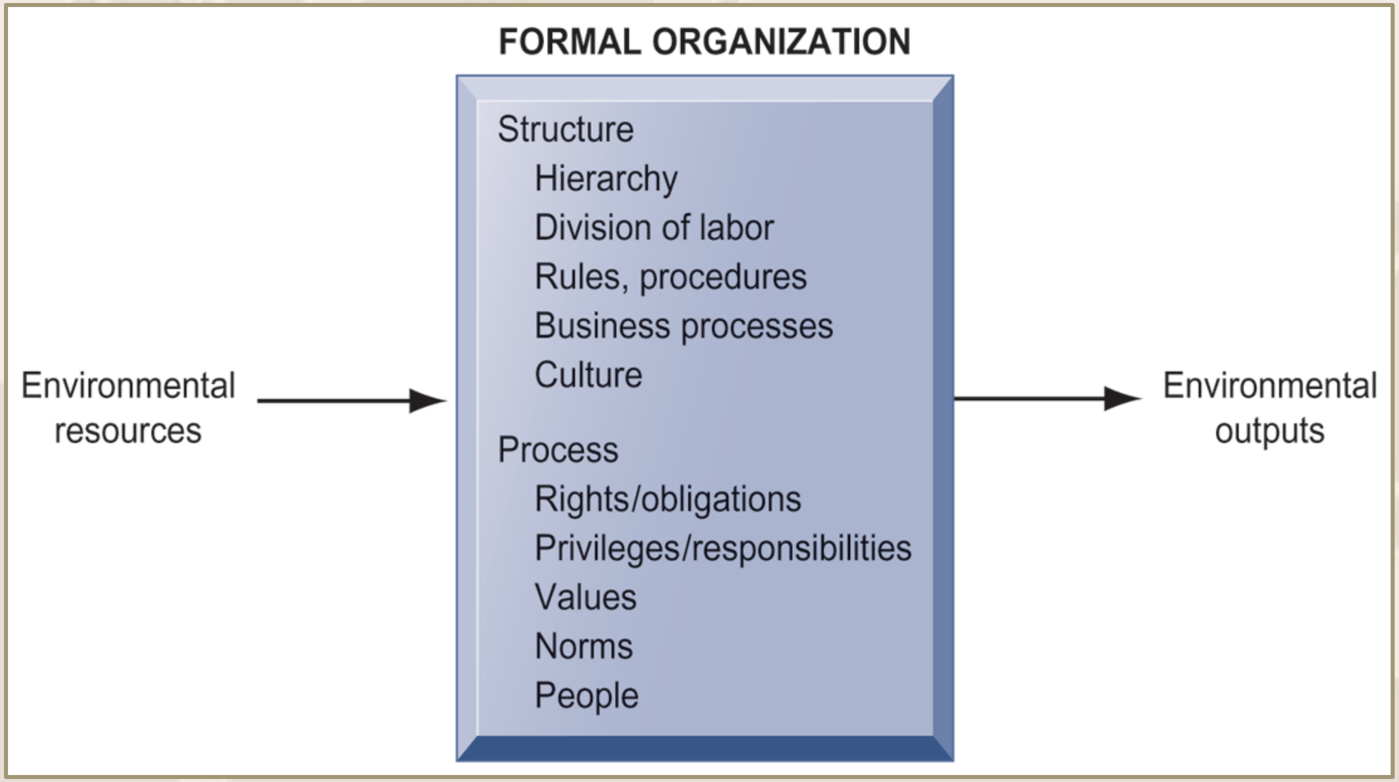


FIGURE 3-3 The behavioral view of organizations emphasizes group relationships, values, and structures.

Organizations and Information Systems

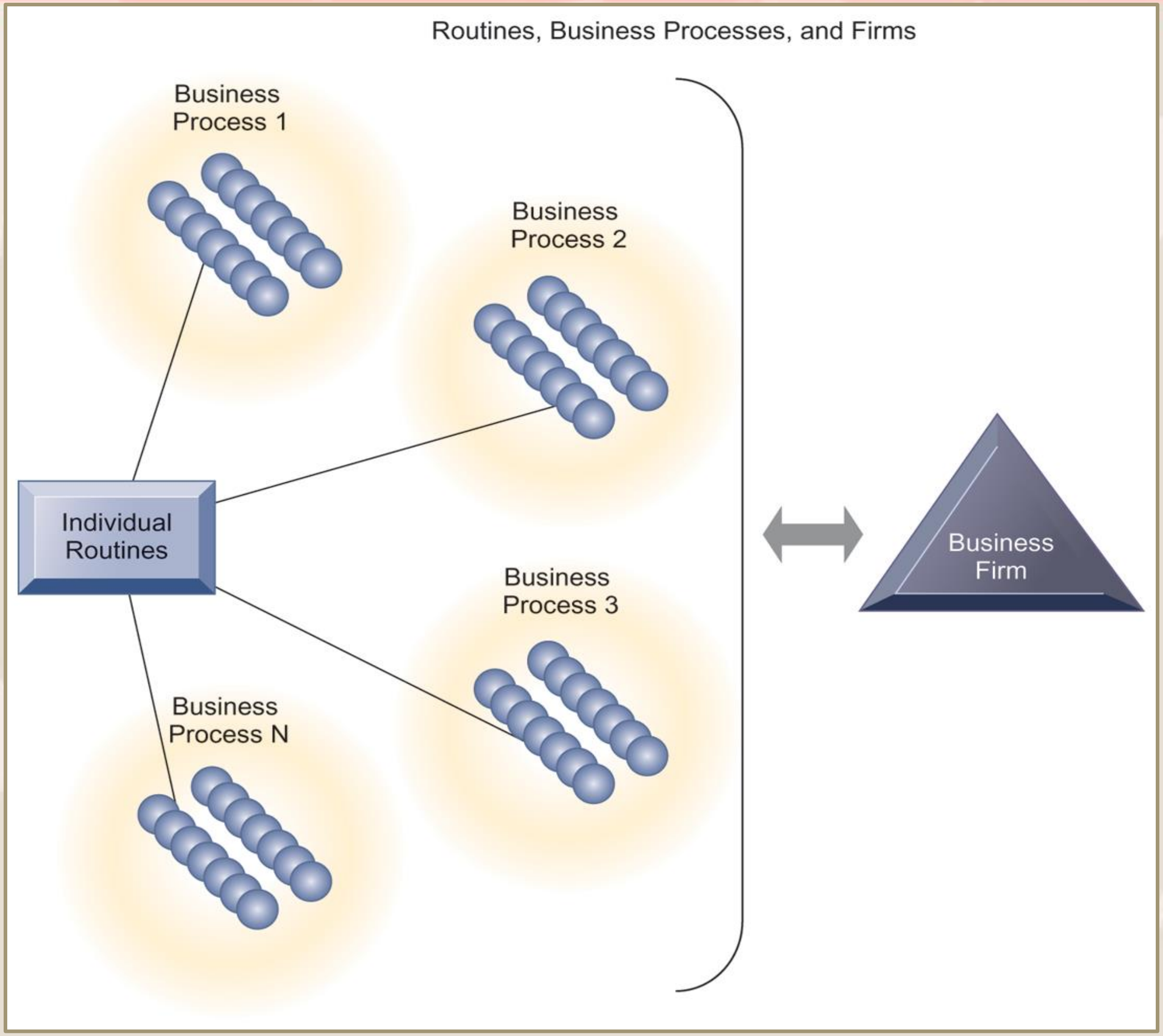
- **Features of organizations**
  - Use of hierarchical structure
  - Accountability, authority in system of impartial decision making
  - Adherence to principle of efficiency
  - Routines and business processes
  - Organizational politics, culture, environments and structures

Organizations and Information Systems

- **Routines and business processes**
  - **Routines (standard operating procedures)**
    - Precise rules, procedures, and practices developed to cope with virtually all expected situations
  - **Business processes: Collections of routines**
  - **Business firm: Collection of business processes**

ROUTINES, BUSINESS PROCESSES, AND FIRMS

All organizations are composed of individual routines and behaviors, a collection of which make up a business process. A collection of business processes make up the business firm. New information system applications require that individual routines and business processes change to achieve high levels of organizational performance.



IGURE 3-4

Organizations and Information Systems

- Organizational politics
  - Divergent viewpoints lead to political struggle, competition, and conflict
  - Political resistance greatly hampers organizational change

Organizations and Information Systems

- **Organizational culture:**
  - **Encompasses set of assumptions that define goal and product**
    - What products the organization should produce
    - How and where it should be produced
    - For whom the products should be produced
  - **May be powerful unifying force as well as restraint on change**

Organizations and Information Systems

- Organizational environments:
  - Organizations and environments have a reciprocal relationship
  - Organizations are open to, and dependent on, the social and physical environment
  - Organizations can influence their environments
  - Environments generally change faster than organizations
  - Information systems can be an instrument of environmental scanning, act as a lens

ENVIRONMENTS AND ORGANIZATIONS HAVE A RECIPROCAL RELATIONSHIP

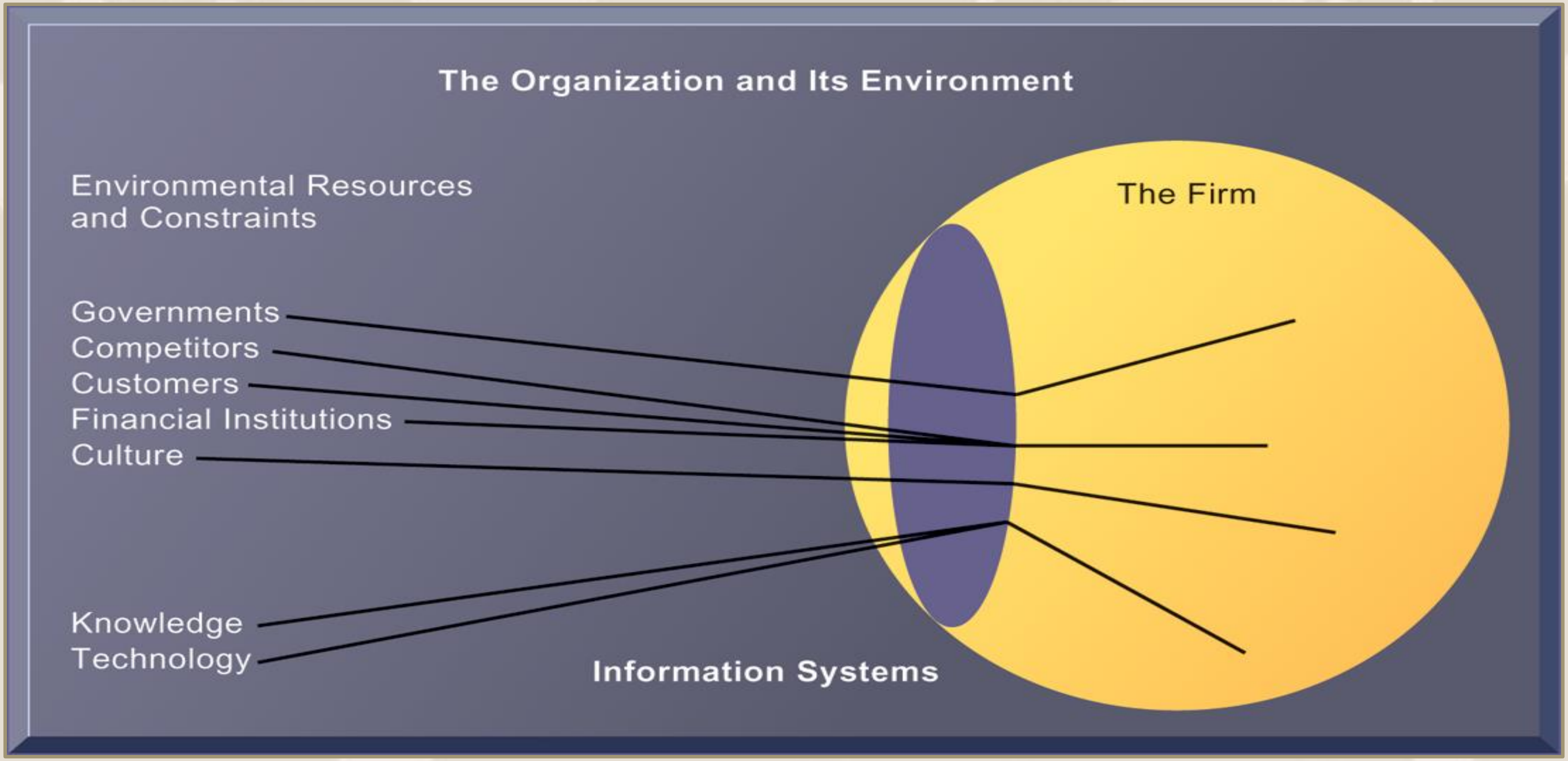


FIGURE 3-5 Environments shape what organizations can do, but organizations can influence their environments and decide to change environments altogether. Information technology plays a critical role in helping organizations perceive environmental change and in helping organizations act on their environment.

Organizations and Information Systems

- **Disruptive technologies**
  - **Technology that brings about sweeping change to businesses, industries, markets**
  - **Examples: personal computers, word processing software, the Internet, the PageRank algorithm**
  - **First movers and fast followers**
    - First movers – inventors of disruptive technologies
    - Fast followers – firms with the size and resources to capitalize on that technology

Disruptive technologies: winners and losers

Technology	Description	Winners and losers
Microprocessor chips (1971)	Thousands and eventually millions of transistors on a silicon chip	Microprocessor firms win (Intel, Texas Instruments) while transistor firms (GE) decline.
Personal computers (1975)	Small, inexpensive, but fully functional desktop computers	PC manufacturers (HP, Apple, IBM), and chip manufacturers prosper (Intel), while mainframe (IBM) and minicomputer (DEC) firms lose.
PC word processing software (1979)	Inexpensive, limited but functional text editing and formatting for personal computers	PC and software manufacturers (Microsoft, HP, Apple) prosper, while the typewriter industry disappears.
World Wide Web (1989)	A global database of digital files and "pages" instantly available	Owners of online content and news benefit, while traditional publishers (newspapers, magazines, broadcast television) lose.
Internet music services (1998)	Repositories of downloadable music on the Web with acceptable fidelity	Owners of online music collections (MP3.com, iTunes), telecommunications providers who own Internet backbone (AT&T, Verizon), local Internet service providers win, while record label firms and music retailers lose (Tower Records).
PageRank algorithm	A method for ranking Web pages in terms of their popularity to supplement Web search by key terms	Google is the winner (they own the patent), while traditional key word search engines (Alta Vista) lose.
Software as Web service	Using the Internet to provide remote access to online software	Online software services companies (Salesforce.com) win, while traditional "boxed" software companies (Microsoft, SAP, Oracle) lose.

Organizations and Information Systems

- **5 basic kinds of organizational structure**
  - **Entrepreneurial:**
    - Small start-up business
  - **Machine bureaucracy:**
    - Midsize manufacturing firm
  - **Divisionalized bureaucracy:**
    - Fortune 500 firms
  - **Professional bureaucracy:**
    - Law firms, school systems, hospitals
  - **Adhocracy:**
    - Consulting firms

Organizations and Information Systems

- Other organizational features
  - Goals
  - Groups
  - Leadership styles
  - Tasks
  - Surrounding environments

How Information Systems Impact Organizations and Business Firms

- **Economic impacts**
  - **IT changes relative costs of capital and the costs of information**
  - **Information systems technology is a factor of production, like capital and labor**
  - **IT affects the cost and quality of information and changes economics of information**
    - Information technology helps firms contract in size because it can reduce transaction costs (the cost of participating in markets)
      - Outsourcing

How Information Systems Impact Organizations and Business Firms

- **Transaction cost theory**
  - **Firms seek to economize on transaction costs (the costs of participating in markets)**
    - Vertical integration, hiring more employees, buying suppliers and distributors
  - **IT lowers market transaction costs for a firm, making it worthwhile for firms to transact with other firms rather than grow the number of employees**

How Information Systems Impact Organizations and Business Firms

THE TRANSACTION COST THEORY OF THE IMPACT OF INFORMATION TECHNOLOGY ON THE ORGANIZATION

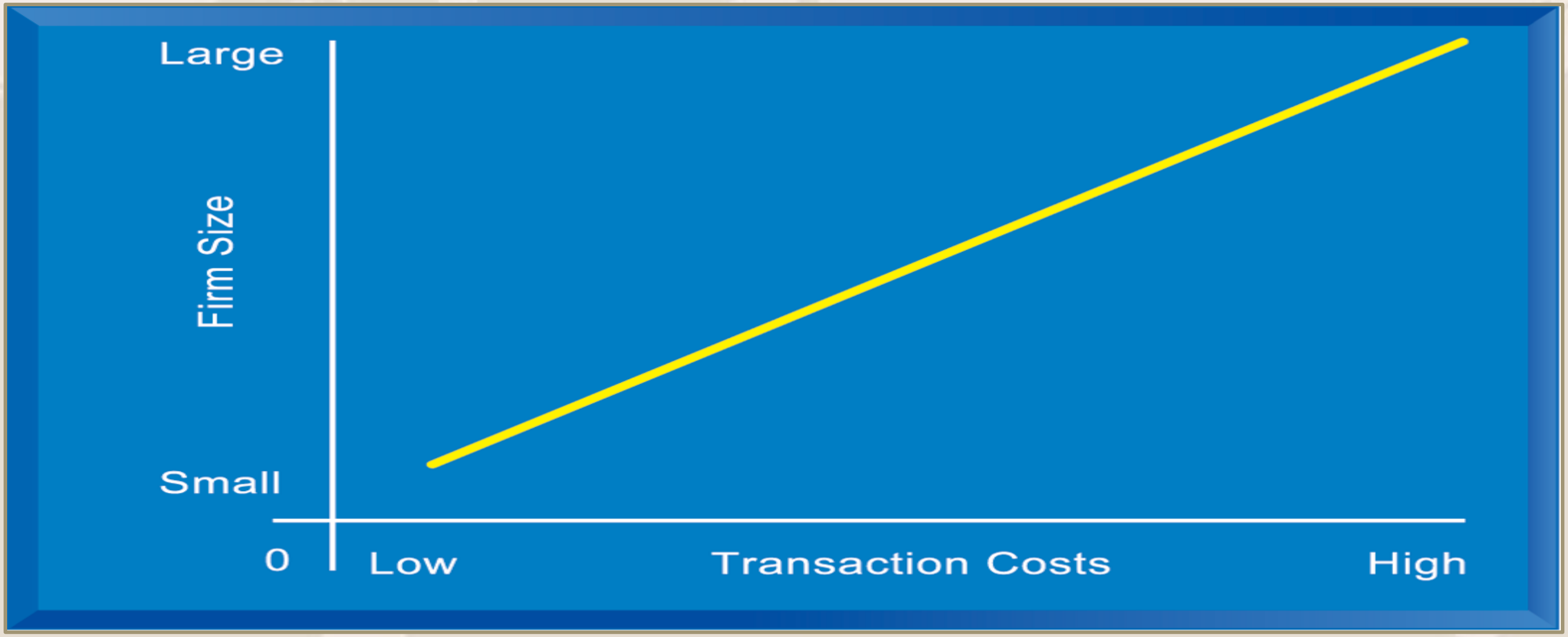


FIGURE 3-6

Firms traditionally grew in size to reduce market transaction costs. IT potentially reduces the firms market transaction costs. This means firms can outsource work using the market, reduce their employee head count and still grow revenues, relying more on outsourcing firms and external contractors.

How Information Systems Impact Organizations and Business Firms

- Agency theory:
  - Firm is nexus of contracts among self-interested parties requiring supervision
  - Firms experience agency costs (the cost of managing and supervising) which rise as firm grows
  - IT can reduce agency costs, making it possible for firms to grow without adding to the costs of supervising, and without adding employees

How Information Systems Impact Organizations and Business Firms

THE AGENCY THEORY OF THE IMPACT OF INFORMATION TECHNOLOGY ON THE ORGANIZATION

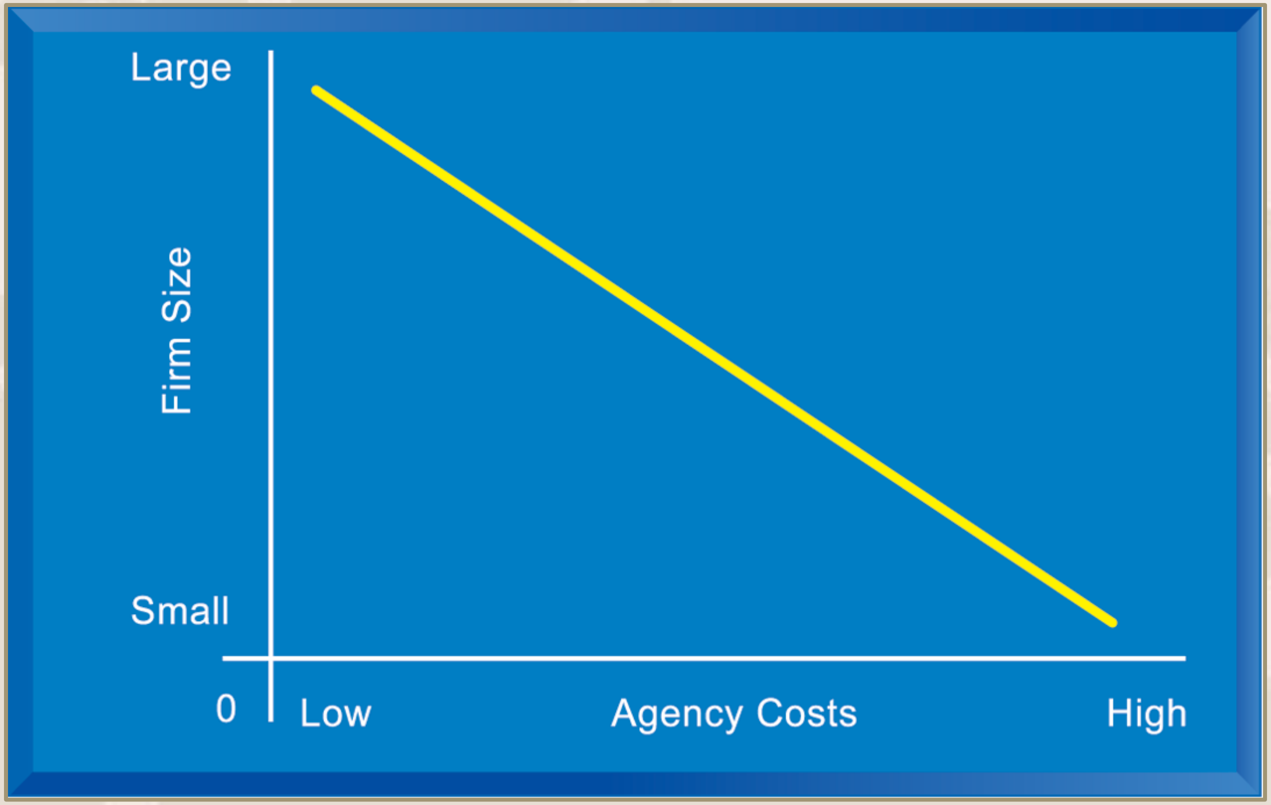


FIGURE 3-7 As firms grow in size and complexity, traditionally they experience rising agency costs.

How Information Systems Impact Organizations and Business Firms

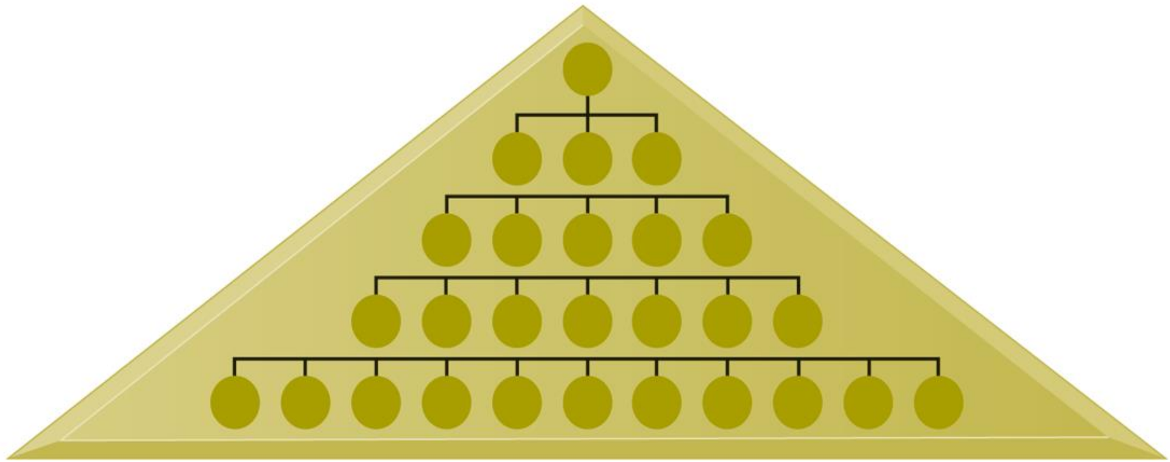
- **Organizational and behavioral impacts**
  - **IT flattens organizations**
    - Decision making pushed to lower levels
    - Fewer managers needed (IT enables faster decision making and increases span of control)
  - **Postindustrial organizations**
    - Organizations flatten because in postindustrial societies, authority increasingly relies on knowledge and competence rather than formal positions

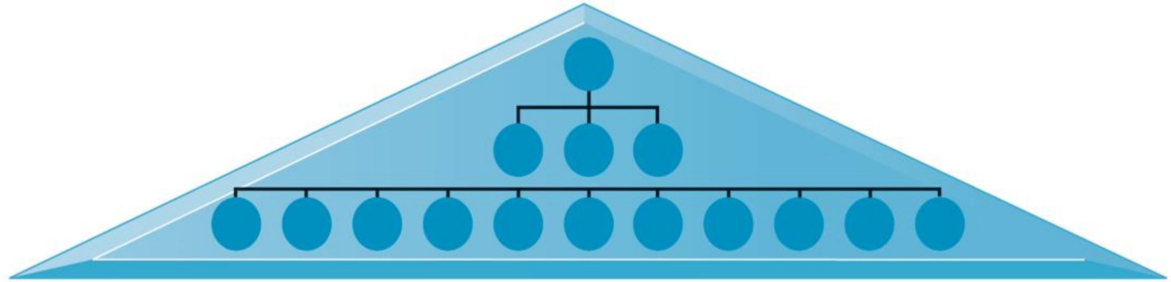
How Information Systems Impact Organizations and Business Firms

FLATTENING ORGANIZATIONS

Information systems can reduce the number of levels in an organization by providing managers with information to supervise larger numbers of workers and by giving lower-level employees more decision-making authority.

FIGURE 3-8


A traditional hierarchical organization with many levels of management


An organization that has been "flattened" by removing layers of management

How Information Systems Impact Organizations and Business Firms

- Organizational resistance to change
  - Information systems become bound up in organizational politics because they influence access to a key resource – information
  - Information systems potentially change an organization's structure, culture, politics, and work
  - Most common reason for failure of large projects is due to organizational and political resistance to change

How Information Systems Impact Organizations and Business Firms

ORGANIZATIONAL RESISTANCE AND THE MUTUALLY ADJUSTING RELATIONSHIP BETWEEN TECHNOLOGY AND THE ORGANIZATION

Implementing information systems has consequences for task arrangements, structures, and people. According to this model, to implement change, all four components must be changed simultaneously.

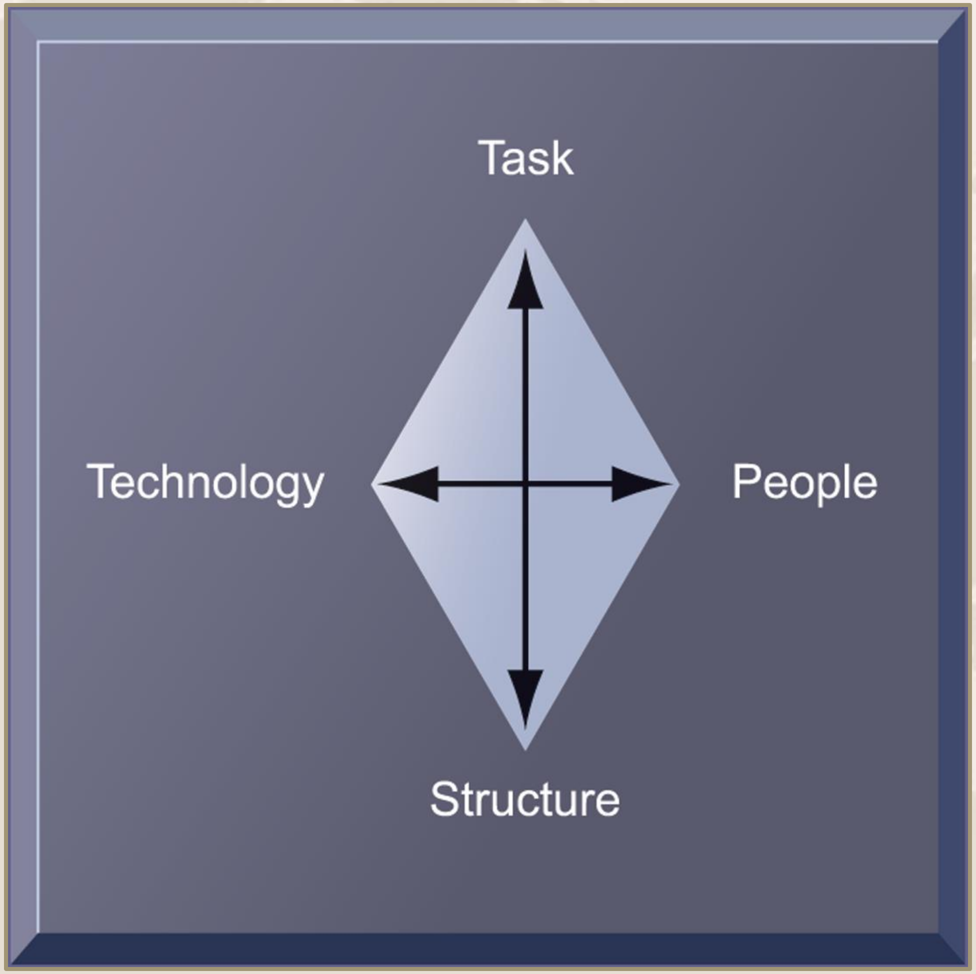


FIGURE 3-9

How Information Systems Impact Organizations and Business Firms

- **The Internet and organizations**
  - **The Internet increases the accessibility, storage, and distribution of information and knowledge for organizations**
  - **The Internet can greatly lower transaction and agency costs**
    - Example: Large firm delivers internal manuals to employees via a corporate Web site, saving millions of dollars in distribution costs

- **Central organizational factors to consider when planning a new system:**
  - **Environment**
  - **Structure**
    - Hierarchy, specialization, routines, business processes
  - **Culture and politics**
  - **Type of organization and style of leadership**
  - **. Line Organization . Line and Staff Organization . Functional Organization . Project Organization . Matrix Organization**
  - Structural, participative, servant, freedom, transformational
  - **Main interest groups affected by system; attitudes of end users**
  - **Tasks, decisions, and business processes the system will assist**

Using Information Systems to Achieve Competitive Advantage

- **Why do some firms become leaders in their industry?**
- **Michael Porter's competitive forces model**
  - **Provides general view of firm, its competitors, and environment**
  - **Five competitive forces shape fate of firm**
    1. Traditional competitors
    2. New market entrants
    3. Substitute products and services
    4. Customers
    5. Suppliers

Using Information Systems to Achieve Competitive Advantage

PORTER'S COMPETITIVE FORCES MODEL

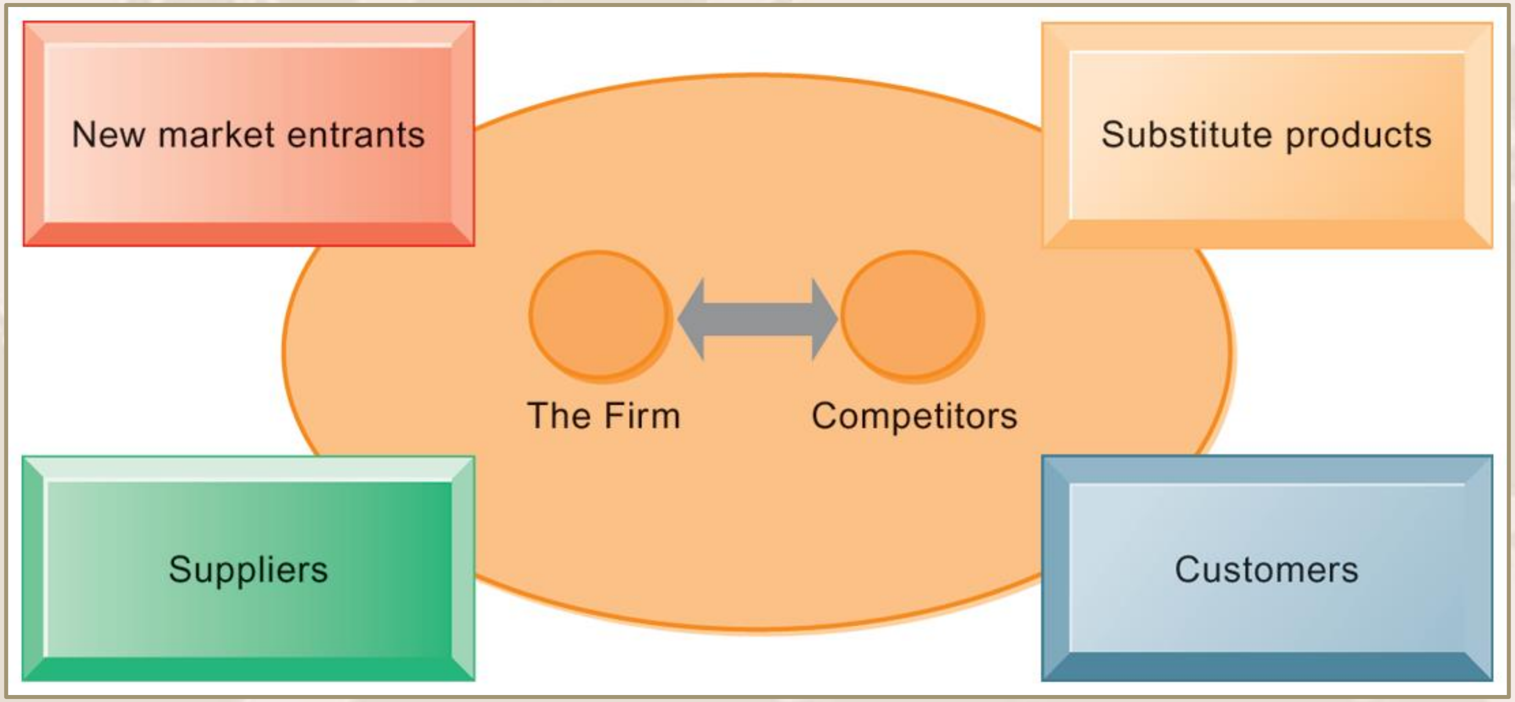


FIGURE 3-10 In Porter's competitive forces model, the strategic position of the firm and its strategies are determined not only by competition with its traditional direct competitors but also by four other forces in the industry's environment: new market entrants, substitute products, customers, and suppliers.

Using Information Systems to Achieve Competitive Advantage

- Traditional competitors
  - All firms share market space with competitors who are continuously devising new products, services, efficiencies, switching costs
- New market entrants
  - Some industries have high barriers to entry, e.g. computer chip business
  - New companies have new equipment, younger workers, but little brand recognition

Using Information Systems to Achieve Competitive Advantage

- **Substitute products and services**
  - **Substitutes customers might use if your prices become too high, e.g. iTunes substitutes for CDs**
- **Customers**
  - **Can customers easily switch to competitor's products? Can they force businesses to compete on price alone in transparent marketplace?**
- **Suppliers**
  - **Market power of suppliers when firm cannot raise prices as fast as suppliers**

Using Information Systems to Achieve Competitive Advantage

- **Four generic strategies for dealing with competitive forces, enabled by using IT**
  - **Low-cost leadership**
  - **Product differentiation**
  - **Focus on market niche**
  - **Strengthen customer and supplier intimacy**

Using Information Systems to Achieve Competitive Advantage

- **Low-cost leadership**
  - **Produce products and services at a lower price than competitors while enhancing quality and level of service**
  - **Examples: Wal-Mart**
- **Product differentiation**
  - **Enable new products or services, greatly change customer convenience and experience**
  - **Examples: Google, Nike, Apple**

Using Information Systems to Achieve Competitive Advantage

- Focus on market niche
  - Use information systems to enable a focused strategy on a single market niche; specialize
  - Example: Hilton Hotels
- Strengthen customer and supplier intimacy
  - Use information systems to develop strong ties and loyalty with customers and suppliers; increase switching costs
  - Example: Netflix, Amazon

Using Information Systems to Achieve Competitive Advantage

HOW MUCH DO CREDIT CARD COMPANIES KNOW ABOUT YOU?

Read the Interactive Session and discuss the following questions

- **What competitive strategy are the credit card companies pursuing? How do information systems support that strategy?**
- **What are the business benefits of analyzing customer purchase data and constructing behavioral profiles?**
- **Are these practices by credit card companies ethical? Are they an invasion of privacy? Why or why not?**

Using Information Systems to Achieve Competitive Advantage

- **The Internet's impact on competitive advantage**
  - **Transformation, destruction, threat to some industries**
    - E.g. travel agency, printed encyclopedia, newspaper
  - **Competitive forces still at work, but rivalry more intense**
  - **Universal standards allow new rivals, entrants to market**
  - **New opportunities for building brands and loyal customer bases**

Using Information Systems to Achieve Competitive Advantage

IS THE IPAD A DISRUPTIVE TECHNOLOGY?

Read the Interactive Session and discuss the following questions

- **Evaluate the impact of the iPad using Porter's competitive forces model.**
- **What makes the iPad a disruptive technology? Who are likely to be the winners and losers if the iPad becomes a hit? Why?**
- **What effects will the iPad have on the business models of Apple, content creators, and distributors?**

Using Information Systems to Achieve Competitive Advantage

- **Business value chain model**
  - **Views firm as series of activities that add value to products or services**
  - **Highlights activities where competitive strategies can best be applied**
    - Primary activities vs. support activities
  - **At each stage, determine how information systems can improve operational efficiency and improve customer and supplier intimacy**
  - **Utilize benchmarking, industry best practices**

Using Information Systems to Achieve Competitive Advantage

THE VALUE CHAIN MODEL

This figure provides examples of systems for both primary and support activities of a firm and of its value partners that can add a margin of value to a firm's products or services.

