

Essentials of
MIS

Kenneth C. Laudon Jane P. Laudon 11e

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 MyMISLab**

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 Database querying and reporting	Chapter 12*
Manufacturing and Production		
Analyzing supplier performance and pricing	Spreadsheet date functions Data filtering Database functions	Chapter 2
Inventory management	Importing data into a database Database querying and reporting	Chapter 6
Bill of materials cost sensitivity analysis	Spreadsheet data tables Spreadsheet formulas	Chapter 11*
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 Database querying and reporting	Chapter 6*

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
Using Internet newsgroups for marketing	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

Essentials of Management Information Systems

Eleventh Edition

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New York University

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Azimuth Information Systems

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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.

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

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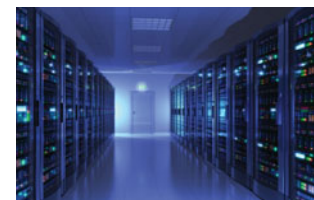
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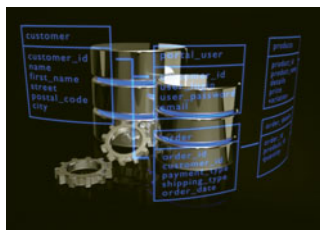
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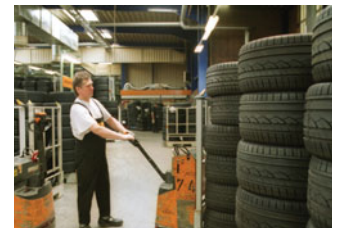
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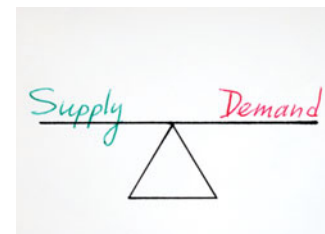
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Preface

We wrote this book for business school students who wanted an in-depth look at how today's business firms use information technologies and systems to achieve corporate objectives. Information systems are one of the major tools available to business managers for achieving operational excellence, developing new products and services, improving decision making, and achieving competitive advantage. Students will find here 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.

When interviewing potential employees, business firms often look for new hires who know how to use information systems and technologies for achieving bottom-line business results. Our hope is that after reading this book and completing the course, you will be able to participate in, and even lead, management discussions of information systems and technologies at your firm. Regardless of whether you are an accounting, finance, management, operations management, marketing, or information systems major, the knowledge and information you find in this book will be valuable throughout your business career.

What's New in This Edition

CURRENCY

The 11th edition features all new opening, closing, and Interactive Session cases. The text, figures, tables, and cases have been updated through October 2013 with the latest sources from industry and MIS research.

NEW FEATURES

- Chapter-opening cases have added new case study questions.
- More online cases: MIS Classic Cases, consisting of five outstanding cases from previous editions on companies such as Kmart or Blockbuster/Netflix, will be available on the book's Web site. In addition, all of the chapter-ending cases from the previous edition (Ess10e) will be available online.
- The chapter on Ethical and Social Issues in Information Systems has been positioned earlier in the text as Chapter 4 to highlight the importance of this topic.
- Learning Tracks and Video Cases for each chapter are listed at the beginning of each chapter.

NEW TOPICS

- **Social Business:** Extensive 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.
- **Social, Mobile, Local:** New e-commerce content in Chapter 10 describing how social tools, mobile technology, and location-based services are transforming marketing and advertising.

- **Big Data:** Chapter 6 on Databases and Information Management rewritten to provide in-depth coverage of Big Data and new data management technologies, including Hadoop, in-memory computing, non-relational databases, and analytic platforms.
- **Cloud Computing:** Expanded and updated 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 chapter-ending case on Amazon's cloud services. Cloud computing also covered in Chapter 6 (databases in the cloud); Chapter 8 (cloud security); Chapter 9 (cloud-based CRM); Chapter 10 (e-commerce); and Chapter 12 (cloud-based systems development).
- Consumerization of IT and BYOD
- Internet of Things
- Visual Web
- Location analytics
- Location-based services (geosocial, geoadvertising, geoinformation services)
- Social graph, social marketing, social search, social CRM
- Building an e-commerce presence
- Mobile device management
- Responsive Web design
- Expanded coverage of business analytics including big data analytics
- Mobile and native apps
- Cyberlockers
- Software-defined networking
- 3-D printing
- Quantum computing

What's New in MIS?

