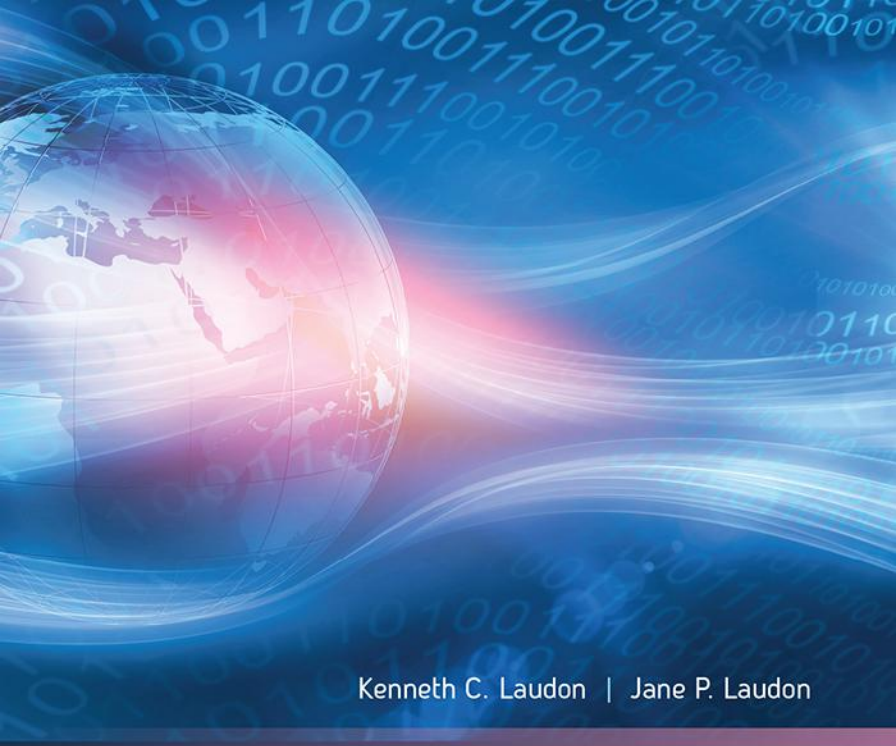


Kenneth C. Laudon | Jane P. Laudon

ESSENTIALS OF MIS

FOURTEENTH EDITION

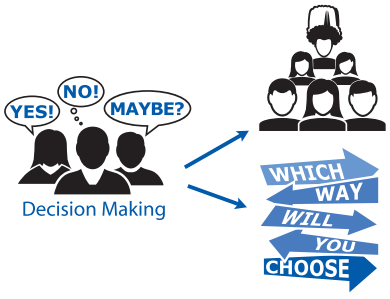
MyLab MIS: Fostering Employability Skills for Today's Learner

Reach every student with MyLab MIS MyLab is the teaching and learning platform that empowers you to reach every student. By combining trusted authors' content with digital tools and a flexible platform, MyLab MIS personalizes the learning experience and improves results for each student. And with Decision-Making Sims and Excel and Access Grader Projects, students understand how MIS concepts will help them succeed in their future careers.

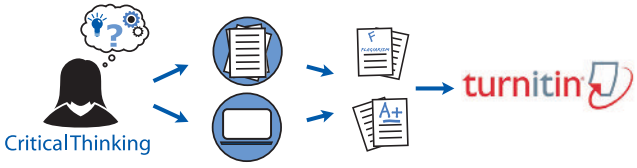
MyLab MIS™ Grader

- Using proven, field-tested technology, **Auto-Graded Excel and Access Projects** let you seamlessly integrate Microsoft® Excel and Access content into your course without having to manually grade.

- **Decision-Making Sims** put students in professional roles and give them the opportunity to apply course concepts and develop decision-making skills through real-world business challenges.

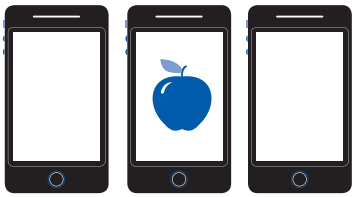


- **Engaging Videos** explore a variety of business topics related to the theory students are learning in class.
- **Exercise Quizzes** assess students' comprehension of the concepts in each video.



Pearson

- **Dynamic Study Modules** help students study chapter topics and the language of MIS on their own by continuously assessing their knowledge application and performance in real time. These are available as graded assignments prior to class, and are accessible on smartphones, tablets, and computers.



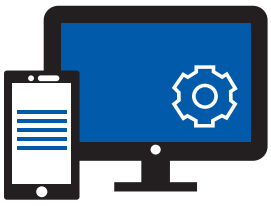
- **Learning Catalytics™** is a student response tool that helps you generate class discussion, customize your lecture, and promote peer-to-peer learning based on real-time analytics. Learning Catalytics uses students' smartphones, tablets, or laptops to engage them in more interactive tasks.

- The **Gradebook** offers an easy way for you and your students to see their performance in your course.

  Item Analysis lets you quickly see trends by analyzing details like the number of students who answered correctly/incorrectly, time on task, and more.

  And because it's correlated with the AACSB Standards, you can track students' progress toward outcomes that the organization has deemed important in preparing students to be leaders.

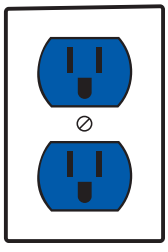
- **Pearson eText** enhances learning—both in and out of the classroom. Students can take notes, highlight, and bookmark important content, or engage with interactive lecture and example videos that bring learning to life anytime, anywhere via MyLab or the app.



- **Accessibility (ADA)**—Pearson is working toward WCAG 2.0 Level AA and Section 508 standards, as expressed in the **Pearson Guidelines for Accessible Educational Web Media.** Moreover, our products support customers in meeting their obligation to comply with the Americans with Disabilities Act (ADA) by providing access to learning technology programs for users with disabilities.

  Please email our Accessibility Team at **disability.support@pearson.com** for the most up-to-date information.

- With **LMS Integration**, you can link your MyLab course from Blackboard Learn™, Brightspace® by D2L®, Canvas™, or Moodle®.



http://www.pearsonmylabandmastering.com

Integrating Business with Technology

By completing the projects in this text, students will be able to demonstrate business knowledge, application software proficiency, and Internet skills. These projects can be used by instructors as learning assessment tools and by students as demonstrations of business, software, and problem-solving skills to future employers. Here are some of the skills and competencies students using this text will be able to demonstrate:

Business Application skills: Use of both business and software skills in real-world business applications. Demonstrates both business knowledge and proficiency in spreadsheet, database, and Web page/blog creation tools.

Internet skills: Ability to use Internet tools to access information, conduct research, or perform online calculations and analysis.

Analytical, writing and presentation skills: Ability to research a specific topic, analyze a problem, think creatively, suggest a solution, and prepare a clear written or oral presentation of the solution, working either individually or with others in a group.

*** Dirt Bikes Running Case in MyLabMIS**

Business Application Skills

Business Skills	Software Skills	Chapter
Finance and Accounting		
Financial statement analysis	Spreadsheet charts	Chapter 2*
	Spreadsheet formulas	Chapter 10
	Spreadsheet downloading and formatting	
Pricing hardware and software	Spreadsheet formulas	Chapter 5
Technology rent vs. buy decision	Spreadsheet formulas	Chapter 5*
Total Cost of Ownership (TCO) Analysis		
Analyzing telecommunications services and costs	Spreadsheet formulas	Chapter 7
Risk assessment	Spreadsheet charts and formulas	Chapter 8
Human Resources		
Employee training and skills tracking	Database design	Chapter 12*
	Database querying and reporting	
Manufacturing and Production		
Analyzing supplier performance and pricing	Spreadsheet date functions	Chapter 2
	Data filtering	
	Database functions	
Inventory management	Importing data into a database	Chapter 6
	Database querying and reporting	
Bill of materials cost sensitivity analysis	Spreadsheet data tables	Chapter 11*
	Spreadsheet formulas	
Sales and Marketing		
Sales trend analysis	Database querying and reporting	Chapter 1
Customer reservation system	Database querying and reporting	Chapter 3
Customer sales analysis	Database design	
Marketing decisions	Spreadsheet pivot tables	Chapter 11
Customer profiling	Database design	Chapter 6*
	Database querying and reporting	

Customer service analysis	Database design Database querying and reporting	Chapter 9
Sales lead and customer analysis	Database design Database querying and reporting	Chapter 12
Blog creation and design	Blog creation tool	Chapter 4

Internet Skills

Using online software tools for job hunting and career development	Chapter 1
Using online interactive mapping software to plan efficient transportation routes	Chapter 2
Researching product information Evaluating Web sites for auto sales	Chapter 3
Analyzing Web browser privacy protection	Chapter 4
Researching travel costs using online travel sites	Chapter 5
Searching online databases for products and services	Chapter 6
Using Web search engines for business research	Chapter 7
Researching and evaluating business outsourcing services	Chapter 8
Researching and evaluating supply chain management services	Chapter 9
Evaluating e-commerce hosting services	Chapter 10
Using shopping bots to compare product price, features, and availability	Chapter 11
Analyzing Web site design	Chapter 12

Analytical, Writing, and Presentation Skills*

Business Problem	Chapter
Management analysis of a business	Chapter 1
Value chain and competitive forces analysis Business strategy formulation	Chapter 3
Formulating a corporate privacy policy	Chapter 4
Employee productivity analysis	Chapter 7
Disaster recovery planning	Chapter 8
Locating and evaluating suppliers	Chapter 9
Developing an e-commerce strategy	Chapter 10

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Fourteenth Edition

Essentials of Management Information Systems

Kenneth C. Laudon
New York University

Jane P. Laudon
Azimuth Information Systems

Pearson

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About the Authors

Kenneth C. Laudon is a Professor of Information Systems at New York University's Stern School of Business. He holds a B.A. in Economics from Stanford and a Ph.D. from Columbia University. He has authored twelve books dealing with electronic commerce, information systems, organizations, and society. Professor Laudon has also written over forty articles concerned with the social, organizational, and management impacts of information systems, privacy, ethics, and multimedia technology.

Professor Laudon's current research is on the planning and management of large-scale information systems and multimedia information technology. He has received grants from the National Science Foundation to study the evolution of national information systems at the Social Security Administration, the IRS, and the FBI. Ken's research focuses on enterprise system implementation, computer-related organizational and occupational changes in large organizations, changes in management ideology, changes in public policy, and understanding productivity change in the knowledge sector.

Ken Laudon has testified as an expert before the United States Congress. He has been a researcher and consultant to the Office of Technology Assessment (United States Congress), Department of Homeland Security, and to the Office of the President, several executive branch agencies, and Congressional Committees. Professor Laudon also acts as an in-house educator for several consulting firms and as a consultant on systems planning and strategy to several Fortune 500 firms.

At NYU's Stern School of Business, Ken Laudon teaches courses on Managing the Digital Firm, Information Technology and Corporate Strategy, Professional Responsibility (Ethics), and Electronic Commerce and Digital Markets. Ken Laudon's hobby is sailing.

Jane Price Laudon is a management consultant in the information systems area and the author of seven books. Her special interests include systems analysis, data management, MIS auditing, software evaluation, and teaching business professionals how to design and use information systems.

Jane received her Ph.D. from Columbia University, her M.A. from Harvard University, and her B.A. from Barnard College. She has taught at Columbia University and the New York University Stern School of Business. She maintains a lifelong interest in languages and civilizations of Asia.

The Laudons have two daughters, Erica and Elisabeth, to whom this book is dedicated.

Brief Contents

Complete Contents

Business Cases and Interactive Sessions

Here are some of the business firms you will find described in the cases and Interactive Sessions of this book:

Chapter 1: Business Information Systems in Your Career

PCL Construction: The New Digital Firm
UPS Competes Globally with Information Technology
Will Automation Steal Our Jobs?
New Technology at UPS Clashes with Outdated Ways of Working

Chapter 2: Global E-business and Collaboration

Enterprise Social Networking Transforms Sharp Corporation into a More Innovative Connected Organization
The City of Mississauga Goes Digital
Videoconferencing: Something for Everyone
Should Companies Embrace Social Business?

Chapter 3: Achieving Competitive Advantage with Information Systems

Technology Helps Starbucks Find Better Ways to Compete
Smart Products—Coming Your Way
Tommy Hilfiger Transforms Its Wholesale Sales Process with Digital Showrooms
Grocery Wars

Chapter 4: Ethical and Social Issues in Information Systems

Are Cars Becoming Big Brother on Wheels?
The Boeing 737 MAX Crashes: What Happened and Why?
How Harmful Are Smartphones?
Facebook Privacy: Your Life for Sale

Chapter 5: IT Infrastructure: Hardware and Software

American Airlines Heads for the Cloud
Is Business Ready for Wearable Computers?
Look to the Cloud
What Should Firms Do About BYOD?

Chapter 6: Foundations of Business Intelligence: Databases and Information Management

Domino's Masters Data One Pizza at a Time
Big Data Baseball
Databases Where the Data Aren't There
Does Big Data Provide the Answer?