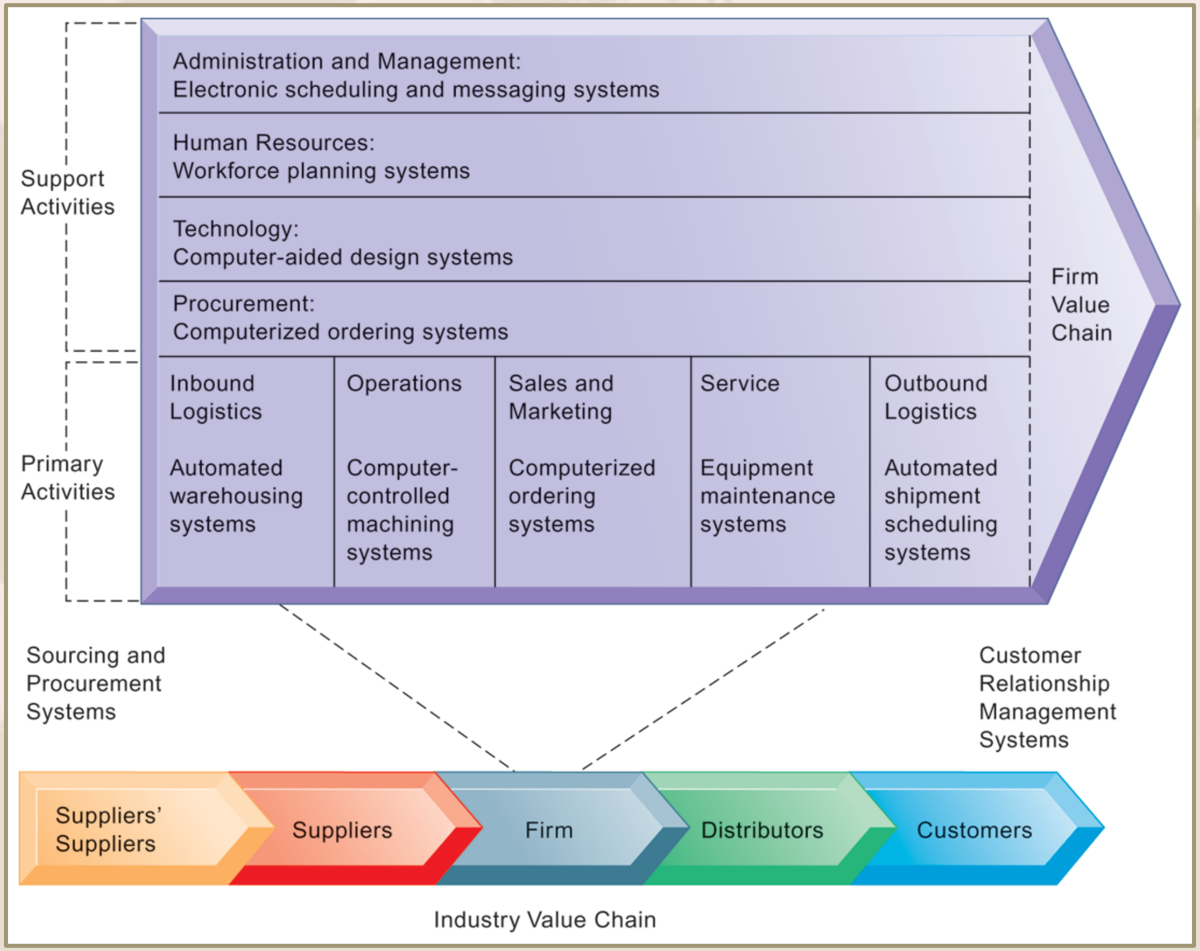


FIGURE 3-11

Using Information Systems to Achieve Competitive Advantage

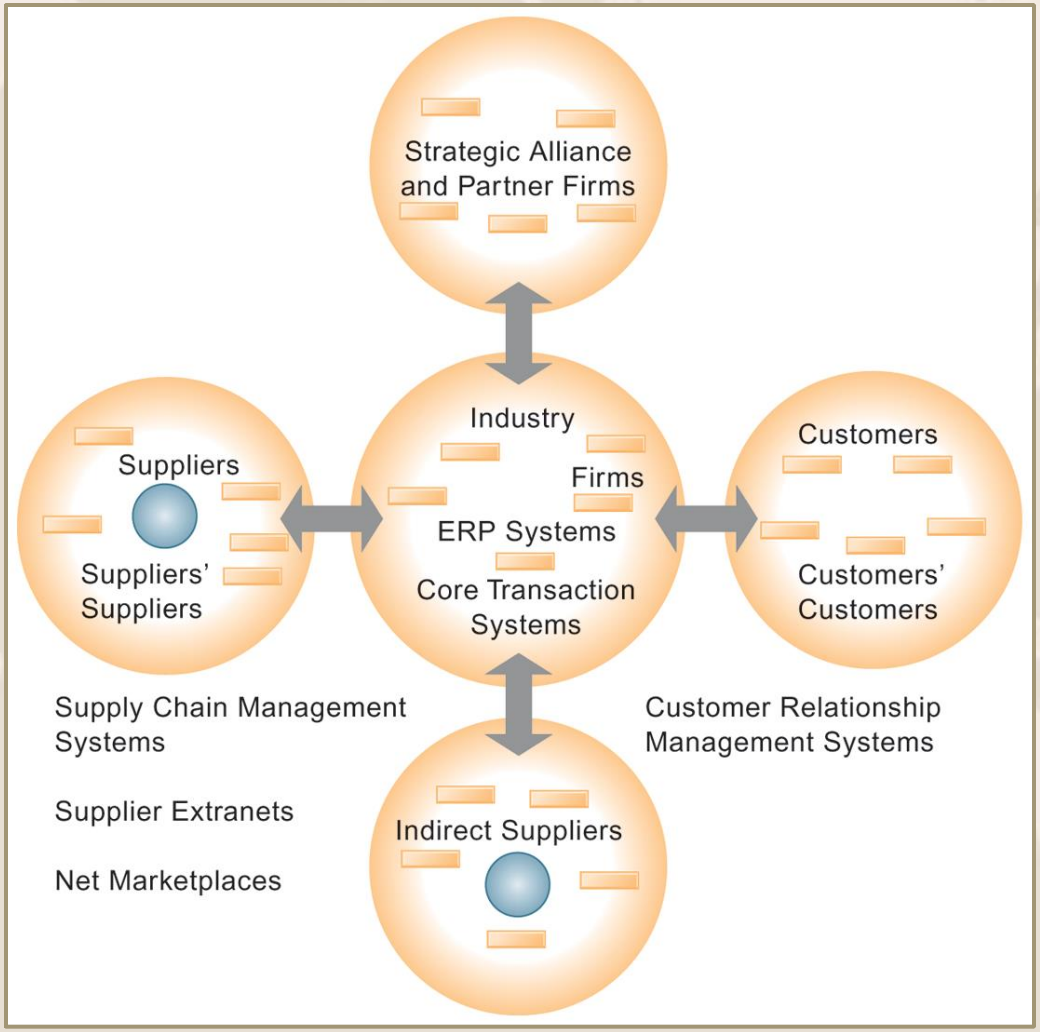
- **Value web:**
  - **Collection of independent firms using highly synchronized IT to coordinate value chains to produce product or service collectively**
  - **More customer driven, less linear operation than traditional value chain**

Using Information Systems to Achieve Competitive Advantage

THE VALUE WEB

The value web is a networked system that can synchronize the value chains of business partners within an industry to respond rapidly to changes in supply and demand.

FIGURE 3-12



Using Information Systems to Achieve Competitive Advantage

- **Information systems can improve overall performance of business units by promoting synergies and core competencies**
  - **Synergies**
    - When output of some units used as inputs to others, or organizations pool markets and expertise
    - Example: merger of Bank of NY and JPMorgan Chase
    - Purchase of YouTube by Google

Using Information Systems to Achieve Competitive Advantage

- Core competencies
  - Activity for which firm is world-class leader
  - Relies on knowledge, experience, and sharing this across business units
  - Example: Procter & Gamble’s intranet and directory of subject matter experts

Using Information Systems to Achieve Competitive Advantage

- **Network-based strategies**
  - **Take advantage of firm's abilities to network with each other**
  - **Include use of:**
    - Network economics
    - Virtual company model
    - Business ecosystems

Using Information Systems to Achieve Competitive Advantage

- **Traditional economics: Law of diminishing returns**
  - The more any given resource is applied to production, the lower the marginal gain in output, until a point is reached where the additional inputs produce no additional outputs
- **Network economics:**
  - Marginal cost of adding new participant almost zero, with much greater marginal gain
  - Value of community grows with size
  - Value of software grows as installed customer base grows

Using Information Systems to Achieve Competitive Advantage

- Virtual company strategy
  - Virtual company uses networks to ally with other companies to create and distribute products without being limited by traditional organizational boundaries or physical locations
  - E.g. Li & Fung manages production, shipment of garments for major fashion companies, outsourcing all work to over 7,500 suppliers

Using Information Systems to Achieve Competitive Advantage

- **Business ecosystems**
  - **Industry sets of firms providing related services and products**
    - Microsoft platform used by thousands of firms
    - Wal-Mart's order entry and inventory management
  - **Keystone firms:** Dominate ecosystem and create platform used by other firms
  - **Niche firms:** Rely on platform developed by keystone firm
  - **Individual firms can consider how IT will help them become profitable niche players in larger ecosystems**

Using Information Systems to Achieve Competitive Advantage

AN ECOSYSTEM STRATEGIC MODEL

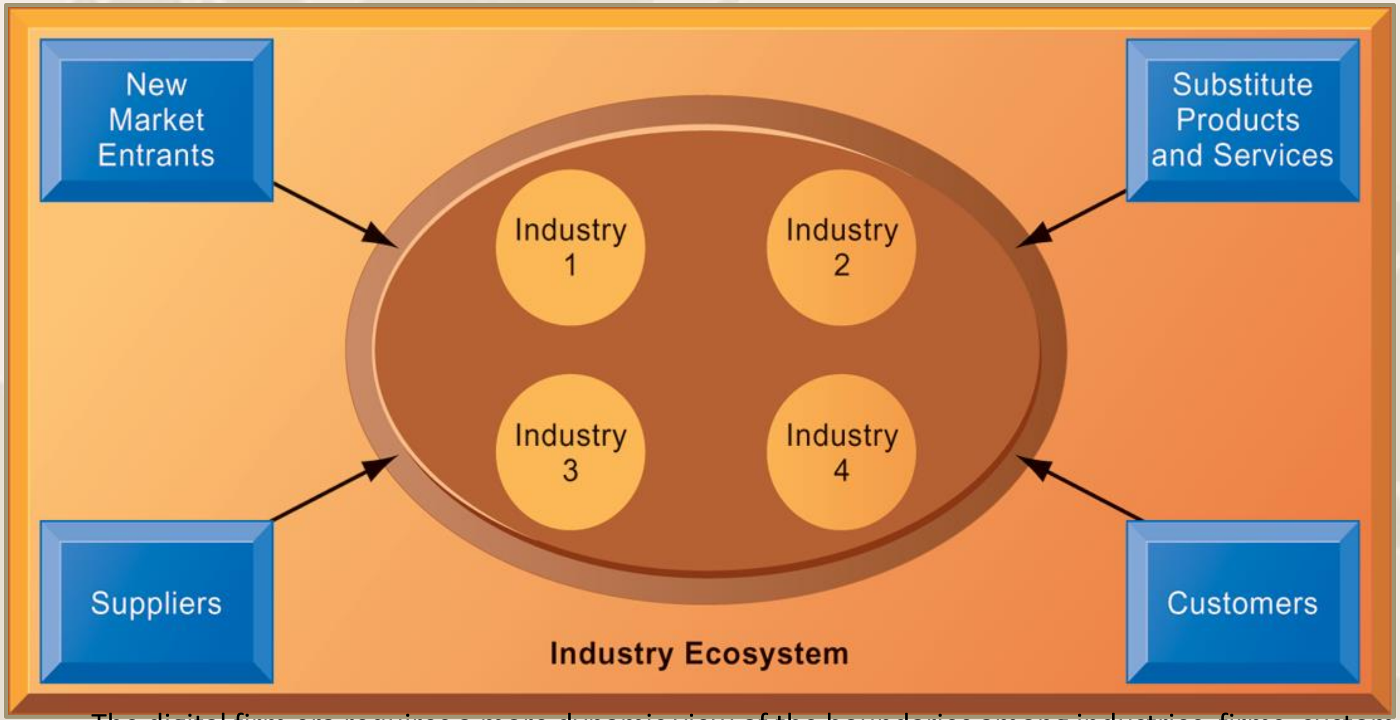


FIGURE 3-13 The digital firm era requires a more dynamic view of the boundaries among industries, firms, customers, and suppliers, with competition occurring among industry sets in a business ecosystem. In the ecosystem model, multiple industries work together to deliver value to the customer. IT plays an important role in enabling a dense network of interactions among the participating firms.

Using Information Systems for Competitive Advantage: Management Issues

- **Sustaining competitive advantage**
  - Because competitors can retaliate and copy strategic systems, competitive advantage is not always sustainable; systems may become tools for survival
- **Performing strategic systems analysis**
  - What is structure of industry?
  - What are value chains for this firm?
- **Managing strategic transitions**
  - Adopting strategic systems requires changes in business goals, relationships with customers and suppliers, and business processes

Chapter 4

ETHICAL AND SOCIAL ISSUES IN INFORMATION SYSTEMS

VIDEO CASES

Case 1: Big Brother is Copying Everything on the Internet
Case 2: Delete: The Virtue of Forgetting in a Digital Age

Learning Objectives

- What ethical, social, and political issues are raised by information systems?
- What specific principles for conduct can be used to guide ethical decisions?
- Why do contemporary information systems technology and the Internet pose challenges to the protection of individual privacy and intellectual property?
- How have information systems affected everyday life?

Understanding Ethical and Social Issues Related to Systems

- Recent cases of failed ethical judgment in business
  - Lehman Brothers, Minerals Management Service, Pfizer
  - In many, information systems used to bury decisions from public scrutiny
- Ethics
  - Principles of right and wrong that individuals, acting as free moral agents, use to make choices to guide their behaviors

Understanding Ethical and Social Issues Related to Systems

- **Information systems and ethics**
  - **Information systems raise new ethical questions because they create opportunities for:**
    - Intense social change, threatening existing distributions of power, money, rights, and obligations
    - New kinds of crime

Understanding Ethical and Social Issues Related to Systems

- **Model for thinking about ethical, social, political issues:**
  - **Society as a calm pond**
  - **IT as rock dropped in pond, creating ripples of new situations not covered by old rules**
  - **Social and political institutions cannot respond overnight to these ripples—it may take years to develop etiquette, expectations, laws**
    - Requires understanding of ethics to make choices in legally gray areas

Understanding Ethical and Social Issues Related to Systems

THE RELATIONSHIP BETWEEN ETHICAL, SOCIAL, AND POLITICAL ISSUES IN AN INFORMATION SOCIETY

The introduction of new information technology has a ripple effect, raising new ethical, social, and political issues that must be dealt with on the individual, social, and political levels. These issues have five moral dimensions: information rights and obligations, property rights and obligations, system quality, quality of life, and accountability and control.

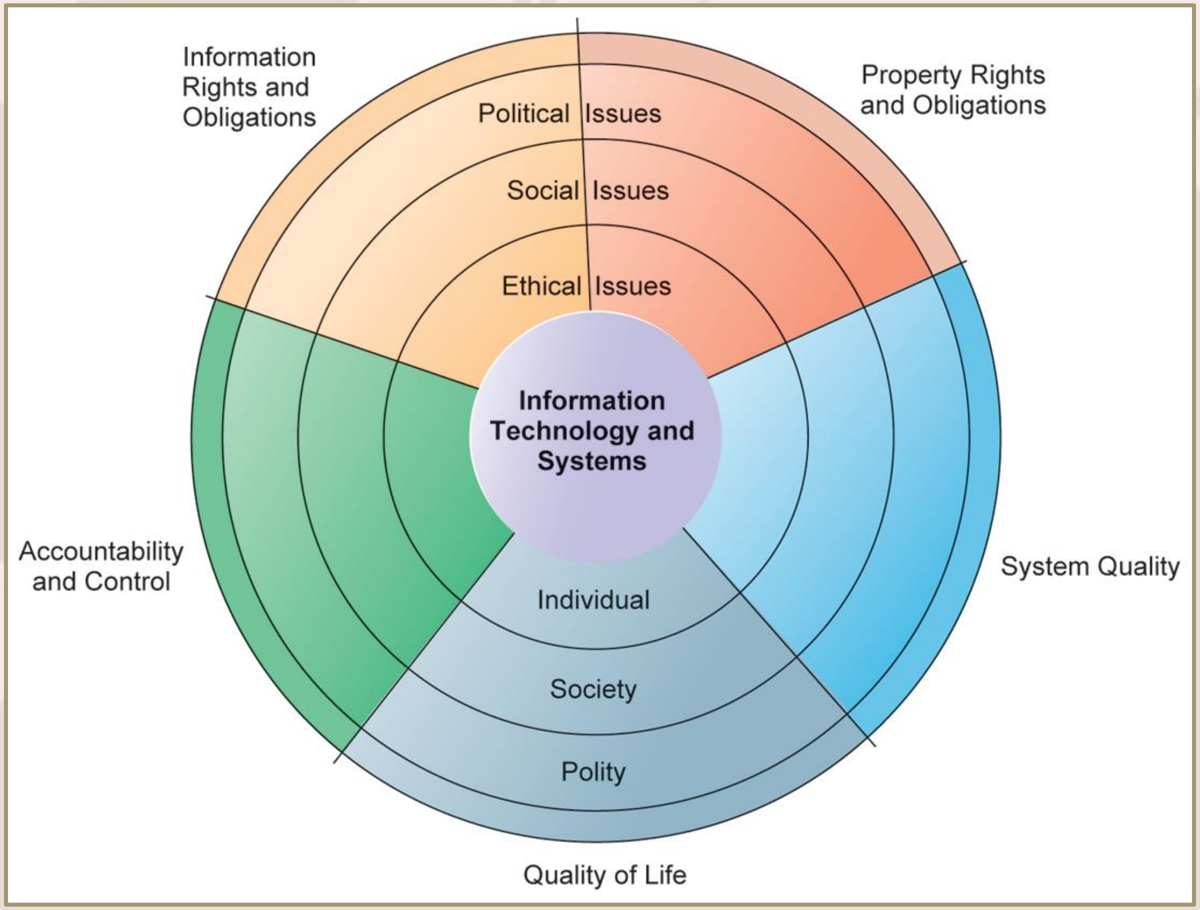


FIGURE 4-1

Understanding Ethical and Social Issues Related to Systems

- **Five moral dimensions of the information age**
  1. **Information rights and obligations**
  2. **Property rights and obligations**
  3. **Accountability and control**
  4. **System quality**
  5. **Quality of life**

Understanding Ethical and Social Issues Related to Systems

- **Key technology trends that raise ethical issues**
  1. **Doubling of computer power**
     - More organizations depend on computer systems for critical operations
  2. **Rapidly declining data storage costs**
     - Organizations can easily maintain detailed databases on individuals
  3. **Networking advances and the Internet**
     - Copying data from one location to another and accessing personal data from remote locations is much easier

Understanding Ethical and Social Issues Related to Systems

- **Key technology trends that raise ethical issues** (*cont.*)

  4. Advances in data analysis techniques

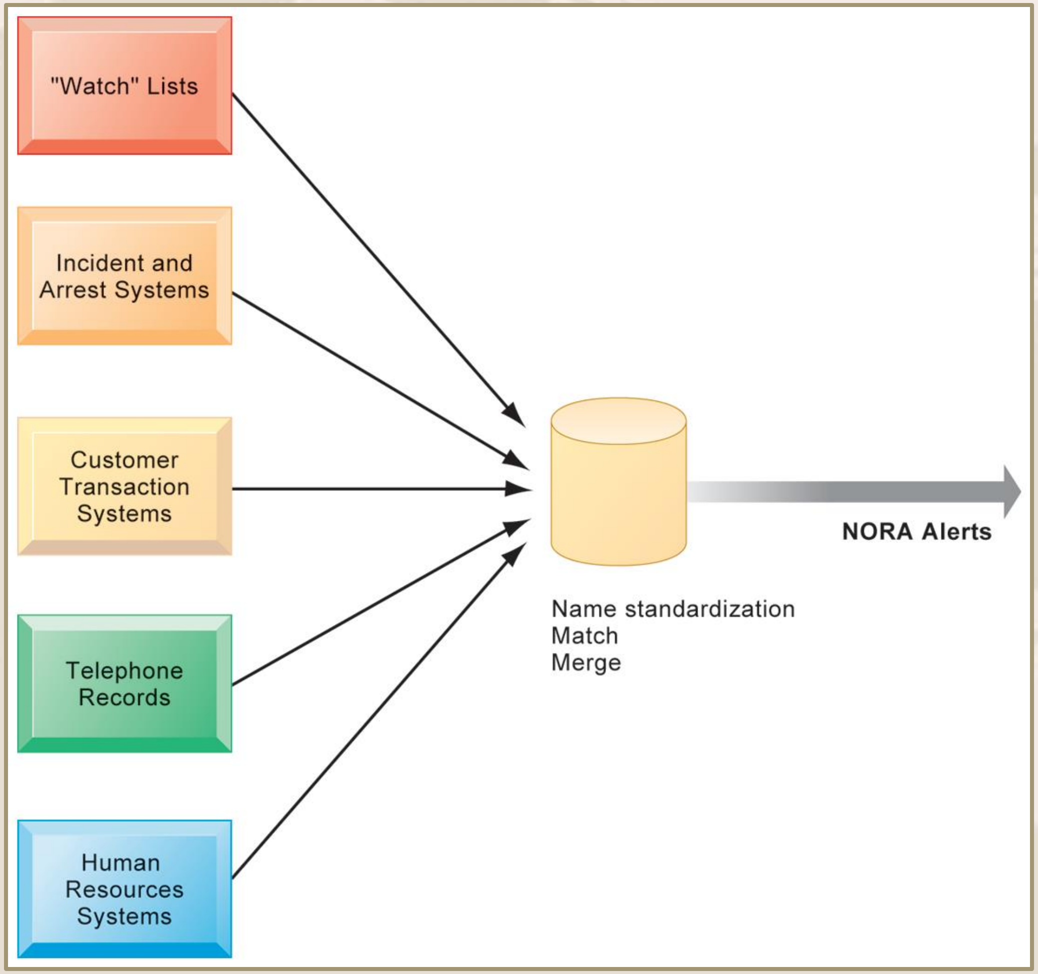
  - Companies can analyze vast quantities of data gathered on individuals for:
    - **Profiling**
      - » Combining data from multiple sources to create dossiers of detailed information on individuals
    - **Nonobvious relationship awareness (NORA)**
      - » Combining data from multiple sources to find obscure hidden connections that might help identify criminals or terrorists

Understanding Ethical and Social Issues Related to Systems

NONOBVIOUS RELATIONSHIP AWARENESS (NORA)

NORA technology can take information about people from disparate sources and find obscure, nonobvious relationships. It might discover, for example, that an applicant for a job at a casino shares a telephone number with a known criminal and issue an alert to the hiring manager.

FIGURE 4-2



Ethics in an Information Society

- **Basic concepts for ethical analysis**
  - **Responsibility:**
    - Accepting the potential costs, duties, and obligations for decisions
  - **Accountability:**
    - Mechanisms for identifying responsible parties
  - **Liability:**
    - Permits individuals (and firms) to recover damages done to them
  - **Due process:**
    - Laws are well known and understood, with an ability to appeal to higher authorities

Ethics in an Information Society

- **Ethical analysis: A five-step process**
  1. **Identify and clearly describe the facts**
  2. **Define the conflict or dilemma and identify the higher-order values involved**
  3. **Identify the stakeholders**
  4. **Identify the options that you can reasonably take**
  5. **Identify the potential consequences of your options**

Ethics in an Information Society

- **Six Candidate Ethical Principles**
  1. **Golden Rule**
     - Do unto others as you would have them do unto you
  2. **Immanuel Kant's Categorical Imperative**
     - If an action is not right for everyone to take, it is not right for anyone
  3. **Descartes' Rule of Change**
     - If an action cannot be taken repeatedly, it is not right to take at all

Ethics in an Information Society

- **Six Candidate Ethical Principles** ***(cont.)***

4. Utilitarian Principle

- Take the action that achieves the higher or greater value

5. Risk Aversion Principle

- Take the action that produces the least harm or least potential cost

6. Ethical “no free lunch” Rule

- Assume that virtually all tangible and intangible objects are owned by someone unless there is a specific declaration otherwise

Ethics in an Information Society

- **Professional codes of conduct**
  - **Promulgated by associations of professionals**
    - E.g. AMA(american medical association), ABA(american bar association) , AITP(association of information technology professionals)
  - **Promises by professions to regulate themselves in the general interest of society**
- **Real-world ethical dilemmas**
  - **One set of interests pitted against another**
  - **E.g. Right of company to maximize productivity of workers vs. workers right to use Internet for short personal tasks**

The Moral Dimensions of Information Systems

- **Privacy:**
  - Claim of individuals to be left alone, free from surveillance or interference from other individuals, organizations, or state. Claim to be able to control information about yourself
- **In U.S., privacy protected by:**
  - First Amendment (freedom of speech)
  - Fourth Amendment (unreasonable search and seizure)
  - Additional federal statues (e.g. Privacy Act of 1974)

The Moral Dimensions of Information Systems

- **Fair information practices:**
  - **Set of principles governing the collection and use of information**
  - **Basis of most U.S. and European privacy laws**
  - **Based on mutuality of interest between record holder and individual**
  - **Restated and extended by FTC in 1998 to provide guidelines for protecting online privacy**
  - **Used to drive changes in privacy legislation**
    - COPPA
    - Gramm-Leach-Bliley Act
    - HIPAA

The Moral Dimensions of Information Systems

- **FTC FIP principles:**
  1. **Notice/awareness (core principle)**
  2. **Choice/consent (core principle)**
  3. **Access/participation**
  4. **Security**
  5. **Enforcement**

The Moral Dimensions of Information Systems

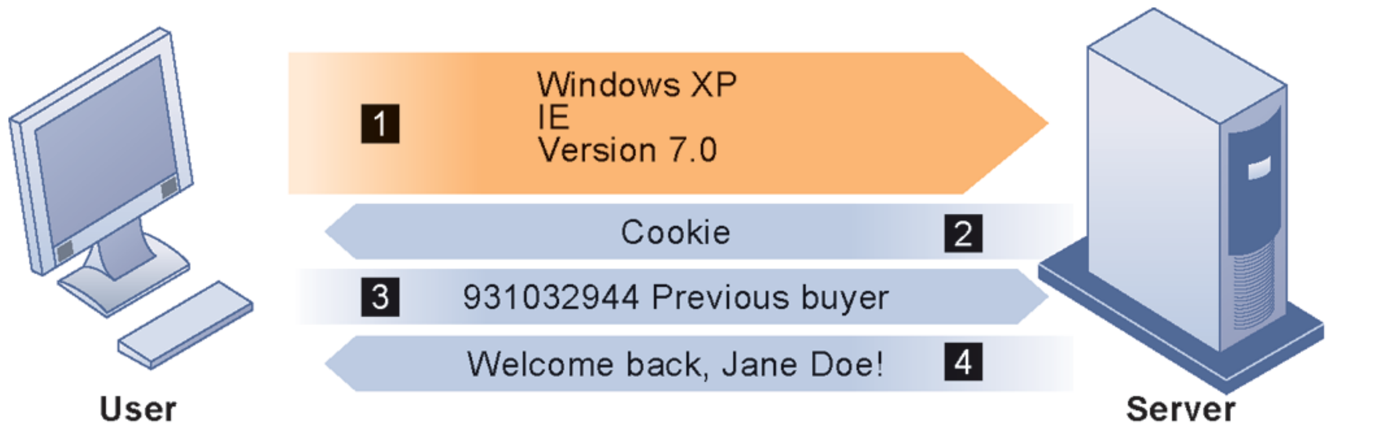
- **European Directive on Data Protection:**
  - **Requires companies to inform people when they collect information about them and disclose how it will be stored and used.**
  - **Requires informed consent of customer**
  - **EU member nations cannot transfer personal data to countries with no similar privacy protection (e.g. U.S.)**
  - **U.S. businesses use safe harbor framework**
    - Self-regulating policy to meet objectives of government legislation without involving government regulation or enforcement.

The Moral Dimensions of Information Systems

- **Internet Challenges to Privacy:**
  - **Cookies**
    - Tiny files downloaded by Web site to visitor's hard drive to help identify visitor's browser and track visits to site
    - Allow Web sites to develop profiles on visitors
  - **Web beacons/bugs**
    - Tiny graphics embedded in e-mail and Web pages to monitor who is reading message
  - **Spyware**
    - Surreptitiously installed on user's computer
    - May transmit user's keystrokes or display unwanted ads
- **Google's collection of private data; behavioral targeting**

The Moral Dimensions of Information Systems

HOW COOKIES IDENTIFY WEB VISITORS



1. The Web server reads the user's Web browser and determines the operating system, browser name, version number, Internet address, and other information.
2. The server transmits a tiny text file with user identification information called a cookie, which the user's browser receives and stores on the user's computer hard drive.
3. When the user returns to the Web site, the server requests the contents of any cookie it deposited previously in the user's computer.
4. The Web server reads the cookie, identifies the visitor, and calls up data on the user.

FIGURE 4-3 Cookies are written by a Web site on a visitor's hard drive. When the visitor returns to that Web site, the Web server requests the ID number from the cookie and uses it to access the data stored by that server on that visitor. The Web site can then use these data to display personalized information.

The Moral Dimensions of Information Systems

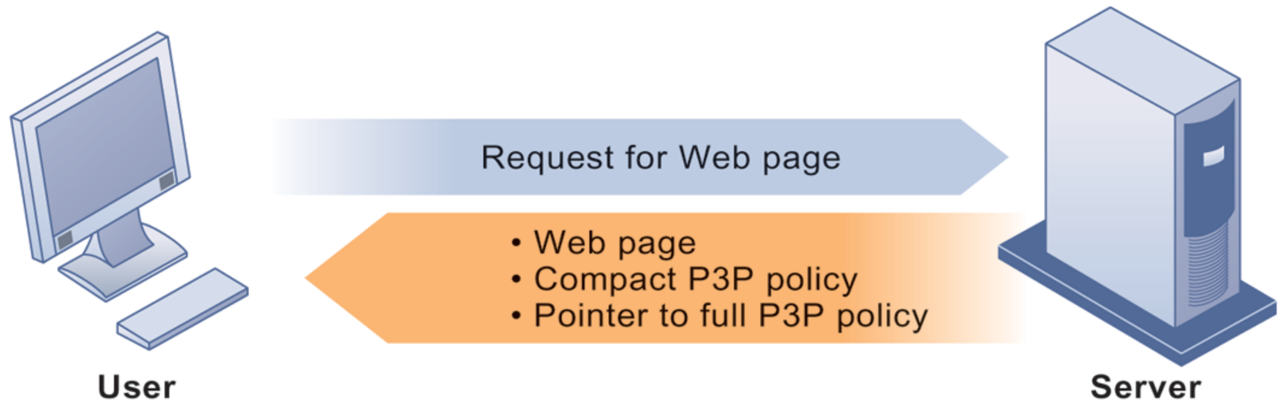
- **U.S. allows businesses to gather transaction information and use this for other marketing purposes**
- **Online industry promotes self-regulation over privacy legislation**
- **However, extent of responsibility taken varies**
  - Statements of information use
  - Opt-out selection boxes
  - Online “seals” of privacy principles
- **Most Web sites do not have any privacy policies**

The Moral Dimensions of Information Systems

- **Technical solutions**
  - **The Platform for Privacy Preferences (P3P)**
    - Allows Web sites to communicate privacy policies to visitor's Web browser – user
    - User specifies privacy levels desired in browser settings
    - E.g. "medium" level accepts cookies from first-party host sites that have opt-in or opt-out policies but rejects third-party cookies that use personally identifiable information without an opt-in policy

The Moral Dimensions of Information Systems

THE P3P STANDARD



1. The user with P3P Web browsing software requests a Web page.
2. The Web server returns the Web page along with a compact version of the Web site's policy and a pointer to the full P3P policy. If the Web site is not P3P compliant, no P3P data are returned.
3. The user's Web browsing software compares the response from the Web site with the user's privacy preferences. If the Web site does not have a P3P policy or the policy does not match the privacy levels established by the user, it warns the user or rejects the cookies from the Web site. Otherwise, the Web page loads normally.

FIGURE 4-4 P3P enables Web sites to translate their privacy policies into a standard format that can be read by the user's Web browser software. The browser software evaluates the Web site's privacy policy to determine whether it is compatible with the user's privacy preferences.

The Moral Dimensions of Information Systems

- **Property rights: Intellectual property**
  - **Intellectual property: Intangible property of any kind created by individuals or corporations**
  - **Three main ways that protect intellectual property**
    1. **Trade secret:** Intellectual work or product belonging to business, not in the public domain
    2. **Copyright:** Statutory grant protecting intellectual property from being copied for the life of the author, plus 70 years
    3. **Patents:** Grants creator of invention an exclusive monopoly on ideas behind invention for 20 years

The Moral Dimensions of Information Systems

- **Challenges to intellectual property rights**
  - **Digital media different from physical media (e.g. books)**
    - Ease of replication
    - Ease of transmission (networks, Internet)
    - Difficulty in classifying software
    - Compactness
    - Difficulties in establishing uniqueness
- **Digital Millennium Copyright Act (DMCA)**
  - **Makes it illegal to circumvent technology-based protections of copyrighted materials**

The Moral Dimensions of Information Systems

- **Accountability, Liability, Control**
  - **Computer-related liability problems**
    - If software fails, who is responsible?
      - If seen as part of machine that injures or harms, software producer and operator may be liable
      - If seen as similar to book, difficult to hold author/publisher responsible
      - What should liability be if software seen as service? Would this be similar to telephone systems not being liable for transmitted messages?

The Moral Dimensions of Information Systems

- **System Quality: Data Quality and System Errors**
  - **What is an acceptable, technologically feasible level of system quality?**
    - Flawless software is economically unfeasible
  - **Three principal sources of poor system performance:**
    - Software bugs, errors
    - Hardware or facility failures
    - Poor input data quality (most common source of business system failure)

The Moral Dimensions of Information Systems

- **Quality of life: Equity, access, and boundaries**
  - **Negative social consequences of systems**
    - **Balancing power:** Although computing power decentralizing, key decision-making remains centralized
    - **Rapidity of change:** Businesses may not have enough time to respond to global competition
    - **Maintaining boundaries:** Computing, Internet use lengthens work-day, infringes on family, personal time
    - **Dependence and vulnerability:** Public and private organizations ever more dependent on computer systems

The Moral Dimensions of Information Systems

- **Computer crime and abuse**
  - **Computer crime: Commission of illegal acts through use of compute or against a computer system – computer may be object or instrument of crime**
  - **Computer abuse: Unethical acts, not illegal**
    - Spam: High costs for businesses in dealing with spam
- **Employment:**
  - **Reengineering work resulting in lost jobs**
- **Equity and access – the digital divide:**
  - **Certain ethnic and income groups in the United States less likely to have computers or Internet access**

The Moral Dimensions of Information Systems

THE PERILS OF TEXTING

Read the Interactive Session and discuss the following questions

- **Which of the five moral dimensions of information systems identified in this text is involved in this case?**
- **What are the ethical, social, and political issues raised by this case?**
- **Which of the ethical principles described in the text are useful for decision making about texting while driving?**

The Moral Dimensions of Information Systems

- **Health risks:**
  - **Repetitive stress injury (RSI)**
    - Largest source is computer keyboards
    - Carpal Tunnel Syndrome (CTS)
  - **Computer vision syndrome (CVS)**
  - **Technostress**
  - **Role of radiation, screen emissions, low-level electromagnetic fields**

The Moral Dimensions of Information Systems

TOO MUCH TECHNOLOGY?

Read the Interactive Session and discuss the following questions

- **What are some of the arguments for and against the use of digital media?**
- **How might the brain be affected by constant digital media usage?**
- **Do you think these arguments outweigh the positives of digital media usage? Why or why not?**
- **What additional concerns are there for children using digital media? Should children under 8 use computers and cell phones? Why or why not?**

Chapter 5

IT INFRASTRUCTURE AND EMERGING TECHNOLOGIES

VIDEO CASES

Case 1: Google and IBM Produce Cloud Computing
Case 2: IBM Blue Cloud is Ready-to-Use Computing
Case 3: What the Hell is Cloud Computing?
Case 4: What is AJAX and How Does it Work?
Case 5: Yahoo's FireEagle Geolocation Service

Learning Objectives

- Define IT infrastructure and describe its components.
- Identify and describe the stages and technology drivers of IT infrastructure evolution.
- Assess contemporary computer hardware platform trends.
- Assess contemporary software platform trends.
- Evaluate the challenges of managing IT infrastructure and management solutions.

IT Infrastructure

- **IT infrastructure:**
  - **Set of physical devices and software required to operate enterprise**
  - **Set of firmwide services including:**
    - Computing platforms providing computing services
    - Telecommunications services
    - Data management services
    - Application software services
    - Physical facilities management services
    - IT management, standards, education, research and development services
  - **"Service platform" perspective more accurate view of value of investments**

IT Infrastructure

CONNECTION BETWEEN THE FIRM, IT INFRASTRUCTURE, AND BUSINESS CAPABILITIES

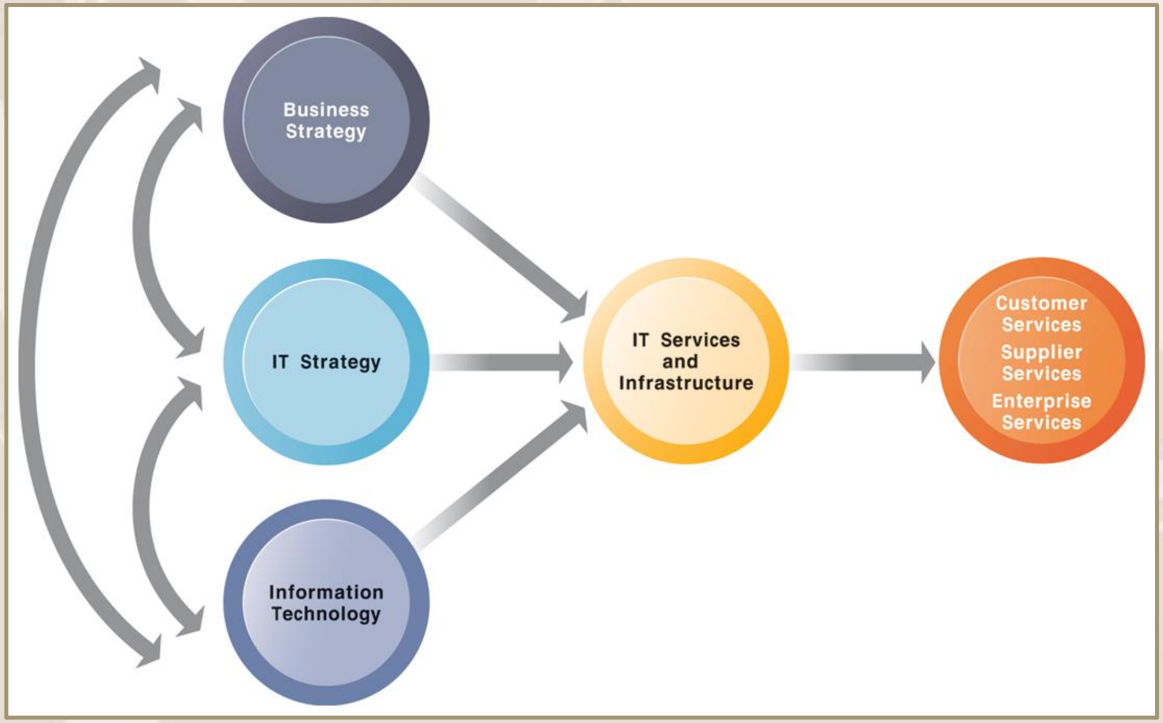


FIGURE 5-1 The services a firm is capable of providing to its customers, suppliers, and employees are a direct function of its IT infrastructure. Ideally, this infrastructure should support the firm's business and information systems strategy. New information technologies have a powerful impact on business and IT strategies, as well as the services that can be provided to customers.

IT Infrastructure

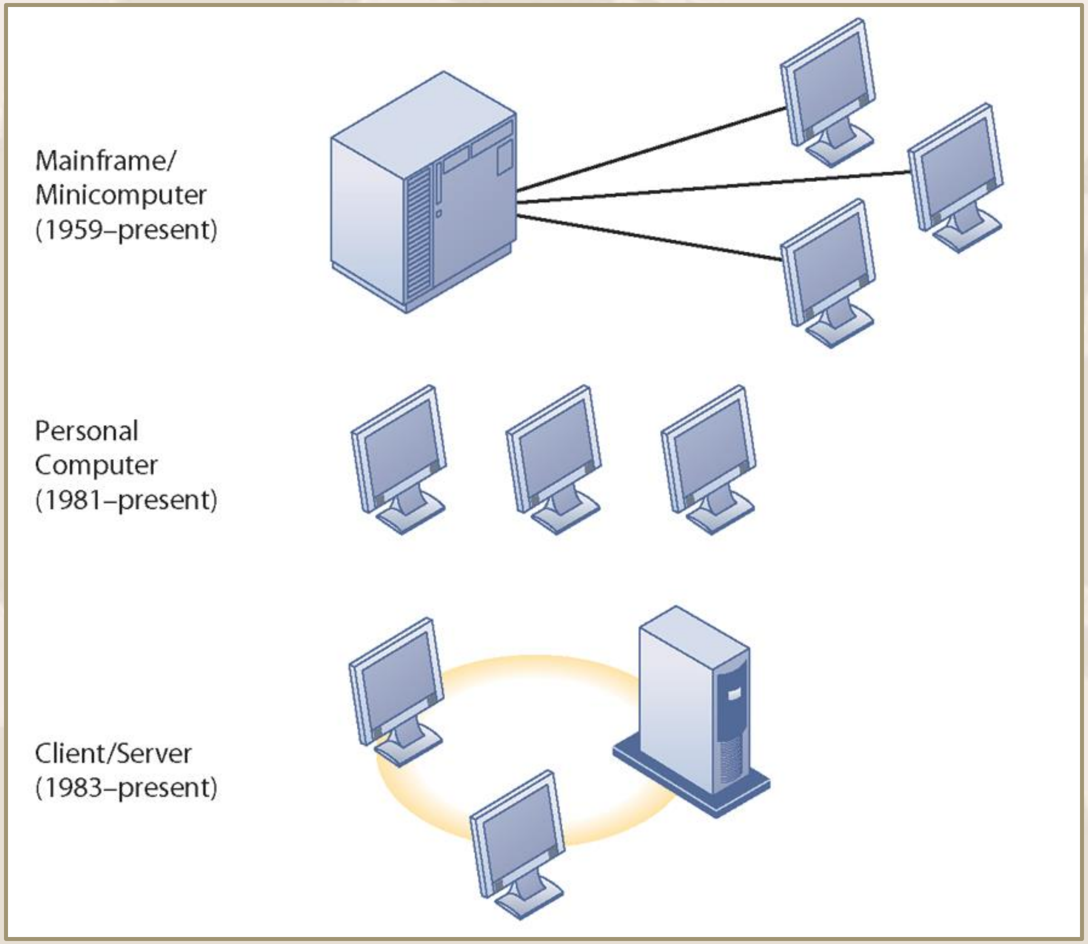
- **Evolution of IT infrastructure**
  - **General-purpose mainframe & minicomputer era: 1959 to present**
    - 1958 IBM first mainframes introduced
    - 1965 Less expensive DEC minicomputers introduced
  - **Personal computer era: 1981 to present**
    - 1981 Introduction of IBM PC
    - Proliferation in 80s, 90s resulted in growth of personal software
  - **Client/server era: 1983 to present**
    - Desktop clients networked to servers, with processing work split between clients and servers
    - Network may be two-tiered or multitiered (N-tiered)
    - Various types of servers (network, application, Web)

IT Infrastructure

STAGES IN IT INFRASTRUCTURE EVOLUTION

Illustrated here are the typical computing configurations characterizing each of the five eras of IT infrastructure evolution.