Plenty. In fact, there's a whole new world of doing business using new technologies for managing and organizing. What makes the MIS field the most exciting area of study in schools of business is the continuous change in technology, management, and business processes. (Chapter 1 describes these changes in more detail.)

A continuing stream of information technology innovations is transforming the traditional business world. Examples include the emergence of cloud computing, the growth of a mobile digital business platform based on smartphones and tablet computers, and not least, the use of social networks by managers to achieve business objectives. Most of these changes have occurred in the last few years. These innovations are enabling entrepreneurs and innovative traditional firms to create new products and services, develop new business models, and transform the day-to-day conduct of business. In the process, some old businesses, even industries, are being destroyed while new businesses are springing up.

For instance, the emergence of online video stores like Netflix for streaming, and Apple iTunes for downloading, has forever changed how premium video is distributed, and even created. Netflix in 2013 attracted 30 million subscribers to its DVD rental and streaming movie business. Netflix now accounts for 90% of streaming premium movies and TV shows, and consumes an estimated 33% of Internet bandwidth in the United States. Netflix has moved into premium TV show production with *House of Cards*, and *Arrested Development*, challenging cable networks like HBO, and potentially disrupting the cable industry dominance of TV show production. Apple's iTunes now accounts for 67% of movie and TV show downloads and has struck deals with major Hollywood studios to obtain the right to distribute recent movies and TV shows. A trickle of viewers are unplugging from cable and using only the Internet for entertainment.

E-commerce is back, generating over \$420 billion in revenues in 2013, and estimated to grow to over \$637 billion in 2017. Amazon's revenues grew 27 percent to \$61 billion in the 12-month period ending June 30, 2013, despite the recession, while offline retail grew by 5 percent. E-commerce is changing how firms design, produce and deliver their

products and services. E-commerce has reinvented itself again, disrupting the traditional marketing and advertising industry and putting major media and content firms in jeopardy. Facebook and other social networking sites such as YouTube, Twitter, and Tumblr, exemplify the new face of e-commerce in the 21st Century. They sell services. When we think of e-commerce we tend to think of a selling physical products. While this iconic vision of e-commerce is still very powerful and the fastest growing form of retail in the U.S., growing up alongside is a whole new value stream based on selling services, not goods. It's a services model of e-commerce. Growth in social commerce is spurred by powerful growth of the mobile platform: 35% of Facebook's users access the service from mobile phones and tablets. Information systems and technologies are the foundation of this new services-based e-commerce.

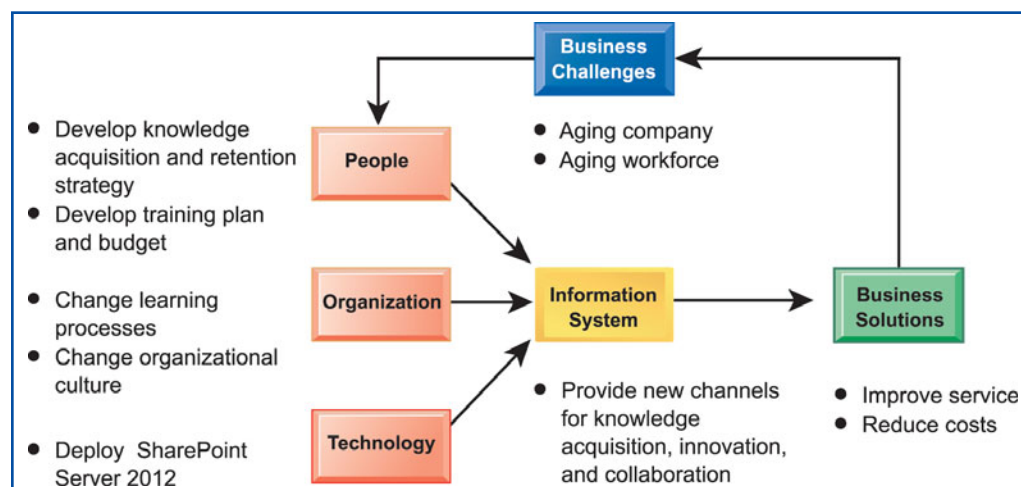
Likewise, the management of business firms has changed: With new mobile smartphones, high-speed wireless Wi-Fi networks, and wireless laptop computers, remote salespeople on the road are only seconds away from their managers' questions and oversight. Managers on the move are in direct, continuous contact with their employees. The growth of enterprise-wide information systems with extraordinarily rich data means that managers no longer operate in a fog of confusion, but instead have online, nearly instant, access to the really important information they need for accurate and timely decisions. In addition to their public uses on the Web, wikis and blogs are becoming important corporate tools for communication, collaboration, and information sharing.