Chapter 7: Telecommunications, the Internet, and Wireless Technology

Tour de France Wins with Wireless Technology
Monitoring Employees on Networks: Unethical or Good Business?
The Internet of Things Aids Waste Management
Google, Apple, and Facebook Battle for Your Internet Experience

Chapter 8: Securing Information Systems

The Electric Power Grid Becomes a Cyberwarfare Battleground
Meltdown and Spectre Haunt the World's Computers
How Secure Is the Cloud?
Is the Equifax Hack the Worst Ever—and Why?

Preface

New To This Edition

Essentials of Management Information Systems, 14th edition has been thoroughly updated to cover the latest industry and technology changes that impact the course.

MyLab MIS™

The MyLab MIS platform provides an interactive digital environment that supports the unique strengths of the content. The goal of *Essentials of Management Information Systems* is to provide students and instructors with an authoritative, up-to-date, interactive, and engaging introduction to the MIS field. The MyLab MIS edition extends these features to a digital platform that emphasizes videos, animations, interactive quizzes, and student comprehension of concepts, theories, and issues. The MyLab MIS environment reflects the new learning styles of students, which are more social, interactive, and usable on digital devices such as smartphones and tablets.

WHAT'S INCLUDED

- **Interactive eText** enhances learning – both in and out of the classroom. Students can add notes, highlight, and bookmark important content, or engage with interactivities and Conceptual Animations to bring learning to life via MyLab or the app.
- **New Conceptual Animations** have author Ken Laudon walk students through three of the most important concepts in each chapter (36 total) using a contemporary animation platform. Available only in the MyLab MIS eText.
- **New Video Cases** collection: 28 video cases (two or more per chapter) and 10 additional instructional videos covering key concepts and experiences in the MIS world. The video cases are written by Ken Laudon and illustrate how real-world corporations and managers are using information technology and systems and are paired with a brief quiz. Video Cases are listed at the beginning of each chapter. (See page xxvii for a list of Video Cases available).
- **MIS Decision Simulations** – interactive exercises allowing students to play the role of a manager and make business decisions.
- **Chapter Warm Ups, Chapter Quizzes** – objective-based quizzing to test knowledge.
- **Discussion Questions** – threaded discussion topics taken from the end of chapter.
- **Excel & Access Graded Projects** – live in the application auto-graded Grader projects provided inside MyLab MIS to support classes covering Office tools. In addition, Hands-On MIS Projects from the book are also available.
- **Running Case** on Dirt Bikes USA provides additional hands-on projects for each chapter.
- **Dynamic Study Modules** help students study chapter topics and the language of MIS on their own by continuously assessing their knowledge application and performance in real time. These are available as graded assignments prior to class, and are accessible on smartphones, tablets, and computers.
- **Learning Catalytics™** is a student response tool that helps you generate class discussion, customize your lecture, and promote peer-to-peer learning based on real-time analytics. Learning Catalytics uses students' devices to engage them in more interactive tasks.
- **Learning Tracks:** 53 Learning Tracks in MyLab MIS for additional coverage of selected topics. This edition includes new Learning Tracks for Structured Methodologies and Object-Oriented Development. (See page xxvi for list of Learning Tracks available.)

ENHANCED STAND-ALONE PEARSON eTEXT

Essentials of Management Information Systems is also available as a stand-alone eText which extends the learning experience, anytime and anywhere: The mobile app lets students use their eText whenever they have a moment in their day, on Android and iPhone mobile phones and tablets. Offline access ensures students never miss a chance to learn. The eText engages students with compelling media: Videos and animations written and produced by the authors bring key concepts to life, helping students place what they are reading into context. Other features include highlights that allow educators to share information directly with students within their eText, and analytics that let educators gain insight into how students use their eText, and plan more effective instruction.

Both the MyLab MIS and eText platforms provide an affordable, simple-to-use mobile reading experience that lets instructors and students extend learning beyond class time.

NEW AND UPDATED TOPICS

The 14th edition features all new opening, closing, and Interactive Session cases. The text, figures, tables, and cases have been updated through September 2019 with the latest sources from industry and MIS research. New topics and coverage include:

- **Updated and expanded coverage of artificial intelligence (AI):** Chapter 11 has been rewritten to include new expanded coverage of machine learning, "deep learning," natural language systems, computer vision systems, and robotics, reflecting the surging interest in business uses of AI and "intelligent" techniques.
- **Making the business case for systems:** Chapter 12 has been rewritten to provide expanded coverage of techniques and decision making criteria for developing a business case for the acquisition and deployment of information systems and related technologies. The chapter shows how to evaluate and select systems projects and technologies that will deliver the greatest value to the firm.
- **Big Data and the Internet of Things:** In-depth coverage of big data, big data analytics, and the Internet of Things (IoT) in Chapters 1, 6, 7, and 11. Includes, analyzing IoT data streams, Hadoop, in-memory computing, nonrelational databases, data lakes, and analytic platforms.
- **Cloud Computing:** Updated and expanded coverage of cloud computing in Chapter 5 (IT infrastructure) with more detail on types of cloud services, private and public clouds, hybrid clouds, managing cloud services, and a new Interactive Session on using cloud services. Cloud computing also covered in Chapter 6 (databases in the cloud), Chapter 8 (cloud security), Chapter 9 (cloud-based CRM and ERP), Chapter 10 (e-commerce), and Chapter 12 (cloud-based systems development).
- **Social, Mobile, Local:** New content in Chapter 10 describing how social tools, mobile technology, and location-based services are transforming e-commerce.
- **Social Business:** Expanded coverage of social business, introduced in Chapter 2 and discussed throughout the text. Detailed discussions of enterprise (internal corporate) social networking as well as social networking in e-commerce.
- Supervised learning
- Unsupervised learning
- Edge computing
- 5G networks
- General Data Protection Regulation (GDPR)
- Mobile device management (MDM)
- Data governance
- Dark web

The Laudon text, MyLab MIS, and eText provide the most up-to-date and comprehensive overview of information systems used by business firms today. After reading this book, we expect students will be able to participate in, and even lead,

management discussions of information systems for their firms and understand how to use information technology in their jobs to achieve bottom-line business results. Regardless of whether students are accounting, finance, management, operations management, marketing, or information systems majors, the knowledge and information in this book will be valuable throughout their business careers.

Solving Teaching and Learning Challenges

MyLab MIS is the teaching and learning platform that empowers you to reach every student. By combining trusted authors' content with digital tools and a flexible platform, MyLab MIS personalizes the learning experience and improves results for each student. And with MIS Decision-Making Sims and auto-graded Excel and Access Projects, students understand how MIS concepts will help them succeed in their future careers

The MyLab MIS and eText editions offer unique digital interactive features that hold student attention spans longer and make learning more effective, including 36 conceptual animations that walk students through key concepts in each chapter, 28 online video cases, and interactive quizzes. All of this is available anytime, anywhere, on any digital device. The result is a comprehensive learning environment that will heighten student engagement and learning in the MIS course.

The Laudon learning package is more current, real-world, and authoritative than competitors. Laudon *Essentials* 14e, MyLab MIS, and eText help students understand MIS concepts and issues through extensive use of real-world company examples, a wide variety of text and video cases based on real-world organizations, and numerous line art illustrations, interactive animations, and hands-on software projects.

The Laudons are known for their outstanding real-world case studies, which describe how well-known business firms are using IT to solve problems and achieve objectives. Students are often asked to analyze the business problem and propose alternative solutions. The Laudons also provide hands-on MIS software and management decision-making problems in each chapter that are based on real-world companies and business scenarios.

The Laudon text and learning package now has a very strong career focus, which incentivizes students to learn by showing exactly how each chapter will help them prepare for future jobs. In addition to Career Opportunities, MyLab MIS features Career Resources, including how to incorporate MIS knowledge into resumes, cover letters, and job interviews.

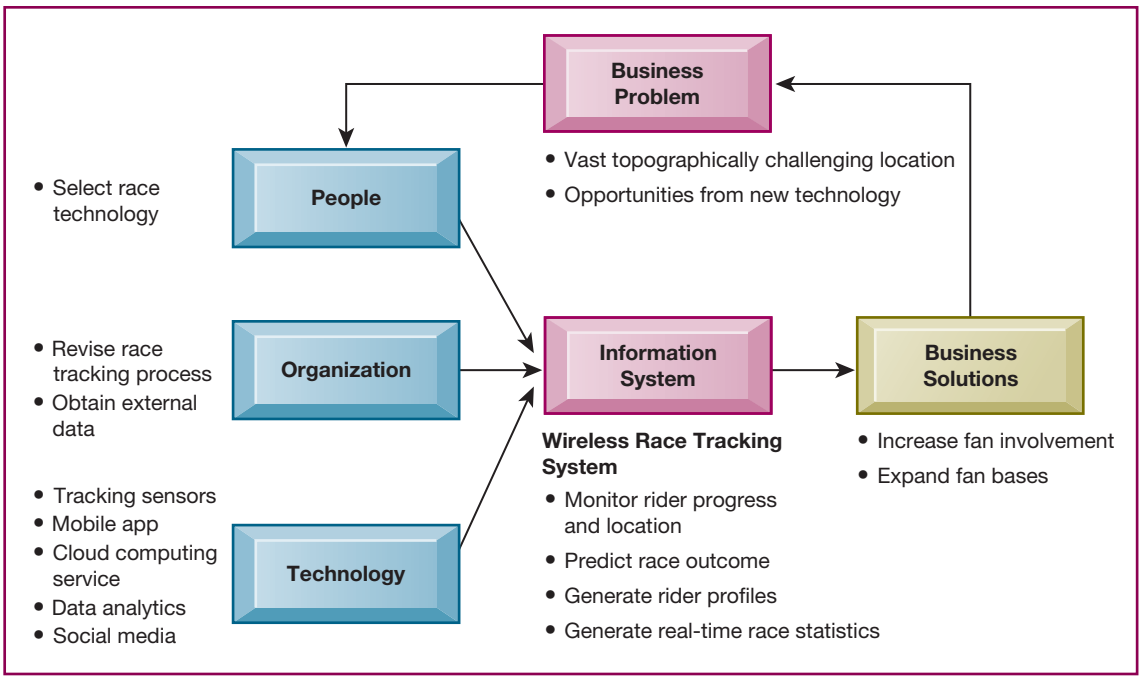
THE CORE TEXT

The Core text provides an overview of fundamental MIS concepts using an integrated framework for describing and analyzing information systems. This framework shows information systems composed of people, organization, and technology elements and is reinforced in student projects and case studies. The Core text consists of 12 chapters with hands-on projects covering the most essential topics in MIS. An important part of the Core text is the Video Case Study and Instructional Video Package: 28 video case studies (two to three per chapter) plus 10 instructional videos that illustrate business uses of information systems, explain new technologies, and explore concepts. Videos are keyed to the topics of each chapter.

Chapter Organization

Each chapter contains the following elements:

- A Chapter Outline based on Learning Objectives
- Lists of all the Case Studies and Video Cases for each chapter
- A chapter-opening case describing a real-world organization to establish the theme and importance of the chapter
- A diagram analyzing the opening case in terms of the people, organization, and technology model used throughout the text



A diagram accompanying each chapter-opening case graphically illustrates how people, organization, and technology elements work together to create an information system solution to the business challenges discussed in the case.

- Two Interactive Sessions with Case Study Questions
- A Career Opportunities section showing students how to use the text for job hunting and career preparation
- A Review Summary keyed to the Student Learning Objectives
- A list of Key Terms that students can use to review concepts
- Review questions for students to test their comprehension of chapter material
- Discussion questions raised by the broader themes of the chapter
- A series of Hands-on MIS Projects consisting of two Management Decision Problems, a hands-on application software project, and a project to develop Internet skills
- A Collaboration and Teamwork Project to develop teamwork and presentation skills with options for using open source collaboration tools
- A chapter-ending case study for students to apply chapter concepts
- Chapter references

Student Learning-Focused

Student Learning Objectives are organized around a set of study questions to focus student attention. Each chapter concludes with a Review Summary and Review Questions organized around these study questions, and each major chapter section is based on a Learning Objective.

KEY FEATURES

We have enhanced the text to make it more interactive, leading edge, and appealing to both students and instructors. The features and learning tools are described in the following sections.

Business-Driven with Real-World Business Cases and Examples

The text helps students see the direct connection between information systems and business performance. It describes the main business objectives driving the use of information systems and technologies in corporations all over the world: operational excellence, new products and services, customer and supplier intimacy, improved decision making, competitive advantage, and survival. In-text examples and case studies show students how specific companies use information systems to achieve these objectives.

We use current (2019) examples from business and public organizations throughout the text to illustrate the important concepts in each chapter. Most of the case studies describe companies or organizations that are familiar to students, such as Uber, Major League Baseball (MLB), Facebook, Walmart, Amazon, Google, Starbucks, and GE.

Hands-On Text Activities

Real-world business scenarios and data help students learn firsthand what MIS is all about. These projects heighten student involvement in this exciting subject.