FIGURE 5-2



IT Infrastructure

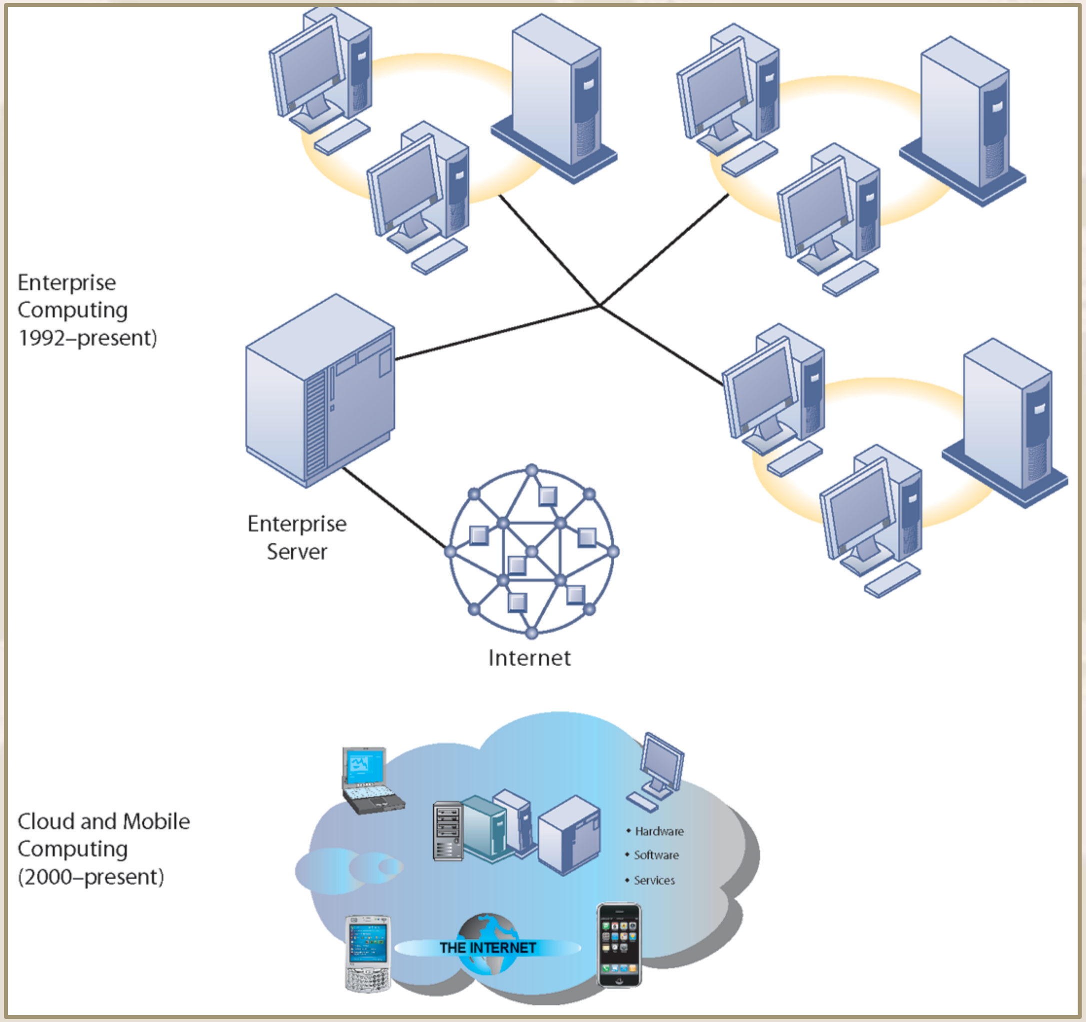
- **Evolution of IT infrastructure (cont.)**
  - **Enterprise computing era: 1992 to present**
    - Move toward integrating disparate networks, applications using Internet standards and enterprise applications
  - **Cloud Computing: 2000 to present**
    - Refers to a model of computing where firms and individuals obtain computing power and software applications over the Internet or other network
    - Fastest growing form of computing

IT Infrastructure

STAGES IN IT INFRASTRUCTURE EVOLUTION (cont.)

Illustrated here are the typical computing configurations characterizing each of the five eras of IT infrastructure evolution.

FIGURE 5-2



IT Infrastructure

A MULTITIERED CLIENT/SERVER NETWORK (N-TIER)

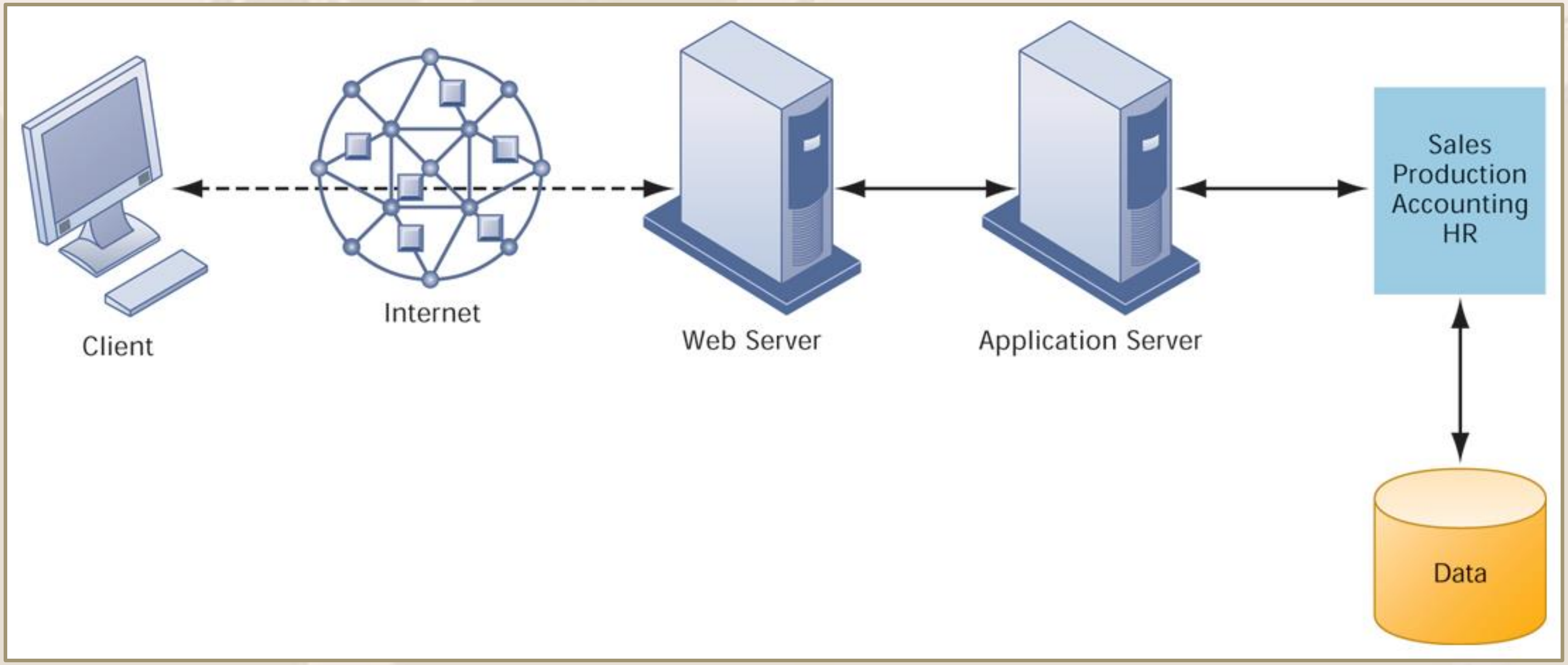


FIGURE 5-3 In a multitiered client/server network, client requests for service are handled by different levels of servers.

IT Infrastructure

- **Technology drivers of infrastructure evolution**
  - **Moore's law and microprocessing power**
    - Computing power doubles every 18 months
    - Nanotechnology:
      - Shrinks size of transistors to size comparable to size of a virus
  - **Law of Mass Digital Storage**
    - The amount of data being stored each year doubles

IT Infrastructure

MOORE'S LAW AND MICROPROCESSOR PERFORMANCE

Packing over 2 billion transistors into a tiny microprocessor has exponentially increased processing power. Processing power has increased to over 500,000 MIPS (millions of instructions per second).

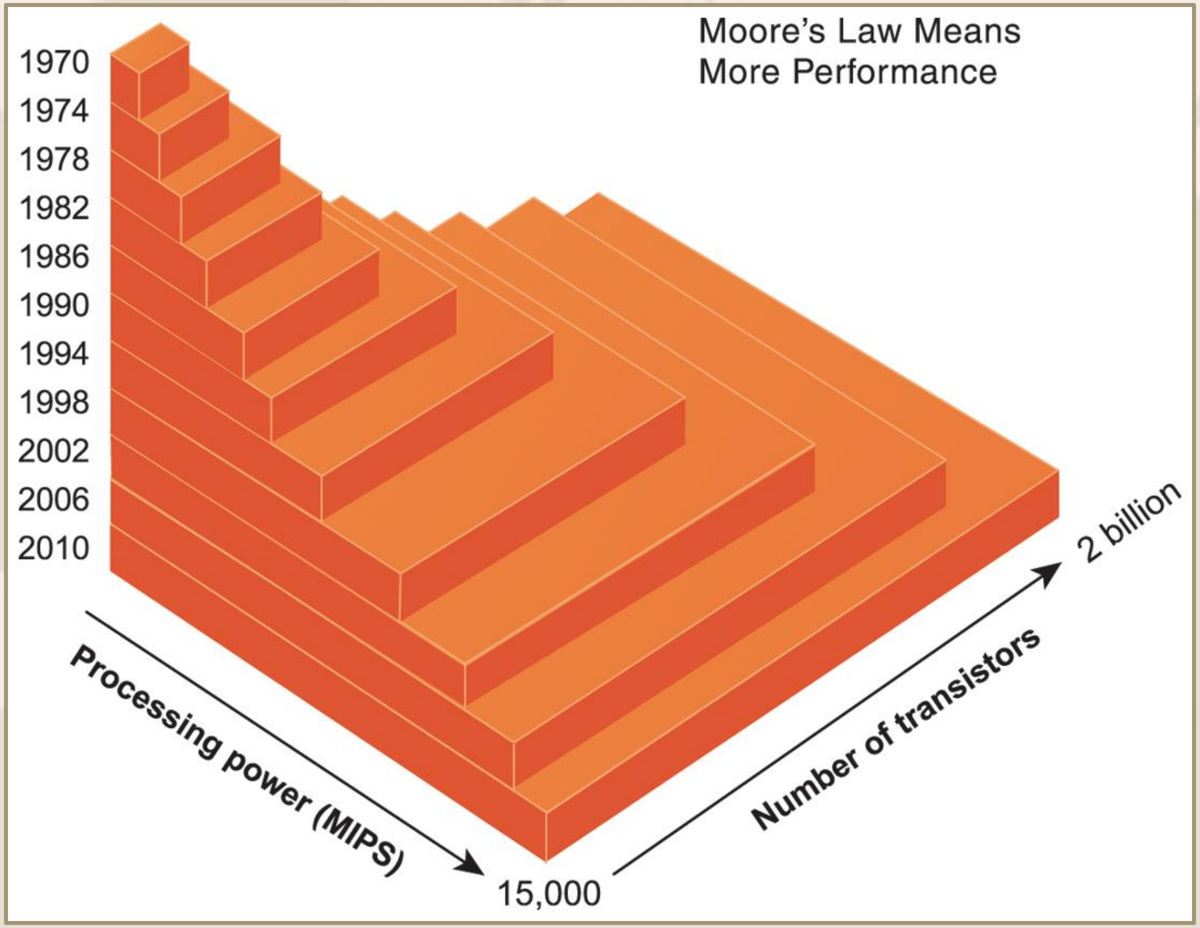


FIGURE 5-4

IT Infrastructure

FALLING COST OF CHIPS

Packing more transistors into less space has driven down transistor cost dramatically as well as the cost of the products in which they are used.

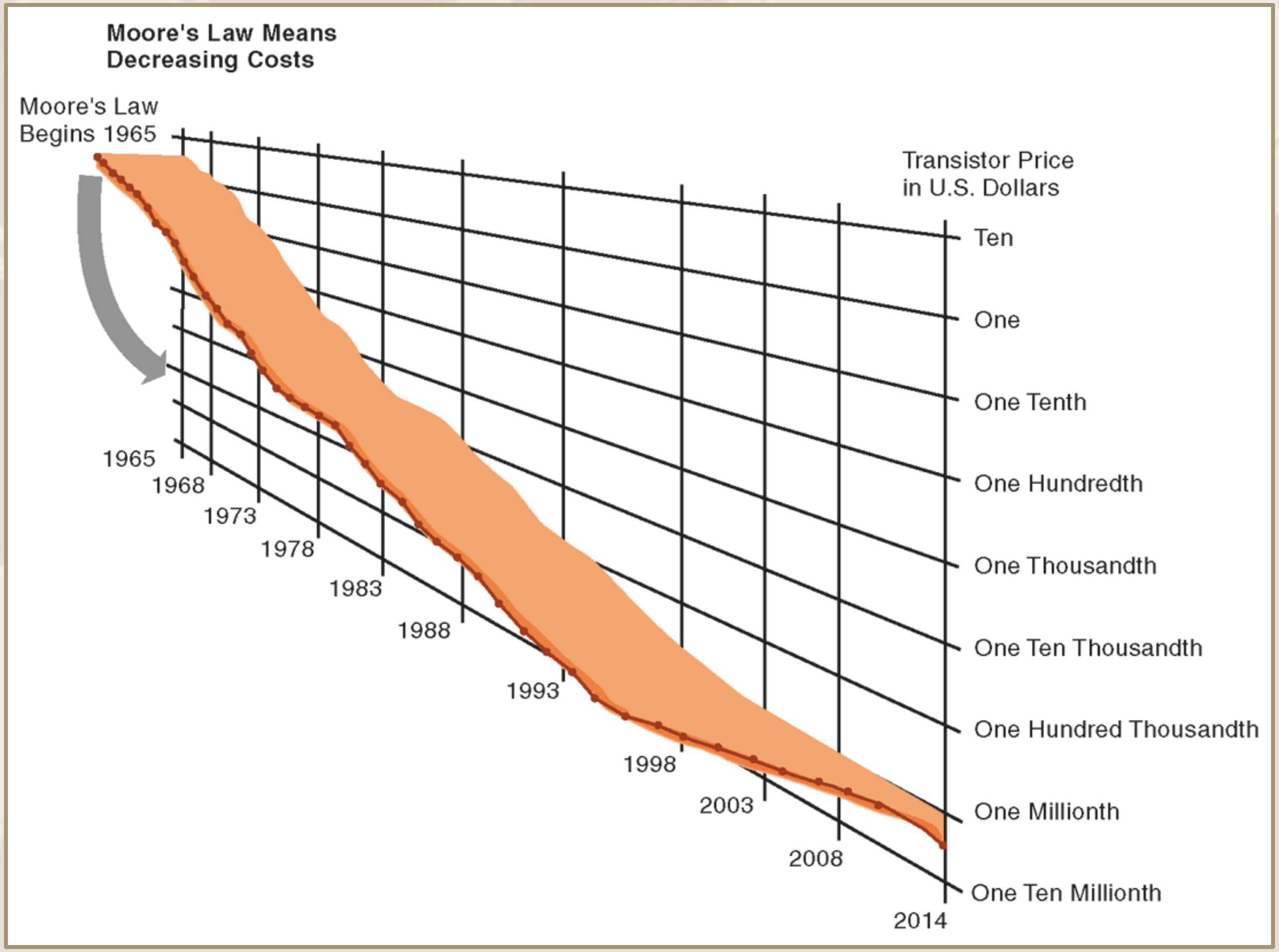


FIGURE 5-5

IT Infrastructure

EXAMPLES OF NANOTUBES

Nanotubes are tiny tubes about 10,000 times thinner than a human hair. They consist of rolled up sheets of carbon hexagons and have potential uses as minuscule wires or in ultrasmall electronic devices and are very powerful conductors of electrical current.

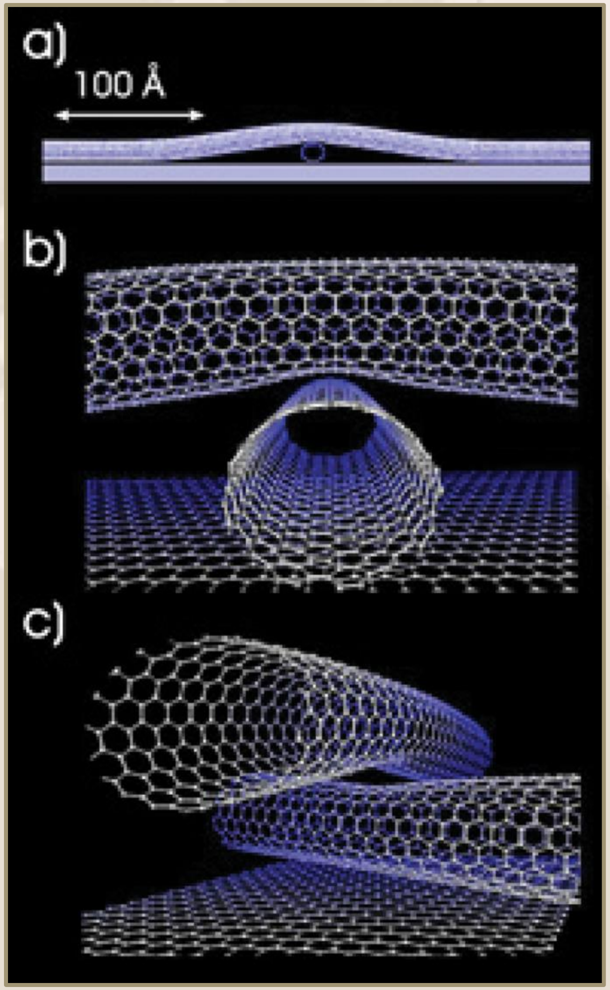


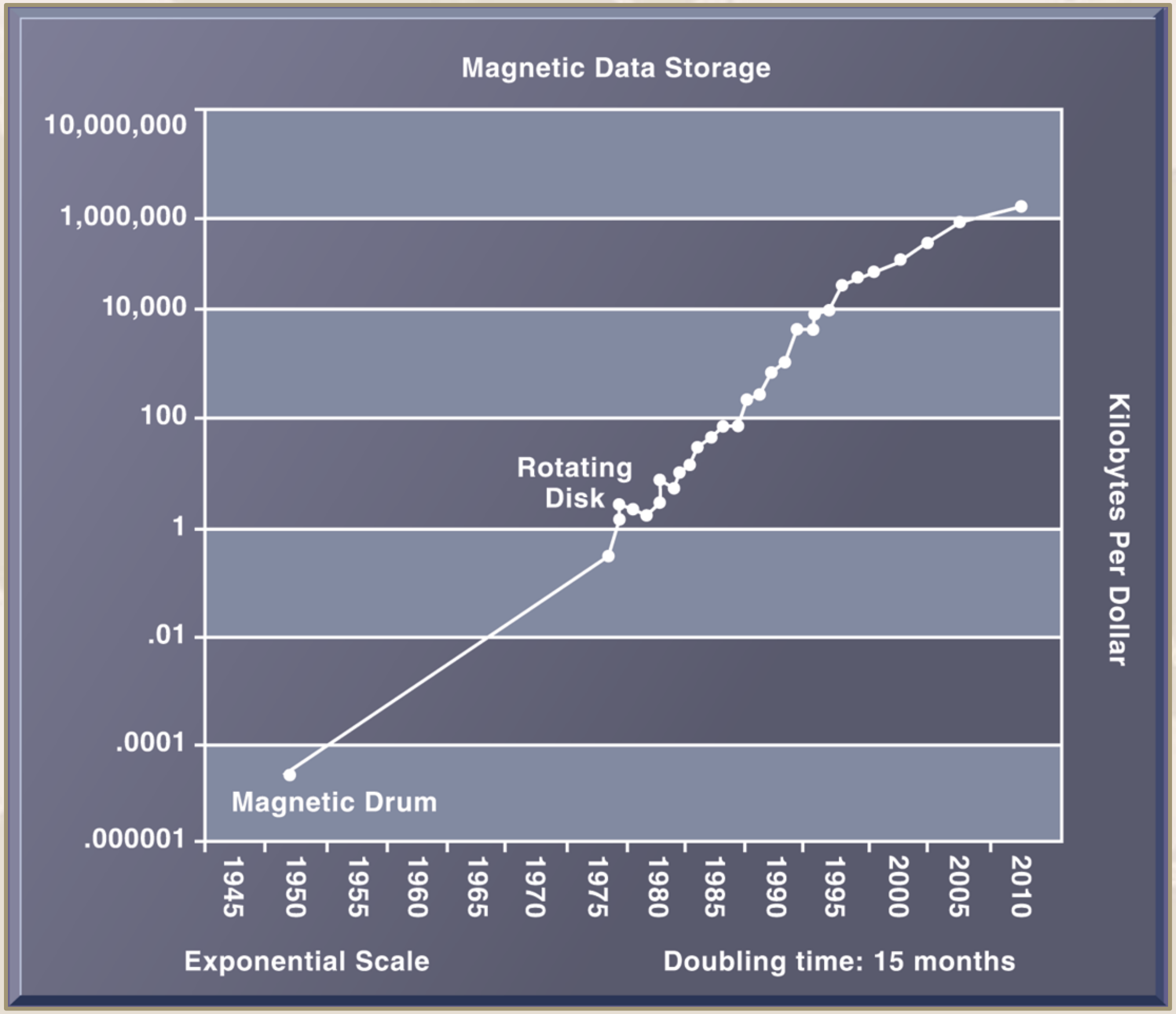
FIGURE 5-6

IT Infrastructure

THE COST OF STORING DATA DECLINES EXPONENTIALLY 1950–2010

Since the first magnetic storage device was used in 1955, the cost of storing a kilobyte of data has fallen exponentially, doubling the amount of digital storage for each dollar expended every 15 months, on average.

FIGURE 5-7



IT Infrastructure

- **Technology drivers of infrastructure evolution (cont.)**
  - **Metcalfe's Law and network economics**
    - Value or power of a network grows exponentially as a function of the number of network members
    - As network members increase, more people want to use it (demand for network access increases)

IT Infrastructure

- **Technology drivers of infrastructure evolution (cont.)**
  - **Declining communication costs and the Internet**
    - An estimated 1.5 billion people worldwide have Internet access
    - As communication costs fall toward a very small number and approach 0, utilization of communication and computing facilities explodes

IT Infrastructure

EXPONENTIAL DECLINES IN INTERNET COMMUNICATIONS COSTS

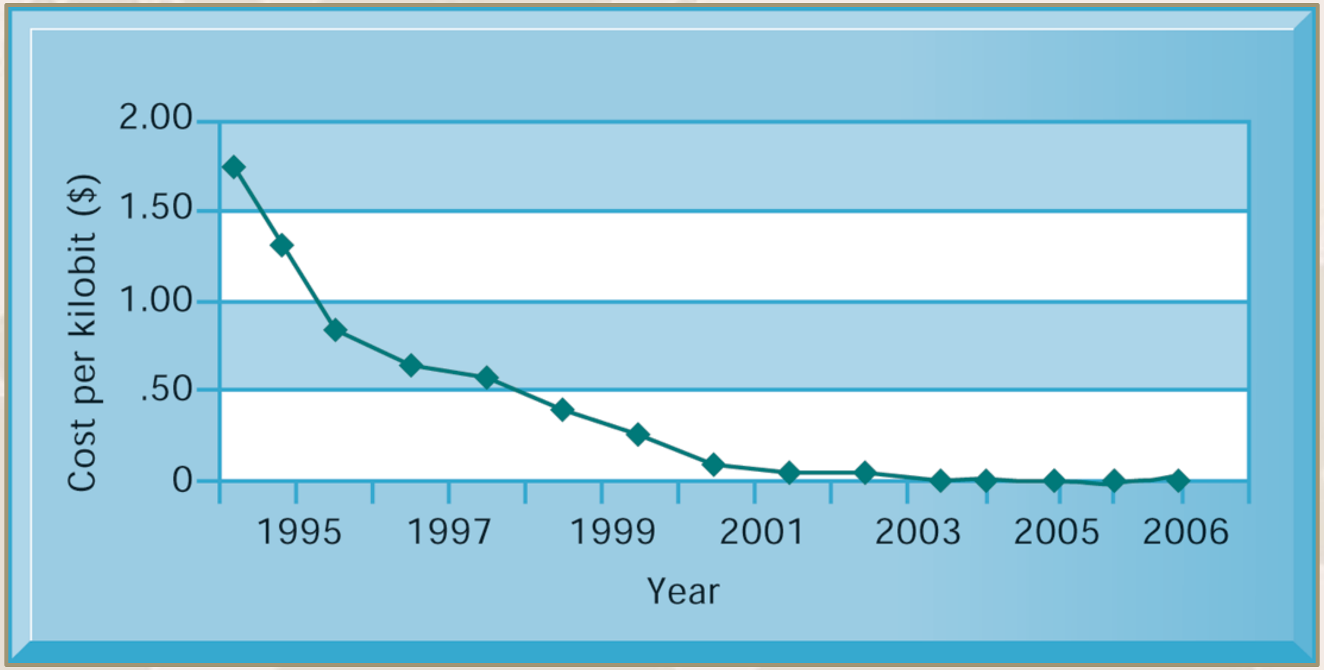


FIGURE 5-8

One reason for the growth in the Internet population is the rapid decline in Internet connection and overall communication costs. The cost per kilobit of Internet access has fallen exponentially since 1995. Digital subscriber line (DSL) and cable modems now deliver a kilobit of communication for a retail price of around 2 cents.

IT Infrastructure

- **Technology drivers of infrastructure evolution (cont.)**
  - **Standards and network effects**
    - Technology standards:
      - Specifications that establish the compatibility of products and the ability to communicate in a network
      - Unleash powerful economies of scale and result in price declines as manufacturers focus on the products built to a single standard

Infrastructure Components

- IT Infrastructure has 7 main components
  1. Computer hardware platforms
  2. Operating system platforms
  3. Enterprise software applications
  4. Data management and storage
  5. Networking/telecommunications platforms
  6. Internet platforms
  7. Consulting system integration services

IT Infrastructure

THE IT INFRASTRUCTURE ECOSYSTEM

There are seven major components that must be coordinated to provide the firm with a coherent IT infrastructure. Listed here are major technologies and suppliers for each component.

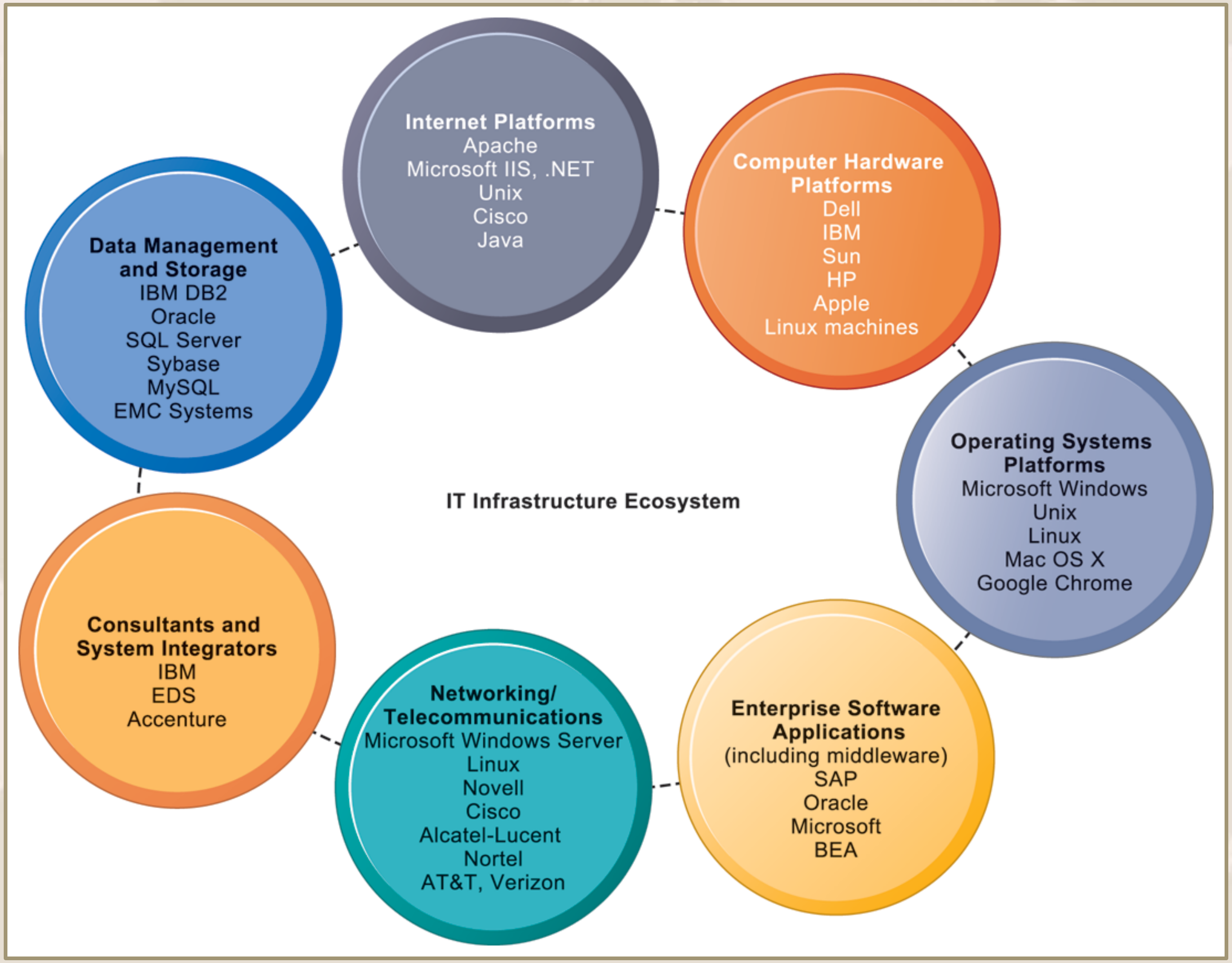


FIGURE 5-9

Infrastructure Components

- **Computer hardware platforms**
  - **Client machines**
    - Desktop PCs, mobile devices – PDAs, laptops
  - **Servers**
    - Blade servers: ultrathin computers stored in racks
  - **Mainframes:**
    - IBM mainframe equivalent to thousands of blade servers
  - **Top chip producers: AMD, Intel, IBM**
  - **Top firms: IBM, HP, Dell, Sun Microsystems**

Infrastructure Components

- **Operating system platforms**
  - **Operating systems**
    - Server level:
    - Client level:
      - 90% run Microsoft Windows
      - Handheld device OS's (Android, iPhone OS)
      - Cloud computing OS's (Google's Chrome OS)
- **Enterprise software applications**
  - **Enterprise application providers: SAP and Oracle**
  - **Middleware providers: BEA**

Infrastructure Components

- **Data management and storage**
  - **Database software:**
    - IBM (DB2), Oracle, Microsoft (SQL Server), Sybase (Adaptive Server Enterprise), MySQL
  - **Physical data storage:**
    - EMC Corp (large-scale systems), Seagate, Maxtor, Western Digital
  - **Storage area networks (SANs):**
    - Connect multiple storage devices on dedicated network

Infrastructure Components

- **Networking/telecommunications platforms**
  - **Telecommunication services**
    - Telecommunications, cable, telephone company charges for voice lines and Internet access
    - AT&T, Verizon
  - **Network operating systems:**
    - Windows Server, Novell, Linux, Unix
  - **Network hardware providers:**
    - Cisco, Alcatel-Lucent, Nortel, Juniper Networks

Infrastructure Components

- Internet platforms
  - Hardware, software, management services to support company Web sites, (including Web hosting services) intranets, extranets
  - Internet hardware server market: Dell, HP/Compaq, IBM
  - Web development tools/suites: Microsoft (FrontPage, .NET) IBM (WebSphere) Sun (Java), independent software developers: Adobe, RealMedia

Infrastructure Components

- Consulting and system integration services
  - Even large firms do not have resources for a full range of support for new, complex infrastructure
  - Software integration: ensuring new infrastructure works with legacy systems
  - Legacy systems: older TPS created for mainframes that would be too costly to replace or redesign
  - Accenture, IBM Global Services, EDS, Infosys, Wipro

Contemporary Hardware Platform Trends

- **The emerging mobile digital platform**
  - **Cell phones, smartphones (BlackBerry, iPhone)**
    - Have assumed data transmission, Web surfing, e-mail and IM duties
  - **Netbooks:**
    - Small, low-cost lightweight notebooks optimized for wireless communication and core computing tasks
  - **Tablets (iPad)**
  - **Networked e-readers (Kindle)**

- Grid computing
  - Connects geographically remote computers into a single network to combine processing power and create virtual supercomputer
  - Provides cost savings, speed, agility
- Virtualization
  - Allows single physical resource to act as multiple resources (i.e., run multiple instances of OS)
  - Reduces hardware and power expenditures
  - Facilitates hardware centralization

- **Cloud computing**
  - **On-demand (utility) computing services obtained over network**
    - Infrastructure as a service
    - Platform as a service
    - Software as a service
  - **Cloud can be public or private**
  - **Allows companies to minimize IT investments**
  - **Drawbacks: Concerns of security, reliability**

Contemporary Hardware Platform Trends

- **Green computing**
  - Practices and technologies for manufacturing, using, disposing of computing and networking hardware
- **Autonomic computing**
  - Industry-wide effort to develop systems that can configure, heal themselves when broken, and protect themselves from outside intruders
  - Similar to self-updating antivirus software; Apple and Microsoft both use automatic updates
- **High performance, power-saving processors**
  - Multi-core processors

Contemporary Software Platform Trends

- **Linux and open-source software**
  - Open-source software: Produced by community of programmers, free and modifiable by user
  - Linux: Open-source software OS
- **Software for the Web**
  - **Java:**
    - Object-oriented programming language
    - Operating system, processor-independent
  - **Ajax**
    - Asynchronous JavaScript and XML
    - Allows client and server to exchange small pieces of data without requiring the page to be reloaded

Contemporary Software Platform Trends

- **Web Services**
  - **Software components that exchange information using Web standards and languages**
  - **XML: Extensible Markup Language**
    - More powerful and flexible than HTML
    - Tagging allows computers to process data automatically
  - **SOAP: Simple Object Access Protocol**
    - Rules for structuring messages enabling applications to pass data and instructions
  - **WSDL: Web Services Description Language**
    - Framework for describing Web service and capabilities
  - **UDDI: Universal Description, Discovery, and Integration**
    - Directory for locating Web services

Contemporary Software Platform Trends

- **SOA: Service-oriented architecture**
  - **Set of self-contained services that communicate with each other to create a working software application**
  - **Software developers reuse these services in other combinations to assemble other applications as needed**
    - Example: an "invoice service" to serve whole firm for calculating and sending printed invoices
  - **Dollar Rent A Car**
    - Uses Web services to link online booking system with Southwest Airlines' Web site

Contemporary Software Platform Trends

HOW DOLLAR RENT A CAR USES WEB SERVICES

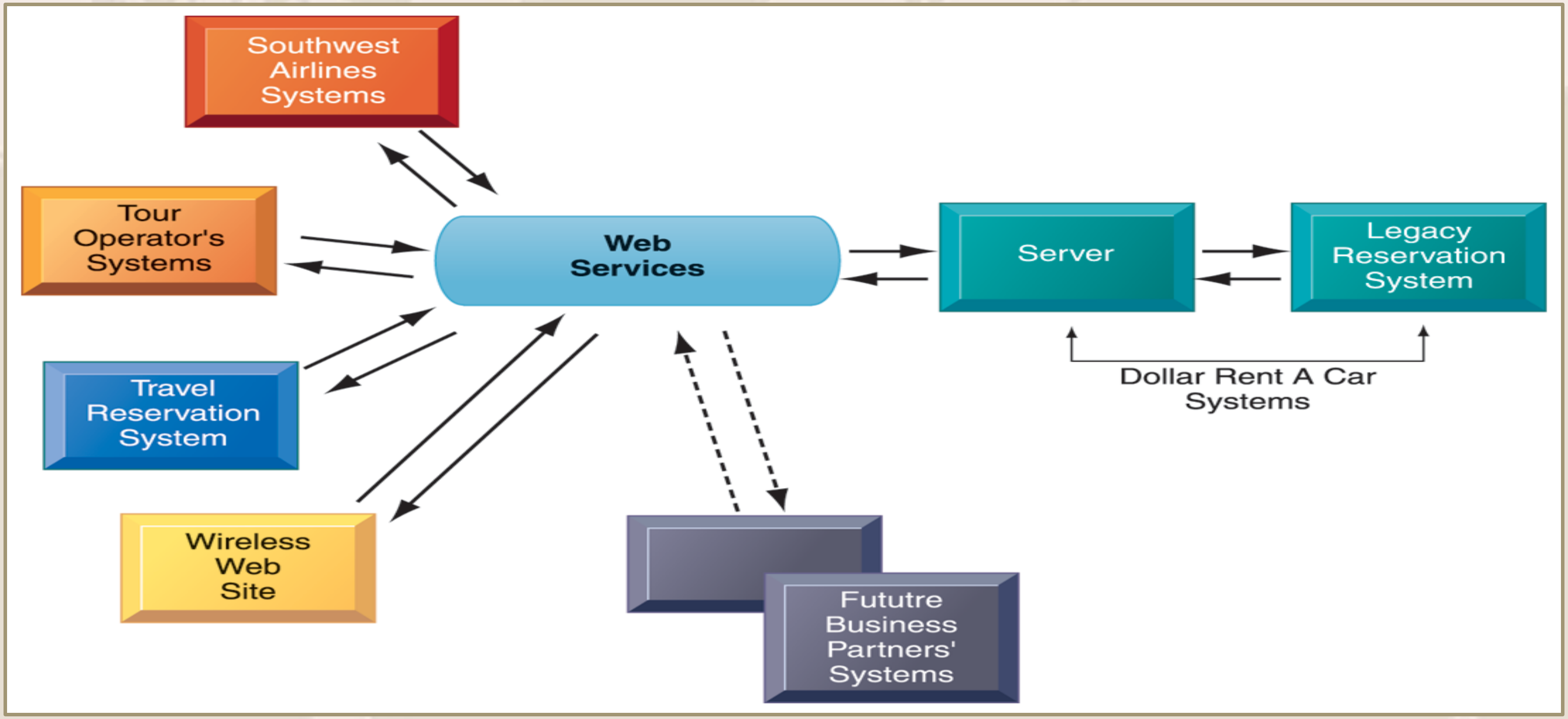


FIGURE 5-10 Dollar Rent A Car uses Web services to provide a standard intermediate layer of software to “talk” to other companies’ information systems. Dollar Rent A Car can use this set of Web services to link to other companies’ information systems without having to build a separate link to each firm’s systems.