The 11th Edition: The Comprehensive Solution for the MIS Curriculum

Since its inception, this text has helped to define the MIS course around the globe. This edition continues to be authoritative, but is also more customizable, flexible, and geared to meeting the needs of different colleges, universities, and individual instructors.

This book is now part of a complete learning package that includes the core text and an extensive offering of supplemental materials on the Web.

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: 24 video case studies (2 per chapter) plus 16 instructional videos that illustrate business uses of information systems, explain new technologies, and explore concepts. Videos are keyed to the topics of each chapter.



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.

In addition, for students and instructors who want to go deeper into selected topics, there are 49 online Learning Tracks that cover a variety of MIS topics in greater depth.

MyMISLab™ provides more in-depth coverage of chapter topics, career resources, additional case studies, supplementary chapter material, and data files for hands-on projects.

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.

Chapter Organization

Each chapter contains the following elements:

- A Chapter Outline that includes lists of all the supplemental Learning Tracks 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 series of Learning Objectives
- Two Interactive Sessions with Case Study Questions
- 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

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 only current (2013) examples from business and public organizations throughout the text to illustrate the important concepts in each chapter. All the case studies describe companies or organizations that are familiar to students, such as the San Francisco Giants, Facebook, Walmart, Google, Apple, and Procter & Gamble.

Interactivity

There's no better way to learn about MIS than by doing MIS! We provide different kinds of hands-on projects where students can work with real-world business scenarios and data, and

learn firsthand what MIS is all about. These projects heighten student involvement in this exciting subject.

- **Online Video Case Package.** Students can watch short videos online, either in-class or at home or work, and then apply the concepts of the book to the analysis of the video. Every chapter contains at least two business video cases that explain how business firms and managers are using information systems, describe new management practices, and explore concepts discussed in the chapter. Each video case consists of a video about a real-world company, a background text case, and case study questions. These video cases enhance students' understanding of MIS topics and the relevance of MIS to the business world. In addition, there are 16 Instructional Videos that describe developments and concepts in MIS keyed to respective chapters.
- **Interactive Sessions.** Two short cases in each chapter have been redesigned as Interactive Sessions to be used in the classroom or online to stimulate student interest and active learning. Each case concludes with case study questions. The case study questions provide topics for class discussion, Internet discussion, or written assignments.

INTERACTIVE SESSION: PEOPLE

The Pleasures and Pitfalls of BYOD

Just about everyone who has a smartphone wants to be able to bring it to work and use it on the job. And why not? Employees using their own smartphones would allow companies to enjoy all of the same benefits of a mobile workforce without spending their own money to purchase these devices. Smaller companies are able to go mobile without making large investments in devices and mobile services. According to Gartner Consultants, BYOD will be embraced by 38 percent of companies by 2016 and half of all companies will mandate BYOD by 2017. BYOD is becoming the "new normal."

But...wait a minute. Nearly three out of five enterprises believe that BYOD represents a growing problem for their organizations, according to a survey of 162 enterprises conducted by Osterman Research on behalf of Dell Inc. Although BYOD can improve employee job satisfaction and productivity, it also can cause a number of problems if not managed properly: Support for personally owned devices is more diffi-

transfer programs like Apple's iCloud; instead, employees use an IBM-hosted version called MyMobileHub. IBM even turns off Siri, the voice-activated personal assistant, on employees' iPhones because the spoken queries are uploaded to Apple servers.