- **Interactive Sessions.** Two short cases in each chapter have been redesigned as Interactive Sessions that can be used to stimulate student interest and active learning. Each case concludes with case study questions. The case study questions provide topics for discussion or written assignments.
- **Hands-On MIS Projects.** Every chapter concludes with a Hands-On MIS Projects section containing three types of projects: two Management Decision Problems; a hands-on application software exercise using Microsoft Excel, Access, or web page and blog creation tools; and a project that develops Internet business skills. Files for these projects are available in MyLab. As mentioned, the Dirt Bikes USA running case in MyLab MIS provides additional hands-on projects for each chapter.
- **Collaboration and Teamwork Projects.** Each chapter features a collaborative project that encourages students working in teams to use Google Drive, Google Docs, or other open source collaboration tools. The first team project in Chapter 1 asks students to build a collaborative Google site.

INTERACTIVE SESSION: TECHNOLOGY

The Internet of Things Aids Waste Management

In 2003 the city of San Francisco set a very ambitious goal: Zero waste, meaning 100 percent of the waste generated by the city would be recycled and composted rather than dumped in landfill. Today San Francisco has come close to achieving that goal. Thanks to a large political, economic, and educational program, the city has been able to divert 80 percent of its waste away from landfills—more than any other major US city. Information technology has also played a major role by providing more efficient methods of waste-sorting and improving citywide waste collection services.

San Francisco partnered with recycling waste-management company Recology, which has an ambitious vision of its own—"a world without waste." This hundred-year-old company proudly calls itself a "resource recovery leader," and continually researches and implements new technologies for waste processing. These include optical sorting, which automatically sorts plastics with an infrared sensor based on their size, shape, and structure, and a landfill gas capture system that turns the methane gas generated by landfill into electric power.

Much of the Recology waste-management work takes place on its 2,000 trucks. Recology updated its JD Edwards EnterpriseOne ERP system to support paperless fleet maintenance. Mechanics can now can view and fill out their work orders immediately online using the system while managers are able to view the orders online instead of chasing down paper orders on vehicles.

Recology truck drivers used to report fuel levels using manual forms that office workers have to key into the system manually. Now an IoT sensor attached to each truck's fueling system automatically senses and sends the data directly to the JD Edwards fleet management module. No human effort is required. New trucks will be equipped with IoT devices linked to their Controller Area Network (CAN) bus, a protocol that enables devices to communicate with each other in applications without a host computer. The IoT devices will collect more than 1 million data is low, the Orchestrator can send the truck driver an email to refuel the tank. If a truck component displays an error, the Orchestrator can schedule the truck for repair. Reducing human effort frees up manager and employee time to focus on more ways to create value, such as conducting waste audits to identify more opportunities for companies to engage in recycling and composting.

All of these technology improvements have provided significant benefits, but Recology wants to do more to manage the growing volume of compostable and recyclable materials it is charged with handling. One possibility is to install IoT sensors at various points in the waste stream to monitor waste generation, recycling, and composting. Compology, a San Francisco startup, has developed technology for monitoring and analyzing data from IoT sensors attached to dumpsters. Waste pickup truck drivers generally follow a specific route every day, stopping to collect trash at every container on the route whether it needs emptying or not. They don't know how full a trash bin is before they encounter it, and the amount of trash in each container can vary by day week, and season. The Compology sensors take high-resolution photos of the interiors of waste containers multiple times per day, sending the images to the cloud. From there, waste haulers can monitor container fullness and optimize truck routes and schedules so that trucks do not waste time picking up trash at empty or half-full containers. This technology also has potential uses for estimating the percentage of nonrecyclable items in the trash. Armed with this information, cities like San Francisco could target households or businesses responsible for too much waste going to landfills.

In addition to waste processing, Recology provides outreach and educational services, actively working with the community to promote its zero-waste goal. Eliminating the remaining 20 percent of San Francisco's waste will be much harder than the first 80 percent, and it can't be accomplished with new technology alone. San Francisco residents

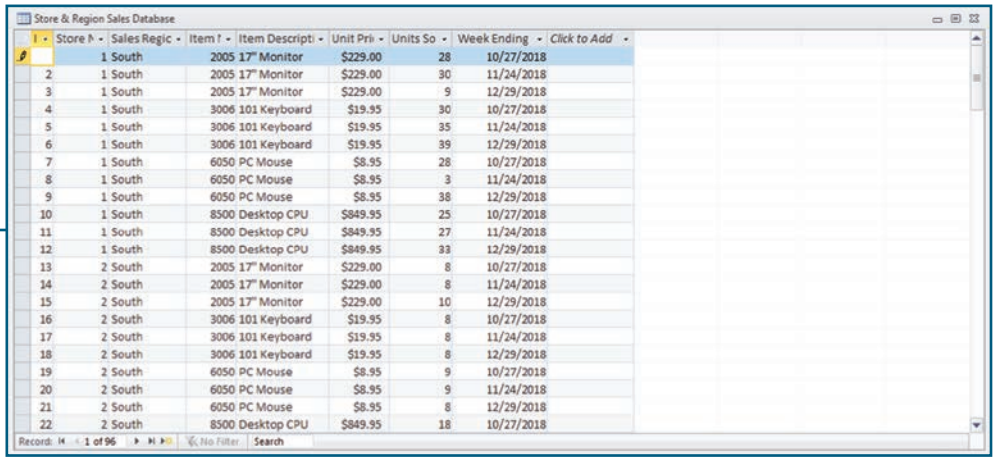
Each chapter contains two Interactive Sessions on People, Organizations, or Technology using real-world companies to illustrate chapter concepts and issues.

Case Study Questions encourage students to apply chapter concepts to real-world companies in class discussions, student presentations, or writing assignments.

CASE STUDY QUESTIONS

1. Identify the problem described in this case study. Is it a people problem, an organizational problem, or a technology problem? Explain your answer.
2. What role has information technology and the IoT played in helping cities deal with their waste management problems? Describe the IT applications that are being used for this purpose.
3. How successful are these IT applications as a solution? Explain your answer.

Students practice using software in real-world settings for achieving operational excellence and enhancing decision making.


Store & Region Sales Database

	Store N	Sales Regic	Item I	Item Descripti	Unit Pri	Units So	Week Ending	Click to Add
	1	South	2005	17" Monitor	$229.00	28	10/27/2018	
2	1	South	2005	17" Monitor	$229.00	30	11/24/2018	
3	1	South	2005	17" Monitor	$229.00	9	12/29/2018	
4	1	South	3006	101 Keyboard	$19.95	30	10/27/2018	
5	1	South	3006	101 Keyboard	$19.95	35	11/24/2018	
6	1	South	3006	101 Keyboard	$19.95	39	12/29/2018	
7	1	South	6050	PC Mouse	$8.95	28	10/27/2018	
8	1	South	6050	PC Mouse	$8.95	3	11/24/2018	
9	1	South	6050	PC Mouse	$8.95	38	12/29/2018	
10	1	South	8500	Desktop CPU	$849.95	25	10/27/2018	
11	1	South	8500	Desktop CPU	$849.95	27	11/24/2018	
12	1	South	8500	Desktop CPU	$849.95	33	12/29/2018	
13	2	South	2005	17" Monitor	$229.00	8	10/27/2018	
14	2	South	2005	17" Monitor	$229.00	8	11/24/2018	
15	2	South	2005	17" Monitor	$229.00	10	12/29/2018	
16	2	South	3006	101 Keyboard	$19.95	8	10/27/2018	
17	2	South	3006	101 Keyboard	$19.95	8	11/24/2018	
18	2	South	3006	101 Keyboard	$19.95	8	12/29/2018	
19	2	South	6050	PC Mouse	$8.95	9	10/27/2018	
20	2	South	6050	PC Mouse	$8.95	9	11/24/2018	
21	2	South	6050	PC Mouse	$8.95	8	12/29/2018	
22	2	South	8500	Desktop CPU	$849.95	18	10/27/2018	

Record: 1 of 96 | No Filter | Search

Each chapter features a project to develop Internet skills for accessing information, conducting research, and performing online calculations and analysis.

IMPROVING DECISION MAKING: USING WEB TOOLS TO CONFIGURE AND PRICE AN AUTOMOBILE

Software skills: Internet-based software
Business skills: Researching product information and pricing

3-11 In this exercise, you will use software at car-selling websites to find product information about a car of your choice and use that information to make an important purchase decision. You will also evaluate two of these sites as selling tools.

You are interested in purchasing a new Ford Escape (or some other car of your choice). Go to the website of CarsDirect and begin your investigation.

Developing Career Skills

For students to succeed in a rapidly changing job market, they should be aware of their career options and how to go about developing a variety of skills. With MyLab MIS and *Essentials of Management Information Systems*, we focus on these skills in the following ways.

CAREER OPPORTUNITIES AND RESOURCES

Every student who reads this text wants to know: How will this book help my career? Our new Career Opportunities feature shows how to use this text, MyLab MIS, and eText as tools for job-hunting and career-building. Job interviewers will typically ask about why you want the job, along with your ability to communicate, multitask, work in a team, show leadership, solve problems, and meet goals. These are general skills and behaviors you'll need to succeed in any job, and you should be prepared to provide examples from your course work and job experiences that demonstrate these skills. But there are also business knowledge and professional skills that employers will ask you about. Career Opportunities will show you how to use what you have learned in this text to demonstrate these skills.

The Career Opportunities section, identified by this icon is the last major section of each chapter under the heading "How will MIS help my career?". There you will find a description of an entry-level job for a recent college graduate based on a real-world job description from major online job sites related to the topics covered in that chapter. The name of the company offering the job and its location have been changed. Each chapter's job posting describes the required educational background and specific job skills, and suggests some of the business-related questions that might arise during the job interview. The authors provide tips for answering the questions and preparing for the interview. Career Opportunities also show where students can find out more information about the technical and business knowledge required for the job in this text and on the web and social media.

Below are the job descriptions used in this edition based on postings from both large and small businesses. A few of these jobs call for an MIS major, others for MIS course work, but many postings are not that specific. Some require some previous internship or job experience, but many are entry-level positions suitable for new college graduates, and some of these positions provide on-the-job training. However, all require knowledge of business information systems and applications and the ability to work in a digital environment.

Chapter	Career Opportunity Job Description
1. Business Information Systems in Your Career	Financial Client Support and Sales Assistant
2. Global E-business and Collaboration	Entry Level Sales Support Specialist
3. Achieving Competitive Advantage with Information Systems	Entry Level Business Development Representative
4. Ethical and Social Issues in Information Systems	Junior Privacy Analyst
5. IT Infrastructure: Hardware and Software	Entry Level IT Consultant
6. Foundations of Business Intelligence: Databases and Information Management	Global Data Services Sales and Marketing Assistant
7. Telecommunications, the Internet, and Wireless Technology	Automotive Digital Advisor
8. Securing Information Systems	Entry Level Identity Access and Management Support Specialist
9. Achieving Operational Excellence and Customer Intimacy: Enterprise Applications	Manufacturing Management Trainee
10. E-commerce: Digital Markets, Digital Goods	Junior E-Commerce Data Analyst
11. Improving Decision Making and Managing Artificial Intelligence	AI Technology Sales Assistant
12. Making the Business Case for Information Systems and Managing Projects	IT Project Management Assistant

Students can use Career Opportunities to shape their resumes and career plans as well as to prepare for interviews. For instructors, Career Opportunities are potential projects for student research and in-class discussion.

In MyLab MIS we have provided additional Career Resources, including job-hunting guides and instructions on how to build a Digital Portfolio demonstrating the business knowledge, application software proficiency, and Internet skills acquired from using the text. The portfolio can be included in a resume or job application or used as a learning assessment tool for instructors.

Instructor Teaching Resources

Supplements available to instructors at www.pearsonhighered.com/laudon	Features of the Supplement
Instructor's Manual	• Chapter-by-chapter summaries • Examples and activities not in the main book • Teaching outlines • Teaching tips • Solutions to all questions and problems in the book
Test Bank authored by Professor Kenneth Laudon, New York University	The authors have worked closely with skilled test item writers to ensure that higher-level cognitive skills are tested. Test bank multiple-choice questions include questions on content but also include many questions that require analysis, synthesis, and evaluation skills. **AACSB Assessment Guidelines** As a part of its accreditation activities, the AACSB has developed an Assurance of Learning Program designed to ensure that schools do in fact teach students what they promise. Schools are required to state a clear mission, develop a coherent business program, identify student learning objectives, and then prove that students do in fact achieve the objectives. We have attempted in this book to support AACSB efforts to encourage assessment-based education. The end papers of this edition identify student learning objectives and anticipated outcomes for our Hands-On MIS projects. The authors will provide custom advice on how to use this text in colleges with different missions and assessment needs. Please e-mail the authors or contact your local Pearson representative for contact information.
Computerized TestGen	TestGen allows instructors to: • Customize, save, and generate classroom tests • Edit, add, or delete questions from the Test Item Files • Analyze test results • Organize a database of tests and student results
PowerPoints authored by Professor Kenneth Laudon, New York University	The authors have prepared a comprehensive collection of 50 PowerPoint slides for each chapter to be used in your lectures. Many of these slides are the same as used by Ken Laudon in his MIS classes and executive education presentations. Each of the slides is annotated with teaching suggestions for asking students questions, developing in-class lists that illustrate key concepts, and recommending other firms as examples in addition to those provided in the text. The annotations are like an Instructor's Manual built into the slides and make it easier to teach the course effectively. PowerPoints meet accessibility standards for students with disabilities. Features include but are not limited to: • Keyboard and Screen Reader access • Alternative text for images • High color contrast between background and foreground colors

Learning Tracks

There are 53 Learning Tracks in MyLab MIS available to instructors and students.