Contemporary Software Platform Trends

- **Software outsourcing and cloud services**
  - **Three external sources for software:**
    1. Software packages and enterprise software
    2. Software outsourcing (domestic or offshore)
       - Domestic:
         - » Primarily for middleware, integration services, software support
       - Offshore:
         - » Primarily for lower level maintenance, data entry, call centers, although outsourcing for new-program development is increasing

Contemporary Software Platform Trends

- **Three external sources for software (cont.)**
  3. **Cloud-based software services**
     - Software as a service (SaaS)
     - Accessed with Web browser over Internet
     - Ranges from free or low-cost services for individuals to business and enterprise software
     - Users pay on subscription or per-transaction
     - E.g. Salesforce.com
     - Service Level Agreements (SLAs): formal agreement with service providers

Contemporary Software Platform Trends

CHANGING SOURCES OF FIRM SOFTWARE

In 2010, U.S. firms will spend over $265 billion on software. About 40 percent of that ($106 billion) will originate outside the firm, either from enterprise software vendors selling firmwide applications or individual application service providers leasing or selling software modules. Another 10 percent ($10 billion) will be provided by SaaS vendors as an online cloud-based service.

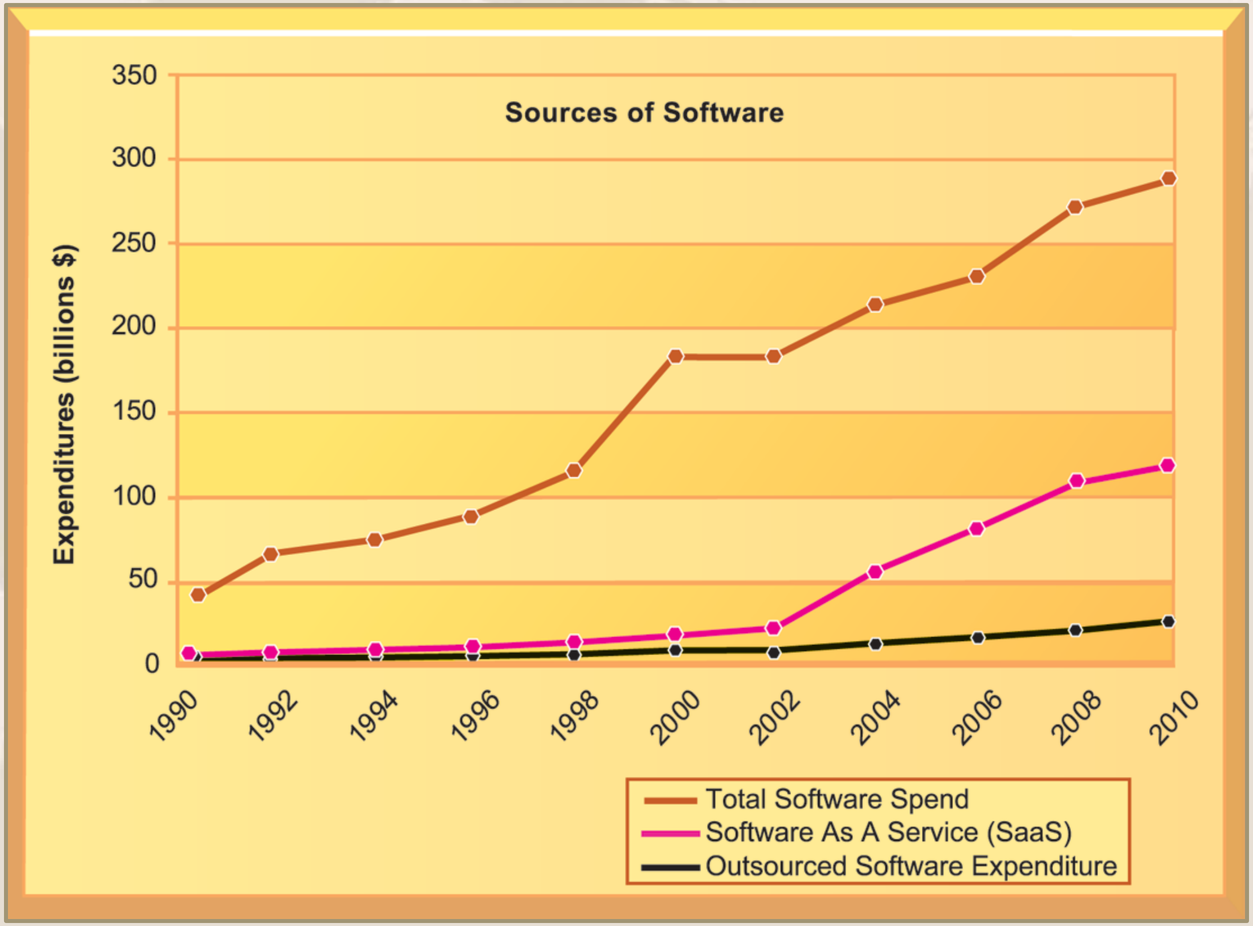


FIGURE 5-11

Contemporary Software Platform Trends

- **Software outsourcing and cloud services (cont.)**
  - **Mashups**
    - Combinations of two or more online applications, such as combining mapping software (Google Maps) with local content
  - **Apps**
    - Small pieces of software that run on the Internet, on your computer, or on your cell phone
      - iPhone, BlackBerry, Android
    - Generally delivered over the Internet

Management Issues

- **Dealing with platform and infrastructure change**
  - **As firms shrink or grow, IT needs to be flexible and scalable**
  - **Scalability:**
    - Ability to expand to serve larger numbers of users
  - **For mobile computing and cloud computing**
    - New policies and procedures for managing these new platforms
    - Contractual agreements with firms running clouds and distributing software required

Management Issues

- **Management and governance**
  - **Who controls IT infrastructure?**
  - **How should IT department be organized?**
    - Centralized
      - Central IT department makes decisions
    - Decentralized
      - Business unit IT departments make own decisions
  - **How are costs allocated between divisions, departments?**

Management Issues

- **Making wise infrastructure investments**
  - **Amount to spend on IT is complex question**
    - Rent vs. buy, outsourcing
  - **Total cost of ownership (TCO) model**
    - Analyzes direct and indirect costs
    - Hardware, software account for only about 20% of TCO
    - Other costs: Installation, training, support, maintenance, infrastructure, downtime, space and energy
    - TCO can be reduced through use of cloud services, greater centralization and standardization of hardware and software resources

Management Issues

- Competitive forces model for IT infrastructure investment
  1. Market demand for firm's services
  2. Firm's business strategy
  3. Firm's IT strategy, infrastructure, and cost
  4. Information technology assessment
  5. Competitor firm services
  6. Competitor firm IT infrastructure investments

Management Issues

COMPETITIVE FORCES MODEL FOR IT INFRASTRUCTURE

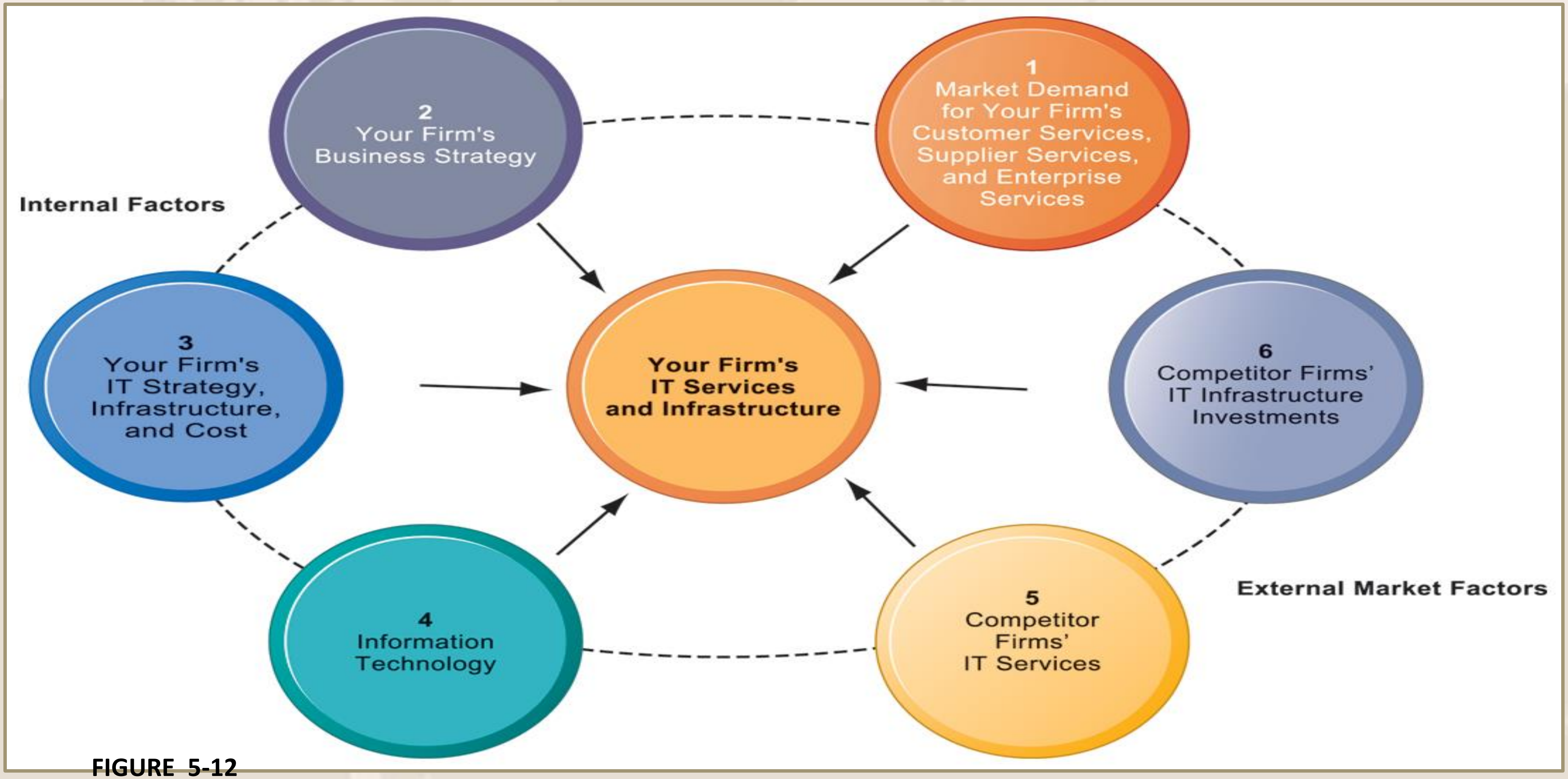


FIGURE 5-12

There are six factors you can use to answer the question, “How much should our firm spend on IT infrastructure?”

Chapter 7

TELECOMMUNICATIONS, THE INTERNET, AND WIRELESS TECHNOLOGY

VIDEO CASES

Case 1: Traveling the Internet and Wireless Technology
Case 2: Unified Communications Systems With Virtual Collaboration: IBM and Forterra
Instructional Video 1: AT&T Launches Managed Cisco Telepresence Solution
Instructional Video 2: CNN Telepresence

Learning Objectives

- What are the principal components of telecommunications networks and key networking technologies?
- What are the main telecommunications transmission media and types of networks?
- How does the Internet and Internet technology work and how do they support communication and e-business?
- What are the principal technologies and standards for wireless networking, communication, and Internet access?
- Why are radio frequency identification (RFID) and wireless sensor networks valuable for business?

Telecommunications and Networking in Today's Business World

- **Networking and communication Trends**
  - **Convergence:**
    - Telephone networks and computer networks converging into single digital network using Internet standards
    - E.g. cable companies providing voice service
  - **Broadband:**
    - More than 60% U.S. Internet users have broadband access
  - **Broadband wireless:**
    - Voice and data communication as well as Internet access are increasingly taking place over broadband wireless platforms

Telecommunications and Networking in Today's Business World

- **What is a computer network?**
  - **Two or more connected computers**
  - **Major components in simple network**
    - Client computer
    - Server computer
    - Network interfaces (NICs)
    - Connection medium
    - Network operating system
    - Hub or switch
  - **Routers**
    - Device used to route packets of data through different networks, ensuring that data sent gets to the correct address

Telecommunications and Networking in Today's Business World

COMPONENTS OF A SIMPLE COMPUTER NETWORK

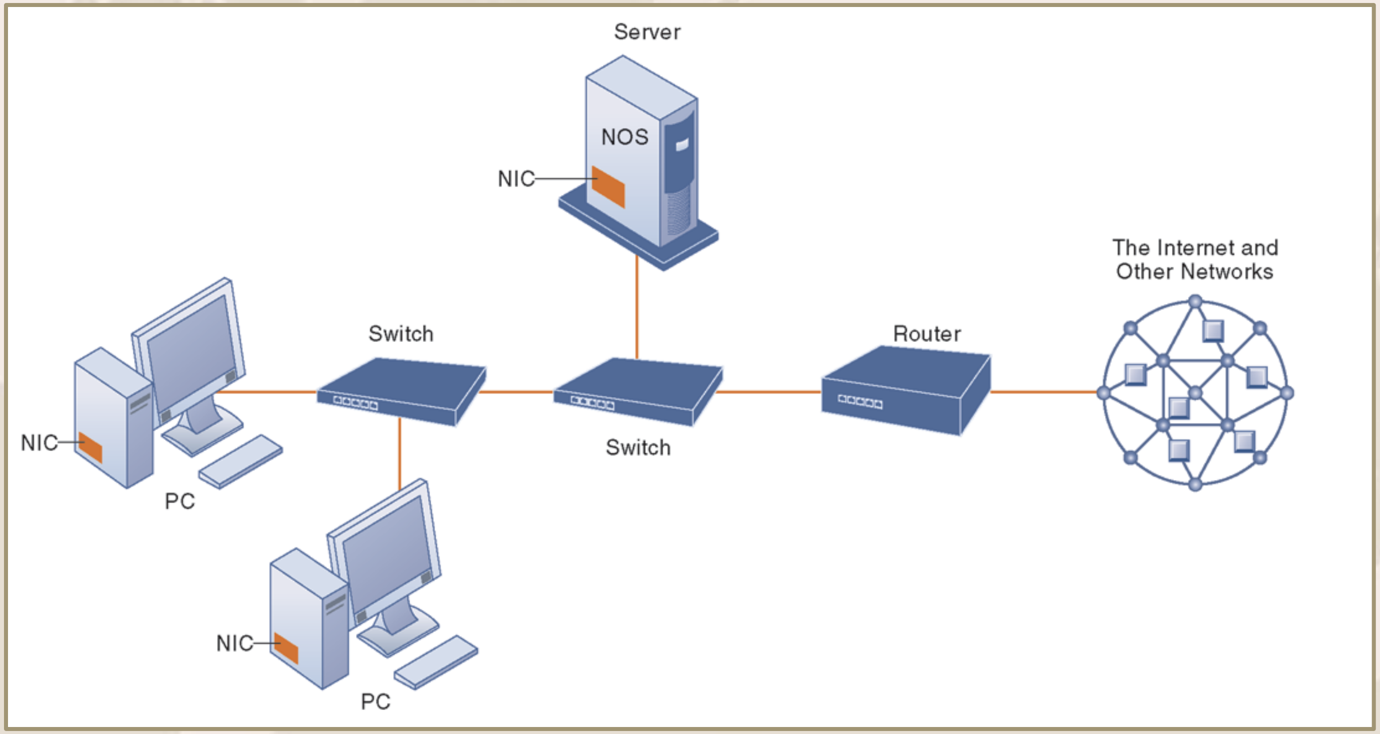


FIGURE 7-1 Illustrated here is a very simple computer network, consisting of computers, a network operating system residing on a dedicated server computer, cable (wiring) connecting the devices, network interface cards (NICs), switches, and a router.

Telecommunications and Networking in Today's Business World

- **Components of networks in large companies**
  - **Hundreds of local area networks (LANs) linked to firmwide corporate network**
  - **Various powerful servers**
    - Web site
    - Corporate intranet, extranet
    - Backend systems
  - **Mobile wireless LANs (Wi-Fi networks)**
  - **Videoconferencing system**
  - **Telephone network**
  - **Wireless cell phones**

Telecommunications and Networking in Today's Business World

CORPORATE NETWORK INFRASTRUCTURE

Today's corporate network infrastructure is a collection of many different networks from the public switched telephone network, to the Internet, to corporate local area networks linking workgroups, departments, or office floors.

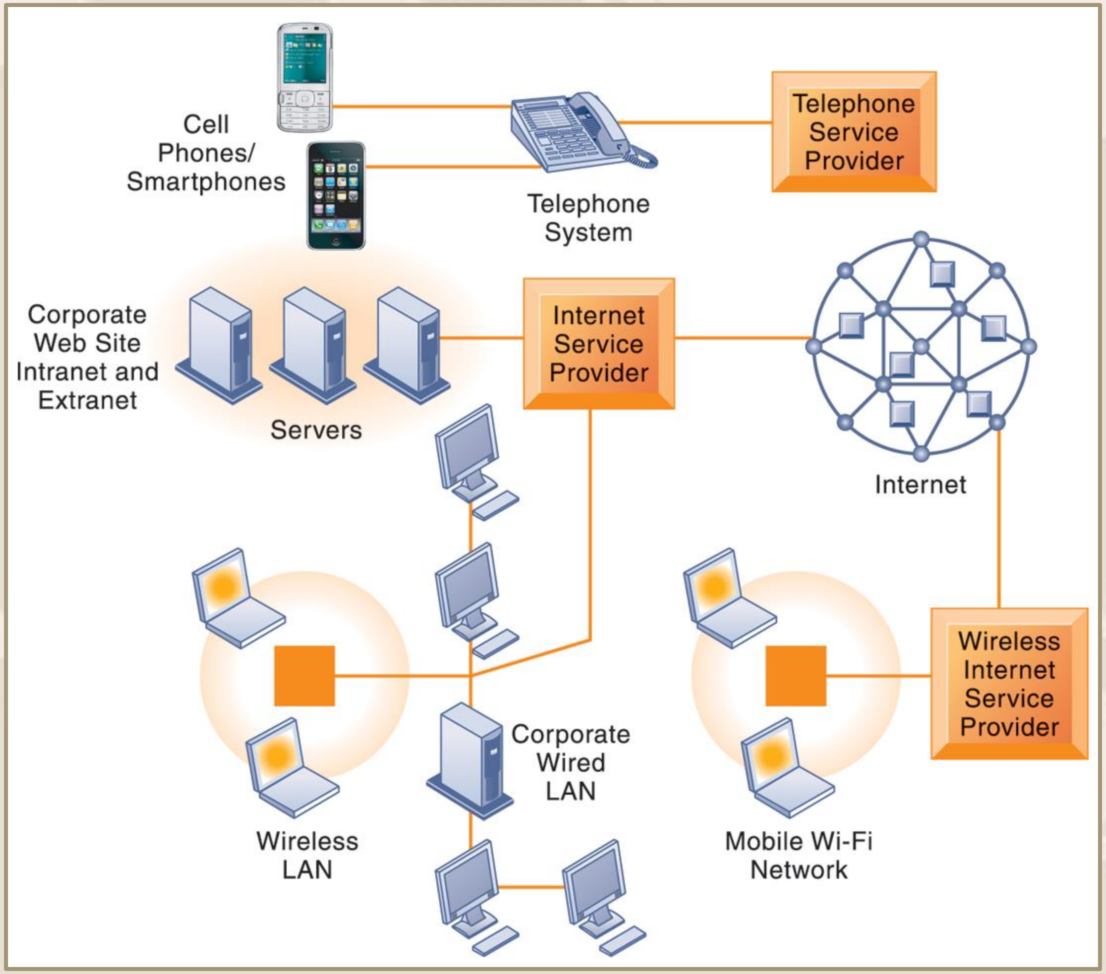


FIGURE 7-2

Telecommunications and Networking in Today's Business World

- **Key networking technologies**
  - **Client/server computing**
    - Distributed computing model
    - Clients linked through network controlled by network server computer
    - Server sets rules of communication for network and provides every client with an address so others can find it on the network
    - Has largely replaced centralized mainframe computing
    - The Internet: Largest implementation of client/server computing

Telecommunications and Networking in Today's Business World

- **Key networking technologies (cont.)**
  - **Packet switching**
    - Method of slicing digital messages into parcels (packets), sending packets along different communication paths as they become available, and then reassembling packets at destination
    - Previous circuit-switched networks required assembly of complete point-to-point circuit
    - Packet switching more efficient use of network's communications capacity

Telecommunications and Networking in Today's Business World

PACKED-SWITCHED NETWORKS AND PACKET COMMUNICATIONS

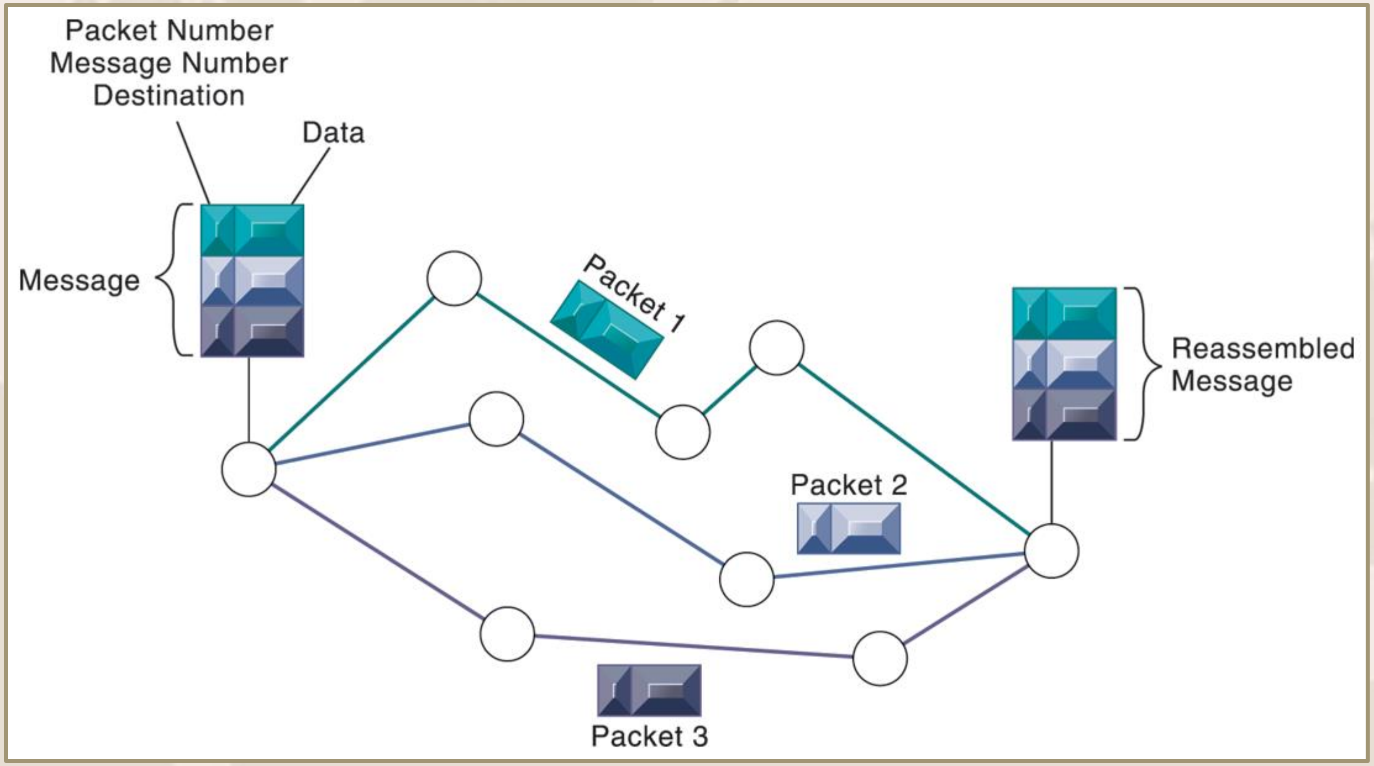


FIGURE 7-3 Data are grouped into small packets, which are transmitted independently over various communications channels and reassembled at their final destination.

Telecommunications and Networking in Today's Business World

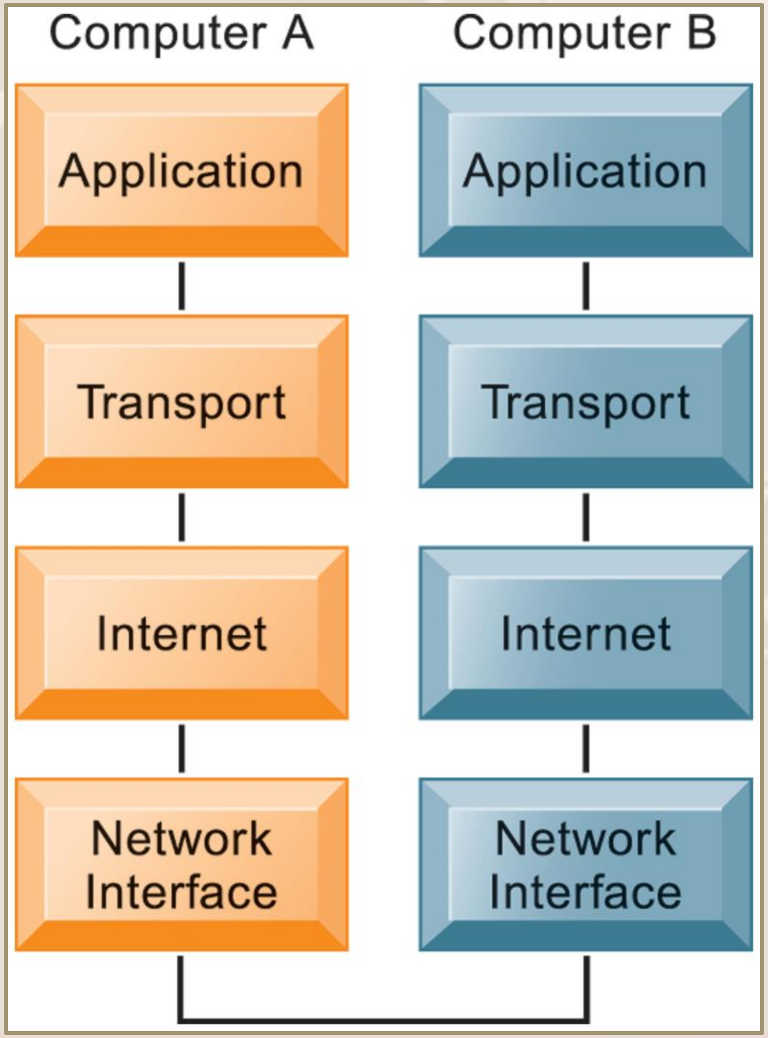
- **Key networking technologies (cont.)**
  - **TCP/IP and connectivity**
    - **Connectivity between computers enabled by protocols**
    - **Protocols:** Rules that govern transmission of information between two points
    - **Transmission Control Protocol/Internet Protocol (TCP/IP)**
      - Common worldwide standard that is basis for Internet
    - **Department of Defense reference model for TCP/IP**
      - Four layers
        1. Application layer
        2. Transport layer
        3. Internet layer
        4. Network interface layer

Telecommunications and Networking in Today's Business World

THE TRANSMISSION CONTROL PROTOCOL/ INTERNET PROTOCOL (TCP/IP) REFERENCE MODEL

This figure illustrates the four layers of the TCP/IP reference model for communications

FIGURE 7-4



Telecommunications and Networking in Today's Business World

- **Signals: digital vs. analog**
  - **Modem: Translates digital signals into analog form**
- **Types of networks**
  - **Local-area networks (LANs)**
    - Campus-area networks (CANs)
    - Peer-to-peer
    - Topologies: star, bus, ring
  - **Metropolitan and wide-area networks**
    - Wide-area networks (WANs)
    - Metropolitan-area networks (MANs)

Telecommunications and Networking in Today's Business World

FUNCTIONS OF THE MODEM

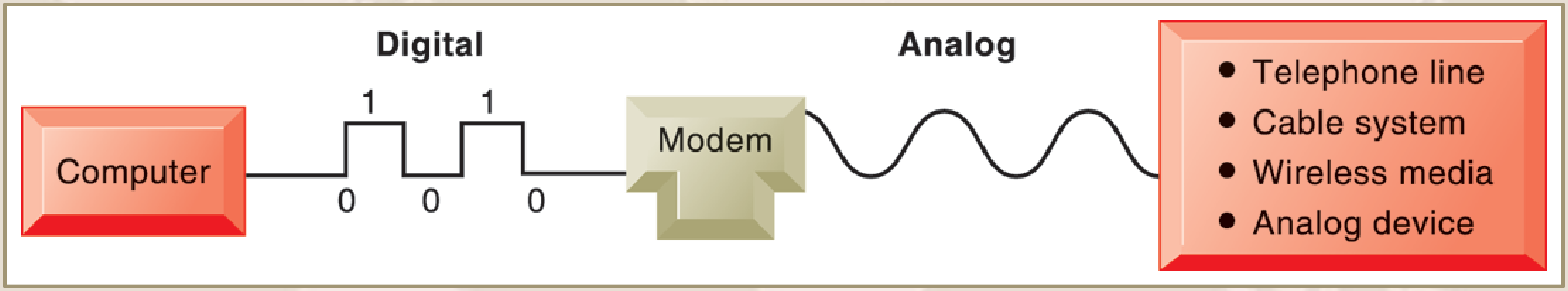


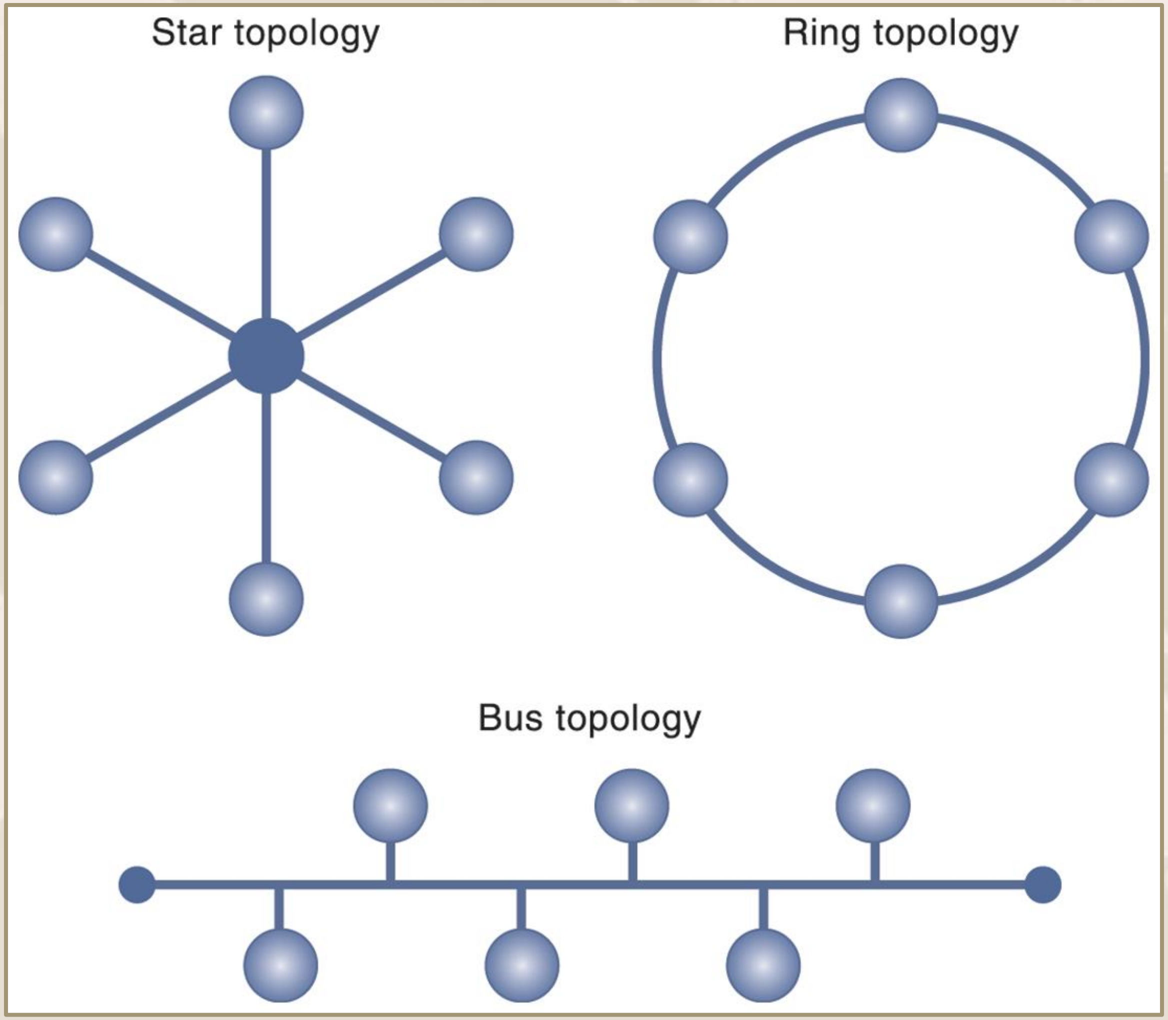
FIGURE 7-5 A modem is a device that translates digital signals into analog form (and vice versa) so that computers can transmit data over analog networks such as telephone and cable networks.

Telecommunications and Networking in Today's Business World

NETWORK TOPOLOGIES

The three basic network topologies are the star, bus, and ring.

FIGURE 7-6



Telecommunications and Networking in Today's Business World

- **Physical transmission media**
  - **Twisted wire (modems)**
  - **Coaxial cable**
  - **Fiber optics and optical networks**
    - Dense wavelength division multiplexing (DWDM)
  - **Wireless transmission media and devices**
    - Microwave
    - Satellites
    - Cellular telephones
  - **Transmission speed (hertz, bandwidth)**

Telecommunications and Networking in Today's Business World

BP'S SATELLITE TRANSMISSION SYSTEM

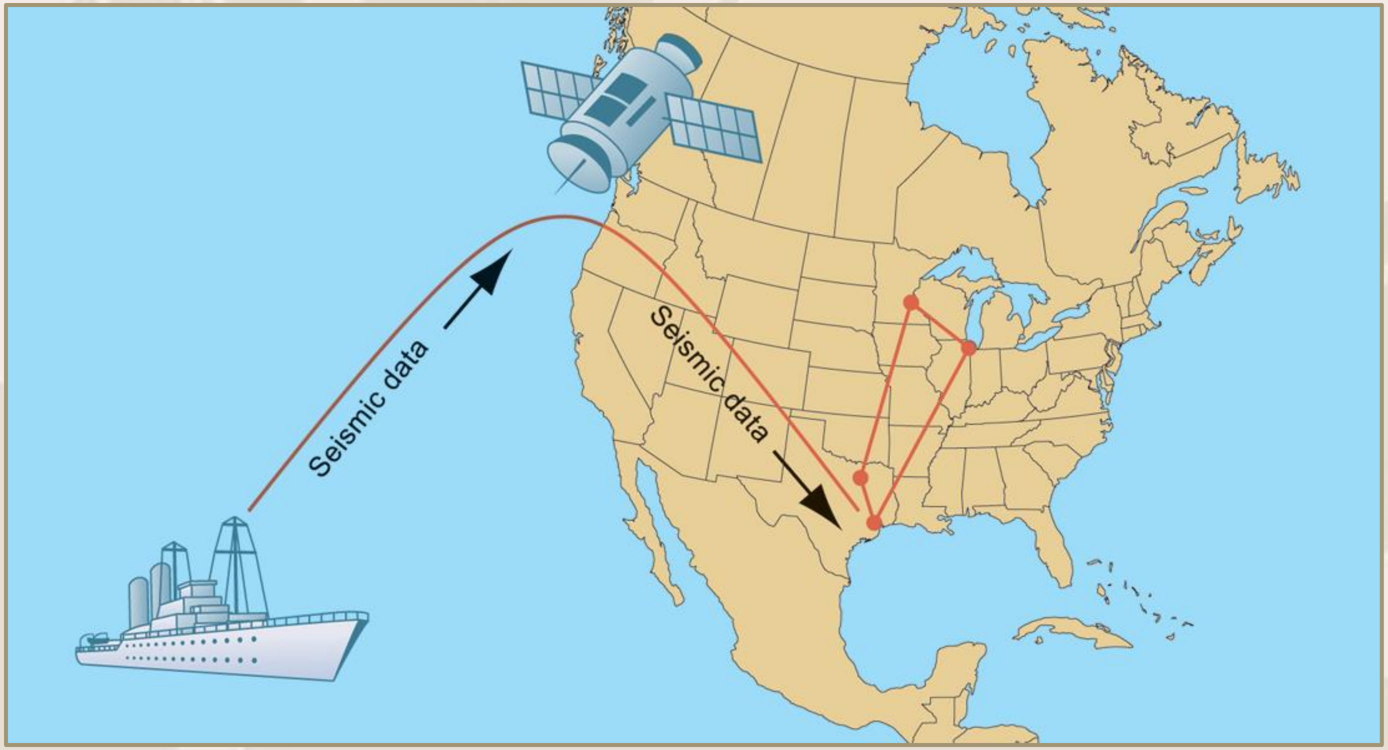


FIGURE 7-7 Communication satellites help BP transfer seismic data between oil exploration ships and research centers in the United States.

The Global Internet

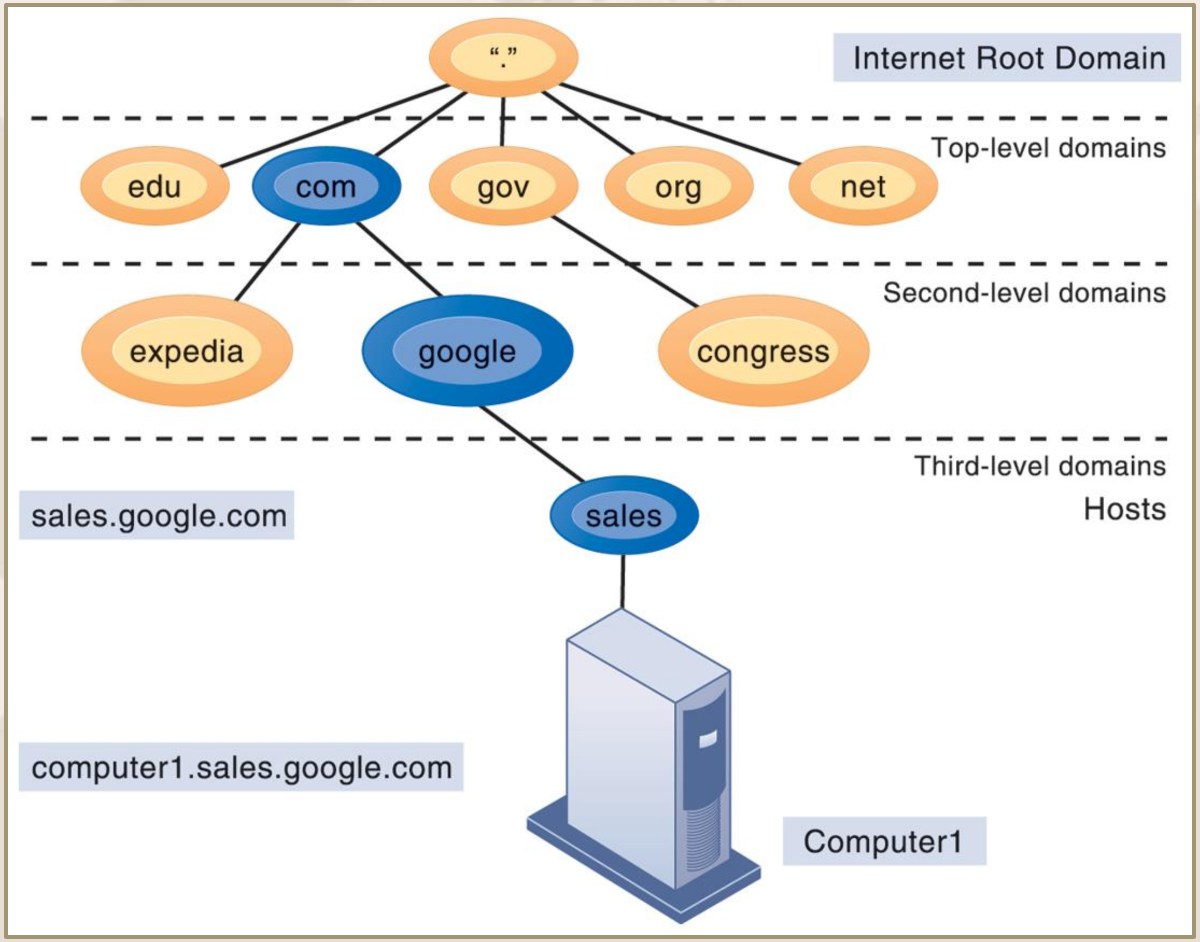
- **What is the Internet?**
- **Internet Addressing and Architecture**
  - **The Domain Name System**
    - Hierarchical structure
    - Top-level domains
  - **Internet Architecture and Governance**
    - No formal management: IAB, ICANN, W3C
  - **The Future Internet: IPv6 and Internet2**

The Global Internet

THE DOMAIN NAME SYSTEM

Domain Name System is a hierarchical system with a root domain, top-level domains, second-level domains, and host computers at the third level.