Each employee's device is treated differently, depending on the model and the job responsibilities of the person using it. Some people are only allowed to receive IBM e-mail, calendars, and contacts on their portable devices, while others can access internal IBM applications and files (see Chapter 8). IBM equips the mobile devices of the latter category of employees with additional software, such as programs that encrypt information as it travels to and from corporate networks.

One company that has successfully implemented BYOD is Intel Corporation, the giant semiconductor company. About 70 percent of the 39,000 devices registered on its network are personal devices. Intel approached BYOD in a positive manner, trying to find

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

CASE STUDY QUESTIONS

1. What are the advantages and disadvantages of allowing employees to use their personal smartphones for work?
2. What people, organization, and technology factors should be addressed when deciding whether to allow employees to use their personal smartphones for work?
3. Compare the BYOD experiences of IBM and Intel. Why did BYOD at Intel work so well?
4. Allowing employees to use their own smartphones for work will save the company money. Do you agree? Why or why not?

Case Study Questions encourage students to apply chapter concepts to real-world companies in class discussions, student presentations, or writing 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. A Dirt Bikes USA running case in MyMISLab provides additional hands-on projects for each chapter.

Two real-world business scenarios per chapter provide opportunities for students to apply chapter concepts and practice management decision making.

2. Dollar General Corporation operates deep-discount stores offering housewares, cleaning supplies, clothing, health and beauty aids, and packaged food, with most items selling for \$1. Its business model calls for keeping costs as low as possible. The company has no automated method for keeping track of inventory at each store. Managers know approximately how many cases of a particular product the store is supposed to receive when a delivery truck arrives, but the stores lack technology for scanning the cases or verifying the item count inside the cases. Merchandise losses from theft or other mishaps have been rising and now represent over 3 percent of total sales. What decisions have to be made before investing in an information system solution?

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

Store & Region Sales Database							
Item #	Store N	Sales Region	Item Description	Unit Price	Units Sold	Week Ending	Click to Add
1	1	South	2005 17" Monitor	\$229.00	28	10/27/2013	
2	1	South	2005 17" Monitor	\$229.00	30	11/24/2013	
3	1	South	2005 17" Monitor	\$229.00	9	12/29/2013	
4	1	South	3006 101 Keyboard	\$19.95	30	10/27/2013	
5	1	South	3006 101 Keyboard	\$19.95	35	11/24/2013	
6	1	South	3006 101 Keyboard	\$19.95	39	12/29/2013	
7	1	South	6050 PC Mouse	\$8.95	28	10/27/2013	
8	1	South	6050 PC Mouse	\$8.95	3	11/24/2013	
9	1	South	6050 PC Mouse	\$8.95	38	12/29/2013	
10	1	South	8500 Desktop CPU	\$849.95	25	10/27/2013	
11	1	South	8500 Desktop CPU	\$849.95	27	11/24/2013	
12	1	South	8500 Desktop CPU	\$849.95	33	12/29/2013	
13	2	South	2005 17" Monitor	\$229.00	8	10/27/2013	
14	2	South	2005 17" Monitor	\$229.00	8	11/24/2013	
15	2	South	2005 17" Monitor	\$229.00	10	12/29/2013	
16	2	South	3006 101 Keyboard	\$19.95	8	10/27/2013	

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

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

In this exercise, you will use software at car-selling Web sites 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 Web site of CarsDirect (www.carsdirect.com) and begin your investigation. Locate the Ford Escape. Research the various Escape models, choose one you prefer in terms of price, features, and safety ratings. Locate and read at least two reviews. Surf the Web site of the manufacturer, in this case Ford (www.ford.com). Compare the information available on Ford's Web site with that of CarsDirect for the Ford Escape. Try to locate the lowest price for the car you want in a local dealer's inventory. Suggest improvements for CarsDirect.com and Ford.com.

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

- **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.