Chapter	Learning Tracks
Chapter 1: Business Information Systems in Your Career	How Much Does IT Matter? The Changing Business Environment for IT The Business Information Value Chain The Mobile Digital Platform Occupational and Career Outlook for Information Systems Majors 2014–2020
Chapter 2: Global E-business and Collaboration	Systems from a Functional Perspective IT Enables Collaboration and Teamwork Challenges of Using Business Information Systems Challenges of Knowledge Management Systems Organizing the Information Systems Function
Chapter 3: Achieving Competitive Advantage with Information Systems	Challenges of Using Information Systems for Competitive Advantage Primer on Business Process Design and Documentation Primer on Business Process Management
Chapter 4: Ethical and Social Issues in Information Systems	Developing a Corporate Code of Ethics for IT
Chapter 5: IT Infrastructure: Hardware and Software	How Computer Hardware and Software Work Service Level Agreements Cloud Computing The Open Source Software Initiative The Evolution of IT Infrastructure Technology Drivers of IT Infrastructure Fourth Generation Languages
Chapter 6: Foundations of Business Intelligence: Databases and Information Management	Database Design, Normalization, and Entity-Relationship Diagramming Introduction to SQL Hierarchical and Network Data Models
Chapter 7: Telecommunications, the Internet, and Wireless Technology	Broadband Network Services and Technologies Cellular System Generations Wireless Applications for Customer Relationship Management, Supply Chain Management, and Healthcare Introduction to Web 2.0 LAN Topologies
Chapter 8: Securing Information Systems	The Booming Job Market in IT Security The Sarbanes-Oxley Act Computer Forensics General and Application Controls for Information Systems Management Challenges of Security and Control Software Vulnerability and Reliability
Chapter 9: Achieving Operational Excellence and Customer Intimacy: Enterprise Applications	SAP Business Process Map Business Processes in Supply Chain Management and Supply Chain Metrics Best-Practice Business Processes in CRM Software
Chapter 10: E-commerce: Digital Markets, Digital Goods	E-commerce Challenges: The Story of Online Groceries Build an E-commerce Business Plan Hot New Careers in E-Commerce E-commerce Payment Systems Building an E-commerce Website
Chapter 11: Improving Decision Making and Managing Artificial Intelligence	Building and Using Pivot Tables The Expert Systems Inference Engine Case-Based Reasoning Fuzzy Logic
Chapter 12: Making the Business Case for Information Systems and Managing Projects	Capital Budgeting Methods for Information Systems Investments Enterprise Analysis (Business Systems Planning) and Critical Success Factors Information Technology Investments and Productivity Unified Modeling Language Structured Methodologies and Object-Oriented Development

Video Cases and Instructional Videos

Instructors can download step-by-step instructions for accessing the video cases from the Instructor Resources Center.

Chapter	Video
Chapter 1: Business Information Systems in Your Career	Business in the Cloud: Facebook, Google, and eBay Data Centers UPS Global Operations with the DIAD and Worldport Instructional Video: Tour IBM's Raleigh Data Center
Chapter 2: Global E-business and Collaboration	Vision X Grows with SAP Business One CEMEX: Becoming a Social Business Instructional Video: US Foodservice Grows Market with Oracle CRM on Demand
Chapter 3: Achieving Competitive Advantage with Information Systems	GE Becomes a Digital Firm: The Emerging Industrial Internet National Basketball Association: Competing on Global Delivery with Akamai OS Streaming
Chapter 4: Ethical and Social Issues in Information Systems	What Net Neutrality Means for You Facebook and Google Privacy: What Privacy? The United States vs. Terrorism: Data Mining for Terrorists and Innocents Instructional Video: Viktor Mayer Schönberger on the Right to Be Forgotten
Chapter 5: IT Infrastructure: Hardware and Software	Rockwell Automation Fuels the Oil and Gas Industry with the Internet of Things (IoT) ESPN.com: The Future of Sports Coverage in the Cloud Netflix: Building a Business in the Cloud
Chapter 6: Foundations of Business Intelligence: Databases and Information Management	Dubuque Uses Cloud Computing and Sensors to Build a Smarter City Brooks Brothers Closes in on Omnichannel Retail Maruti Suzuki Business Intelligence and Enterprise Databases
Chapter 7: Telecommunications, the Internet, and Wireless Technology	Telepresence Moves out of the Boardroom and into the Field Virtual Collaboration with IBM Sametime
Chapter 8: Securing Information Systems	Stuxnet and Cyberwarfare Cyberespionage: The Chinese Threat Instructional Video: Sony PlayStation Hacked; Data Stolen from 77 Million Users Instructional Video: Meet the Hackers: Anonymous Statement on Hacking SONY
Chapter 9: Achieving Operational Excellence and Customer Intimacy: Enterprise Applications	Maersk Develops a Global Shipping Management System Instructional Video: GSMS Protects Products and Patients by Serializing Every Bottle of Drugs
Chapter 10: E-commerce: Digital Markets, Digital Goods	Walmart Takes on Amazon: A Battle of IT and Management Systems Groupon: Deals Galore Etsy: A Marketplace and Community Instructional Video: Walmart's eCommerce Fulfillment Center Network Instructional Video: Behind the Scenes of an Amazon Warehouse
Chapter 11: Improving Decision Making and Managing Artificial Intelligence	How IBM's Watson Became a Jeopardy Champion Business Intelligence Helps the Cincinnati Zoo Work Smarter
Chapter 12: Making the Business Case for Information Systems and Managing Projects	IBM: Business Process Management in a SaaS Environment IBM Helps the City of Madrid with Real-Time BPM Software Instructional Video: What is PaaS? What is Predix? Instructional Video: BPM: Business Process Management Customer Story

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Essentials of Management Information Systems

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PART I

Information Systems in the Digital Age

Part I introduces the major themes and the problem-solving approaches that are used throughout this book. While surveying the role of information systems in today's businesses, this part raises a series of major questions: What is an information system? Why are information systems so essential in businesses today? How can information systems help businesses become more competitive? What do I need to know about informationsystems to succeed in my business career? What ethical and social issues do widespread use of information systems raise?

CHAPTER

1

Business Information Systems in Your Career

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

I-1 Why are information systems so essential for running and managing a business today?

I-2 What exactly is an information system? How does it work? What are its people, organizational, and technology components?

I-3 How will a four-step method for business problem solving help you solve information system–related problems?

I-4 What information systems skills and knowledge are essential for business careers?

I-5 How will MIS help my career?

CHAPTER CASES

- PCL Construction: The New Digital Firm
- UPS Competes Globally with Information Technology
- Will Automation Steal Our Jobs?
- New Technology at UPS Clashes with Outdated Ways of Working

VIDEO CASES

- Business in the Cloud: Facebook, Google, and eBay Data Centers
- UPS Global Operations with the DIAD and Worldport

Instructional Video:

- Tour IBM's Raleigh Data Center

MyLab MIS

- Discussion questions: 1-5, 1-6, 1-7
- Hands-on MIS Projects: 1-8, 1-9, 1-10, 1-11
- eText with Conceptual Animations

PCL CONSTRUCTION: THE NEW DIGITAL FIRM

Many people think the most widely used tool in a construction project is a hammer, but it is more likely a filing cabinet or fax machine. The construction industry has traditionally been paper-intensive and manual. A complex project such as a large building requires hundreds of architectural drawings and design documents, which can change daily. Costly delays because of difficulty locating and accessing documents and other project information could make or break a project. Now that's changing, and PCL Construction is at the forefront. Information technology has transformed the way this business works, and it is a prime example of the new digital firm.

PCL is a group of independent general contracting construction companies, with over 4,400 employees in the United States, Canada, and Australia. The organization is active in the commercial, institutional, multifamily residential, renewable energy, heavy industrial, historical restoration, and civil-construction sectors. PCL has corporate headquarters in Edmonton, Alberta, Canada and a United States head office in Denver, Colorado.

At a PCL job site, you'll now see employees using mobile devices, including smartphones, tablets, and laptops, to access important information from PCL systems or input data. Digital touch-screen kiosks throughout the job site and electronic plan rooms provide access to digitized, updated blueprints so team members don't have to waste time tracking down paper versions.

In the past, on-site trailers used to house large paper blueprints for a project. Each time a project team member wanted to view plans, that person had to visit a trailer. With up to 800 active construction projects running simultaneously, PCL had trouble keeping project documentation up to date. Information on paper forms to track small changes to project specifications or work requirements might not reach project decision makers until 30–40 days from the time it was recorded. By then, it was too late—decisions were made "from the gut" rather than based on facts.

PCL Construction plans are now in digital form, or the paper versions are scanned for digital storage. Digitized plans can be revised much more rapidly. By performing much of the design and planning work on the computer, PCL is able to identify and resolve conflicts and constructability issues early in the construction process to help keep projects ahead of schedule and within budget.

PCL implemented Project Document Controls (PDC) to facilitate collaboration among project team members. A secure project-based website provides real-time storage and management of information in a single shared accessible

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location. Construction contractors, subcontractors, consultants, suppliers, and clients can work from the same documents wherever they are. PCL uses its own proprietary project management system for budgeting, costing, forecasting, subcontractor tracking, production, and reporting. The project management system is linked to other PCL systems, including the People and Projects database, client management and accounting systems, and the BEST Estimating system. BEST Estimating is PCL's in-house estimating program for creating lump sum and unit price estimates and providing accurate resource and cost information.

PCL started moving its computing work to Microsoft Azure Cloud, which hosts the hardware and software for running some of PCL's applications in remote computing centers managed by Microsoft. Staff working on PCL projects can access information from cloud-based systems at any time and location using mobile devices as well as conventional desktop machines and an Internet connection. PCL saves 80 percent of the cost of backing up its corporate data by using the Azure platform. Azure Cloud also hosts a real-time analytics dashboard to monitor project performance in terms of quality, safety, schedule, and cost. The data are displayed visually as bar graphs or pie charts to construction field staff, project managers, and executives, and colors ranging from red to orange to green display performance ratings.

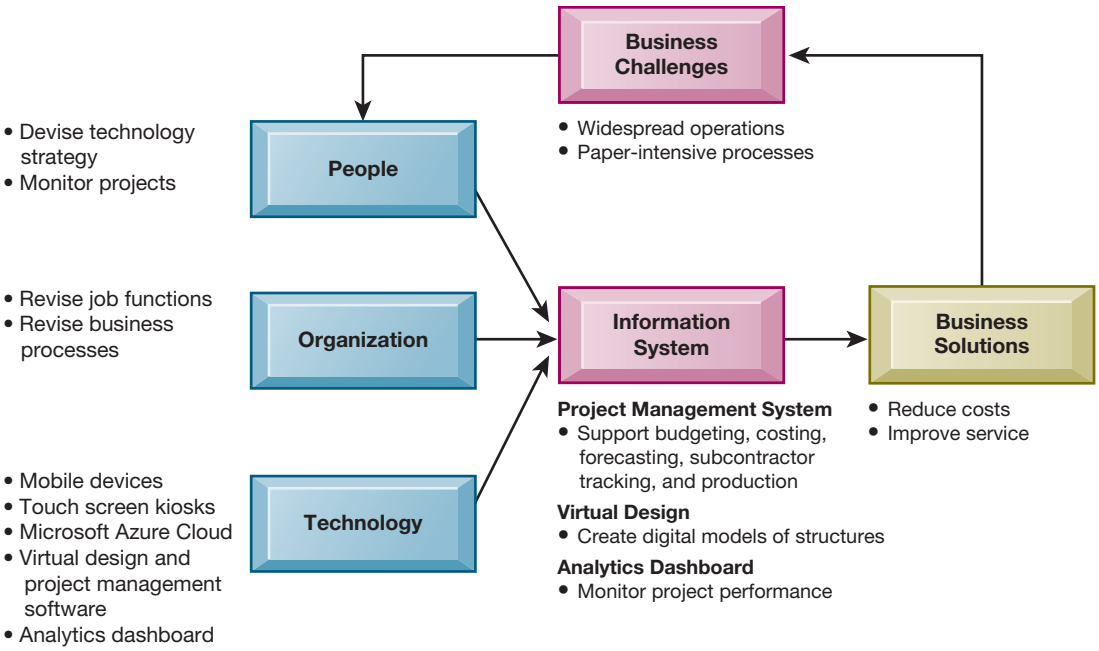
Sources: "Technology and Innovation," pcl.com, accessed February 9, 2019; "PCL: Capitalizing on the Cloud," itworldcanada.com, accessed February 9, 2019; Brian Jackson, "PCL Constructors Reach New Heights with Real-time Analytics Solution in the Cloud," *IT World Canada*, November 9, 2017.