FIGURE 7-8

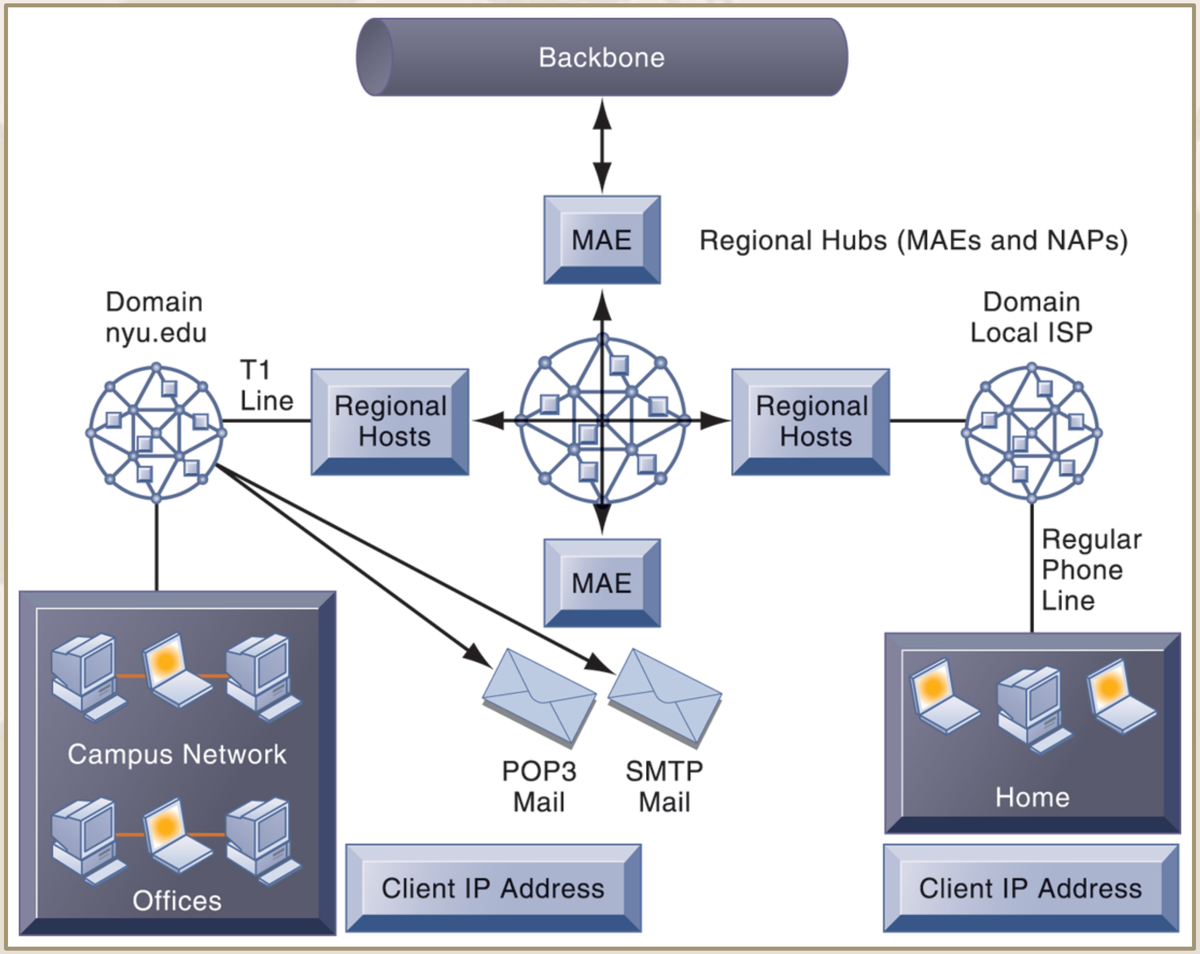


The Global Internet

INTERNET NETWORK ARCHITECTURE

The Internet backbone connects to regional networks, which in turn provide access to Internet service providers, large firms, and government institutions. Network access points (NAPs) and metropolitan area exchanges (MAEs) are hubs where the backbone intersects regional and local networks and where backbone owners connect with one another.

FIGURE 7-9



The Global Internet

- Internet services
  - E-mail
  - Chatting and instant messaging
  - Newsgroups
  - Telnet
  - File Transfer Protocol (FTP)
  - World Wide Web
  - VoIP
  - Virtual private network (VPN)

The Global Internet

CLIENT/SERVER COMPUTING ON THE INTERNET

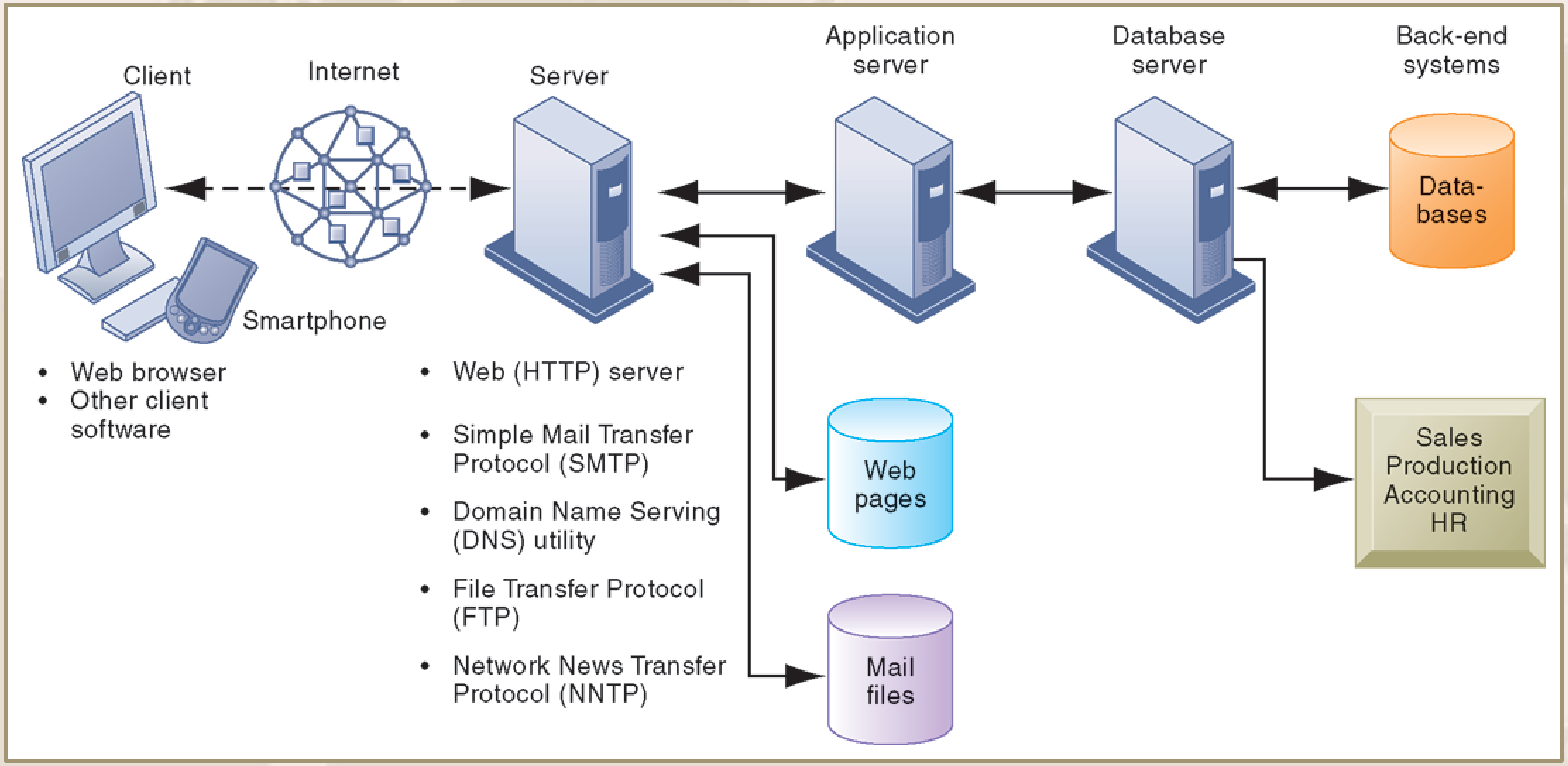


FIGURE 7-10 Client computers running Web browser and other software can access an array of services on servers over the Internet. These services may all run on a single server or on multiple specialized servers.

The Global Internet

HOW VOICE OVER IP WORKS

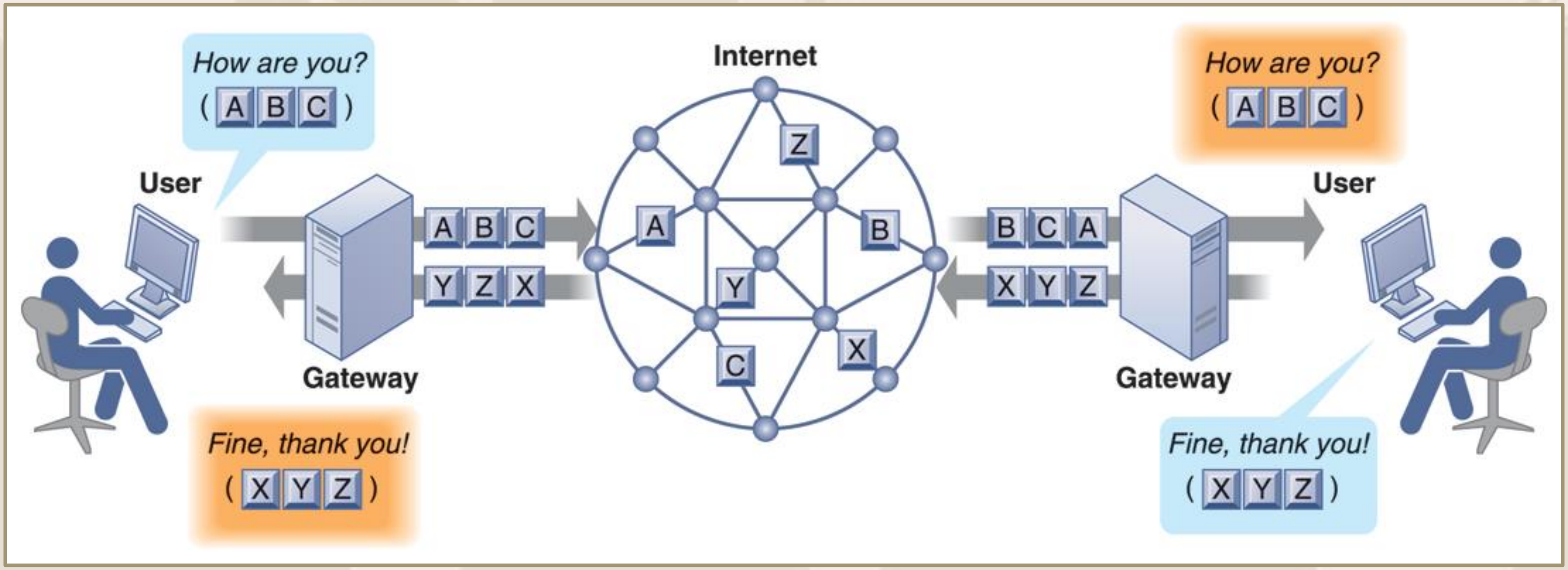


FIGURE 7-11 An VoIP phone call digitizes and breaks up a voice message into data packets that may travel along different routes before being reassembled at the final destination. A processor nearest the call's destination, called a gateway, arranges the packets in the proper order and directs them to the telephone number of the receiver or the IP address of the receiving computer.

The Global Internet

A VIRTUAL PRIVATE NETWORK USING THE INTERNET

This VPN is a private network of computers linked using a secure "tunnel" connection over the Internet. It protects data transmitted over the public Internet by encoding the data and "wrapping" them within the Internet Protocol (IP). By adding a wrapper around a network message to hide its content, organizations can create a private connection that travels through the public Internet.

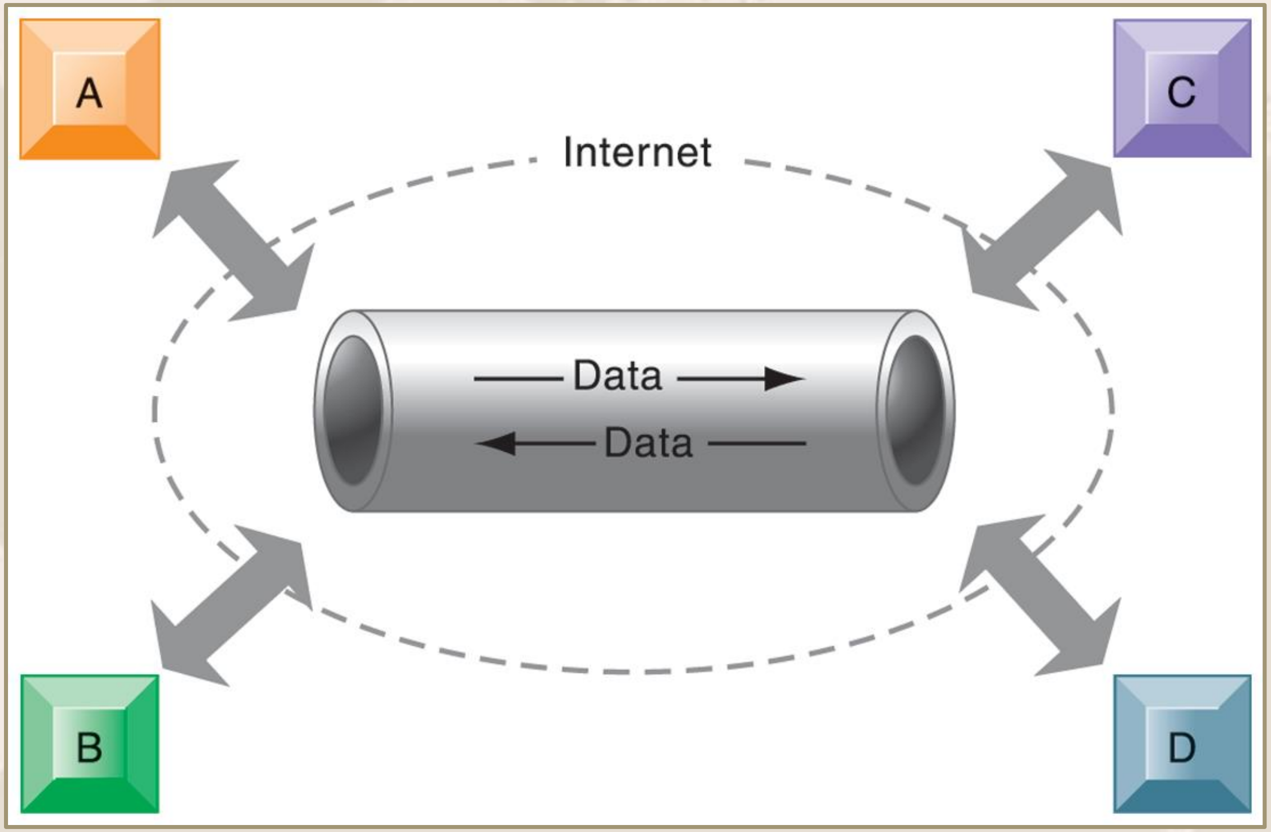


FIGURE 7-12

The Global Internet

- **The World Wide Web**
  - **HTML (Hypertext Markup Language):**
    - Formats documents for display on Web
  - **Hypertext Transfer Protocol (HTTP):**
    - Communications standard used for transferring Web pages
  - **Uniform resource locators (URLs):**
    - Addresses of Web pages
      - E.g. http://www.megacorp.com/content/features/082602.html
  - **Web servers**
    - Software for locating and managing Web pages

The Global Internet

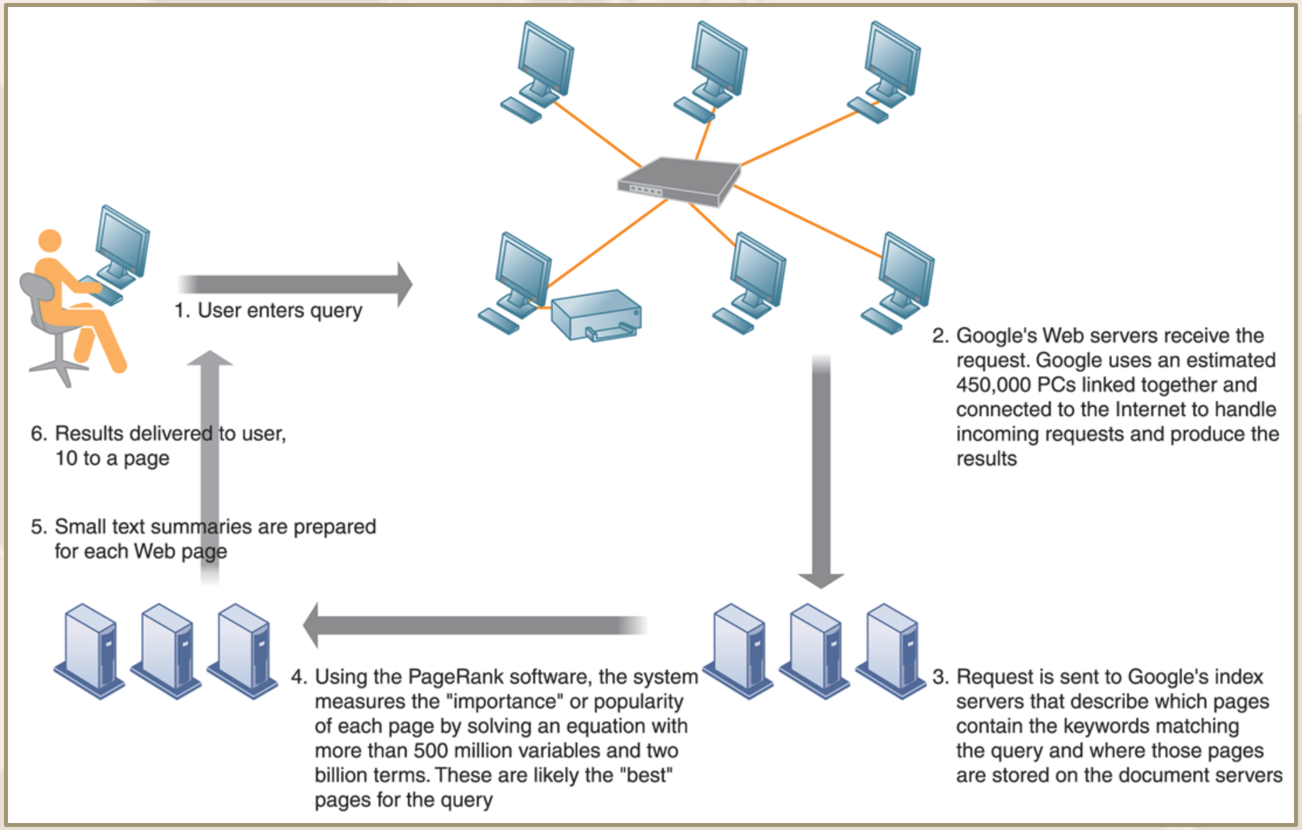
- **The World Wide Web (cont.)**
  - **Search engines**
    - Started in early 1990s as relatively simple software programs using keyword indexes
    - Today, major source of Internet advertising revenue via search engine marketing, using complex algorithms and page ranking techniques to locate results
  - **Shopping bots**
    - Use intelligent agent software for searching Internet for shopping information

The Global Internet

HOW GOOGLE WORKS

The Google search engine is continuously crawling the Web, indexing the content of each page, calculating its popularity, and storing the pages so that it can respond quickly to user requests to see a page. The entire process takes about one-half second.

FIGURE 7-13



The Global Internet

TOP U.S. WEB SEARCH ENGINES

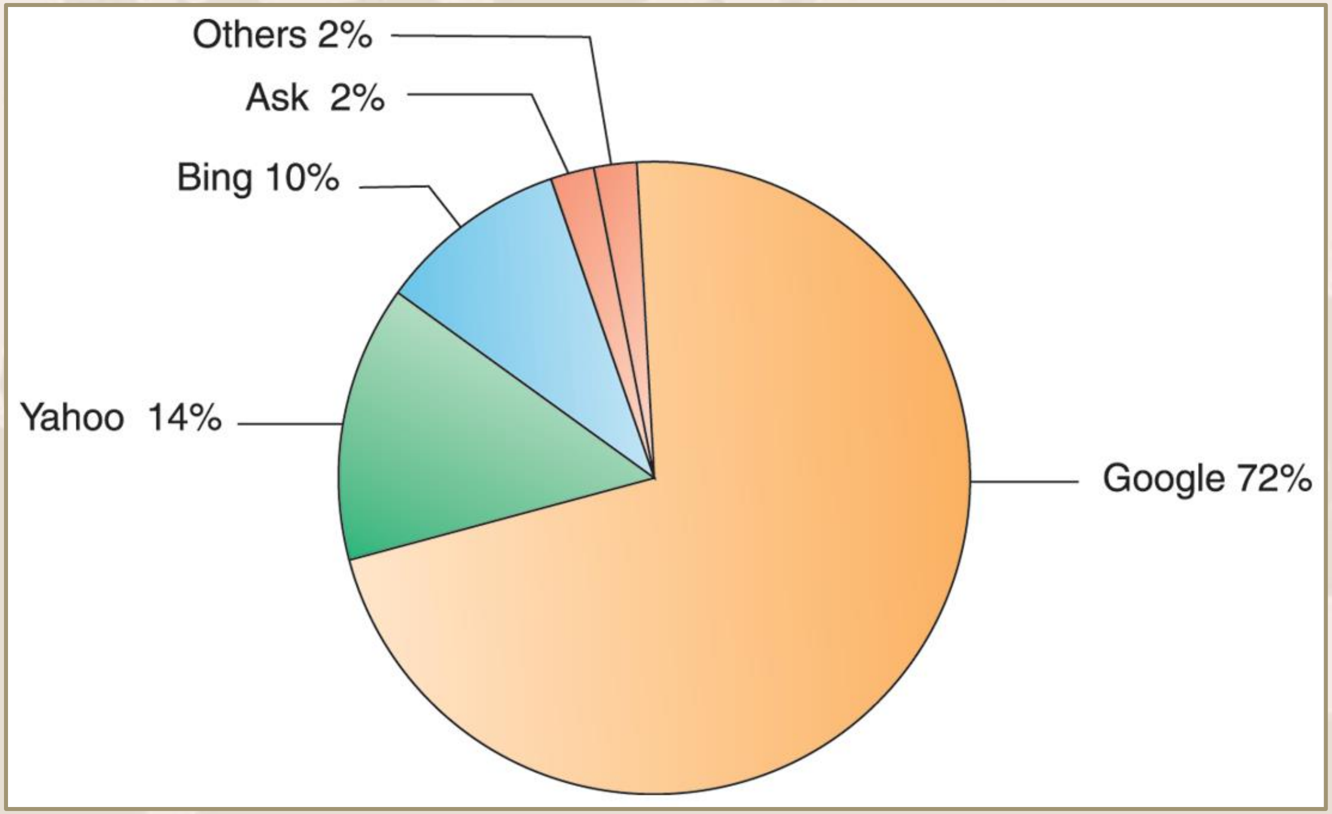


FIGURE 7-14 Google is the most popular search engine on the Web, handling 72 percent of all Web searches.

The Global Internet

- **Web 2.0**
  - **Four defining features**
    1. Interactivity
    2. Real-time user control
    3. Social participation
    4. User-generated content
  - **Technologies and services behind these features**
    - Cloud computing
    - Blogs/RSS
    - Mashups & widgets
    - Wikis
    - Social networks

The Global Internet

- **Web 3.0 – the Semantic Web**
  - Effort of W3C to add meaning to existing Web
  - Make searching more relevant to user
- **Other visions**
  - More "intelligent" computing
  - 3D Web
  - Pervasive Web
  - Increase in cloud computing, SaaS
  - Ubiquitous connectivity between mobile and other access devices
  - Make Web a more seamless experience

The Wireless Revolution

- **Cellular systems**
  - **Competing standards for cellular service**
    - CDMA: United States
    - GSM: Rest of world, plus AT&T and T-Mobile
  - **Third-generation (3G) networks**
    - Suitable for broadband Internet access
    - 144 Kbps – 2Mbps
  - **4G networks**
    - Entirely packet-switched
    - 100 Mbps – 1Gbps

The Wireless Revolution

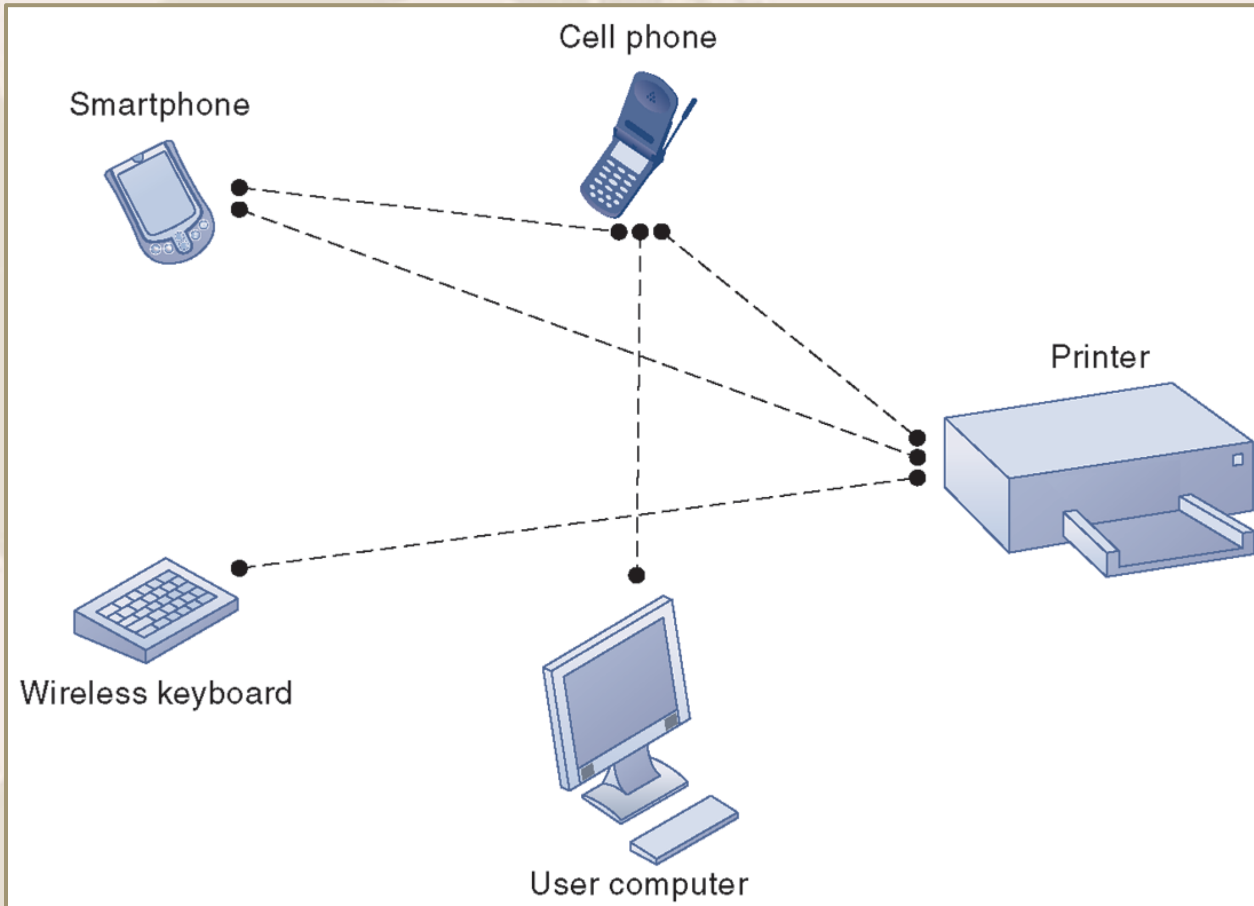
- **Wireless computer networks and Internet access**
  - **Bluetooth (802.15)**
    - Links up to 8 devices in 10-m area
    - Useful for personal networking (PANs) and in business to transmit data from handheld devices to other transmitters
  - **Wi-Fi (802.11)**
    - Set of standards: 802.11a, 802.11b, 802.11g, 802.11n
    - Used for wireless LAN and wireless Internet access
    - Use access points: Device with radio receiver/transmitter for connecting wireless devices to a wired LAN

The Wireless Revolution

A BLUETOOTH NETWORK (PAN)

Bluetooth enables a variety of devices, including cell phones, PDAs, wireless keyboards and mice, PCs, and printers, to interact wirelessly with each other within a small 30-foot (10-meter) area. In addition to the links shown, Bluetooth can be used to network similar devices to send data from one PC to another, for example.

FIGURE 7-15



The Wireless Revolution

AN 802.11 WIRELESS LAN

Mobile laptop computers equipped with network interface cards link to the wired LAN by communicating with the access point. The access point uses radio waves to transmit network signals from the wired network to the client adapters, which convert them into data that the mobile device can understand. The client adapter then transmits the data from the mobile device back to the access point, which forwards the data to the wired network.

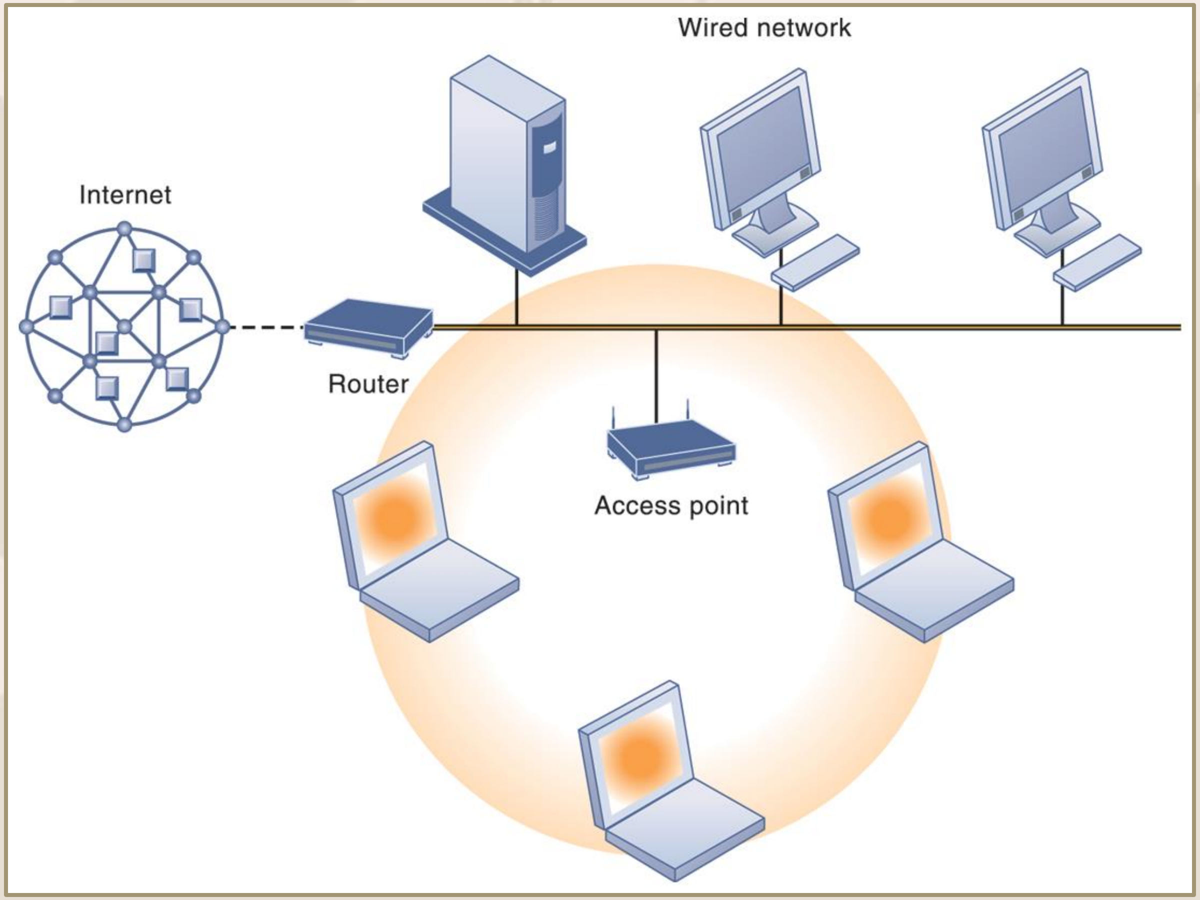


FIGURE 7-16

The Wireless Revolution

- **Wireless computer networks and Internet access**
  - **Wi-Fi (cont.)**
    - Hotspots: Access points in public place to provide maximum wireless coverage for a specific area
    - Weak security features
  - **WiMax (802.16)**
    - Wireless access range of 31 miles
    - Require WiMax antennas
    - Sprint Nextel building WiMax network as foundation for 4G networks

The Wireless Revolution

- **Radio frequency identification (RFID)**
  - **Use tiny tags with embedded microchips containing data about an item and location, and antenna**
  - **Tags transmit radio signals over short distances to special RFID readers, which send data over network to computer for processing**
  - **Active RFID:** Tags have batteries, data can be rewritten, range is hundreds of feet, more expensive
  - **Passive RFID:** Range is shorter, also smaller, less expensive, powered by radio frequency energy

The Wireless Revolution

- **Radio frequency identification (RFID) (cont.)**
  - **Common uses:**
    - Automated toll-collection
    - Tracking goods in a supply chain
  - **Requires companies to have special hardware and software**
  - **Reduction in cost of tags making RFID viable for many firms**

The Wireless Revolution

HOW RFID WORKS

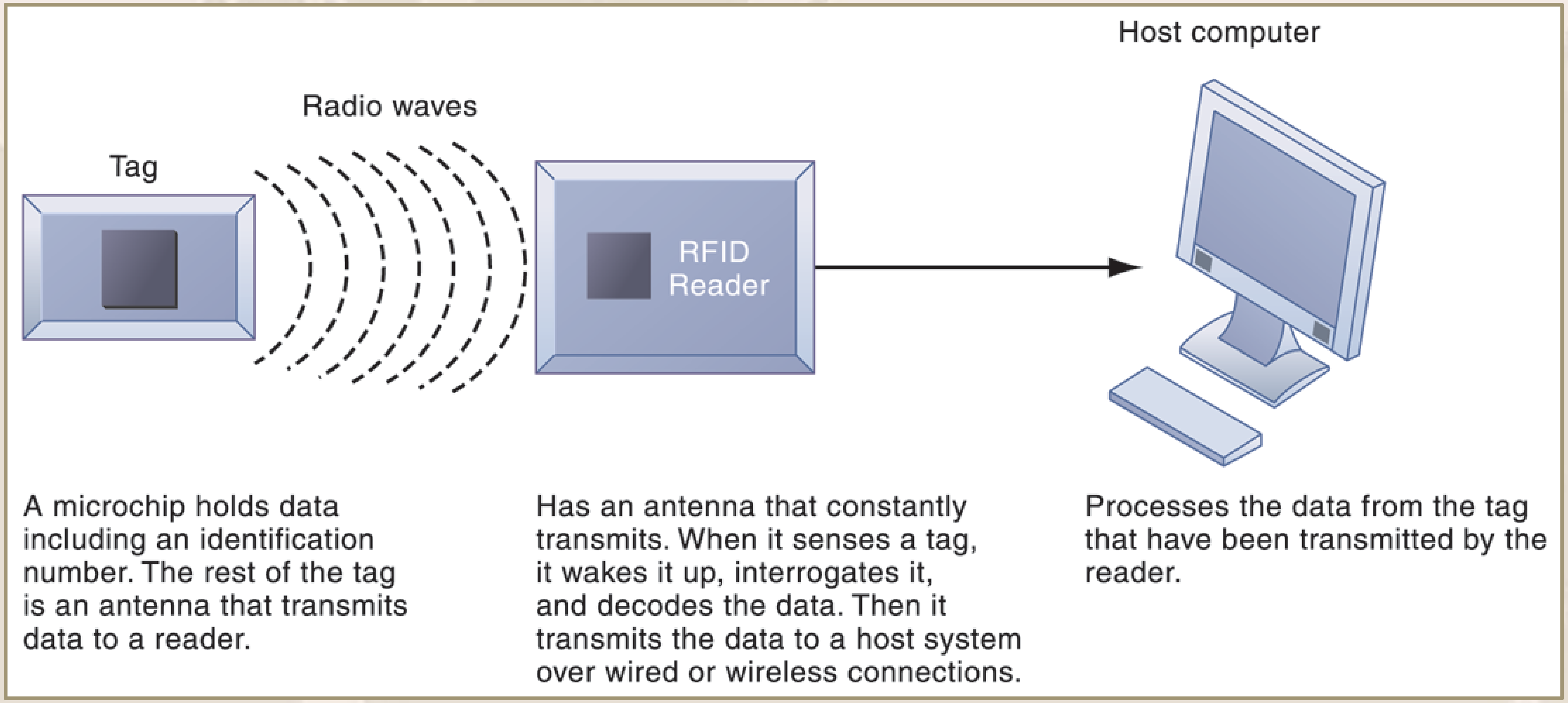


FIGURE 7-17 RFID uses low-powered radio transmitters to read data stored in a tag at distances ranging from 1 inch to 100 feet. The reader captures the data from the tag and sends them over a network to a host computer for processing.

The Wireless Revolution

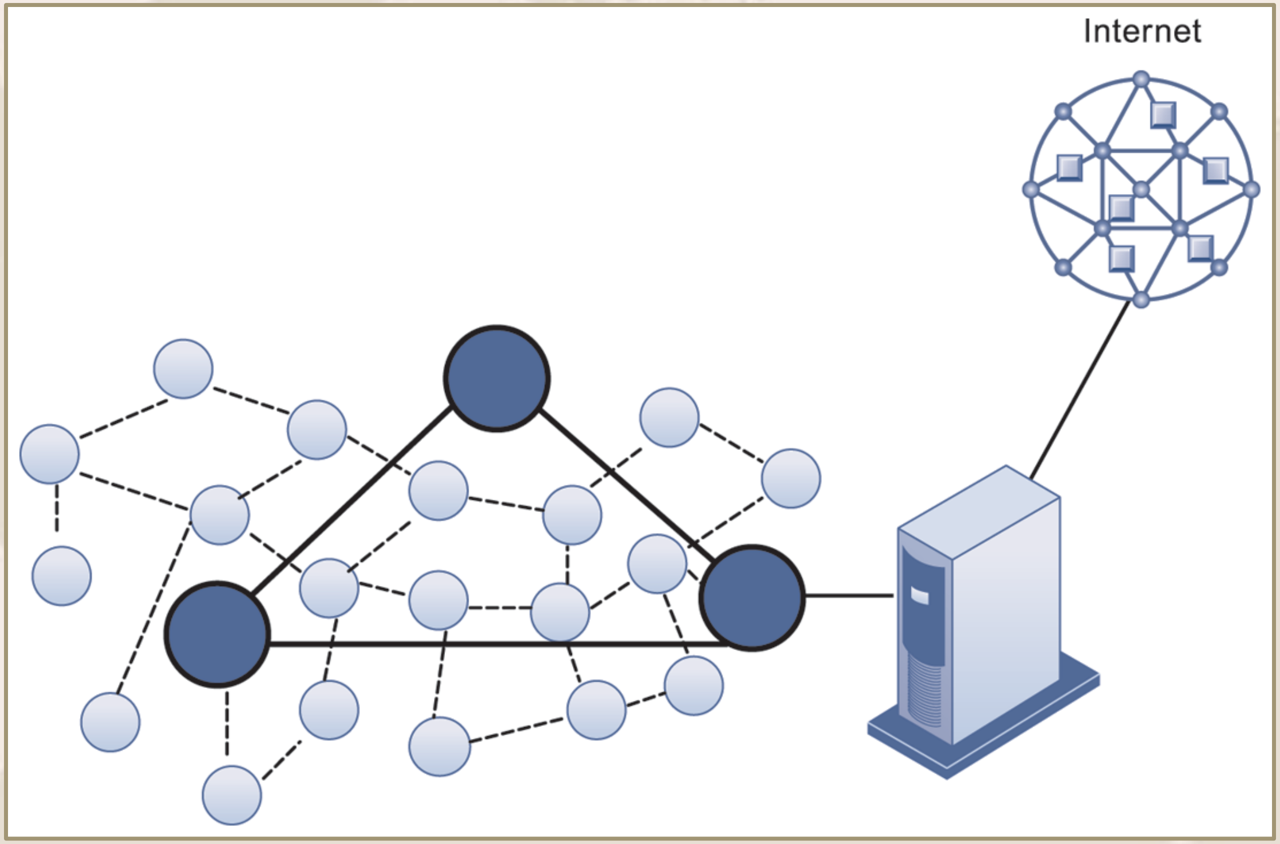
- **Wireless sensor networks (WSNs)**
  - **Networks of hundreds or thousands of interconnected wireless devices embedded into physical environment to provide measurements of many points over large spaces**
    - Devices have built-in processing, storage, and radio frequency sensors and antennas
    - Require low-power, long-lasting batteries and ability to endure in the field without maintenance
  - **Used to monitor building security, detect hazardous substances in air, monitor environmental changes, traffic, or military activity**

The Wireless Revolution

A WIRELESS SENSOR NETWORK

The small circles represent lower-level nodes and the larger circles represent high-end nodes. Lower level nodes forward data to each other or to higher-level nodes, which transmit data more rapidly and speed up network performance.