Assessment and AACSB Assessment Guidelines

The Association to Advance Collegiate Schools of Business (AACSB) is a not-for-profit corporation of educational institutions, corporations and other organizations that seeks to improve business education primarily by accrediting university business programs. 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 front end papers of this edition identify student learning objectives and anticipated outcomes for our Hands-on MIS projects. On the Laudon Web site is a more inclusive and detailed assessment matrix that identifies the learning objectives of each chapter and points to all the available assessment tools for ensuring students in fact do achieve the learning objectives. Because each school is different and may have different missions and learning objectives, no single document can satisfy all situations. 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 Prentice Hall representative for contact information.

For more information on the AACSB Assurance of Learning Program, and how this text supports assessment-based learning, please visit the Web site for this book.

Customization and Flexibility: New Learning Track Modules

Our Learning Tracks feature gives instructors the flexibility to provide in-depth coverage of the topics they choose. There are 49 Learning Tracks available to instructors and students. A Learning Tracks list at the beginning of each chapter directs students to short essays or additional chapters in MyMISLab. This supplementary content takes students deeper into MIS topics, concepts and debates; reviews basic technology concepts in hardware, software, database design, telecommunications, and other areas; and provide additional hands-on software instruction. The 11th Edition includes new Learning Tracks on E-Commerce Payment Systems, LAN Topologies, Building an E-Commerce Web Site, 4th Generation Languages, and Occupational and Career Outlook for Information Systems Majors 2012–2018.

Author-Certified Test bank and Supplements

- **Author-Certified Test Bank.** 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.
- **Annotated Slides.** The authors have prepared a comprehensive collection of fifty PowerPoint slides 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.

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.

MYMISLAB

MyMISLab is a Web-based assessment and tutorial tool that provides practice and testing while personalizing course content and providing student and class assessment and reporting. Your course is not the same as the course taught down the hall. Now, all the

resources both you and your students need for course success are in one place – flexible and easily organized and adapted for your individual course experience. Visit www.mymislab.com to see how you can teach, learn, experience MIS.

Career Resources

The Instructor’s Resource section of the Laudon Web site also provides extensive 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.

Instructional Support Materials

Instructor’s Resource

The support materials described in the following sections are conveniently available for adopters on the Instructor’s Resource Center.

Image Library

The Image Library is an impressive resource to help instructors create vibrant lecture presentations. Almost every figure and photo in the text is provided and organized by chapter for convenience. These images and lecture notes can be imported easily into Microsoft PowerPoint to create new presentations or to add to existing ones.

Instructor’s Manual

The Instructor’s Manual features not only answers to review, discussion, case study, and group project questions but also an in-depth lecture outline, teaching objectives, key terms, teaching suggestions, and Internet resources.

Test Item File

The Test Item File is a comprehensive collection of true–false, multiple-choice, fill-in-the-blank, and essay questions. The questions are rated by difficulty level and the answers are referenced by section. The test item file also contains questions tagged to the AACSB learning standards. An electronic version of the Test Item File is available in TestGen and TestGen conversions are available for BlackBoard or WebCT course management systems. All TestGen files are available for download at the Instructor Resource Center.

PowerPoint Slides

Electronic color slides created by Azimuth Interactive Corporation, Inc., are available in Microsoft PowerPoint. The slides illuminate and build on key concepts in the text.

Video Cases and Instructional Videos

Instructors can download step-by-step instructions for accessing the video cases from the Instructor Resources Center. See page xix for a list of video cases and instructional videos.

Learning Track Modules

49 Learning Tracks provide additional coverage topics for students and instructors. See page xx for a list of the Learning Tracks available for this edition.