PCL Construction's experience shows how essential information systems are today. PCL operates construction projects in numerous distributed locations in an industry that traditionally has been paper-intensive. Processing and accessing the large number of documents and other information required by construction projects was excessively costly and time-consuming, driving up costs. PCL used leading-edge information technology to digitize documents and streamline business processes for documenting, tracking, and analyzing projects. The information flows that drive PCL's business have become largely digital, making use of mobile tools and a cloud computing infrastructure. PCL Construction has become a leading example of a digital firm.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. To reduce time and costs and improve customer service in a heavily paper-based industry, PCL management chose to use information technology to increase the precision and efficiency of key business activities for designing, costing, budgeting, and monitoring a construction project. These technologies include mobile devices (phones, tablets, laptops), touch screen kiosks, cloud computing services, the Internet, and software for creating models, managing documents, monitoring project progress, budgeting, estimating costs, and displaying key project performance indicators on a digital dashboard. The use of leading-edge digital technologies to drive business operations and management decisions is a key topic today in the MIS world and will be discussed throughout this text.

It is also important to note that deploying information technology has changed the way PCL Construction runs its business. To effectively use all of its new digital tools, PCL had to redesign jobs and procedures for gathering, inputting, and accessing information, for designing, budgeting, and calculating costs, and for monitoring project progress. These changes had to be carefully planned to make sure they enhanced efficiency, service, and profitability.

Here are some questions to think about: How did information technology change operations at PCL Construction? What was the role of mobile technology and cloud computing?



1-1 Why are information systems so essential for running and managing a business today?

It's not business as usual in America, or the rest of the global economy, anymore. In 2018, American businesses invested nearly $1 trillion in information systems hardware, software, and telecommunications equipment—about 33 percent of all capital investment in the United States. In addition, they spent another $143 billion on business and management consulting and information technology services, much of which involves redesigning firms' business operations to take advantage of these new technologies. Together, investments in technology and management consulting grew at around 3.5 percent in 2018, far faster than the economy as a whole (Bureau of Economic Analysis, 2018). Worldwide, non-US expenditures for information technology exceeded $3.8 trillion in 2019 (Gartner, Inc., 2019).

HOW INFORMATION SYSTEMS ARE TRANSFORMING BUSINESS

You can see the results of this spending around you every day. Cell phones, smartphones, tablet computers, email, and online conferencing over the Internet have all become essential tools of business. In 2018, more than 150 million businesses had registered .com or .net Internet sites. Approximately 190 million people bought something online, 220 million researched a product, 230 million used a search engine, and 180 million of these searchers used their mobile devices. What this means is that if you and your business aren't connected to the Internet and mobile apps, chances are you are not being as effective as you could be (eMarketer, 2019; Pew Internet and American Life, 2019).

In 2018 FedEx moved more than 1 billion packages worldwide, mostly overnight, and United Parcel Service (UPS) moved more than 5 billion packages as businesses sought to sense and respond to rapidly changing customer demand, reduce inventories to the lowest possible levels, and achieve higher levels of operational efficiency. The growth of e-commerce has had a significant impact on UPS's shipping volume; UPS delivers about 45 percent of all e-commerce shipments, representing about 25 percent of its revenue. Supply chains have become faster paced,

with companies of all sizes depending on the delivery of just-in-time inventory to help them compete. Companies today manage their inventories in near real time to reduce their overhead costs and get to market faster. If you are not part of this new supply chain management economy, chances are your business is not as efficient as it could be.

Print newspaper readership continues to decline, but more than 200 million people read at least some news online, and 180 million read actual newspapers online, with digital newspaper subscriptions growing at 10 percent annually. Two hundred-twenty million used a social networking site such as Facebook, Tumblr, or Pinterest. More than 160 million banked online, and about 85 million read blogs, creating an explosion of new writers, readers, and new forms of customer feedback that did not exist before. At 39 of the top 50 news sites, 60 percent of the visitors came from mobile devices. Adding to this mix of new social media, about 325 million people worldwide used Twitter (about 126 million in the United States), including 80 percent of *Fortune* 500 firms communicating with their customers. This means your customers are empowered and able to talk to each other about your business products and services. Do you have a solid online customer relationship program in place? Do you know what your customers are saying about your firm? Is your marketing department listening?

E-commerce and Internet advertising spending reached $105 billion in 2018, growing at about 15 percent at a time when traditional advertising and commerce have been flat. Facebook's ad revenue hit $55 billion in 2018, and Google's online ad revenues surpassed $116 billion. Is your advertising department reaching this new web and mobile customer?

Federal security and accounting laws require many businesses to keep email messages for five years. Coupled with existing occupational and health laws requiring firms to store employee chemical exposure data for up to 60 years, these laws are spurring the growth of digital information now estimated to be 4.7 zettabytes (4.7 trillion gigabytes), equivalent to more than 60,000 Libraries of Congress. This trove of information is doubling every year thanks in part to more than 200 billion Internet-linked sensors and data generators. Does your compliance department meet the minimal requirements for storing financial, health, and occupational information? If it doesn't, your entire business may be at risk.

Briefly, it's a new world of doing business, one that will greatly affect your future business career. Along with the changes in business come changes in jobs and careers. No matter whether you are a finance, accounting, management, marketing, operations management, or information systems major, how you work, where you work, and how well you are compensated will all be affected by business information systems. The purpose of this book is to help you understand and benefit from these new business realities and opportunities.

KEY CHALLENGES IN MANAGEMENT INFORMATION SYSTEMS

What makes management information systems the most exciting topic in business today is the continual change in technology, management use of the technology, and the impact on business success. New start-up firms arrive in traditional industries using the latest technologies and business models. These changes present challenges to all business managers who need to decide how to adapt their firm to new developments. What are the benefits and costs of these new developments in hardware, software, and business practice?

Table 1.1 summarizes the major challenges in business uses of information systems. These challenges confront all managers, not just information systems professionals. These challenges will appear throughout the book in many chapters, so it might be a good idea to take some time now to discuss them with your professor and classmates.

TABLE 1.1

Keys Challenges in MIS

Change	Management Challenge
Technology	
Cloud computing platform emerges as a major business area of innovation.	A flexible collection of computers on the Internet begins to perform tasks traditionally performed at corporate data centers. Major business applications can be delivered online as an Internet service (software as a service [SaaS]). What are the costs and benefits of cloud computing and how much of the firm's IT infrastructure should be moved to cloud providers?
Big Data and the Internet of Things (IoT)	Businesses look for insights in huge volumes of data from web traffic, email messages, social media content, and Internet-connected machines (sensors). More powerful data analytics and interactive dashboards can provide real-time performance information to managers to enhance decision making. Does our firm have the ability to analyze and use Big Data and analytics? How can we use IoT to provide better products and services?
Artificial Intelligence (AI)	Computer programs can find patterns in large databases that can help managers understand their business, and provide better products. Where could we use AI and where can we find the expertise? What benefits can we expect? How much will it cost?
The mobile platform	Business and personal computing is increasingly moving to smartphones,high-definition tablet computers, car infotainment systems, and wearable devices. These mobile devices can use thousands of applications to support collaboration, coordination of work, communication with colleagues and customers, and online purchases. Over 90 percent of Internet users access the web with mobile devices. Are we making the best use of mobile capabilities for our employees and customers? Where could we improve? What are the costs and benefits?
Management and People	
Return on investment (ROI)	Although firms spend millions on information systems and services, they typically have little understanding of how much benefit they receive. How can we measure and understand the benefit we are receiving from IS/IT expenditures? Are there alternative sources of these services that would cost less?
Online collaboration and social networking	Millions of business professionals use Google Apps, Google Drive, Microsoft Office 365, Yammer, Zoom, and IBM Connections to support blogs, project management, online meetings, personal profiles, and online communities. Is our firm making a coordinated effort to use new technologies to improve coordination, collaboration, and knowledge sharing? Which of the many alternatives should we be using?
Organizations	
Security and privacy	Security lapses and protecting customer privacy are major public issues that affect all businesses. How do we know our data are secure? How much do we spend on security now? What privacy policies do we have in place, and how should we expand our privacy protections as new laws emerge?
Social business	Businesses use social networking platforms, including Facebook, Twitter, Instagram, and internal corporate social tools, to deepen interactions with employees, customers, and suppliers. What use are we making of social business tools? Where should we go from here? Are we getting real value from these platforms?
Telework gains momentum in the workplace.	The Internet, cloud computing, smartphones, and tablet computers make it possible for growing numbers of people to work away from the traditional office. Forty-three percent of employed Americans reported spending some time working remotely and doing so for longer times. Are we taking advantage of telework, and what are the risks of telework for productivity?

GLOBALIZATION CHALLENGES AND OPPORTUNITIES: A FLATTENED WORLD

Prior to AD 1500, there was no truly global economic system of trade that connected all the continents on earth although there were active regional trade markets. After the sixteenth century, a global trading system began to emerge based on advances in

navigation and ship technology. The world trade that ensued after these developments has brought the peoples and cultures of the world much closer together. The Industrial Revolution was really a worldwide phenomenon energized by expansion of trade among nations, making nations both competitors and collaborators in business. The Internet has greatly heightened the competitive tensions among nations as global trade expands and strengthened the benefits that flow from trade, and also created significant dislocations in labor markets.

In 2005, journalist Thomas Friedman wrote an influential book declaring the world was now flat, by which he meant that the Internet and global communications had greatly expanded the opportunities for people to communicate with one another and reduced the economic and cultural advantages of developed countries. The United States and European countries were in a fight for their economic lives, according to Friedman, competing for jobs, markets, resources, and even ideas with highly educated, motivated populations in low-wage areas in the less developed world (Friedman, 2007). This globalization presents you and your business with both challenges and opportunities.

A growing percentage of the economy of the United States and other advanced industrial countries in Europe and Asia depends on imports and exports. In 2018, an estimated 30 percent of the US economy resulted from foreign trade of goods and services, both imports and exports. In Europe and Asia, the number exceeds 50 percent. Half of *Fortune* 500 US firms obtain nearly 50 percent of their revenue from foreign operations. For instance, more than 50 percent of Intel's revenues in 2018 came from overseas sales of its microprocessors. Eighty percent of the toys sold in the United States are manufactured in China; about 90 percent of the PCs manufactured in China use American-made Intel or Advanced Micro Design (AMD) chips.

It's not just goods that move across borders. So too do jobs, some of them high-level jobs that pay well and require a college degree. In the past 15 years, the United States has lost an estimated 2.5 million manufacturing jobs to offshore, low-wage producers, so manufacturing is now a small part of US employment (less than 12 percent) even though it accounts for $2.1 trillion of GDP. In a normal year, about 300,000 service jobs move offshore to lower-wage countries, many of them in less-skilled information system occupations but also in tradable service jobs in architecture, financial services, customer call centers, consulting, engineering, and even radiology.

On the plus side, the US economy created 2.6 million new jobs in 2018. Employment in information systems and the other service occupations listed previously has rapidly expanded in sheer numbers, wages, productivity, and quality of work. Outsourcing has actually accelerated the development of new systems in the United States and worldwide by reducing the cost of building and maintaining them. In 2019 job openings in information systems and technologies far exceeded the supply of applicants.

The challenge for you as a business student is to develop high-level skills through education and on-the-job experience that cannot be outsourced. The challenge for your business is to avoid markets for goods and services that can be produced offshore much less expensively. The opportunities are equally immense. You can learn how to profit from the lower costs available in world markets and the chance to serve a marketplace with billions of customers. You have the opportunity to develop higher-level and more profitable products and services. Throughout this book, you will find examples of companies and individuals who either failed or succeeded in using information systems to adapt to this new global environment.

What does globalization have to do with management information systems? The answer is simple: everything. The emergence of the Internet into a full-blown international communications system has drastically reduced the costs of operating and transacting on a global scale. Communication between a factory floor in Shanghai and a distribution center in Sioux Falls, South Dakota, is now instant and virtually free. Customers now can shop in a worldwide marketplace, obtaining price and quality information reliably 24 hours a day. Firms producing goods and services on a global

scale achieve extraordinary cost reductions by finding low-cost suppliers and managing production facilities in other countries. Internet service firms, such as Google and eBay, can replicate their business models and services in multiple countries without having to redesign their expensive, fixed-cost information systems infrastructure.

BUSINESS DRIVERS OF INFORMATION SYSTEMS

What makes information systems so essential today? Why are businesses investing so much in information systems and technologies? They do so to achieve six important business objectives: operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival.

Operational Excellence

Businesses continuously seek to improve the efficiency of their operations to achieve higher profitability. Information systems and technologies are some of the most important tools available to managers for achieving higher levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behavior.

Walmart, the largest retailer on earth, exemplifies the power of information systems coupled with sophisticated business practices and supportive management to achieve world-class operational efficiency. In 2019, Walmart achieved more than $514 billion in sales—nearly one-tenth of retail sales in the United States—in large part because of its Retail Link system, which digitally links its suppliers to every one of Walmart's 11,666 stores worldwide. As soon as a customer purchases an item, the supplier monitoring the item knows to ship a replacement to the shelf. Walmart is the most efficient retail store in its industry, achieving sales of more than $600 per square foot compared to its closest competitor, Target, at $300 a square foot.

Amazon, the largest online retailer on earth, generating more than $232 billion in sales in 2018, invested $2.1 billion in information systems so that when one of its estimated 300 million users searches for a product, Amazon can respond in milliseconds with the correct product displayed (and recommendations for other products).