FIGURE 7-18



Chapter 8

SECURING INFORMATION SYSTEMS

VIDEO CASES

Case 1: IBM Zone Trusted Information Channel (ZTIC)
Case 2: Open ID and Web Security
Instructional Video 1: The Quest for Identity 2.0
Instructional Video 2: Identity 2.0

Learning Objectives

- Why are information systems vulnerable to destruction, error, and abuse?
- What is the business value of security and control?
- What are the components of an organizational framework for security and control?
- What are the most important tools and technologies for safeguarding information resources?

System Vulnerability and Abuse

- **Security:**
  - **Policies, procedures and technical measures used to prevent unauthorized access, alteration, theft, or physical damage to information systems**
- **Controls:**
  - **Methods, policies, and organizational procedures that ensure safety of organization's assets; accuracy and reliability of its accounting records; and operational adherence to management standards**

System Vulnerability and Abuse

- Why systems are vulnerable
  - Accessibility of networks
  - Hardware problems (breakdowns, configuration errors, damage from improper use or crime)
  - Software problems (programming errors, installation errors, unauthorized changes)
  - Disasters
  - Use of networks/computers outside of firm's control
  - Loss and theft of portable devices

System Vulnerability and Abuse

CONTEMPORARY SECURITY CHALLENGES AND VULNERABILITIES

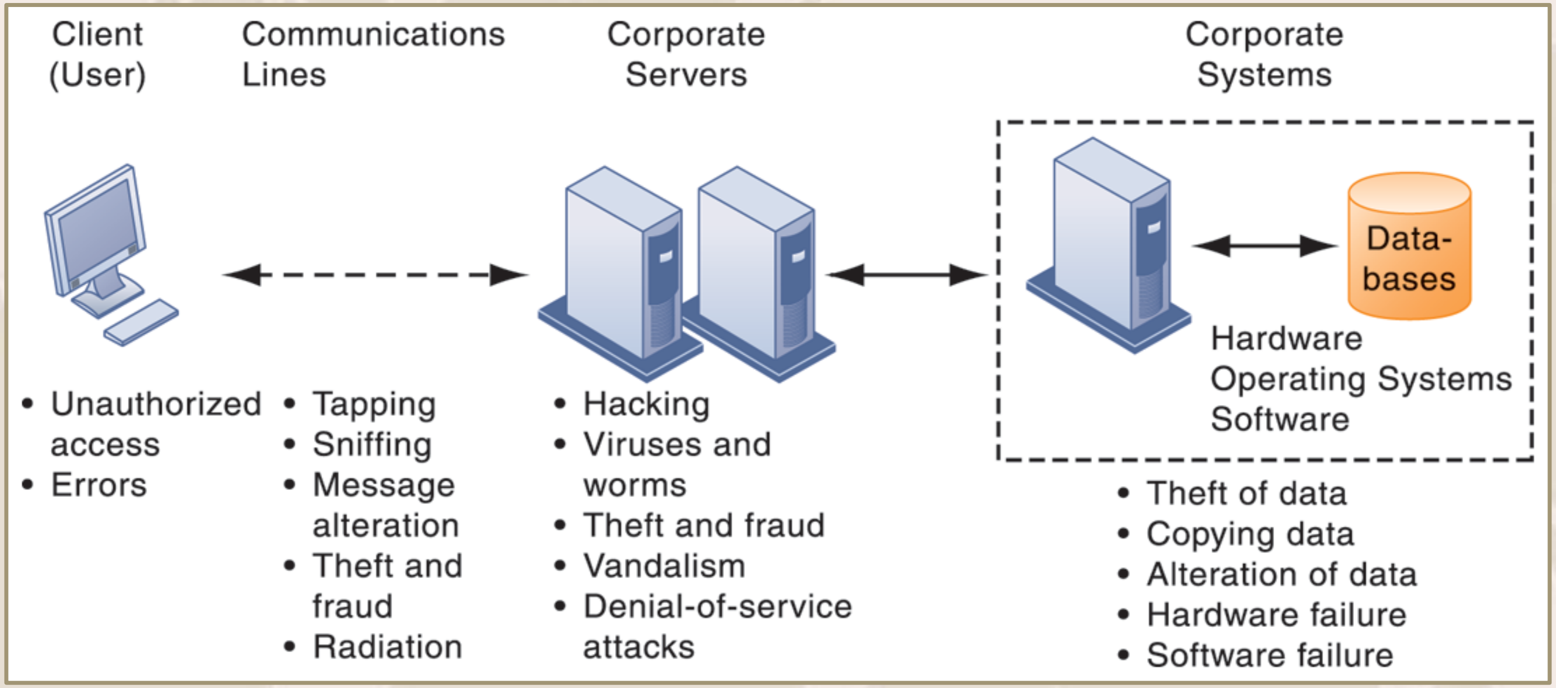


FIGURE 8-1 The architecture of a Web-based application typically includes a Web client, a server, and corporate information systems linked to databases. Each of these components presents security challenges and vulnerabilities. Floods, fires, power failures, and other electrical problems can cause disruptions at any point in the network.

System Vulnerability and Abuse

- **Internet vulnerabilities**
  - **Network open to anyone**
  - **Size of Internet means abuses can have wide impact**
  - **Use of fixed Internet addresses with cable or DSL modems creates fixed targets hackers**
  - **Unencrypted VOIP(voice over internet protocol)**
  - **E-mail, P2P(peer to peer), IM (Instant massaging)**
    - Interception
    - Attachments with malicious software
    - Transmitting trade secrets

System Vulnerability and Abuse

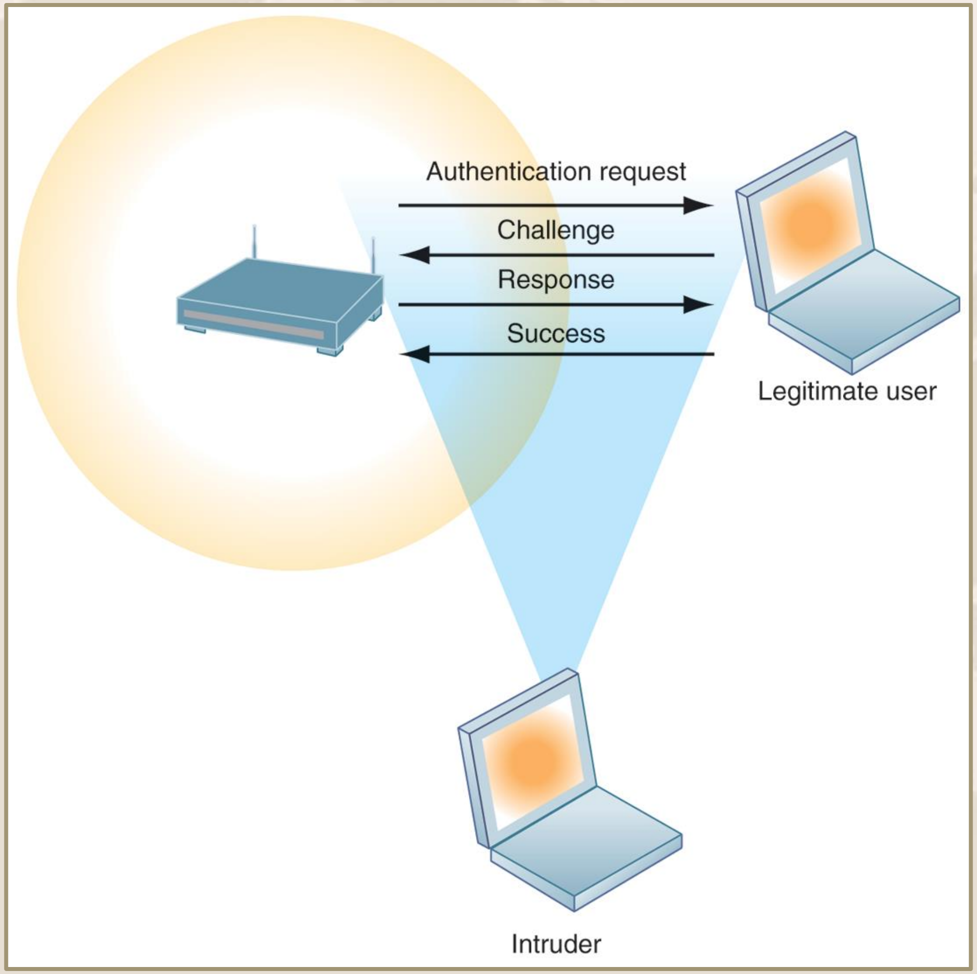
- **Wireless security challenges**
  - **Radio frequency bands easy to scan**
  - **SSIDs (service set identifiers)**
    - Identify access points
    - Broadcast multiple times
    - **War driving**
      - Eavesdroppers drive by buildings and try to detect SSID and gain access to network and resources
  - **WEP (Wired Equivalent Privacy)**
    - Security standard for 802.11; use is optional
    - Uses shared password for both users and access point
    - Users often fail to implement WEP or stronger systems

System Vulnerability and Abuse

WI-FI SECURITY CHALLENGES

Many Wi-Fi networks can be penetrated easily by intruders using sniffer programs to obtain an address to access the resources of a network without authorization.

FIGURE 8-2



System Vulnerability and Abuse

- **Malware (malicious software)**
  - **Viruses**
    - Rogue software program that attaches itself to other software programs or data files in order to be executed
  - **Worms**
    - Independent computer programs that copy themselves from one computer to other computers over a network.
  - **Trojan horses**
    - Software program that appears to be benign but then does something other than expected.

System Vulnerability and Abuse

- **Malware (cont.)**
  - **SQL injection attacks**
    - Hackers submit data to Web forms that exploits site's unprotected software and sends rogue SQL query to database
  - **Spyware**
    - Small programs install themselves surreptitiously on computers to monitor user Web surfing activity and serve up advertising
  - **Key loggers**
    - Record every keystroke on computer to steal serial numbers, passwords, launch Internet attacks

System Vulnerability and Abuse

- **Hackers and computer crime**
  - **Hackers vs. crackers**
  - **Activities include**
    - System intrusion
    - System damage
    - Cybervandalism
      - Intentional disruption, defacement, destruction of Web site or corporate information system

System Vulnerability and Abuse

- Spoofing
  - Misrepresenting oneself by using fake e-mail addresses or masquerading as someone else
  - Redirecting Web link to address different from intended one, with site masquerading as intended destination
- Sniffer
  - Eavesdropping program that monitors information traveling over network
  - Enables hackers to steal proprietary information such as e-mail, company files, etc.

System Vulnerability and Abuse

- **Denial-of-service attacks (DoS)**
  - **Flooding server with thousands of false requests to crash the network.**
- **Distributed denial-of-service attacks (DDoS)**
  - **Use of numerous computers to launch a DoS**
  - **Botnets**
    - Networks of “zombie” PCs infiltrated by bot malware
    - Worldwide, 6 - 24 million computers serve as zombie PCs in thousands of botnets

System Vulnerability and Abuse

- **Computer crime**
  - **Defined as "any violations of criminal law that involve a knowledge of computer technology for their perpetration, investigation, or prosecution"**
  - **Computer may be target of crime, e.g.:**
    - Breaching confidentiality of protected computerized data
    - Accessing a computer system without authority
  - **Computer may be instrument of crime, e.g.:**
    - Theft of trade secrets
    - Using e-mail for threats or harassment

System Vulnerability and Abuse

- Identity theft
  - Theft of personal Information (social security id, driver's license or credit card numbers) to impersonate someone else
- Phishing
  - Setting up fake Web sites or sending e-mail messages that look like legitimate businesses to ask users for confidential personal data.
- Evil twins
  - Wireless networks that pretend to offer trustworthy Wi-Fi connections to the Internet

System Vulnerability and Abuse

- Pharming
  - Redirects users to a bogus Web page, even when individual types correct Web page address into his or her browser
- Click fraud
  - Occurs when individual or computer program fraudulently clicks on online ad without any intention of learning more about the advertiser or making a purchase
- Cyberterrorism and Cyberwarfare

System Vulnerability and Abuse

- **Internal threats: employees**
  - **Security threats often originate inside an organization**
  - **Inside knowledge**
  - **Sloppy security procedures**
    - User lack of knowledge
  - **Social engineering:**
    - Tricking employees into revealing their passwords by pretending to be legitimate members of the company in need of information

System Vulnerability and Abuse

- **Software vulnerability**
  - **Commercial software contains flaws that create security vulnerabilities**
    - Hidden bugs (program code defects)
      - Zero defects cannot be achieved because complete testing is not possible with large programs
    - Flaws can open networks to intruders
  - **Patches**
    - Vendors release small pieces of software to repair flaws
    - However exploits often created faster than patches be released and implemented

Business Value of Security and Control

- Failed computer systems can lead to significant or total loss of business function
- Firms now more vulnerable than ever
  - Confidential personal and financial data
  - Trade secrets, new products, strategies
- A security breach may cut into firm's market value almost immediately
- Inadequate security and controls also bring forth issues of liability

Business Value of Security and Control

- **Legal and regulatory requirements for electronic records management and privacy protection**
  - **HIPAA:** Medical security and privacy rules and procedures
  - **Gramm-Leach-Bliley Act:** Requires financial institutions to ensure the security and confidentiality of customer data
  - **Sarbanes-Oxley Act:** Imposes responsibility on companies and their management to safeguard the accuracy and integrity of financial information that is used internally and released externally

Business Value of Security and Control

- **Electronic evidence**
  - **Evidence for white collar crimes often in digital form**
    - Data on computers, e-mail, instant messages, e-commerce transactions
  - **Proper control of data can save time and money when responding to legal discovery request**
- **Computer forensics:**
  - **Scientific collection, examination, authentication, preservation, and analysis of data from computer storage media for use as evidence in court of law**
  - **Includes recovery of ambient and hidden data**

Establishing a Framework for Security and Control

- **Information systems controls**
  - Manual and automated controls
  - General and application controls
- **General controls**
  - **Govern design, security, and use of computer programs and security of data files in general throughout organization's information technology infrastructure.**
  - **Apply to all computerized applications**
  - **Combination of hardware, software, and manual procedures to create overall control environment**

Establishing a Framework for Security and Control

- Types of general controls
  - Software controls
  - Hardware controls
  - Computer operations controls
  - Data security controls
  - Implementation controls
  - Administrative controls

Establishing a Framework for Security and Control

- **Application controls**
  - **Specific controls unique to each computerized application, such as payroll or order processing**
  - **Include both automated and manual procedures**
  - **Ensure that only authorized data are completely and accurately processed by that application**
  - **Include:**
    - Input controls
    - Processing controls
    - Output controls

Establishing a Framework for Security and Control

- **Risk assessment:** Determines level of risk to firm if specific activity or process is not properly controlled
  - Types of threat
  - Probability of occurrence during year
  - Potential losses, value of threat
  - Expected annual loss

EXPOSURE	PROBABILITY	LOSS RANGE (AVG)	EXPECTED ANNUAL LOSS
Power failure	30%	\$5K - \$200K (\$102,500)	\$30,750
Embezzlement	5%	\$1K - \$50K (\$25,500)	\$1,275
User error	98%	\$200 - \$40K (\$20,100)	\$19,698

Establishing a Framework for Security and Control

- **Security policy**
  - **Ranks information risks, identifies acceptable security goals, and identifies mechanisms for achieving these goals**
  - **Drives other policies**
    - Acceptable use policy (AUP)
      - Defines acceptable uses of firm's information resources and computing equipment
    - Authorization policies
      - Determine differing levels of user access to information assets

Establishing a Framework for Security and Control

- **Identity management**
  - **Business processes and tools to identify valid users of system and control access**
    - Identifies and authorizes different categories of users
    - Specifies which portion of system users can access
    - Authenticating users and protects identities
  - **Identity management systems**
    - Captures access rules for different levels of users

System Vulnerability and Abuse

SECURITY PROFILES FOR A PERSONNEL SYSTEM

These two examples represent two security profiles or data security patterns that might be found in a personnel system. Depending on the security profile, a user would have certain restrictions on access to various systems, locations, or data in an organization.

FIGURE 8-3

SECURITY PROFILE 1

User: Personnel Dept. Clerk

Location: Division 1

Employee Identification Codes with This Profile: 00753, 27834, 37665, 44116

Data Field Restrictions	Type of Access
All employee data for Division 1 only	Read and Update
• Medical history data	None
• Salary	None
• Pensionable earnings	None

SECURITY PROFILE 2

User: Divisional Personnel Manager

Location: Division 1

Employee Identification Codes with This Profile: 27321

Data Field Restrictions	Type of Access
All employee data for Division 1 only	Read Only

Establishing a Framework for Security and Control

- **Disaster recovery planning:** Devises plans for restoration of disrupted services
- **Business continuity planning:** Focuses on restoring business operations after disaster
  - **Both types of plans needed to identify firm's most critical systems**
  - **Business impact analysis to determine impact of an outage**
  - **Management must determine which systems restored first**

Establishing a Framework for Security and Control

- MIS audit
  - Examines firm's overall security environment as well as controls governing individual information systems
  - Reviews technologies, procedures, documentation, training, and personnel.
  - May even simulate disaster to test response of technology, IS staff, other employees.
  - Lists and ranks all control weaknesses and estimates probability of their occurrence.
  - Assesses financial and organizational impact of each threat

System Vulnerability and Abuse

SAMPLE AUDITOR'S LIST OF CONTROL WEAKNESSES

This chart is a sample page from a list of control weaknesses that an auditor might find in a loan system in a local commercial bank. This form helps auditors record and evaluate control weaknesses and shows the results of discussing those weaknesses with management, as well as any corrective actions taken by management.

FIGURE 8-4

Function: Loans
Location: Peoria, IL

Prepared by: J. Ericson
Date: June 16, 2011

Received by: T. Benson
Review date: June 28, 2011

Nature of Weakness and Impact	Chance for Error/Abuse		Notification to Management	
	Yes/ No	Justification	Report date	Management response
User accounts with missing passwords	Yes	Leaves system open to unauthorized outsiders or attackers	5/10/11	Eliminate accounts without passwords
Network configured to allow some sharing of system files	Yes	Exposes critical system files to hostile parties connected to the network	5/10/11	Ensure only required directories are shared and that they are protected with strong passwords
Software patches can update production programs without final approval from Standards and Controls group	No	All production programs require management approval; Standards and Controls group assigns such cases to a temporary production status		

Technologies and Tools for Protecting Information Resources

- Identity management software
  - Automates keeping track of all users and privileges
  - Authenticates users, protecting identities, controlling access
- Authentication
  - Password systems
  - Tokens
  - Smart cards
  - Biometric authentication

Technologies and Tools for Protecting Information Resources

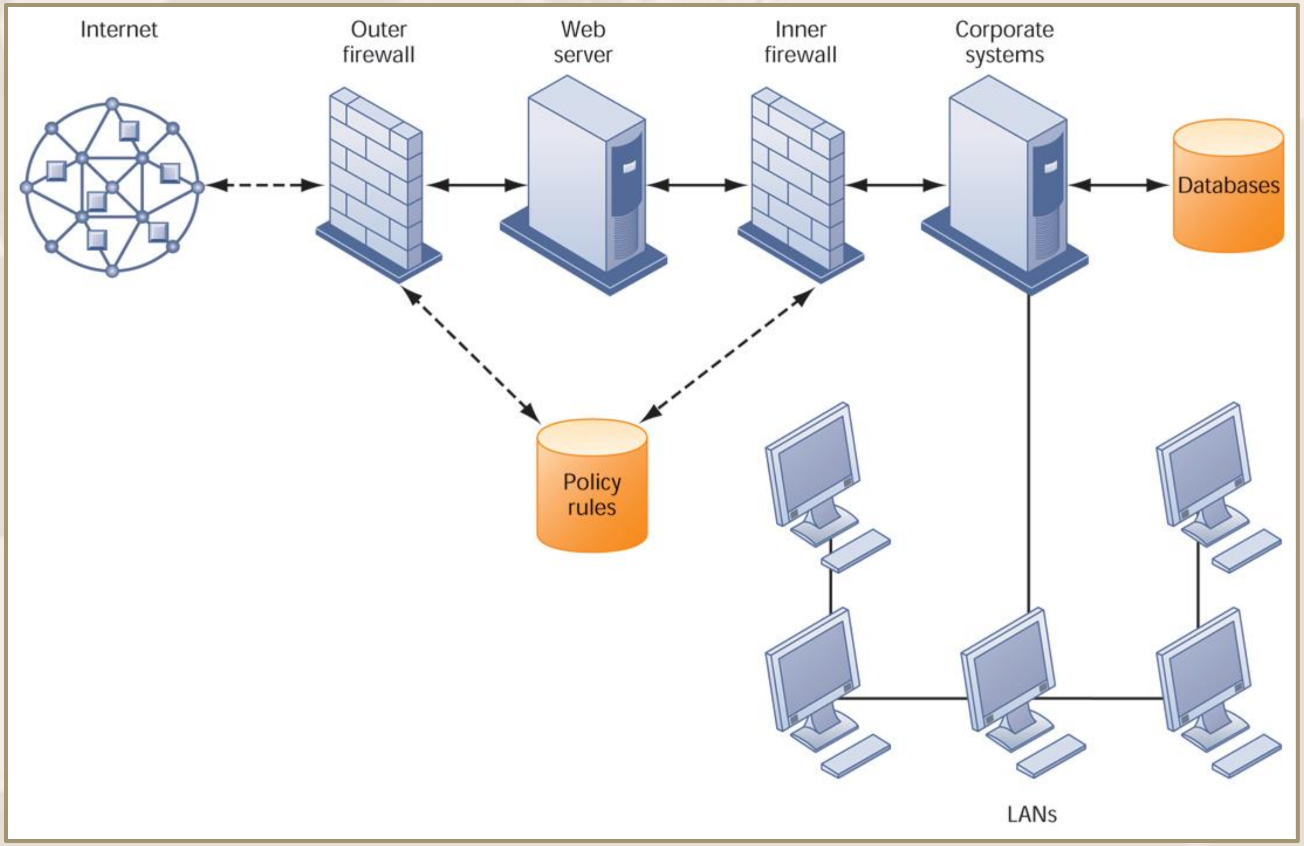
- **Firewall:**
  - **Combination of hardware and software that prevents unauthorized users from accessing private networks**
  - **Technologies include:**
    - Static packet filtering
    - Network address translation (NAT)
    - Application proxy filtering

Technologies and Tools for Protecting Information Resources

A CORPORATE FIREWALL

The firewall is placed between the firm's private network and the public Internet or another distrusted network to protect against unauthorized traffic.

FIGURE 8-5



Technologies and Tools for Protecting Information Resources

- Intrusion detection systems:
  - Monitor hot spots on corporate networks to detect and deter intruders
  - Examines events as they are happening to discover attacks in progress
- Antivirus and antispyware software:
  - Checks computers for presence of malware and can often eliminate it as well
  - Require continual updating
- Unified threat management (UTM) systems

Technologies and Tools for Protecting Information Resources

- **Securing wireless networks**
  - **WEP security can provide some security by**
    - Assigning unique name to network’s SSID and not broadcasting SSID
    - Using it with VPN technology
  - **Wi-Fi Alliance finalized WAP2 specification, replacing WEP with stronger standards**
    - Continually changing keys
    - Encrypted authentication system with central server

Technologies and Tools for Protecting Information Resources

- **Encryption:**
  - **Transforming text or data into cipher text that cannot be read by unintended recipients**
  - **Two methods for encryption on networks**
    - Secure Sockets Layer (SSL) and successor Transport Layer Security (TLS)
    - Secure Hypertext Transfer Protocol (S-HTTP)

Technologies and Tools for Protecting Information Resources

- **Two methods of encryption**
  - **Symmetric key encryption**
    - Sender and receiver use single, shared key
  - **Public key encryption**
    - Uses two, mathematically related keys: Public key and private key
    - Sender encrypts message with recipient's public key
    - Recipient decrypts with private key

Technologies and Tools for Protecting Information Resources

PUBLIC KEY ENCRYPTION

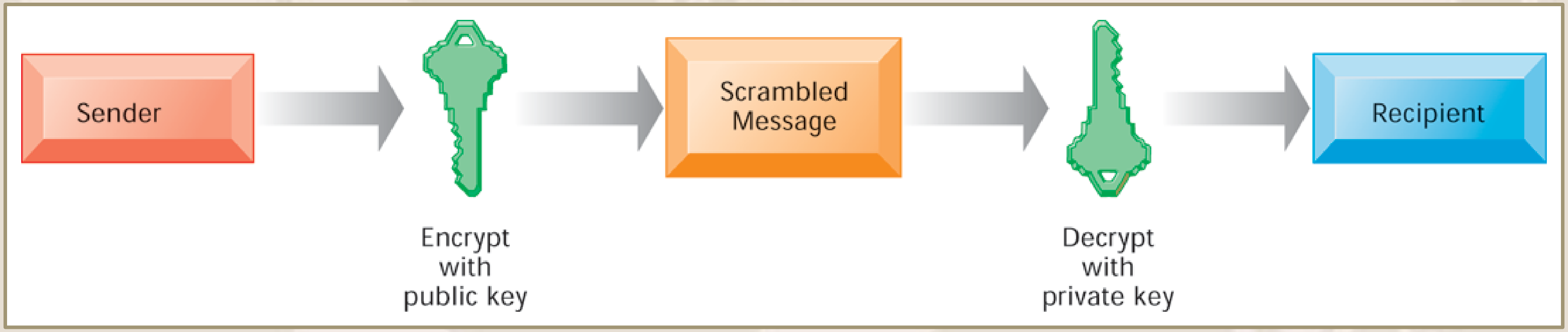


FIGURE 8-6 A public key encryption system can be viewed as a series of public and private keys that lock data when they are transmitted and unlock the data when they are received. The sender locates the recipient's public key in a directory and uses it to encrypt a message. The message is sent in encrypted form over the Internet or a private network. When the encrypted message arrives, the recipient uses his or her private key to decrypt the data and read the message.

Technologies and Tools for Protecting Information Resources

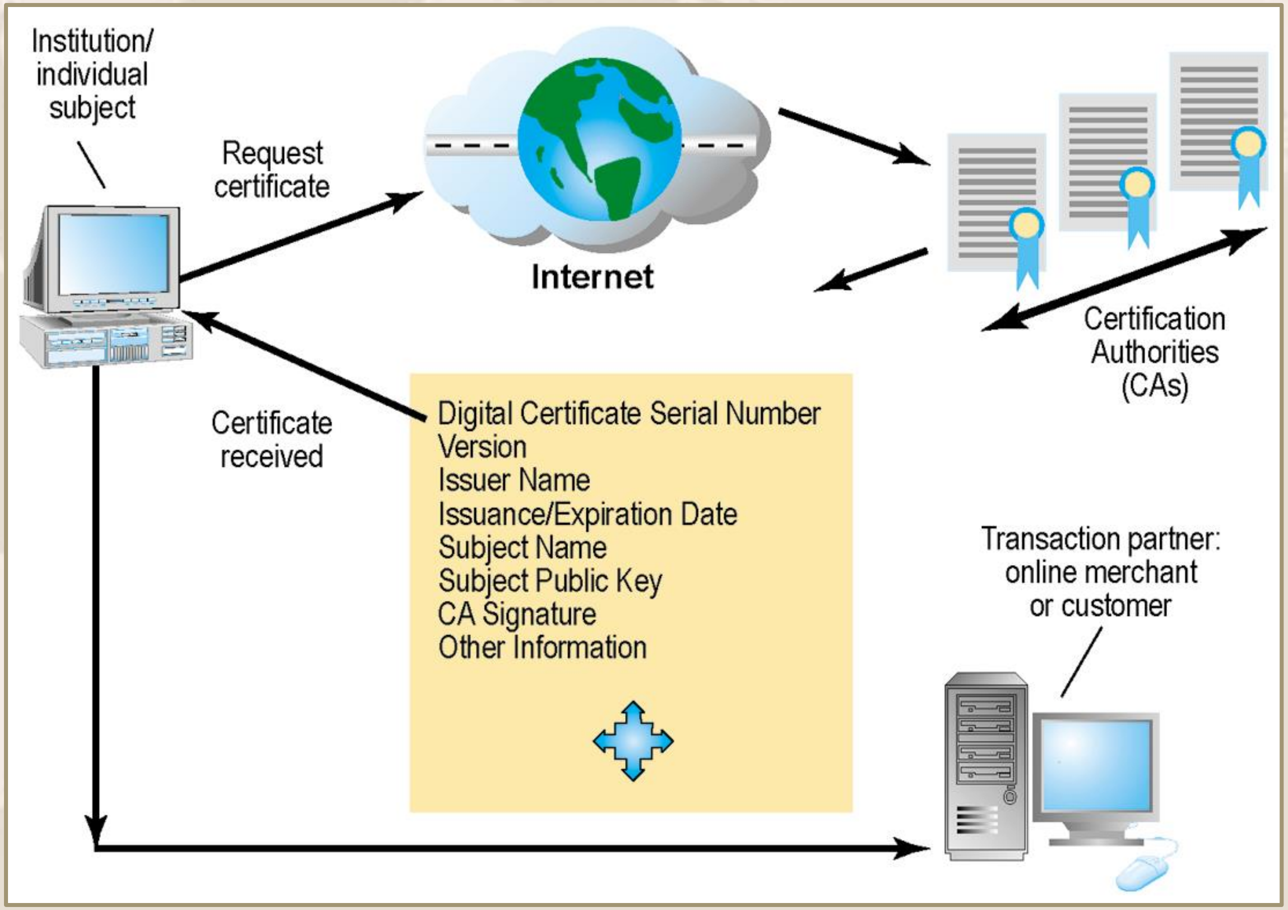
- **Digital certificate:**
  - Data file used to establish the identity of users and electronic assets for protection of online transactions
  - Uses a trusted third party, certification authority (CA), to validate a user’s identity
  - CA verifies user’s identity, stores information in CA server, which generates encrypted digital certificate containing owner ID information and copy of owner’s public key
- **Public key infrastructure (PKI)**
  - Use of public key cryptography working with certificate authority
  - Widely used in e-commerce

Technologies and Tools for Protecting Information Resources

DIGITAL CERTIFICATES

Digital certificates help establish the identity of people or electronic assets. They protect online transactions by providing secure, encrypted, online communication.

FIGURE 8-7



Technologies and Tools for Protecting Information Resources

- Ensuring system availability
  - Online transaction processing requires 100% availability, no downtime
- Fault-tolerant computer systems
  - For continuous availability, e.g. stock markets
  - Contain redundant hardware, software, and power supply components that create an environment that provides continuous, uninterrupted service
- High-availability computing
  - Helps recover quickly from crash
  - Minimizes, does not eliminate downtime

Technologies and Tools for Protecting Information Resources

- **Recovery-oriented computing**
  - **Designing systems that recover quickly with capabilities to help operators pinpoint and correct of faults in multi-component systems**
- **Controlling network traffic**
  - **Deep packet inspection (DPI)**
    - Video and music blocking
- **Security outsourcing**
  - **Managed security service providers (MSSPs)**

Technologies and Tools for Protecting Information Resources

- **Security in the cloud**
  - **Responsibility for security resides with company owning the data**
  - **Firms must ensure providers provides adequate protection**
  - **Service level agreements (SLAs)**
- **Securing mobile platforms**
  - **Security policies should include and cover any special requirements for mobile devices**
    - E.g. updating smart phones with latest security patches, etc.

Technologies and Tools for Protecting Information Resources

- **Ensuring software quality**
  - **Software metrics: Objective assessments of system in form of quantified measurements**
    - Number of transactions
    - Online response time
    - Payroll checks printed per hour
    - Known bugs per hundred lines of code
  - **Early and regular testing**
  - **Walkthrough: Review of specification or design document by small group of qualified people**
  - **Debugging: Process by which errors are eliminated**

Chapter 9

ACHIEVING OPERATIONAL EXCELLENCE AND CUSTOMER INTIMACY: ENTERPRISE APPLICATIONS

VIDEO CASES

Case 1: Sinosteel Strengthens Business Management with ERP Applications
Case 2: Ingram Micro and H&R Block Get Close to Their Customers
Instructional Video 1: Zara's" Wearing Today's Fashions With Supply Chain Management

Learning Objectives

- How do enterprise systems help businesses achieve operational excellence?
- How do supply chain management systems coordinate planning, production, and logistics with suppliers?
- How do customer relationship management systems help firms achieve customer intimacy?
- What are the challenges posed by enterprise applications?
- How are enterprise applications used in platforms for new cross-functional services?

Cannondale Learns to Manage a Global Supply Chain

- **Problem** – Managing parts in a constantly changing product line with suppliers in many countries
- **Solution** – Replace legacy MRPS with Kinaxis on-demand Rapid Response software service
  - Allows both Cannondale and suppliers to see up-to-date information; faster customer response; reduced inventory; reduced cycle and lead times
- **Illustrates:** Need for enterprise-wide system for coordinating supply chain
- **Demonstrates:** Use of cloud services as solution for implementing enterprise applications

Enterprise Systems

- Enterprise Systems
  - Also called "enterprise resource planning (ERP) systems"
  - Suite of integrated software modules and a common central database
  - Collects data from many divisions of firm for use in nearly all of firm's internal business activities
  - Information entered in one process is immediately available for other processes

Enterprise Systems

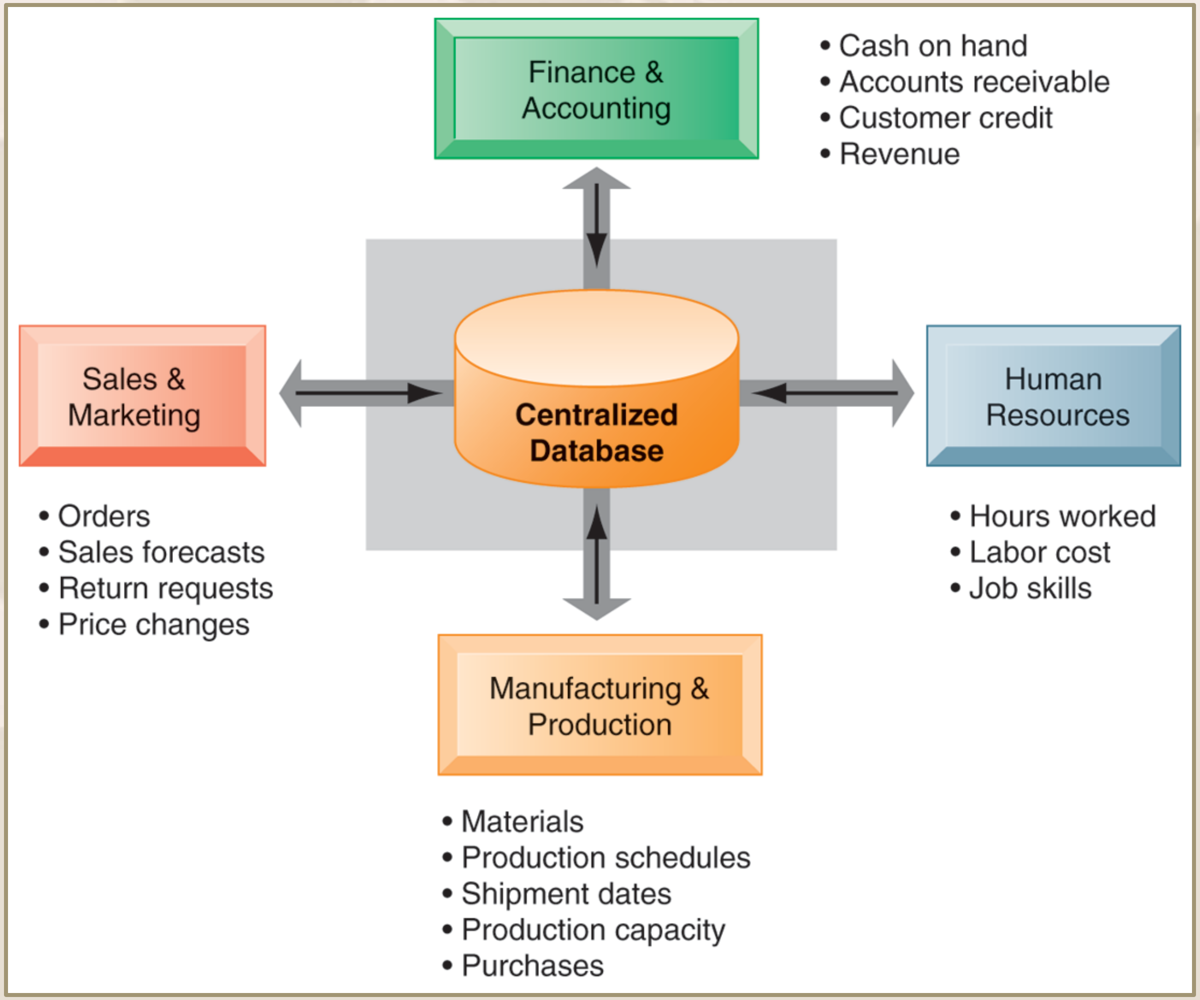
- **Enterprise Software**
  - **Built around thousands of predefined business processes that reflect best practices**
    - Finance/accounting: General ledger, accounts payable, etc.
    - Human resources: Personnel administration, payroll, etc.
    - Manufacturing/production: Purchasing, shipping, etc.
    - Sales/marketing: Order processing, billing, sales planning, etc.
  - **To implement, firms:**
    - Select functions of system they wish to use
    - Map business processes to software processes
      - Use software's configuration tables for customizing

Enterprise Systems

HOW ENTERPRISE SYSTEMS WORK

Enterprise systems feature a set of integrated software modules and a central database that enables data to be shared by many different business processes and functional areas throughout the enterprise.