VIDEO CASES AND INSTRUCTIONAL VIDEOS

Chapter	Video
Chapter 1: Business Information Systems in Your Career	Case 1: UPS Global Operations with the DIAD Case 2: Google Data Center Efficiency Best Practices Instructional Video 1: Green Energy Efficiency in a Data Center Using Tivoli Architecture (IBM) Instructional Video 2: Tour IBM's Raleigh Data Center
Chapter 2: Global E-business and Collaboration	Case 1: Walmart's Retail Link Supply Chain Case 2: Salesforce.com: The Emerging Social Enterprise Instructional Video 1: US Foodservice Grows Market with Oracle CRM on Demand
Chapter 3: Achieving Competitive Advantage with Information Systems	Case 1: National Basketball Association: Competing on Global Delivery With Akamai OS Streaming Case 2: IT and Geo-Mapping Help a Small Business Succeed Case 3: Materials Handling Equipment Corp: Enterprise Systems Drive Corporate Strategy for a Small Business Instructional Video 1: SAP BusinessOne ERP: From Orders to Final Delivery and Payment
Chapter 4: Ethical and Social Issues in Information Systems	Case 1: What Net Neutrality Means for You Case 2: Facebook Privacy Case 3: Data Mining for Terrorists and Innocents Instructional Video 1: Viktor Mayer Schönberger on The Right to Be Forgotten
Chapter 5: IT Infrastructure: Hardware and Software	Case 1: ESPN.com: Getting to eXtreme Scale On the Web Case 2: Salesforce.com: SFA on the iPhone and iPod Touch Case 3: Hudson's Bay Company and IBM: Virtual Blade Platform Instructional Video 1: Google and IBM Produce Cloud Computing Instructional Video 2: IBM Blue Cloud Is Ready-to-Use Computing
Chapter 6: Foundations of Business Intelligence: Databases and Information Management	Case 1: Dubuque Uses Cloud Computing and Sensors to Build a Smarter City Case 2: Maruti Suzuki Business Intelligence and Enterprise Databases
Chapter 7: Telecommunications, the Internet, and Wireless Technology	Case 1: Telepresence Moves Out of the Boardroom and Into the Field Case 2: Virtual Collaboration With Lotus Sametime
Chapter 8: Securing Information Systems	Case 1: Stuxnet and Cyberwarfare Case 2: Cyberespionage: The Chinese Threat Case 3: IBM Zone Trusted Information Channel (ZTIC) Instructional Video 1: Sony PlayStation Hacked; Data Stolen from 77 Million Users Instructional Video 2: Zappos Working to Correct Online Security Breach Instructional Video 3: Meet the Hackers: Anonymous Statement on Hacking SONY
Chapter 9: Achieving Operational Excellence and Customer Intimacy: Enterprise Applications	Case 1: Workday: Enterprise Cloud Software-as-a-Service (SaaS) Case 2: Evolution Homecare Manages Patients with Microsoft Dynamics CRM Instructional Video 1: GSMS Protects Products and Patients By Serializing Every Bottle of Drugs
Chapter 10: E-commerce: Digital Markets, Digital Goods	Case 1: Groupon: Deals Galore Case 2: Etsy: A Marketplace and Community Case 3: Ford AutoXchange B2B Marketplace
Chapter 11: Improving Decision Making and Managing Knowledge	Case 1: How IBM's Watson Became a Jeopardy Champion Case 2: Alfresco: Open Source Document Management and Collaboration Case 3: FreshDirect Uses Business Intelligence to Manage Its Online Grocery. Case 4: Business Intelligence Helps the Cincinnati Zoo Work Smarter Instructional Video 1: Analyzing Big Data: IBM Watson: Watson After Jeopardy
Chapter 12: Building Information Systems and Managing Projects	Case 1: IBM: BPM in a Service-Oriented Architecture Case 2: IBM Helps the City of Madrid With Real-Time BPM Software Instructional Video 1: BPM: Business Process Management Customer Story Instructional Video 2: Workflow Management Visualized

LEARNING TRACKS

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 2012-2020
Chapter 2: Global E-business and Collaboration	Systems From a Functional Perspective IT Enables Collaboration and Teamwork Challenges of Using Business Information 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 Web Site
Chapter 11: Improving Decision Making and Managing Knowledge	Building and Using Pivot Tables The Expert System Inference Engine Challenges of Knowledge Management Systems
Chapter 12: Building Information Systems and Managing Projects	Capital Budgeting Methods for Information Systems Investments Enterprise Analysis: Business Systems Planning and Critical Success Factors Unified Modeling Language Information Technology Investments and Productivity

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Information Systems in the Digital Age

P A R T I

- 1 Business Information Systems in Your Career**
- 2 Global E-business and Collaboration**
- 3 Achieving Competitive Advantage with Information Systems**
- 4 Ethical and Social Issues in Information Systems**

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 several 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 information systems to succeed in my business career? What ethical and social issues are raised by widespread use of information systems?