New Products, Services, and Business Models

Information systems and technologies are a major enabling tool for firms to create new products and services, as well as entirely new business models. A **business model** describes how a company produces, delivers, and sells a product or service to create wealth. Today's music industry is vastly different from the industry a decade ago. Apple Inc. transformed an old business model of music distribution based on vinyl records, tapes, and CDs into an online, legal download distribution model based on its own operating system and iTunes store. Apple has prospered from a continuing stream of innovations, including the original iPod, iTunes music service, iPhone, and iPad.

Customer and Supplier Intimacy

When a business really knows its customers and serves them well, the way they want to be served, the customers generally respond by returning and purchasing more. This raises revenues and profits. Likewise with suppliers: the more a business engages its suppliers, the better the suppliers can provide vital inputs. This lowers costs. How really to know your customers, or suppliers, is a central problem for businesses with millions of offline and online customers.

The Mandarin Oriental in Manhattan and other high-end hotels exemplify the use of information systems and technologies to achieve customer intimacy. These hotels use information systems to keep track of guests' preferences, such as their preferred room temperature, check-in time, frequently dialed telephone numbers, and television programs, and store these data in a giant data repository. Individual rooms

in the hotels are networked to a central network server so that they can be remotely monitored or controlled. When a customer arrives at one of these hotels, the system automatically changes the room conditions, such as dimming the lights, setting the room temperature, or selecting appropriate music, based on the customer's digital profile. The hotels also analyze their customer data to identify their best customers and develop individualized marketing campaigns based on customers' preferences.

JCPenney exemplifies the benefits of information systems-enabled supplier intimacy. Every time a dress shirt is bought at a JCPenney store in the United States, the record of the sale appears immediately on computers in Hong Kong at TAL Apparel Ltd., a giant contract manufacturer that produces one in eight dress shirts sold in the United States. TAL runs the numbers through a computer model it developed and decides how many replacement shirts to make and in what styles, colors, and sizes. TAL then sends the shirts to each JCPenney store, completely bypassing the retailer's warehouses. In other words, JCPenney's surplus shirt inventory is near zero, as is the cost of storing it.

Improved Decision Making

Many business managers operate in an information fog bank, never really having the right information at the right time to make an informed decision. Instead, managers rely on forecasts, best guesses, and luck. The result is over- or underproduction of goods and services, misallocation of resources, and poor response times. These poor outcomes raise costs and lose customers. Information systems and technologies have now made it possible for managers to use real-time data from the marketplace when making decisions.

For instance, Verizon Communications, one of the largest telecommunications operating companies in the United States, uses a web-based digital dashboard to provide managers with precise real-time information on customer complaints, network performance for each locality served, and line outages or storm-damaged lines. Using this information, managers can immediately allocate repair resources to affected areas, inform consumers of repair efforts, and restore service fast.

Competitive Advantage

When firms achieve one or more of these business objectives—operational excellence; new products, services, and business models; customer/supplier intimacy; and improved decision making—chances are they have already achieved a competitive advantage. Doing things better than your competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits that your competitors cannot match. Apple Inc., Walmart, and UPS are industry leaders because they know how to use information systems for this purpose.

Survival

Business firms also invest in information systems and technologies because they are necessities of doing business. Sometimes these necessities are driven by industry-level changes. For instance, after Citibank introduced the first automated teller machines (ATMs) in the New York region to attract customers through higher service levels, its competitors rushed to provide ATMs to their customers to keep up with Citibank. Today, virtually all banks in the United States have regional ATMs and link to national and international ATM networks, such as CIRRUS. Providing ATM services to retail banking customers is simply a requirement of being in and surviving in the retail banking business.

Many federal and state statutes and regulations create a legal duty for companies and their employees to retain records, including digital records. For instance, the Toxic Substances Control Act (1976), which regulates the exposure of US workers to more than 75,000 toxic chemicals, requires firms to retain records on employee exposure

for 30 years. The Sarbanes–Oxley Act (2002), which was intended to improve the accountability of public firms and their auditors, requires public companies to retain audit working papers and records, including all email messages, for five years. Firms turn to information systems and technologies to provide the capability to respond to these information retention and reporting requirements. The Dodd–Frank Act (2010) requires financial service firms to expand their public reporting greatly on derivatives and other financial instruments.

1-2 What exactly is an information system? How does it work? What are its people, organizational, and technology components?

So far we've used *information systems and technologies* informally without defining the terms. **Information technology (IT)** consists of all the hardware and software that a firm needs to use to achieve its business objectives. This includes not only computers, storage technology, and mobile handheld devices but also software, such as the Windows or Linux operating systems, the Microsoft Office desktop productivity suite, and the many thousands of computer programs that can be found in a typical large firm. Information systems are more complex and can be understood best by looking at them from both a technology and a business perspective.

WHAT IS AN INFORMATION SYSTEM?

An **information system (IS)** can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making, coordinating, and control in an organization. In addition, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products.

Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By **information**, we mean data that have been shaped into a form that is meaningful and useful to human beings. **Data**, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

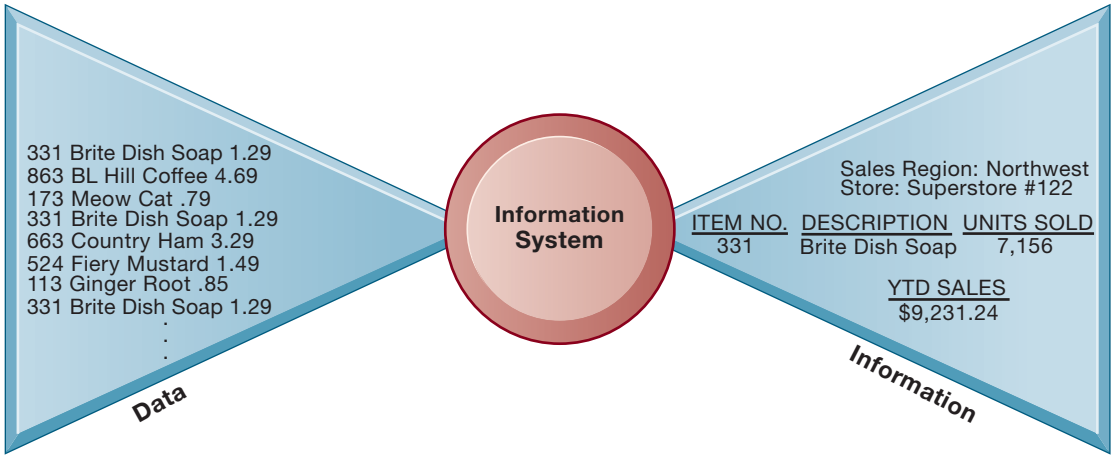


Figure 1.1
Data and Information
Raw data from a supermarket checkout counter can be processed and organized to produce meaningful information, such as the total unit sales of dish detergent or the total sales revenue from dish detergent for a specific store or sales territory.

A brief example contrasting information and data may prove useful. Supermarket checkout counters scan millions of pieces of data, such as bar codes, that describe the product. Such pieces of data can be totaled and analyzed to provide meaningful information, such as the total number of bottles of dish detergent sold at a particular store, which brands of dish detergent were selling the most rapidly at that store or sales territory, or the total amount spent on that brand of dish detergent at that store or sales region (see Figure 1.1).

Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new products or services. These activities are input, processing, and output (see Figure 1.2). **Input** captures or collects raw data from within the organization or from its external environment. **Processing** converts this raw input into a meaningful form. **Output** transfers the processed information to the people who will use it or to the activities for which it will be used. Information systems also require **feedback**, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.

In PCL's project management system, input includes the names and addresses of contractors and subcontractors, project names and identification numbers, project activities, labor costs, materials costs, and start and completion dates for project activities. Computers store these data and process them to calculate how much each project activity and the entire project will cost and estimated completion time. The system provides meaningful information such as the size, cost, and duration of all projects under PCL management, projects over and under budget, and projects and project activities that are late or on time.

Although computer-based information systems use computer technology to process raw data into meaningful information, there is a sharp distinction between a computer and a computer program and an information system. Computers and related software programs are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information. Computer programs, or software, are sets of operating instructions that direct and control computer processing. Knowing how computers and computer programs work is important in designing solutions to organizational problems, but computers are only part of an information system.

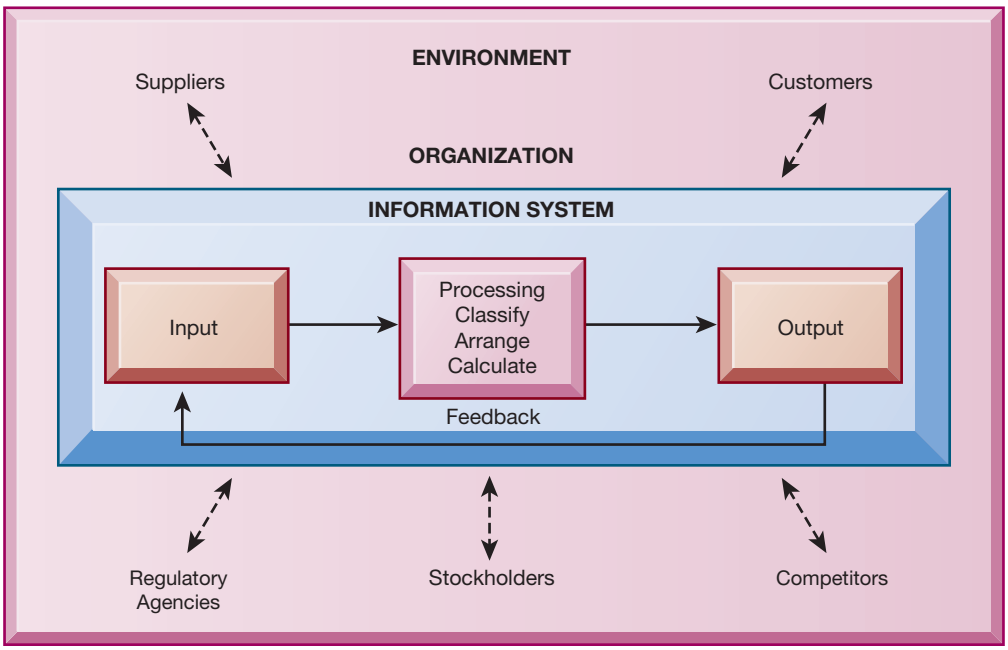


Figure 1.2
Functions of an Information System
An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to appropriate people or activities 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.

A house is an appropriate analogy. Houses are built with hammers, nails, and wood, but these alone do not make a house. The architecture, design, setting, landscaping, and all of the decisions that lead to the creation of these features are part of the house and are crucial for solving the problem of putting a roof over one's head. Computers and programs are the hammer, nails, and lumber of computer-based information systems, but alone they cannot produce the information a particular organization needs. To understand information systems, you must understand the problems they are designed to solve, their architectural and design elements, and the organizational processes that lead to these solutions.

IT ISN'T SIMPLY TECHNOLOGY: THE ROLE OF PEOPLE AND ORGANIZATIONS

To understand information systems fully, you will need to be aware of the broader organization, people, and information technology dimensions of systems (see Figure 1.3) and their power to provide solutions to challenges and problems in the business environment. We refer to this broader understanding of information systems, which encompasses an understanding of the people and organizational dimensions of systems as well as the technical dimensions of systems, as **information systems literacy**. Information systems literacy includes a behavioral as well as a technical approach to studying information systems. **Computer literacy**, in contrast, focuses primarily on knowledge of information technology.

The field of **management information systems (MIS)** tries to achieve this broader information systems literacy. MIS deals with behavioral issues as well as technical issues surrounding the development, use, and impact of information systems that managers and employees in the firm use.

DIMENSIONS OF INFORMATION SYSTEMS

Let's examine each of the dimensions of information systems—organizations, people, and information technology.

Organizations

Information systems are an integral part of organizations and, although we tend to think about information technology changing organizations and business firms, it is, in fact, a two-way street. The history and culture of business firms also affects how the technology is used and how it should be used. To understand how a specific business firm uses information systems, you need to know something about the structure, history, and culture of the company.

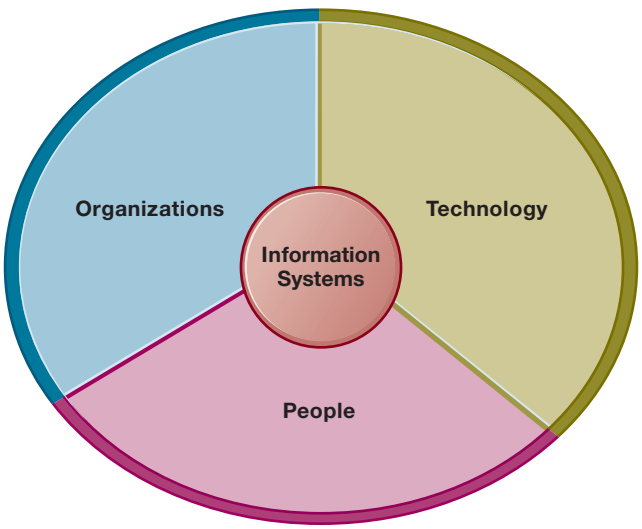


Figure 1.3
Information Systems Are More Than Computers
Using information systems effectively requires an understanding of the organization, people, and information technology shaping the systems. An information system provides a solution to important business problems or challenges facing the firm.