FIGURE 9-1



Enterprise Systems

- **Business value of enterprise systems**
  - Increase operational efficiency
  - Provide firm wide information to support decision making
  - Enable rapid responses to customer requests for information or products
  - Include analytical tools to evaluate overall organizational performance

Supply Chain Management Systems

- **Supply chain:**
  - **Network of organizations and processes for:**
    - Procuring raw materials
    - Transforming them into products
    - Distributing the products
- **Upstream supply chain:**
  - Firm's suppliers, suppliers' suppliers, processes for managing relationships with them
- **Downstream supply chain:**
  - Organizations and processes responsible for delivering products to customers

Supply Chain Management Systems

NIKE'S SUPPLY CHAIN

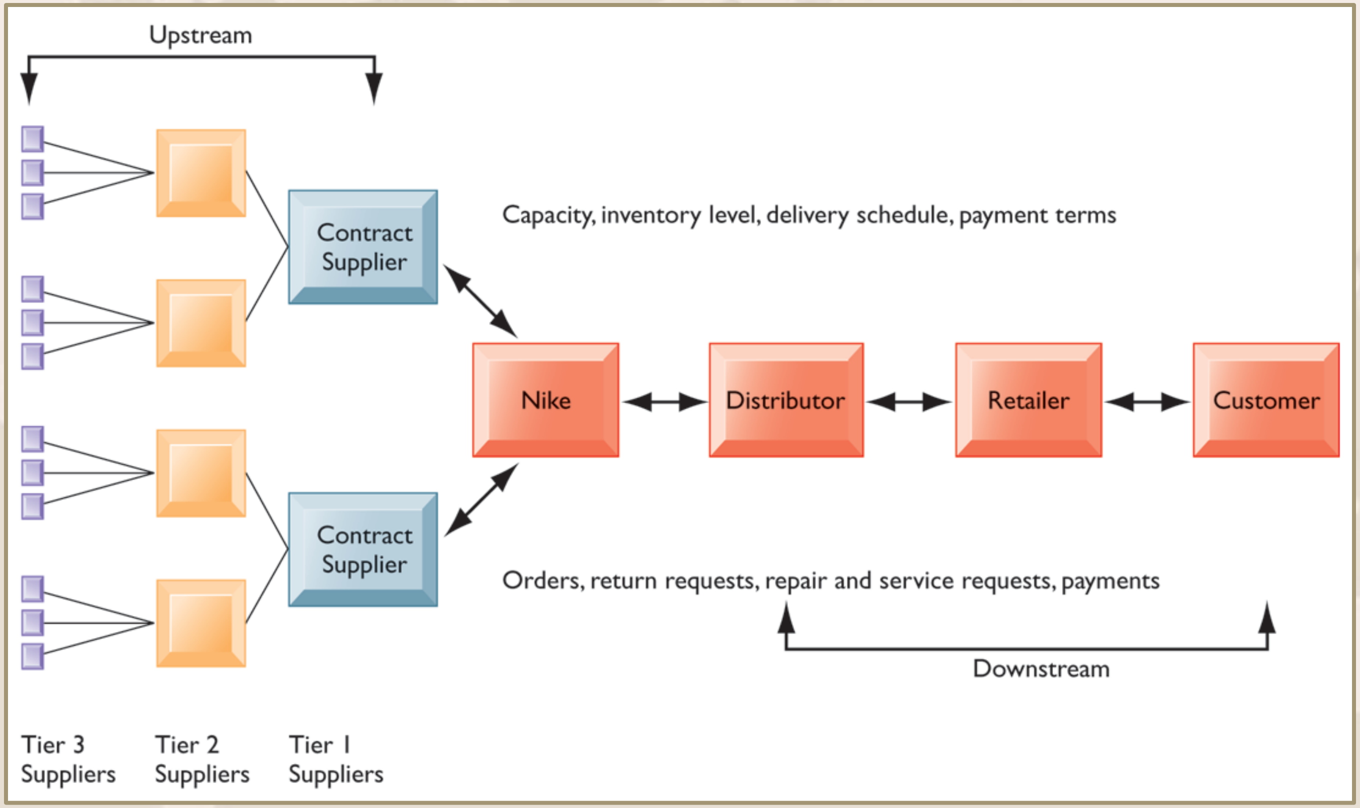


FIGURE 9-2 This figure illustrates the major entities in Nike's supply chain and the flow of information upstream and downstream to coordinate the activities involved in buying, making, and moving a product. Shown here is a simplified supply chain, with the upstream portion focusing only on the suppliers for sneakers and sneaker soles.

Supply Chain Management Systems

- **Information and supply chain management**
  - **Inefficiencies cut into a company's operating costs**
    - Can waste up to 25% of operating expenses
  - **Just-in-time strategy:**
    - Components arrive as they are needed
    - Finished goods shipped after leaving assembly line
  - **Safety stock**
    - Buffer for lack of flexibility in supply chain
  - **Bullwhip effect**
    - Information about product demand gets distorted as it passes from one entity to next across supply chain

Supply Chain Management Systems

THE BULLWHIP EFFECT

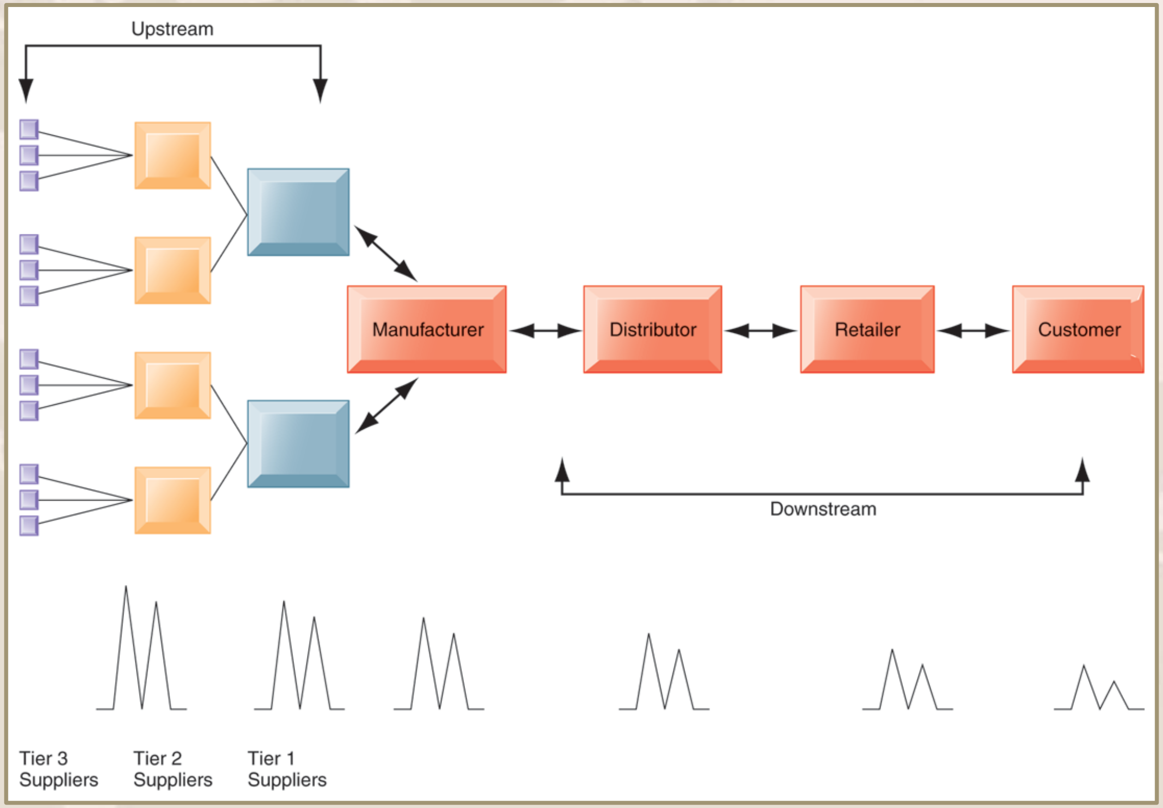


FIGURE 9-3 Inaccurate information can cause minor fluctuations in demand for a product to be amplified as one moves further back in the supply chain. Minor fluctuations in retail sales for a product can create excess inventory for distributors, manufacturers, and suppliers.

Supply Chain Management Systems

- **Supply chain management software**
  - **Supply chain planning systems**
    - Model existing supply chain
    - Demand planning
    - Optimize sourcing, manufacturing plans
    - Establish inventory levels
    - Identifying transportation modes
  - **Supply chain execution systems**
    - Manage flow of products through distribution centers and warehouses

Supply Chain Management Systems

- Global supply chain issues
  - Global supply chains typically span greater geographic distances and time differences
  - More complex pricing issues (local taxes, transportation, etc.)
  - Foreign government regulations
- Internet helps companies manage many aspects of global supply chains
  - Sourcing, transportation, communications, international finance

Supply Chain Management Systems

- **Supply chain management systems**
  - **Push-based model (build-to-stock)**
    - Schedules based on best guesses of demand
  - **Pull-based model (demand-driven)**
    - Customer orders trigger events in supply chain
  - **Sequential supply chains**
    - Information and materials flow sequentially from company to company
  - **Concurrent supply chains**
    - Information flows in many directions simultaneously among members of a supply chain network

Supply Chain Management Systems

THE BULLWHIP EFFECT

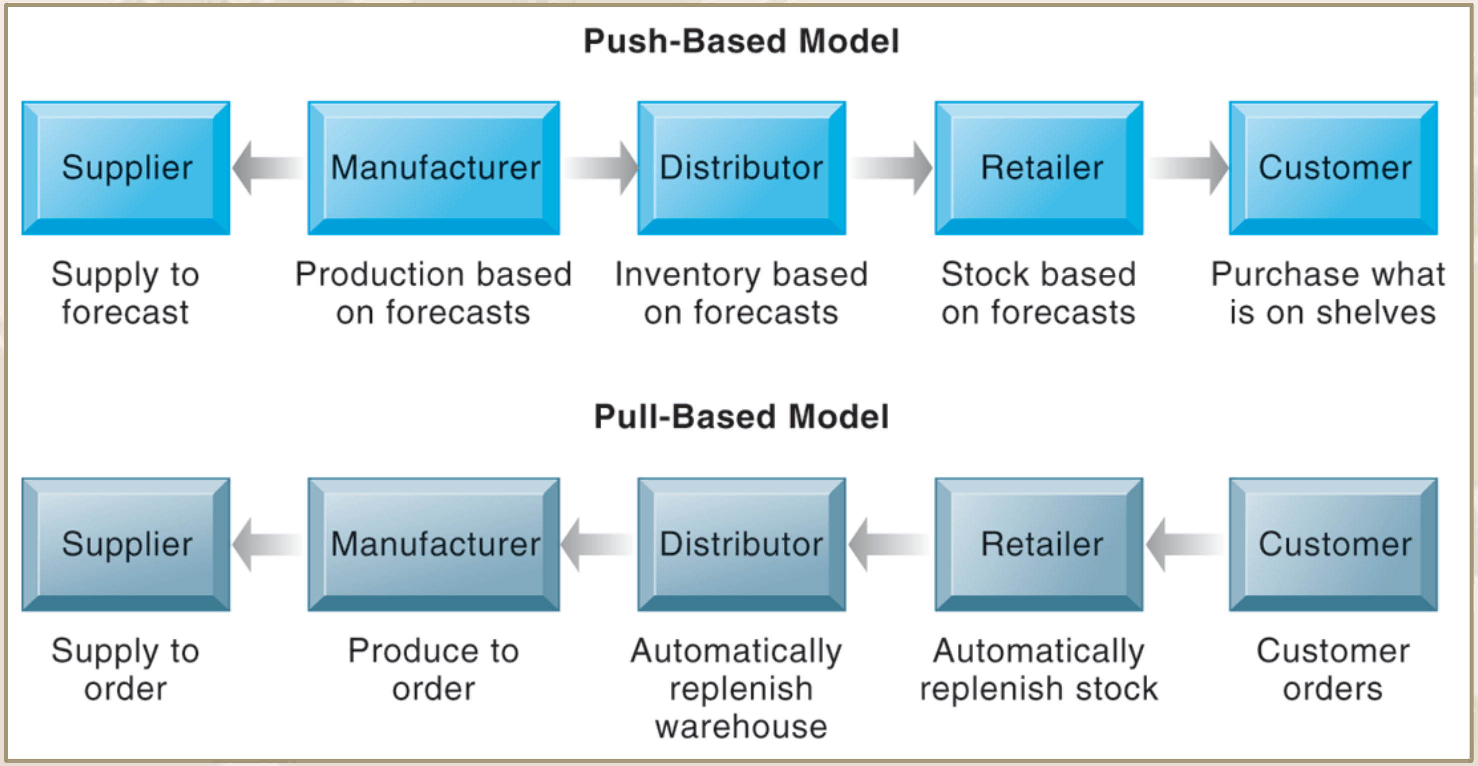


FIGURE 9-4 The difference between push- and pull-based models is summarized by the slogan, “Make what we sell, not sell what we make.”

Supply Chain Management Systems

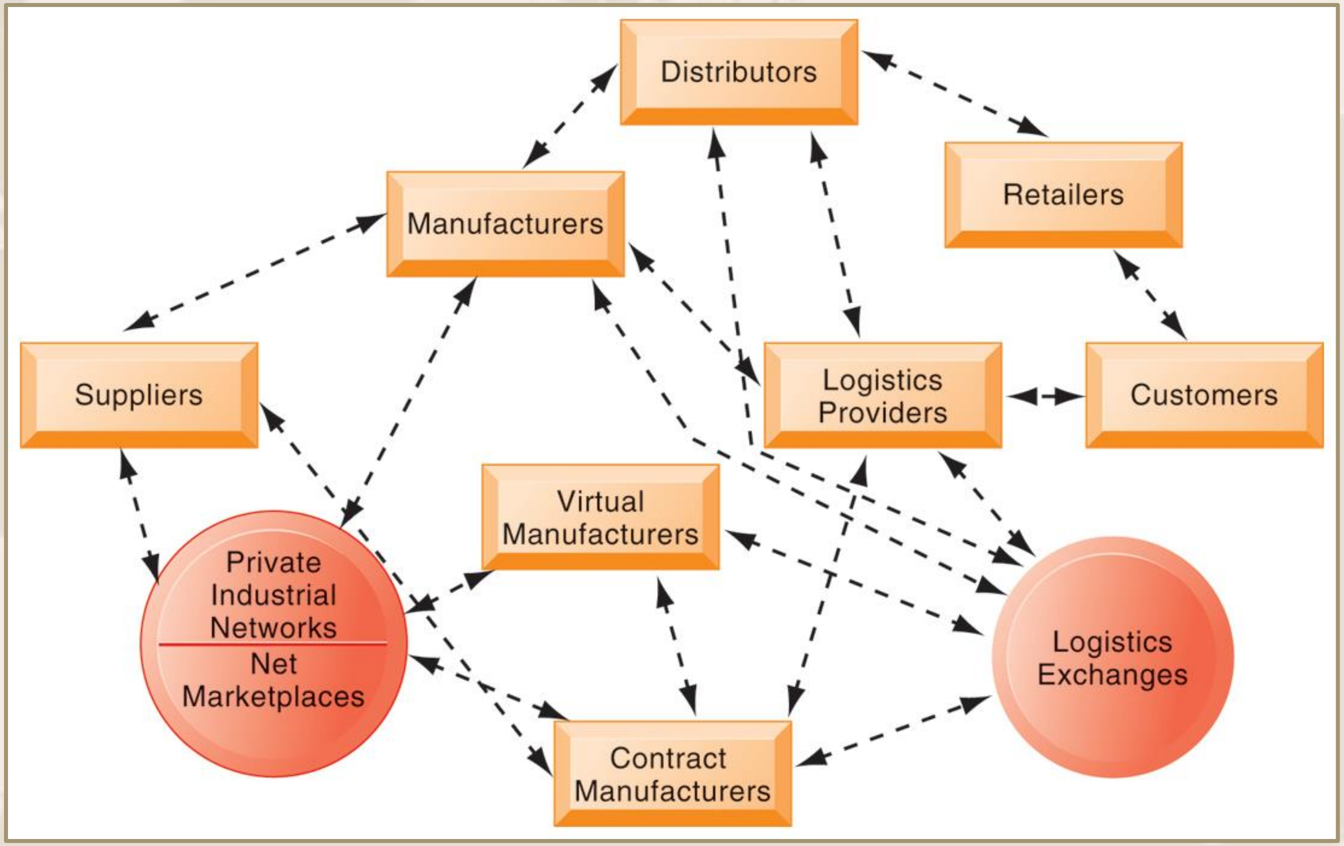
- Business value of SCM systems
  - Match supply to demand
  - Reduce inventory levels
  - Improve delivery service
  - Speed product time to market
  - Use assets more effectively
  - Reduced supply chain costs lead to increased profitability
  - Increased sales

Supply Chain Management Systems

THE FUTURE INTERNET-DRIVEN SUPPLY CHAIN

The future Internet-driven supply chain operates like a digital logistics nervous system. It provides multidirectional communication among firms, networks of firms, and e-marketplaces so that entire networks of supply chain partners can immediately adjust inventories, orders, and capacities.

FIGURE 9-5



Customer Relationship Management Systems

- Knowing the customer
  - In large businesses, too many customers and too many ways customers interact with firm
- Customer relationship management (CRM) systems
  - Capture and integrate customer data from all over the organization
  - Consolidate and analyze customer data
  - Distribute customer information to various systems and customer touch points across enterprise
  - Provide single enterprise view of customers

Customer Relationship Management Systems

CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

CRM systems examine customers from a multifaceted perspective. These systems use a set of integrated applications to address all aspects of the customer relationship, including customer service, sales, and marketing.

FIGURE 9-6

Customer Relationship Management Systems

- **CRM software**
  - **CRM packages range from niche tools to large-scale enterprise applications**
  - **More comprehensive have modules for:**
    - **Partner relationship management (PRM)**
      - Integrating lead generation, pricing, promotions, order configurations, and availability
      - Tools to assess partners' performances
    - **Employee relationship management (ERM)**
      - E.g. Setting objectives, employee performance management, performance-based compensation, employee training

Customer Relationship Management Systems

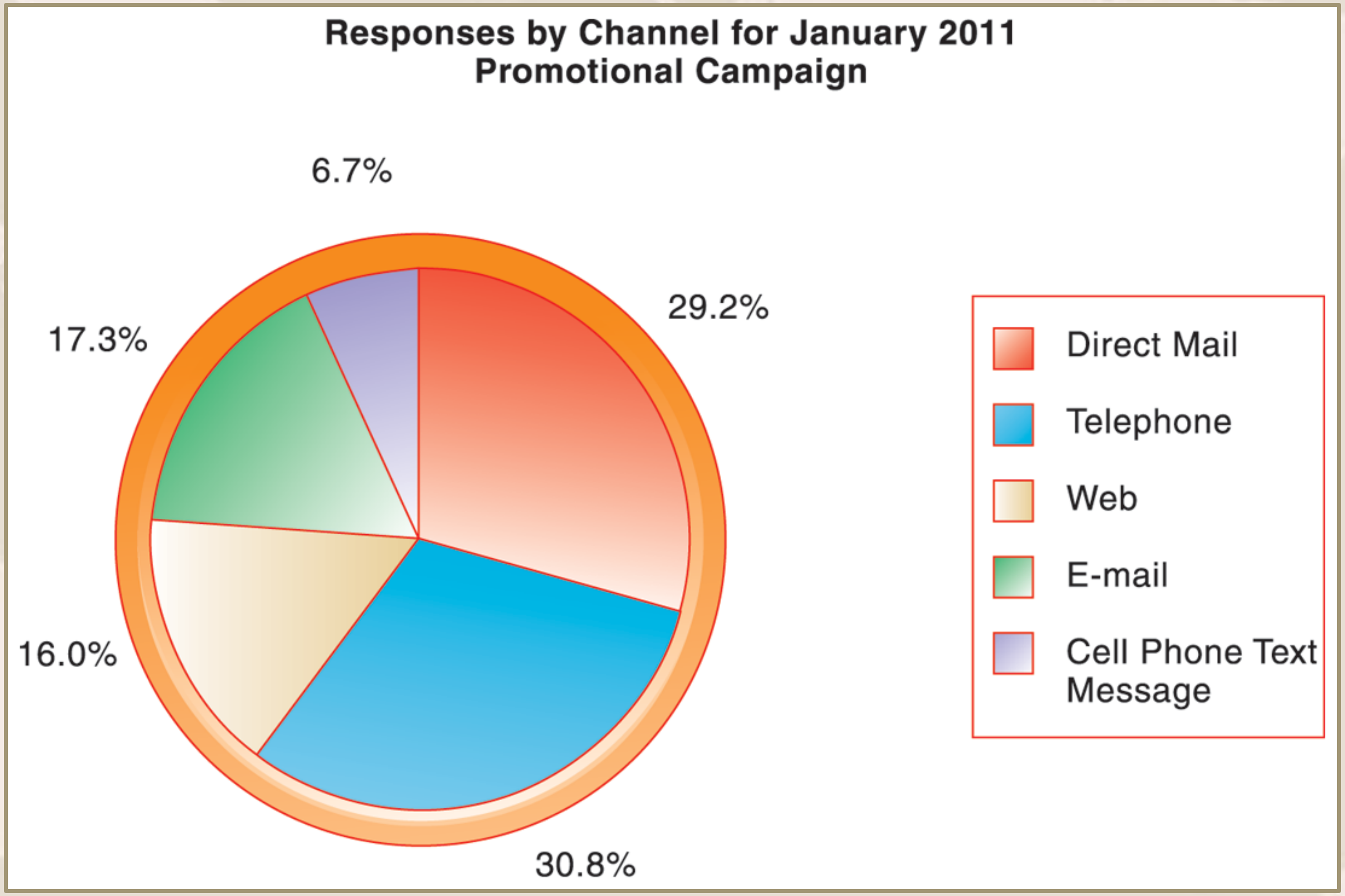
- **CRM packages typically include tools for:**
  - **Sales force automation (SFA)**
    - E.g. sales prospect and contact information, and sales quote generation capabilities
  - **Customer service**
    - E.g. assigning and managing customer service requests; Web-based self-service capabilities
  - **Marketing**
    - E.g. capturing prospect and customer data, scheduling and tracking direct-marketing mailings or e-mail

Customer Relationship Management Systems

HOW CRM SYSTEMS SUPPORT MARKETING

Customer relationship management software provides a single point for users to manage and evaluate marketing campaigns across multiple channels, including e-mail, direct mail, telephone, the Web, and wireless messages.

FIGURE 9-7

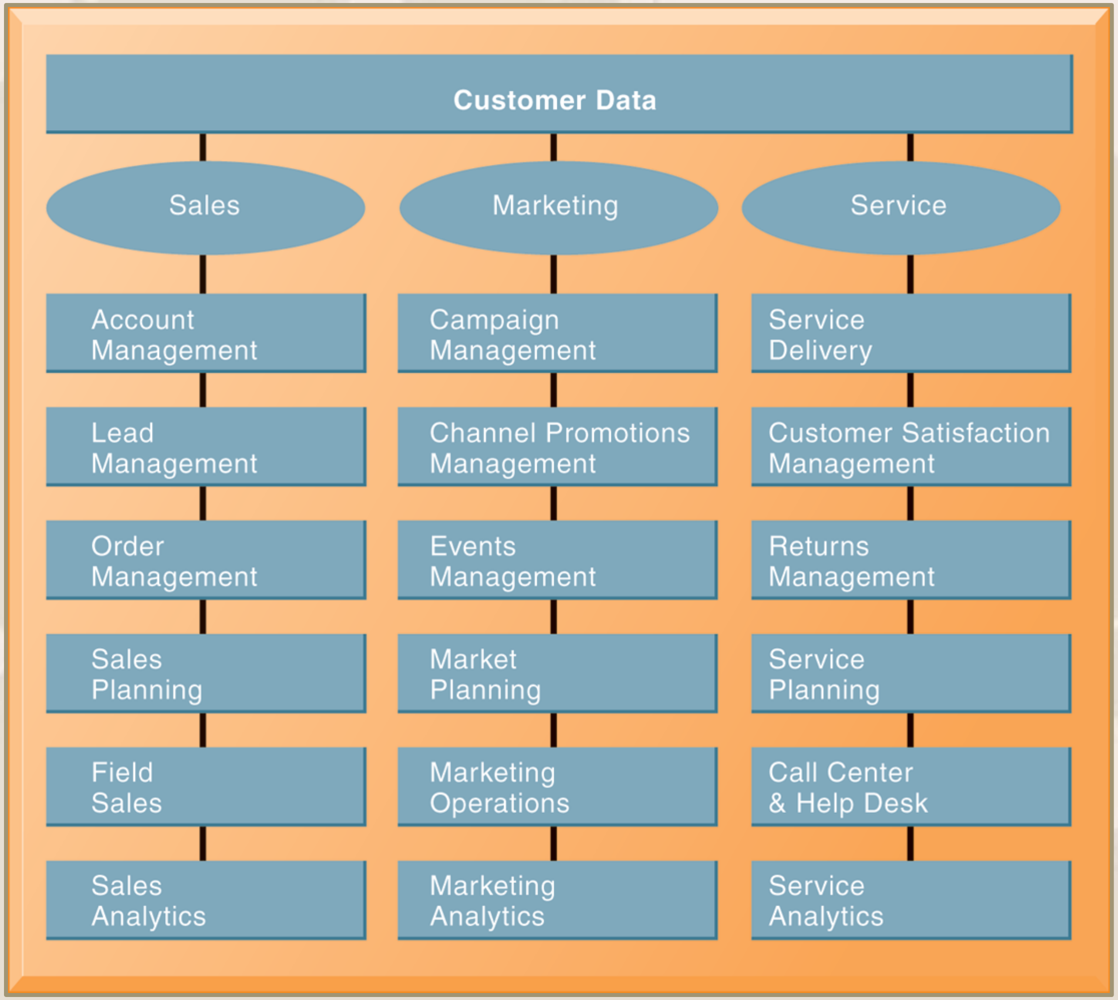


Customer Relationship Management Systems

CRM SOFTWARE CAPABILITIES

The major CRM software products support business processes in sales, service, and marketing, integrating customer information from many different sources. Included are support for both the operational and analytical aspects of CRM.

FIGURE 9-8



Customer Relationship Management Systems

CUSTOMER LOYALTY MANAGEMENT PROCESS MAP

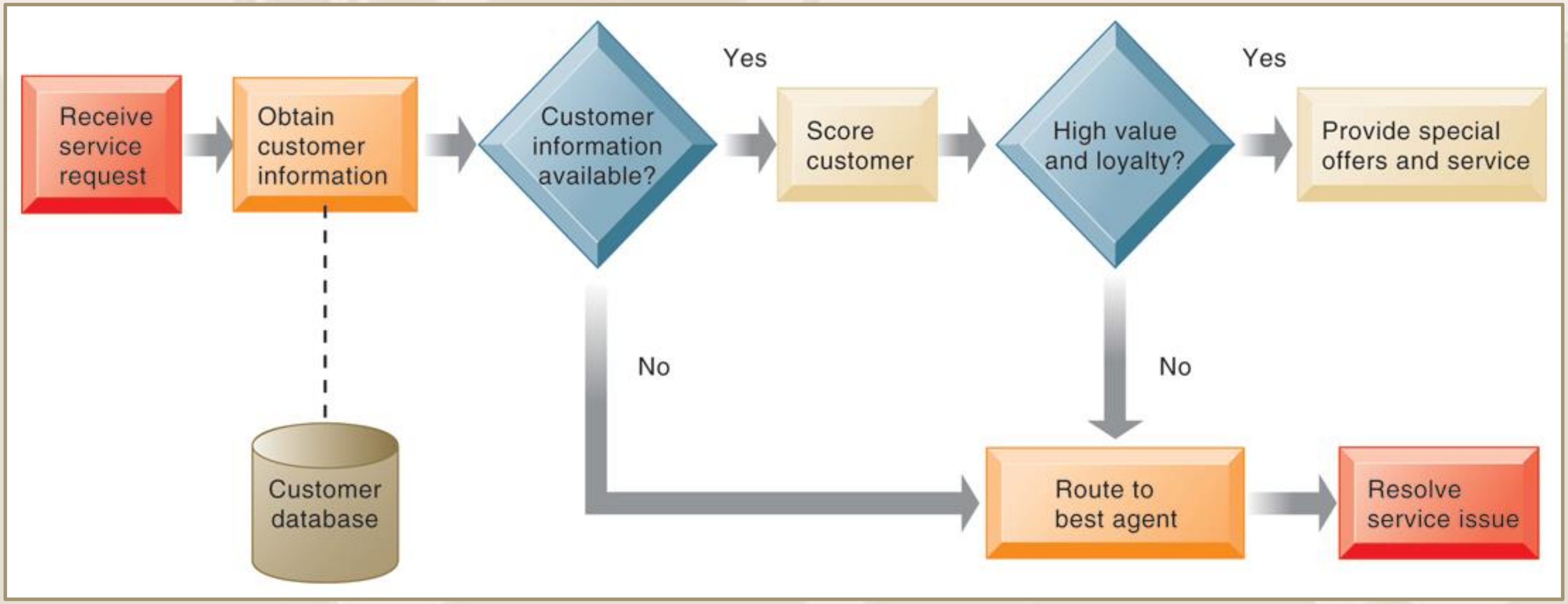


FIGURE 9-9 This process map shows how a best practice for promoting customer loyalty through customer service would be modeled by customer relationship management software. The CRM software helps firms identify high-value customers for preferential treatment.

Customer Relationship Management Systems

- **Operational CRM:**
  - **Customer-facing applications**
    - E.g. sales force automation, call center and customer service support, and marketing automation
- **Analytical CRM:**
  - **Analyze customer data output from operational CRM applications**
  - **Based on data warehouses populated by operational CRM systems and customer touch points**
    - Customer lifetime value (CLTV)

Customer Relationship Management Systems

ANALYTICAL CRM DATA WAREHOUSE

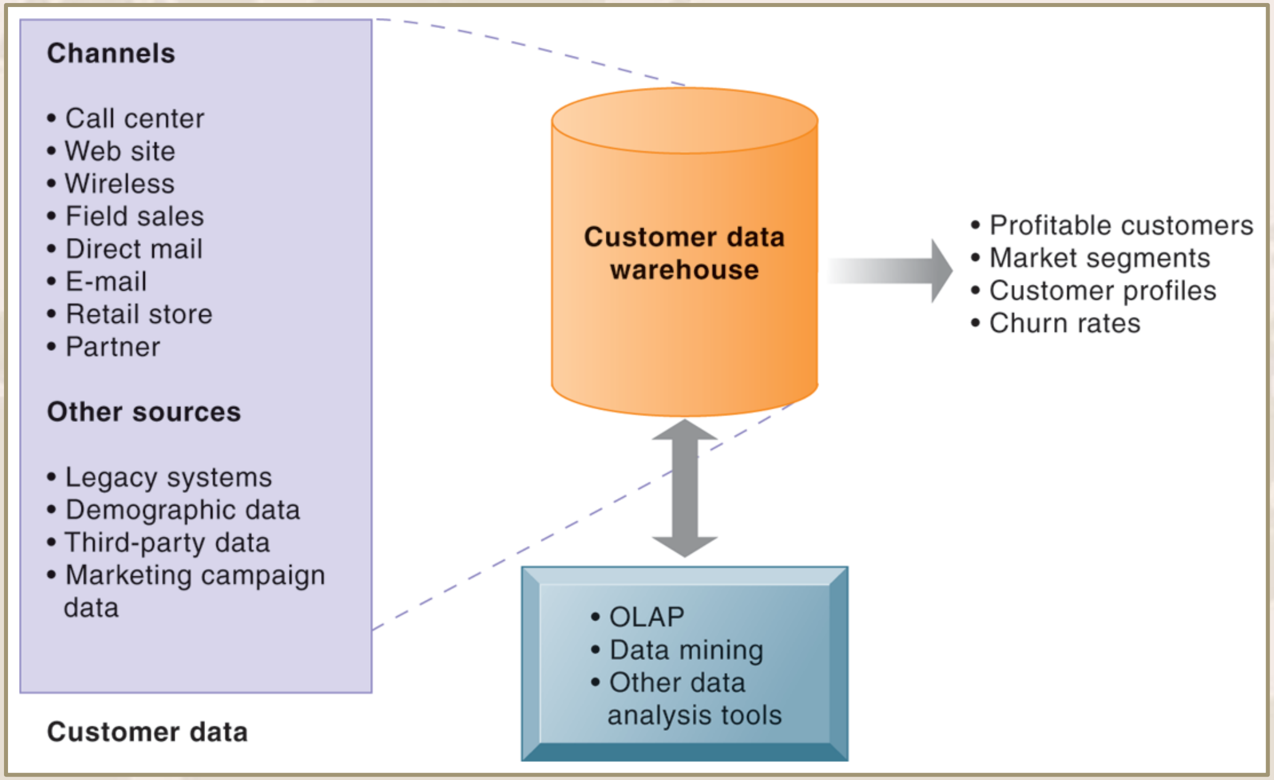


FIGURE 9-10 Analytical CRM uses a customer data warehouse and tools to analyze customer data collected from the firm's customer touch points and from other sources.

Customer Relationship Management Systems

- **Business value of CRM**
  - **Increased customer satisfaction**
  - **Reduced direct-marketing costs**
  - **More effective marketing**
  - **Lower costs for customer acquisition/retention**
  - **Increased sales revenue**
  - **Reduce churn rate**
    - Number of customers who stop using or purchasing products or services from a company.
    - Indicator of growth or decline of firm's customer base

Enterprise Applications: New Opportunities and Challenges

- Highly expensive to purchase and implement
  - $3.5 million to over $12 million
- Technological changes
- Business process changes
- Organizational changes
- Switching costs, dependence on software vendors
- Data standardization, management, cleansing

Enterprise Applications: New Opportunities and Challenges

- **Next-generation enterprise applications**
  - **Move is to make applications more flexible, Web-enabled, integrated with other systems**
  - **Enterprise suites**
    - Software to enable CRM, SCM, and enterprise systems work together and with suppliers and client systems
    - Utilize Web services, SOA
  - **Open source & on-demand solutions**
  - **Mobile compatible; Web 2.0 capabilities**
  - **Complementary analytics products**

Enterprise Applications: New Opportunities and Challenges

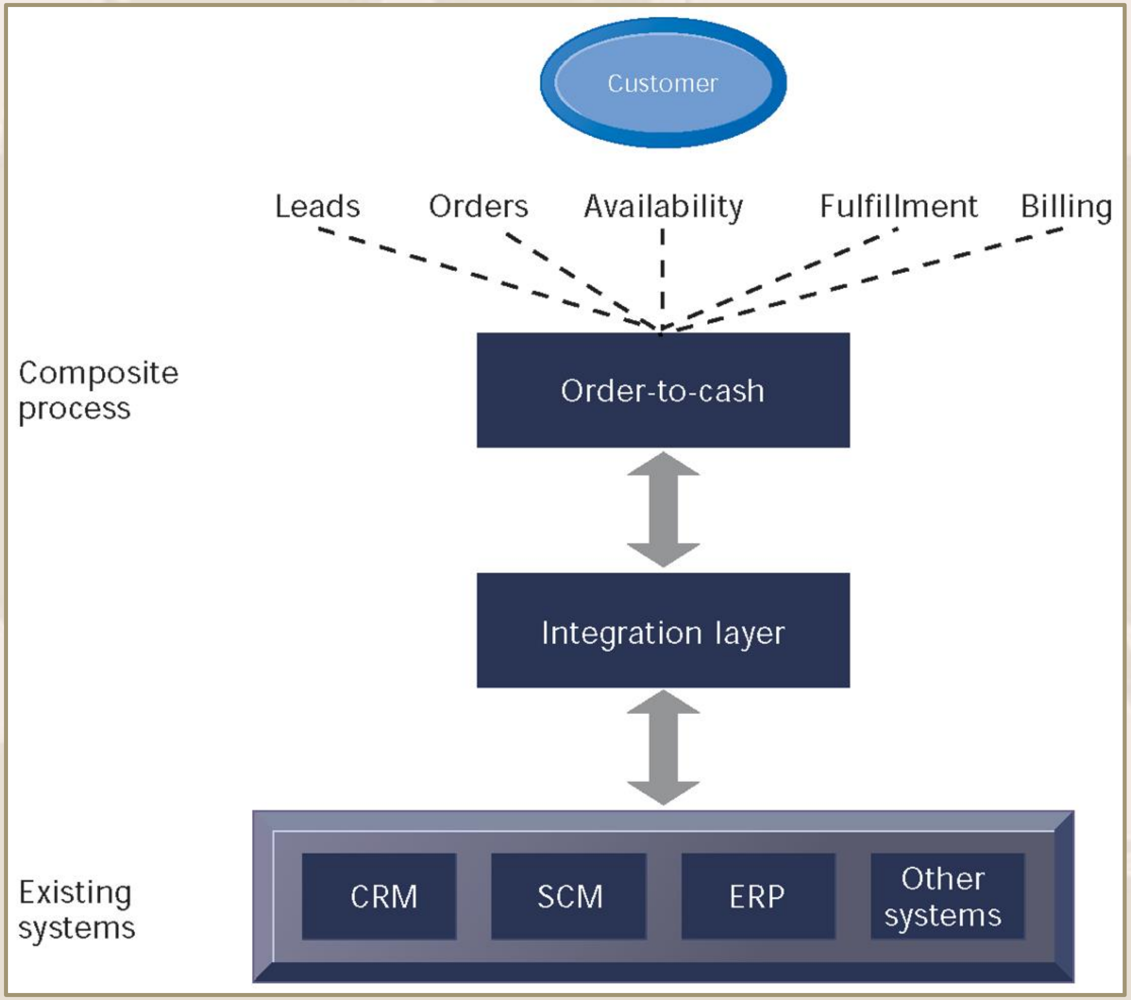
- **Service platform:**
  - **Integrates multiple applications to deliver a seamless experience for all parties**
    - E.g. Order-to-cash process

Enterprise Applications: New Opportunities and Challenges

ORDER-TO-CASH SERVICE

Order-to-cash is a composite process that integrates data from individual enterprise systems and legacy financial applications. The process must be modeled and translated into a software system using application integration tools.

FIGURE 9-11



Chapter 10

E-COMMERCE: DIGITAL MARKETS, DIGITAL GOODS

VIDEO CASES

Case 1: M-Commerce: The Past, Present, and Future

Case 2: Ford AutoXchange B2B Marketplace

Learning Objectives

- **What are the unique features of e-commerce, digital markets, and digital goods?**
- **What are the principal e-commerce business and revenue models?**
- **How has e-commerce transformed marketing?**
- **How has e-commerce affected business-to-business transactions?**
- **What is the role of m-commerce in business and what are the most important m-commerce applications?**
- **What issues must be addressed when building an e-commerce Web site?**

E-commerce and the Internet

- E-commerce today:
  - Use of the Internet and Web to transact business; digitally enabled transactions
  - Began in 1995 and grew exponentially, still growing even in a recession
  - Companies that survived the dot-com bubble burst and now thrive
  - E-commerce revolution is still in its early stages

E-commerce and the Internet

THE GROWTH OF E-COMMERCE

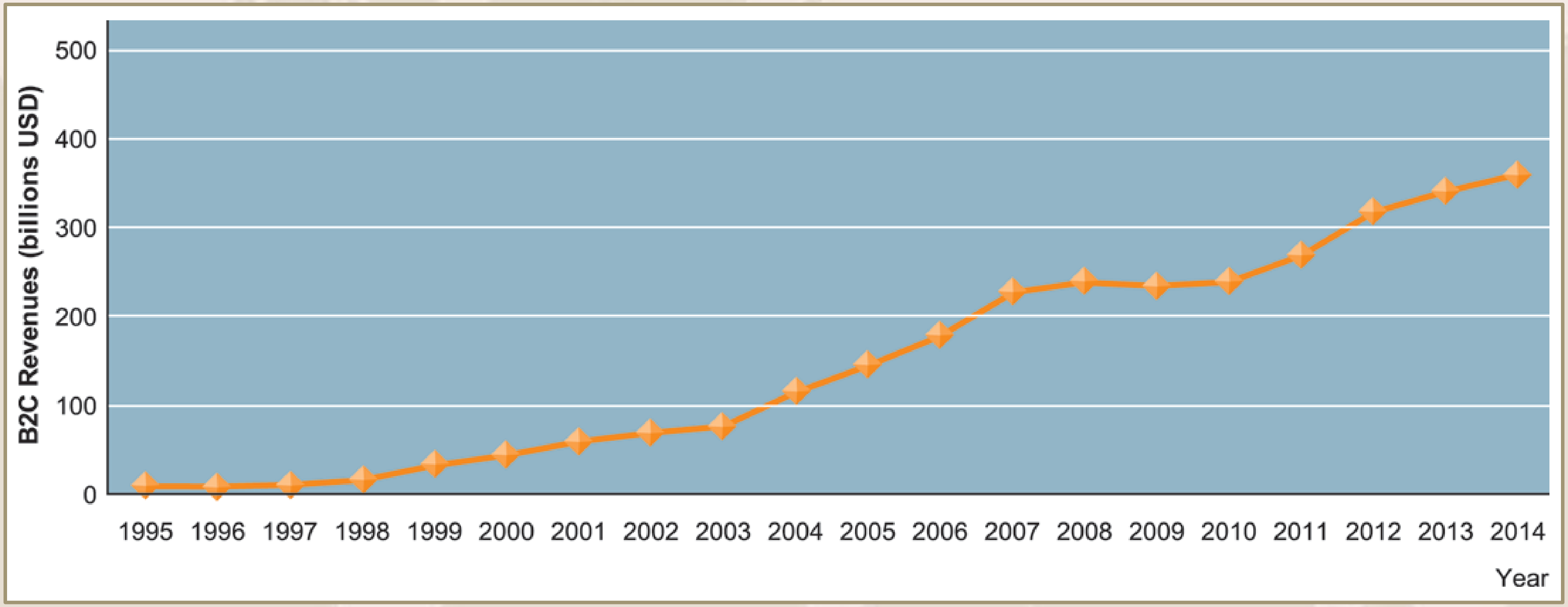


FIGURE 10-1

Retail e-commerce revenues grew 15–25 percent per year until the recession of 2008–2009, when they slowed measurably. In 2010, e-commerce revenues are growing again at an estimated 12 percent annually.