Organizations have a structure that is composed of different levels and specialties. Their structures reveal a clear-cut division of labor. A business firm is organized as a hierarchy, or a pyramid structure, of rising authority and responsibility. The upper levels of the hierarchy consist of managerial, professional, and technical employees, whereas the lower levels consist of operational personnel. Experts are employed and trained for different business functions, such as sales and marketing, manufacturing and production, finance and accounting, and human resources. The firm builds information systems to serve these different specialties and levels of the firm. Chapter 2 provides more detail on these business functions and organizational levels and the ways in which information systems support them.

An organization accomplishes and coordinates work through this structured hierarchy and through its **business processes**, which are logically related tasks and behaviors for accomplishing work. Developing a new product, fulfilling an order, and hiring a new employee are examples of business processes.

Most organizations' business processes include formal rules that have been developed over a long time for accomplishing tasks. These rules guide employees in a variety of procedures, from writing an invoice to responding to customer complaints. Some of these business processes have been written down, but others are informal work practices, such as a requirement to return telephone calls from coworkers or customers, that are not formally documented. Information systems automate many business processes. For instance, how a customer receives credit or how a customer is billed is often determined by an information system that incorporates a set of formal business processes.

Each organization has a unique **culture**, or fundamental set of assumptions, values, and ways of doing things, that has been accepted by most of its members. Parts of an organization's culture can always be found embedded in its information systems. For instance, the United Parcel Service's concern with placing service to the customer first is an aspect of its organizational culture that can be found in the company's package tracking systems.

Different levels and specialties in an organization create different interests and points of view. These views often conflict. Conflict is the basis for organizational politics. Information systems come out of this cauldron of differing perspectives, conflicts, compromises, and agreements that are a natural part of all organizations.

People

A business is only as good as the people who work there and run it. Likewise with information systems, they are useless without skilled people to build and maintain them or people who can understand how to use the information in a system to achieve business objectives.

For instance, a call center that provides help to customers by using an advanced customer relationship management system (described in later chapters) is useless if employees are not adequately trained to deal with customers, find solutions to their problems, and leave the customer feeling that the company cares for them. Likewise, employee attitudes about their jobs, employers, or technology can have a powerful effect on their abilities to use information systems productively.

Business firms require many kinds of skills and people, including managers as well as rank-and-file employees. The job of managers is to make sense out of the many situations organizations face, make decisions, and formulate action plans to solve organizational problems. Managers perceive business challenges in the environment, they set the organizational strategy for responding to those challenges, and they allocate the human and financial resources to coordinate the work and achieve success. Throughout, they must exercise responsible leadership.

However, managers must do more than manage what already exists. They must also create new products and services and even re-create the organization from time to time. A substantial part of management responsibility is creative work driven

by new knowledge and information. Information technology can play a powerful role in helping managers develop novel solutions to a broad range of problems.

As you will learn throughout this text, technology is relatively inexpensive today, but people are very expensive. Because people are the only ones capable of business problem solving and converting information technology into useful business solutions, we spend considerable effort in this text looking at the people dimension of information systems.

Technology

Information technology is one of many tools managers use to cope with change and complexity. **Computer hardware** is the physical equipment used for input, processing, and output activities in an information system. It consists of the following: computers of various sizes and shapes; various input, output, and storage devices; and networking devices that link computers.

Computer software consists of the detailed, preprogrammed instructions that control and coordinate the computer hardware components in an information system. Chapter 5 describes the contemporary software and hardware platforms firms use today in greater detail.

Data management technology consists of the software governing the organization of data on physical storage media. More detail on data organization and access methods can be found in Chapter 6.

Networking and telecommunications technology, consisting of both physical devices and software, links the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipment can be connected in networks for sharing voice, data, images, sound, and video. A **network** links two or more computers to share data or resources such as a printer.

The world's largest and most widely used network is the **Internet**, a global network of networks that uses universal standards (described in Chapter 7) to connect millions of networks in more than 230 countries around the world.

The Internet has created a new, universal technology platform on which to build new products, services, strategies, and business models. This same technology platform has internal uses, providing the connectivity to link different systems and networks within the firm. Internal corporate networks based on Internet technology are called **intranets**. Private intranets extended to authorized users outside the organization are called **extranets**, and firms use such networks to coordinate their activities with other firms for making purchases, collaborating on design, and performing other interorganizational work. For most business firms today, using Internet technology is a business necessity and a competitive advantage.

The **World Wide Web** is a service the Internet provides that uses universally accepted standards for storing, retrieving, formatting, and displaying information in a page format on the Internet. Web pages contain text, graphics, animations, sound, and video and are linked to other web pages. By clicking highlighted words or buttons on a web page, you can link to related pages to find additional information and links to other locations on the web. The web can serve as the foundation for new kinds of information systems such as UPS's web-based package tracking system.

All these technologies, along with the people required to run and manage them, represent resources that can be shared throughout the organization and constitute the firm's **information technology (IT) infrastructure**. The IT infrastructure provides the foundation, or *platform*, on which the firm can build its specific information systems. Each organization must carefully design and manage its information technology infrastructure so that it has the set of technology services it needs for the work it wants to accomplish with information systems. Chapters 5, 6, 7, and 8 of this text examine each major technology component of information technology infrastructure and show how they all work together to create the technology platform for the organization.

UPS Competes Globally with Information Technology

United Parcel Service (UPS) started out in 1907 in a closet-sized basement office. Jim Casey and Claude Ryan—two teenagers from Seattle with two bicycles and one phone—promised the "best service and lowest rates." UPS has used this formula successfully for more than a century to become the world's largest ground and air package-delivery company. It's a global enterprise with more than 454,000 employees and over 119,000 delivery vehicles.

Today UPS delivers 5.1 billion packages and documents in more than 220 countries and territories. The firm has been able to maintain leadership in small-package delivery services despite stiff competition from FedEx and the US Postal Service by investing heavily in advanced information technology. UPS spends more than $1 billion each year to maintain a high level of customer service while keeping costs low and streamlining its overall operations.

It all starts with the scannable bar-coded label attached to a package, which contains detailed information about the sender, the destination, and when the package should arrive. Customers can download and print their own labels using special software provided by UPS or by accessing the UPS website. Before the package is even picked up, information from the "smart" label is transmitted to one of UPS's computer centers in Mahwah, New Jersey, or Alpharetta, Georgia, and sent to the distribution center nearest its final destination.

Dispatchers at this center download the label data and use special routing software called ORION to create the most efficient delivery route for each driver that considers traffic, weather conditions, and the location of each stop. Each UPS driver makes an average of 100 stops per day. In a network with 55,000 routes in the United States alone, shaving even one mile off each driver's daily route translates into big savings in time, fuel consumption, miles driven, and carbon emissions—as much as $400 million per year.

These savings are critical as UPS tries to boost earnings growth as more of its business shifts to less-profitable e-commerce deliveries. UPS drivers who used to drop off several heavy packages a day at one retailer now often make multiple stops scattered across residential neighborhoods, delivering one package per household. The shift requires more fuel and more time, increasing the cost to deliver each package.

The first thing a UPS driver picks up each day is a handheld computer called a Delivery Information Acquisition Device (DIAD), which can access a wireless cell phone network. As soon as the driver logs on, his or her day's route is downloaded onto the handheld. The DIAD also automatically captures customers' signatures along with pickup and delivery information. Package tracking information is then transmitted to UPS's computer network for storage and processing. From there, the information can be accessed worldwide to provide proof of delivery to customers or to respond to customer queries. It usually takes less than 60 seconds from the time a driver presses "complete" on the DIAD for the new information to be available on the web.

Through its automated package tracking system, UPS can monitor and even reroute packages throughout the delivery process. At various points along the route from sender to receiver, bar code devices scan shipping information on the package label and feed data about the progress of the package into the central computer. Customer service representatives are able to check the status of any package from desktop computers linked to the central computers and respond immediately to inquiries from customers. UPS customers can also access this information from the company's website using their own computers or mobile phones. UPS now has mobile apps and a mobile website for iPhone, BlackBerry, and Android smartphone users.

Anyone with a package to ship can access the UPS website to track packages, check delivery routes, calculate shipping rates, determine time in transit, print labels, and schedule a pickup. The data collected at the UPS website are transmitted to the UPS central computer and then back to the customer after processing. UPS also provides tools that enable customers, such as Cisco Systems, to embed UPS functions, such as tracking and cost calculations, into their own websites so that they can track shipments without visiting the UPS site.

UPS is now leveraging its decades of expertise managing its own global delivery network to manage logistics and supply chain activities for other companies. It created a UPS Supply Chain Solutions division that provides a complete bundle of standardized services to subscribing companies at a fraction of what it would cost to build their own systems and infrastructure. These services include supply chain design and management,

freight forwarding, customs brokerage, mail services, multimodal transportation, and financial services in addition to logistics services.

UPS technology and business services are helpful to businesses of all sizes, including small start-ups. Fondarific is a Savannah-based company that manufactures and sells fondant icings for decorating wedding cakes and childrens'cakes. UPS made it possible for Fondarific to grow rapidly when international sales took off. UPS set up a class in exporting to teach Fondarific how to manage international sales and logistics and how to use its WorldShip global shipping software for UPS package and freight services. UPS also showed the company how to integrate shipping systems with Quickbooks accounting software and inventory software.

UPS provides both financial and shipping advice and services to 4Moms, a Pittsburgh-headquartered company with 80 employees that makes innovative baby products using consumer technology. 4Moms uses UPS Trade Direct, which enables companies to reduce freight and inventory costs by bypassing distribution centers and shipping their goods directly to retailers. The UPS Cargo Finance service helps 4Moms manage the cost of inventory as it is shipped around the world.

Sources: Bloomberg, "UPS Sees Payoff From $20Bn Tech Bet, SupplyChainBrain," April 24, 2019; www.ups.com, accessed February 7, 2019; Shefali Kapadia, "Company of the Year: UPS," *Supply Chain Dive*, December 3, 2018; and Haylle Sok, "UPS Technology to Save $75 Million per Year in 2020," *Global Trade*, December 25, 2018.

CASE STUDY QUESTIONS

1. What are the inputs, processing, and outputs of UPS's package tracking system?
2. What technologies are used by UPS? How are these technologies related to UPS's business strategy?
3. What strategic business objectives do UPS's information systems address?
4. What would happen if UPS's information systems were not available?

The Interactive Session on Technology describes some of the typical technologies used in computer-based information systems today. UPS invests heavily in information systems technology to make its business more efficient and customer oriented. It uses an array of information technologies, including bar code scanning systems, wireless networks, large mainframe computers, handheld computers, the Internet, and many pieces of software for tracking packages, calculating fees, maintaining customer accounts, and managing logistics. As you read this case, try to identify the problem this company was facing, what alternative solutions were available to management, and how well the chosen solution worked.

Let's identify the organization, people, and technology elements in the UPS package tracking system we have just described. The organization element anchors the package tracking system in UPS's sales and production functions (the main product of UPS is a service—package delivery). It specifies the required procedures for identifying packages with both sender and recipient information, taking inventory, tracking the packages en route, and providing package status reports for UPS customers and customer service representatives.

The system must also provide information to satisfy the needs of managers and workers. UPS drivers need to be trained in both package pickup and delivery procedures and in how to use the package tracking system so that they can work efficiently and effectively. UPS customers may need some training to use UPS in-house package tracking software or the UPS website.

UPS's management is responsible for monitoring service levels and costs and for promoting the company's strategy of combining low cost and superior service. Management decided to use automation to increase the ease of sending a package via UPS and of checking its delivery status, thereby reducing delivery costs and increasing sales revenues.

The technology supporting this system consists of handheld computers, bar code scanners, wired and wireless communications networks, desktop computers, UPS's central computer, storage technology for the package delivery data, UPS in-house package tracking software, and software to access the web. The result is an information system solution to the business challenge of providing a high level of service with low prices in the face of mounting competition.

1-3 How will a four-step method for business problem solving help you solve information system–related problems?

Our approach to understanding information systems is to consider information systems and technologies as solutions to a variety of business challenges and problems. We refer to this as a problem-solving approach. Businesses face many challenges and problems, and information systems are one major way of solving these problems. All the cases in this book illustrate how a company used information systems to solve a specific problem.

The problem-solving approach has direct relevance to your future career. Your future employers will hire you because you can solve business problems and achieve business objectives. Your knowledge of how information systems contribute to problem solving will be very helpful to both you and your employers.

THE PROBLEM-SOLVING APPROACH

At first glance, problem solving in daily life seems to be perfectly straightforward; a machine breaks down, parts and oil spill all over the floor, and, obviously, somebody has to do something about it. So, of course, you find a tool around the shop and start repairing the machine. After a cleanup and proper inspection of other parts, you start the machine, and production resumes.

No doubt, some problems in business are this straightforward, but few problems are this simple in the real world of business. In real-world business firms, a number of major factors are simultaneously involved in problems. These major factors can usefully be grouped into three categories: *organization, technology,* and *people*. In other words, a whole set of problems is usually involved.

A MODEL OF THE PROBLEM-SOLVING PROCESS

There is a simple model of problem solving that you can use to help you understand and solve business problems by using information systems. You can think of business problem-solving as a four-step process (see Figure 1.4). Most problem solvers work through this model on their way to finding a solution. Let's take a brief look at each step.

Problem Identification

The first step in the problem-solving process is to understand what kind of problem exists. Contrary to popular beliefs, problems are not like basketballs on a court simply waiting to be picked up by some objective problem solver. Before problems can be solved, there must be agreement in a business that a problem exists, about what the problem is, about its causes, and about what can be done about it, given the limited resources of the organization. Problems have to be properly defined by people in an organization before they can be solved.

For instance, what at first glance what might seem like a problem with employees not adequately responding to customers in a timely and accurate manner might in reality be a result of an older, out-of-date information system for keeping track of customers; or it might be a combination of both poor employee incentives for treating

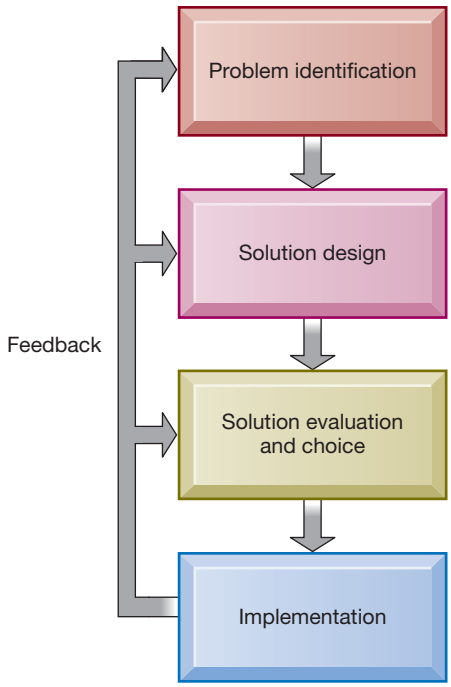


Figure 1.4
Problem Solving Is a Continuous Four-Step Process
During implementation and thereafter, the outcome must be continually measured, and the information about how well the solution is working is fed back to the problem solvers. In this way, the identification of the problem can change over time, solutions can be changed, and new choices can be made, all based on experience.

customers well and an outdated system. Once you understand this critical fact, you can start to solve problems creatively. Finding answers to these questions will require fact gathering, interviews with people involved in the problem, and analysis of documents and data.

In this text, we emphasize three different and typical dimensions of business problems: organizations, technology, and people (see Table 1.2). Typical organizational problems include poor business processes (usually inherited from the past), unsupportive culture, political infighting, and changes in the organization's surrounding environment. Typical technology problems include insufficient or aging hardware, outdated software, inadequate database capacity, insufficient network capacity, and the incompatibility of old systems with new technology. Typical people problems include employee training, difficulties of evaluating performance, legal and regulatory compliance, ergonomics, poor or indecisive management, and employee support and participation. When you begin to analyze a business problem, you will find these dimensions are helpful guides to understanding the kind of problem with which you are working.

Solution Design

The second step is to design solutions to the problem(s) you have identified. As it turns out, there are usually a great many solutions to any given problem, and the choice of solution often reflects the differing perspectives of people in an organization. You should try to consider as many solutions as possible so that you can understand the range of possible solutions. Some solutions emphasize technology; others focus on change in the organization and people aspects of the problem. As you will find throughout the text, most successful solutions result from an integrated approach in which changes in organization and people accompany new technologies.

Solution Evaluation and Choice

Choosing the best solution for your business firm is the next step in the process. Some of the factors to consider when trying to find the best single solution are the cost of the solution, the feasibility of the solution for your business given existing resources and skills, and the length of time required to build and implement the solution. Also very important at this point are the attitudes and support of your employees and

TABLE 1.2

Dimensions of Business Problems

Dimension	Description
Organizational dimensions	Outdated business processes
	Unsupportive culture and attitudes
	Political conflict
	Turbulent business environment, change
	Complexity of task
	Inadequate resources
Technology dimensions	Insufficient or aging hardware
	Outdated software
	Inadequate database capacity
	Insufficient network capacity
	Incompatibility of old systems with new technology
	Rapid technological change and failure to adopt new technology
People dimensions	Lack of employee training
	Difficulties of evaluating performance
	Legal and regulatory compliance
	Work environment
	Lack of employee support and participation
	Indecisive management
	Poor management
	Wrong incentives

managers. A solution that does not have the support of all the major interests in the business can quickly turn into a disaster.

Implementation

The best solution is one that can be implemented. Implementation of an information system solution involves building the solution and introducing it into the organization. This includes purchasing or building the software and hardware—the technology part of the equation. The software must be tested in a realistic business setting; then employees need to be trained, and documentation about how to use the new system needs to be written.

You will definitely need to think about change management. **Change management** refers to the many techniques used to bring about successful change in a business. Nearly all information systems require changes in the firm's business processes and, therefore, changes in what hundreds or even thousands of employees do every day. You will have to design new, more efficient business processes and then figure out how to encourage employees to adapt to these new ways of doing business. This may require meeting sessions to introduce the change to groups of employees, new training modules to bring employees quickly up to speed on the new information systems and processes, and, finally, some kind of rewards or incentives to encourage people to support the changes enthusiastically.

Implementation also includes the measurement of outcomes. After a solution has been implemented, it must be evaluated to determine how well it is working and whether any additional changes are required to meet the original objectives. This information is fed back to the problem solvers. In this way, the identification of the problem can change over time, solutions can be changed, and new choices made, all based on experience.

Problem Solving: A Process, Not an Event

It is easy to fall into the trap of thinking about problem solving as an event that is over at some point, like a relay race or a baseball game. Often in the real world, this

does not happen. Sometimes the chosen solution does not work, and new solutions are required.

For instance, the US National Aeronautics and Space Administration (NASA) spent more than $1 billion to fix a problem with shedding foam on the space shuttle. Experience proved the initial solution did not work. More often, the chosen solution partially works but needs a lot of continuous changes to fit the situation well. Sometimes, the nature of the problem changes in a way that makes the initial solution ineffective. For instance, hackers create new variations on computer viruses that require continually evolving antivirus programs to hold them in check. For all these reasons, problem solving is a continuous process rather than a single event.

THE ROLE OF CRITICAL THINKING IN PROBLEM SOLVING

It is amazingly easy to accept someone else's definition of a problem or to adopt the opinions of some authoritative group that has objectively analyzed the problem and offers quick solutions. You should try to resist this tendency to accept existing definitions of any problem. It is essential for you to try to maintain some distance from any specific solution until you are sure you have properly identified the problem, developed understanding, and analyzed alternatives. Otherwise, you may leap off in the wrong direction, solve the wrong problem, and waste resources. You will have to engage in some critical-thinking exercises.

Critical thinking can be briefly defined as the sustained suspension of judgment with an awareness of multiple perspectives and alternatives. It involves at least four elements as described below:

- Maintaining doubt and suspending judgment
- Being aware of different perspectives
- Testing alternatives and letting experience guide
- Being aware of organizational and personal limitations

Simply following a rote pattern of decision making, or a model, does not guarantee a correct solution. The best protection against incorrect results is to engage in critical thinking throughout the problem-solving process.

First, maintain doubt and suspend judgment. Perhaps the most frequent error in problem solving is to arrive prematurely at a judgment about the nature of the problem. By doubting all solutions at first and refusing to rush to a judgment, you create the necessary mental conditions to take a fresh, creative look at problems, and you keep open the chance to make a creative contribution.

Second, recognize that all interesting business problems have many dimensions and that the same problem can be viewed from different perspectives. In this text, we have emphasized the usefulness of three perspectives on business problems: technology, organizations, and people. Within each of these broad perspectives are many subperspectives, or views. The *technology perspective*, for instance, includes a consideration of all the components in the firm's IT infrastructure and the way they work together. The *organization perspective* includes a consideration of a firm's business processes, structure, culture, and politics. The *people perspective* includes consideration of the firm's management as well as employees as individuals and their interrelationships in workgroups.

You will have to decide for yourself which major perspectives are useful for viewing a given problem. The ultimate criterion here is usefulness: Does adopting a certain perspective tell you something more about the problem that is useful for solving the problem? If not, reject that perspective as not meaningful in this situation and look for other perspectives.

The third element of critical thinking involves testing alternatives, or modeling solutions to problems, letting experience be the guide. Not all contingencies can be known in advance, and much can be learned through experience. Therefore, experiment, gather data, and reassess the problem periodically.

THE CONNECTIONS AMONG BUSINESS OBJECTIVES, PROBLEMS, AND SOLUTIONS

Now let's make the connection between business information systems and the problem-solving approach. At the beginning of this chapter, we identified six business objectives of information systems: operational excellence; new products, services, and business models; customer/supplier intimacy; improved decision making; strategic advantage; and survival. When firms cannot achieve these objectives, they become challenges or problems that receive attention. Managers and employees who are aware of these challenges often turn to information systems as one of the solutions or the entire solution.

Review the diagram at the beginning of this chapter. The diagram shows how PCL's systems solved the business problem of inefficiencies created by a far-flung, highly paper-intensive business. These systems provided a solution that takes advantage of opportunities provided by new wireless digital technology and the Internet. PCL digitally enabled its key business processes for planning, designing, and monitoring its construction projects. These systems have been essential in improving PCL's overall business performance. The diagram also illustrates how people, technology, and organizational elements work together to create the systems.

Each chapter of this text begins with a diagram similar to this one to help you analyze the chapter-opening case. You can use this diagram as a starting point for analyzing any information system or information system problem you encounter.

1-4 What information systems skills and knowledge are essential for business careers?

Looking out to 2026, the US economy will create 11.5 million new jobs, and 34 million existing jobs will open up as their occupants retire. More than 95 percent of the new jobs will be created in the service sector, and the fastest growing jobs will be in healthcare services. About 35 percent of the new jobs will require at least a bachelor's degree, another 30 percent some postsecondary education (US Bureau of Labor Statistics, 2019; US Census, 2019).

What this means is that US business firms are looking for candidates who have a broad range of problem-solving skills—the ability to read, write, and present ideas—as well as the technical skills required for specific tasks. Regardless of your business school major, or your future occupation, information systems and technologies will play a major and expanding role in your day-to-day work and your career. Your career opportunities, and your compensation, will in part depend on your ability to help business firms use information systems to achieve their objectives.

HOW INFORMATION SYSTEMS WILL AFFECT BUSINESS CAREERS

In the following sections, we describe how specific occupations will be affected by information systems and what skills you should be building in order to benefit from this emerging labor market based on the research of the Bureau of Labor Statistics (Bureau of Labor Statistics, 2019; US Census, 2019).

Accounting

There are about 1.4 million accountants in the US labor force today, and the field is expected to expand by 11 percent by the year 2026, adding 140,000 new jobs and twice as many to replace retirees. This above-average growth in accounting is driven in part by new accounting laws for public companies, greater scrutiny of public and private firms by government tax auditors, and a growing demand for management and operational advice.

Accountants rely heavily on information systems to summarize transactions, create financial records, organize data, and perform financial analysis. Because of new public laws, accountants require an intimate knowledge of databases, reporting systems, and networks to trace financial transactions. Because so many transactions are occurring over the Internet, accountants need to understand online transaction and reporting systems and how systems are used to achieve management accounting functions in an online and mobile business environment.

Finance

If you include financial analysts, stock analysts, brokers, loan officers, budget analysts, financial advisors, and related financial service occupations, there are currently about 2 million managers and employees in finance. These financial occupations are expected to grow on average by about 12 percent by the year 2026 and add more than 130,000 new jobs. Financial advisors will grow by 15 percent in this period.

Financial managers play important roles in planning, organizing, and implementing information system strategies for their firms. Financial managers work directly with a firm's board of directors and senior management to ensure that investments in information systems help achieve corporate goals and high returns. The relationship between information systems and the practice of modern financial management and services is so strong that many advise finance majors to comajor in information systems (and vice versa).

Marketing

No field has undergone more technology-driven change in the past five years than marketing and advertising. The explosion in e-commerce activity described earlier means that eyeballs are moving rapidly to the Internet. Internet advertising is the fastest-growing form of advertising, reaching $105 billion in 2018. Product branding and customer communication are moving online at a fast pace.

There are about 1.5 million public relations, marketing analysts, and marketing and sales managers in the US labor force. This field is growing faster than average, at about 10 percent, and is expected to add more than 300,000 jobs by 2026. There is a much larger group of 1.2 million nonmanagerial employees in marketing-related occupations (art, design, entertainment, sports, and media) and more than 15.9 million employees in sales. These occupations together are expected to create an additional 2 million jobs by 2026. Marketing and advertising managers and specialists deal with large databases of customer behavior both online and offline in the process of creating brands and selling products and services. They develop reports on product performance, retrieve feedback from customers, and manage product development. These managers need an understanding of how enterprise-wide systems for product management, sales force management, and customer relationship management are used to develop products that consumers want, to manage the customer relationship, and to manage an increasingly mobile sales force.

Operations Management in Services and Manufacturing

The growing size and complexity of modern industrial production and the emergence of huge global service companies have created a growing demand for employees who can coordinate and optimize the resources required to produce goods and services. Operations management as a discipline is directly relevant to three occupational categories: industrial production managers, administrative service managers, and operations analysts.

Production managers, administrative service managers, and operations analysts will be employing information systems and technologies every day to accomplish their jobs, with extensive use of database and analytical software.