E-commerce and the Internet

- **Why e-commerce is different – 8 unique features**

1. **Ubiquity**
   - Internet/Web technology available everywhere: work, home, etc., anytime.
   - Effect:
     – Marketplace removed from temporal, geographic locations to become "marketspace"
     – Enhanced customer convenience and reduced shopping costs

E-commerce and the Internet

- **8 unique features (cont.)**

2. Global reach

- The technology reaches across national boundaries, around Earth
- Effect:
  - Commerce enabled across cultural and national boundaries seamlessly and without modification
  - Marketspace includes, potentially, billions of consumers and millions of businesses worldwide

E-commerce and the Internet

- **8 unique features (cont.)**

3. Universal standards

- One set of technology standards: Internet standards
- Effect:
  - Disparate computer systems easily communicate with each other
  - Lower market entry costs—costs merchants must pay to bring goods to market
  - Lower consumers' search costs—effort required to find suitable products

E-commerce and the Internet

- **8 unique features (cont.)**

4. Richness

- Supports video, audio, and text messages
- Effect:
  - Possible to deliver rich messages with text, audio, and video simultaneously to large numbers of people
  - Video, audio, and text marketing messages can be integrated into single marketing message and consumer experience

E-commerce and the Internet

- **8 unique features (cont.)**

  5. **Interactivity**
     - The technology works through interaction with the user
     - Effect:
       - Consumers engaged in dialog that dynamically adjusts experience to the individual
       - Consumer becomes co-participant in process of delivering goods to market

E-commerce and the Internet

- **8 unique features (cont.)**

6. **Information density**
   - Large increases in information density—the total amount and quality of information available to all market participants
   - Effect:
     - Greater price transparency
     - Greater cost transparency
     - Enables merchants to engage in price discrimination

E-commerce and the Internet

- **8 unique features (cont.)**

7. Personalization/Customization

- Technology permits modification of messages, goods
- Effect
  - Personalized messages can be sent to individuals as well as groups
  - Products and services can be customized to individual preferences

E-commerce and the Internet

- **8 unique features (cont.)**

  8. Social technology
  - The technology promotes user content generation and social networking
  - Effect
    - – New Internet social and business models enable user content creation and distribution, and support social networks

E-commerce and the Internet

- **Key concepts in e-commerce**
  - **Digital markets reduce**
    - Information asymmetry
    - Search costs
    - Transaction costs
    - Menu costs
  - **Digital markets enable**
    - Price discrimination
    - Dynamic pricing
    - Disintermediation

E-commerce and the Internet

THE BENEFITS OF DISINTERMEDIATION TO THE CONSUMER

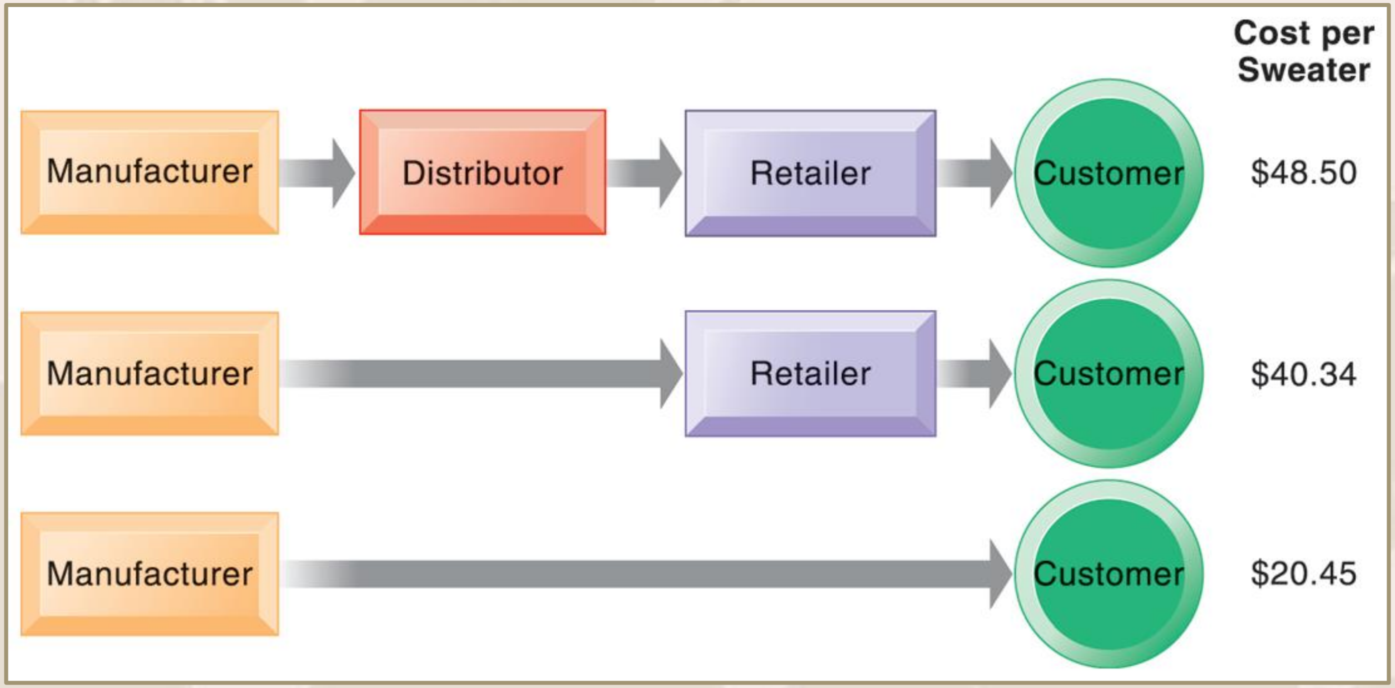


FIGURE 10-2

The typical distribution channel has several intermediary layers, each of which adds to the final cost of a product, such as a sweater. Removing layers lowers the final cost to the consumer.

E-commerce and the Internet

- **Key concepts in e-commerce**
  - **Digital goods**
    - Goods that can be delivered over a digital network
      - E.g. Music tracks, video, software, newspapers, books
    - Cost of producing first unit almost entire cost of product: marginal cost of 2nd unit is about zero
    - Costs of delivery over the Internet very low
    - Marketing costs remain the same; pricing highly variable
    - Industries with digital goods are undergoing revolutionary changes (publishers, record labels, etc.)

E-commerce: Business and Technology

- Types of e-commerce
  - Business-to-consumer (B2C)
  - Business-to-business (B2B)
  - Consumer-to-consumer (C2C)
  - Mobile commerce (m-commerce)

E-commerce: Business and Technology

- **E-commerce business models**
  - Portal
  - E-tailer
  - Content Provider
  - Transaction Broker
  - Market Creator
  - Service Provider
  - Community Provider

E-commerce: Business and Technology

TWITTER SEARCHES FOR A BUSINESS MODEL

Read the Interactive Session and discuss the following questions

- **Based on your reading in this chapter, how would you characterize Twitter's business model?**
- **If Twitter is to have a revenue model, which of the revenue models described in this chapter would work?**
- **What is the most important asset that Twitter has and how could it monetize this asset?**
- **What impact will a high customer churn rate have on Twitter's potential advertising revenue?**

E-commerce: Business and Technology

- E-commerce revenue models
  1. Advertising
  2. Sales
  3. Subscription
  4. Free/Freemium
  5. Transaction Fee
  6. Affiliate

E-commerce: Business and Technology

- **Most popular Web 2.0 service: social networking**
  - Social networking sites sell banner ads, user preference information, and music, videos and e-books
- **Social shopping sites**
  - Swap shopping ideas with friends (Kaboodle, ThisNext)
- **Wisdom of crowds/crowdsourcing**
  - Large numbers of people can make better decisions about topics and products than a single person
- **Prediction markets:**
  - Peer-to-peer betting markets on specific outcomes (elections, sales figures, designs for new products)

E-commerce: Business and Technology

FACEBOOK: MANAGING YOUR PRIVACY FOR THEIR PROFIT

Read the Interactive Session and discuss the following questions

- **What concepts in the chapter are illustrated in this case?**
- **Describe the weaknesses of Facebook's privacy policies and features. What management, organization, and technology factors have contributed to those weaknesses?**
- **List and describe some of the options that Facebook managers have in balancing privacy and profitability. How can Facebook better safeguard user privacy? What would be the impact on its profitability and business model?**
- **Do you anticipate that Facebook will be successful in developing a business model that monetizes their site traffic? Why or why not?**

E-commerce: Business and Technology

- **E-commerce marketing**
  - **Internet provides marketers with new ways of identifying and communicating with customers**
  - **Long tail marketing:** Ability to reach a large audience inexpensively
  - **Behavioral targeting:** Tracking online behavior of individuals on thousands of Web sites
  - **Advertising formats include search engine marketing, display ads, rich media, and e-mail**

E-commerce: Business and Technology

WEB SITE VISITOR TRACKING

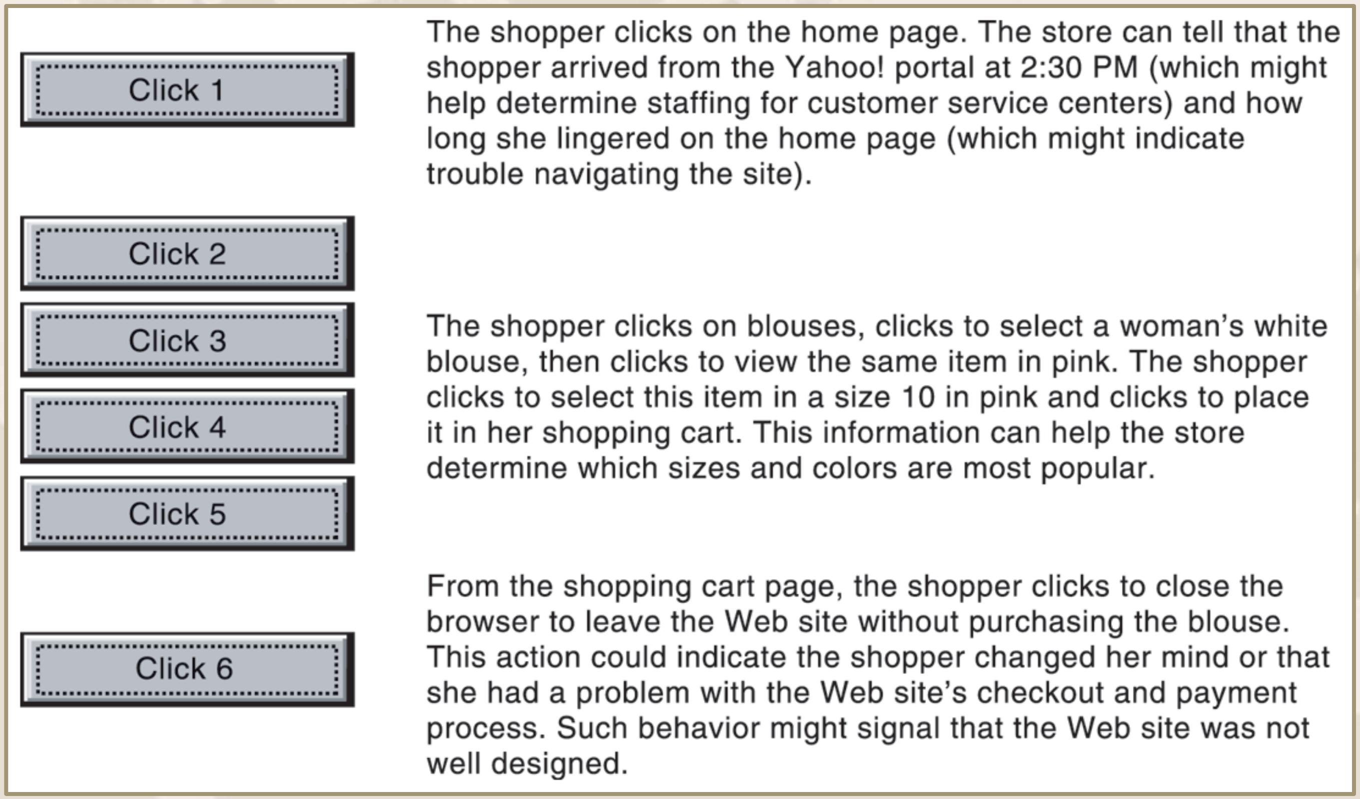


FIGURE 10-3 E-commerce Web sites have tools to track a shopper's every step through an online store. Close examination of customer behavior at a Web site selling women's clothing shows what the store might learn at each step and what actions it could take to increase sales.

E-commerce: Business and Technology

WEB SITE PERSONALIZATION

Firms can create unique personalized Web pages that display content or ads for products or services of special interest to individual users, improving the customer experience and creating additional value.

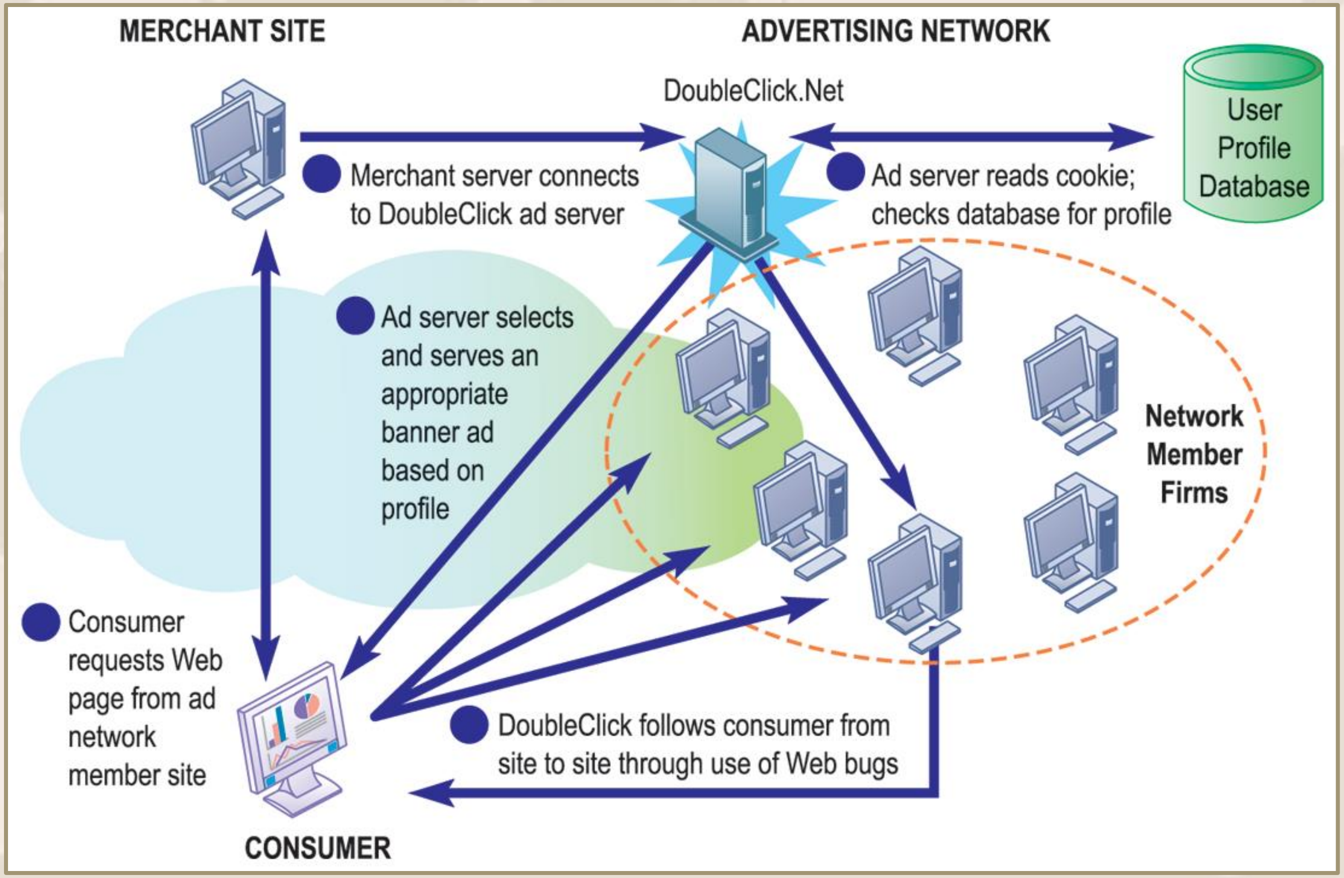
FIGURE 10-4

E-commerce: Business and Technology

HOW AN ADVERTISING NETWORK SUCH AS DOUBLECLICK WORKS

Advertising networks have become controversial among privacy advocates because of their ability to track individual consumers across the Internet.

FIGURE 10-5



E-commerce: Business and Technology

- **Business-to-business e-commerce**
  - **Electronic data interchange (EDI)**
    - Computer-to-computer exchange of standard transactions such as invoices, purchase orders
    - Major industries have EDI standards that define structure and information fields of electronic documents for that industry
    - More companies increasingly moving away from private networks to Internet for linking to other firms
      - E.g. Procurement: Businesses can now use Internet to locate most low-cost supplier, search online catalogs of supplier products, negotiate with suppliers, place orders, etc.

E-commerce: Business and Technology

ELECTRONIC DATA INTERCHANGE (EDI)

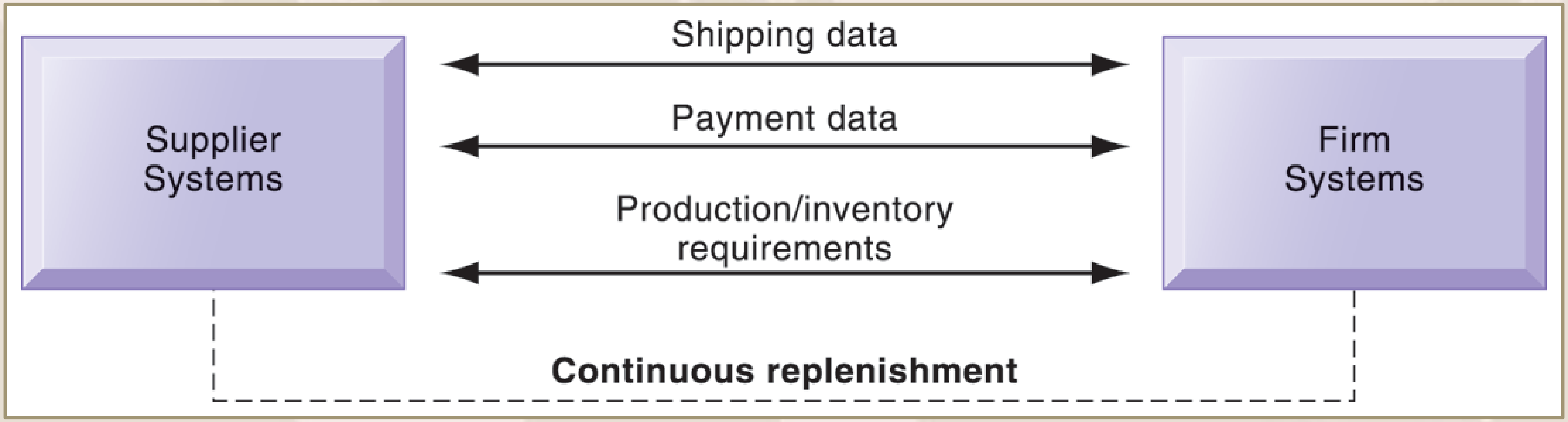


FIGURE 10-6 Companies use EDI to automate transactions for B2B e-commerce and continuous inventory replenishment. Suppliers can automatically send data about shipments to purchasing firms. The purchasing firms can use EDI to provide production and inventory requirements and payment data to suppliers.

E-commerce: Business and Technology

- **Business-to-business e-commerce (cont.)**
  - **Private industrial networks (private exchanges)**
    - Large firm using extranet to link to its suppliers, distributors and other key business partners
    - Owned by buyer
    - Permits sharing of:
      - Product design and development
      - Marketing
      - Production scheduling and inventory management
      - Unstructured communication (graphics and e-mail)

E-commerce: Business and Technology

A PRIVATE INDUSTRIAL NETWORK

A private industrial network, also known as a private exchange, links a firm to its suppliers, distributors, and other key business partners for efficient supply chain management and other collaborative commerce activities.

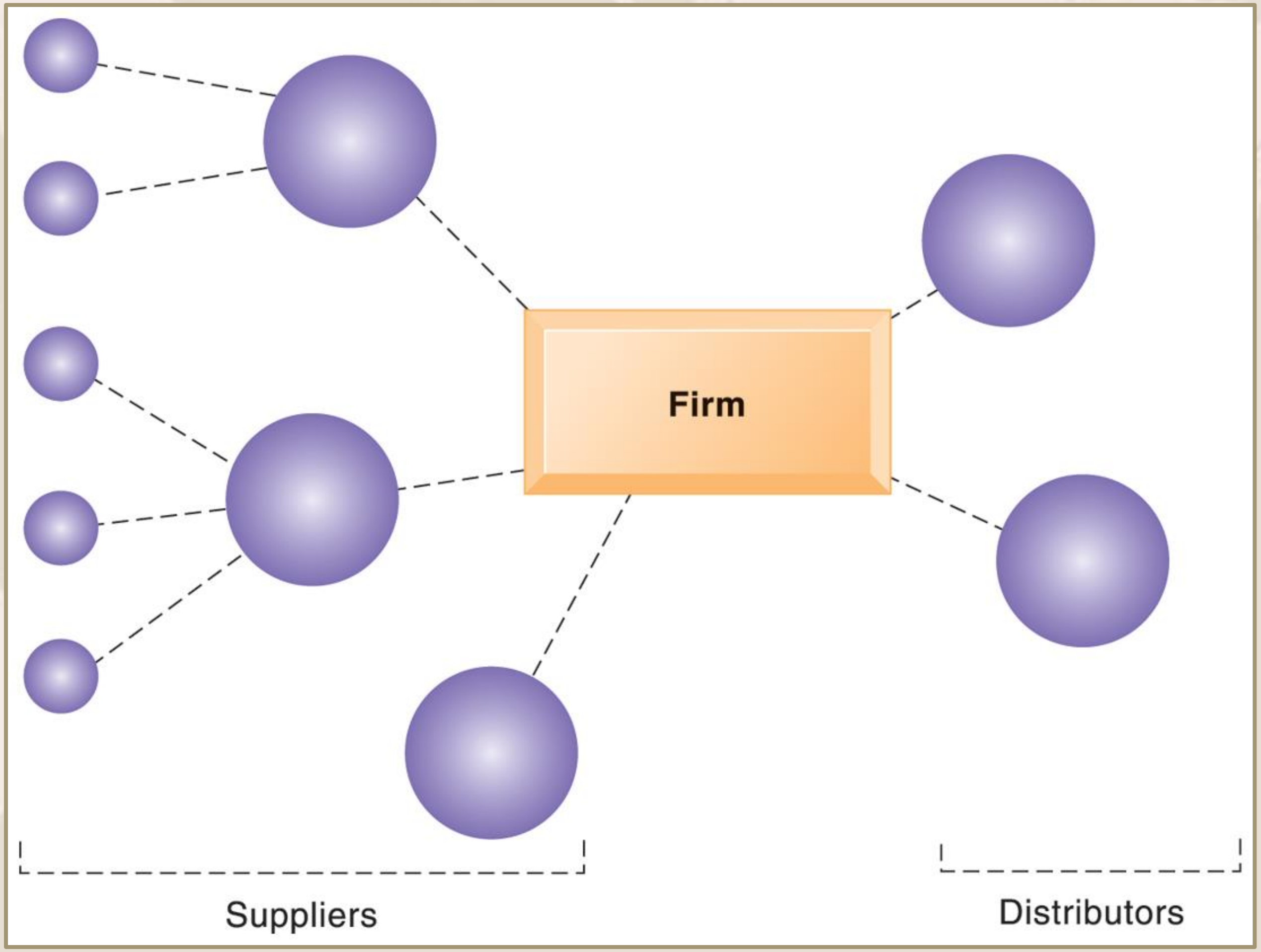


FIGURE 10-7

E-commerce: Business and Technology

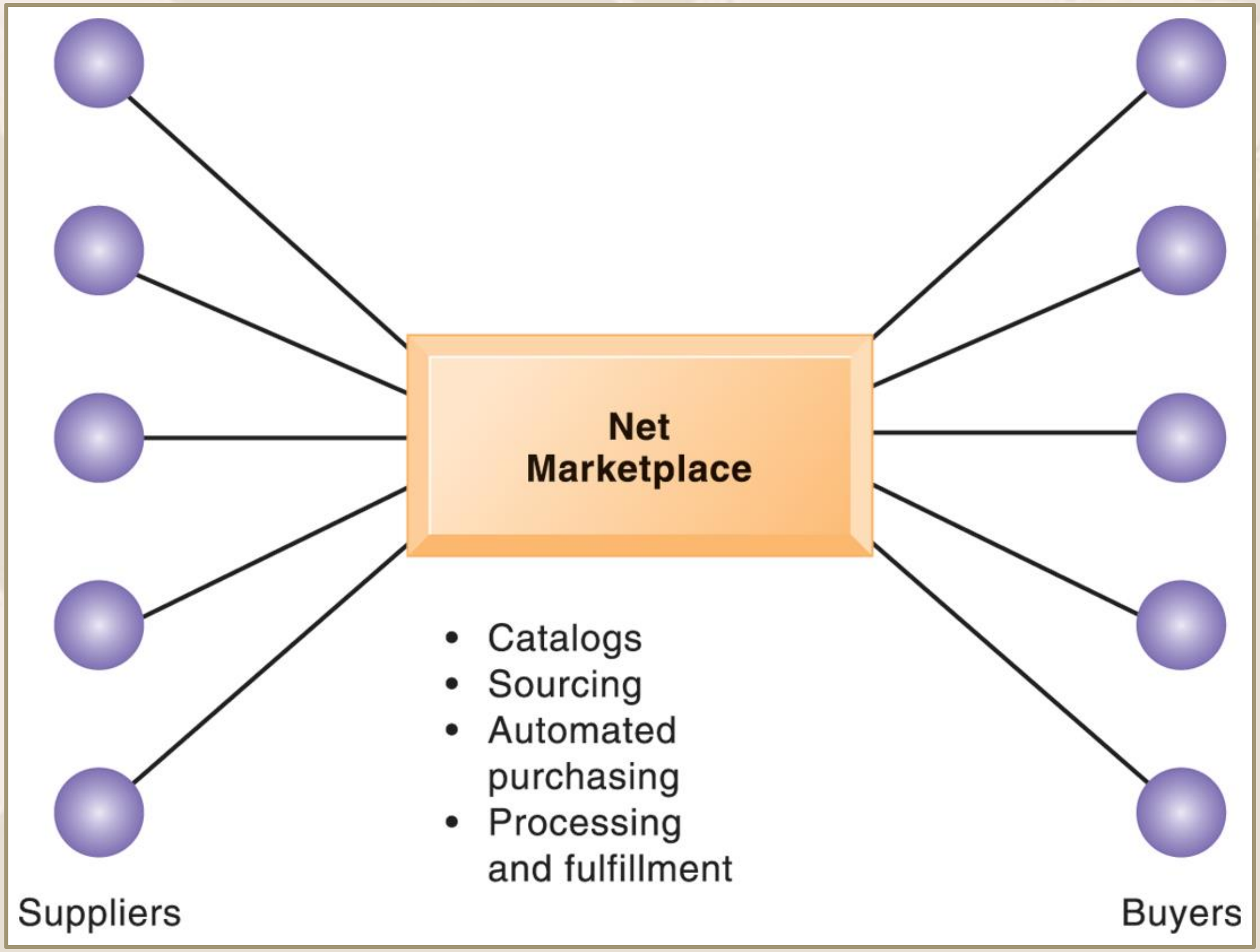
- **Business-to-business e-commerce (cont.)**
  - **Net marketplaces (e-hubs)**
    - Single market for many buyers and sellers
    - Industry-owned or owned by independent intermediary
    - Generate revenue from transaction fees, other services
    - Use prices established through negotiation, auction, RFQs, or fixed prices
    - May focus on direct or indirect goods
    - May be vertical or horizontal marketplaces

E-commerce: Business and Technology

A NET MARKETPLACE

Net marketplaces are online marketplaces where multiple buyers can purchase from multiple sellers.

FIGURE 10-8



E-commerce: Business and Technology

- **Business-to-business e-commerce (cont.)**
  - **Exchanges**
    - Independently owned third-party Net marketplaces
    - Connect thousands of suppliers and buyers for spot purchasing
    - Typically provide vertical markets for direct goods for single industry (food, electronics)
    - Proliferated during early years of e-commerce; many have failed
      - Competitive bidding drove prices down and did not offer long-term relationships with buyers or services to make lowering prices worthwhile

The Mobile Digital Platform and Mobile E-commerce

- **M-commerce**
  - **Although m-commerce represents small fraction of total e-commerce transactions, revenue has been steadily growing**
    - Location-based services
    - Banking and financial services
    - Wireless advertising and retailing
    - Games and entertainment

The Mobile Digital Platform and Mobile E-commerce

CONSOLIDATED MOBILE COMMERCE REVENUES

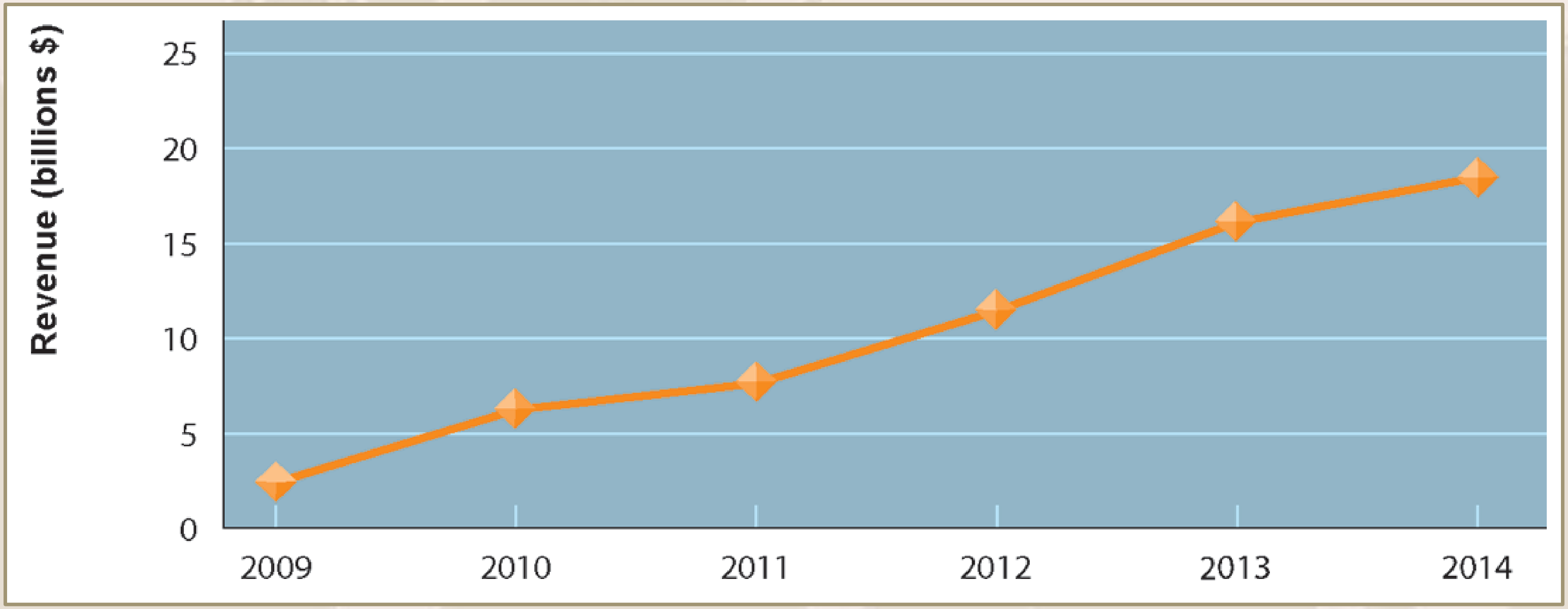


FIGURE 10-9

Mobile e-commerce is the fastest growing type of B2C e-commerce although it represents only a small part of all e-commerce in 2010.

Building an E-commerce Web Site

- Assembling a team with the skills required to make decisions about:
  - Technology
  - Site design
  - Social and information policies
  - Hardware, software, and telecommunications infrastructure
- Customer’s demands should drive the site’s technology and design

Building an E-commerce Web Site

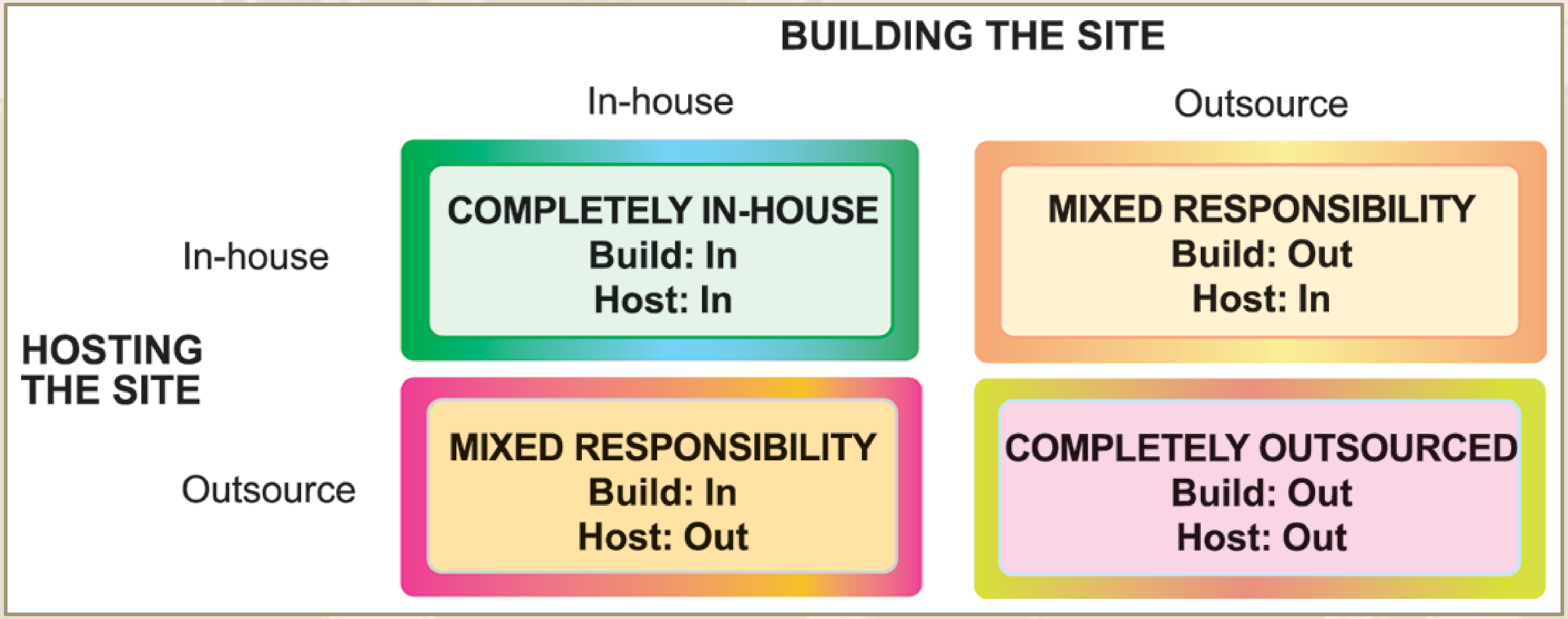
- **Business decisions drive the technology – not the reverse**
  - **Business objectives**
    - Capabilities the site should have
    - E.g. execute a transaction payment
  - **System functionality**
    - Technological capability to achieve this objective
    - E.g. a shopping cart or other payment system
  - **Information requirements**
    - E.g. secure credit card clearing, multiple payment options

Building an E-commerce Web Site

- **Alternatives in building the Web site**
  - **Completely in-house**
  - **Mixed responsibility**
  - **Completely outsourced**
    - Co-location
- **Web site budgets**
  - **Several thousand to millions / year**
  - **50% of a budget is system maintenance and content creation**

The Mobile Digital Platform and Mobile E-commerce

CHOICES IN BUILDING AND HOSTING WEB SITES



You have a number of alternatives to consider when building and hosting an e-commerce site.

FIGURE 10-10

The Mobile Digital Platform and Mobile E-commerce

COMPONENTS OF A WEB SITE BUDGET

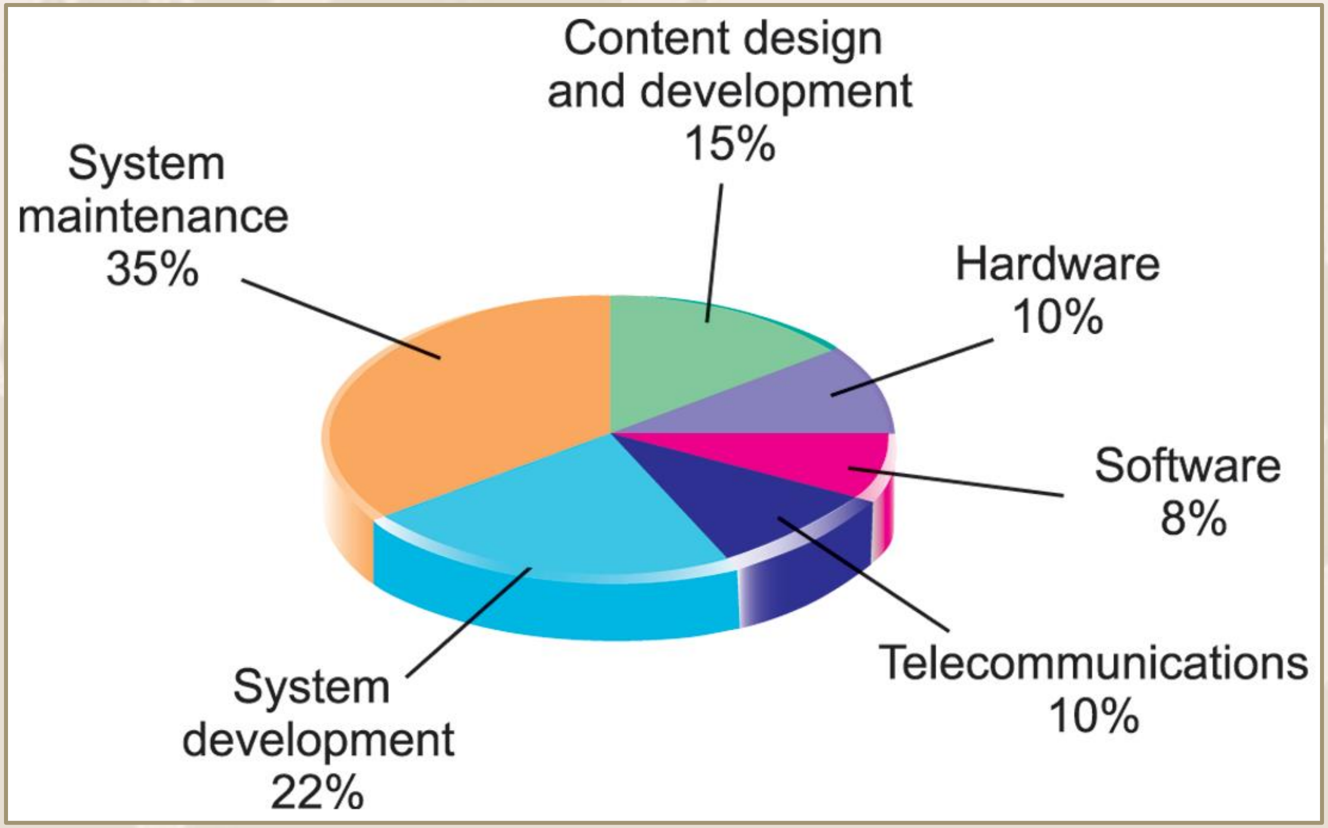


FIGURE 10-11