Business Information Systems in Your Career

CHAPTER 1

STUDENT LEARNING OBJECTIVES

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

1. How are information systems transforming business, and what is their relationship to globalization?
2. Why are information systems so essential for running and managing a business today?
3. What exactly is an information system? How does it work? What are its people, organizational, and technology components?
4. How will a four-step method for business problem solving help you solve information system-related problems?
5. How will information systems affect business careers, and what information systems skills and knowledge are essential?

LEARNING TRACKS

1. How Much Does IT Matter?
2. The Changing Business Environment for Information Technology
3. The Business Information Value Chain
4. The Mobile Digital Platform
5. Occupational and Career Outlook for Information Systems Majors 2012-2020

VIDEO CASES

- Case 1:* UPS Global Operations with the DIAD
Case 2: Google Data Center Efficiency Best Practices
Instructional Video 1: Green Energy Efficiency in a Data Center Using Tivoli Architecture (IBM)
Instructional Video 2: Tour IBM's Raleigh Data Center

CHAPTER OUTLINE

Chapter-Opening Case: *The San Francisco Giants Win Big with Information Technology*

1.1 The Role of Information Systems in Business Today

1.2 Perspectives on Information Systems and Information Technology

1.3 Understanding Information Systems: A Business Problem-Solving Approach

1.4 Information Systems and Your Career

Business Problem-Solving Case: *A New Look at Electronic Medical Records*

THE SAN FRANCISCO GIANTS WIN BIG WITH INFORMATION TECHNOLOGY

The San Francisco Giants are one of the oldest U.S. baseball teams, and one of the most successful as well. They have won the most games of any team in the history of American baseball and any North American professional sports team. The Giants have captured 22 National League pennants and appeared in 19 World Series competitions—both records in the National League. Their most recent triumph was winning the 2012 World Series. The Giants have outstanding players (with the most Hall of Fame players in all of professional baseball) and coaches, but some of their success, both as a team and as a business, can be attributed to their use of information technology.

Baseball is very much a game of statistics, and all the major teams are constantly analyzing their data on player performance and optimal positioning on the field (see the Chapter 11 opening case on Moneyball). But the Giants are doing more. They have started to use a video system from Sportsvision called Fieldf/x, which helps teams analyze player reaction times. The information the system produces on player speed and response time, such as how quickly an outfielder comes in for a ball or reacts to line drives, will make player data analysis much more accurate. In some cases, it will provide information that didn't exist before. Fieldf/x generates a million records per game.



© Cynthia Lindow/Alamy.

That amounts to 5 billion records in three years, the amount of time required to provide a high level of confidence in the data. In addition to player and team statistics, the Giants are starting to collect data about fans, including ticket purchases and social media activity.

Under the leadership of chief information officer (CIO) Bill Schlough, the San Francisco Giants have pioneered in dynamic ticket pricing, based on software from Qcue, in which the price of a ticket fluctuates according to the level of demand for a particular ball game. It's similar to the dynamic ticket pricing used in the airline industry. If a game is part of a crucial series, the Giants are playing an in-division rival, or the game appears to be selling out especially fast, ticket prices will rise. If the game isn't a big draw, ticket prices fall. The Giants have sold out 100 percent of their home games since October 2010, and have increased season ticket sales from 21,000 in 2010 to 29,000 in 2012.

Season ticket-holders don't normally attend every game, and this can lose revenue for a team. Every time a fan with a season ticket decides to stay home from a game, the sports franchise loses an average of \$20 in concession and merchandise sales. To make sure stadium seats are always filled, the Giants created a secondary online ticket market where season ticket holders can resell tickets they are not using over the Internet. The Giants's information technology specialists found a way to activate and deactivate the bar codes on tickets so that they can be resold. The system is also a way for the Giants to provide additional service to customers.

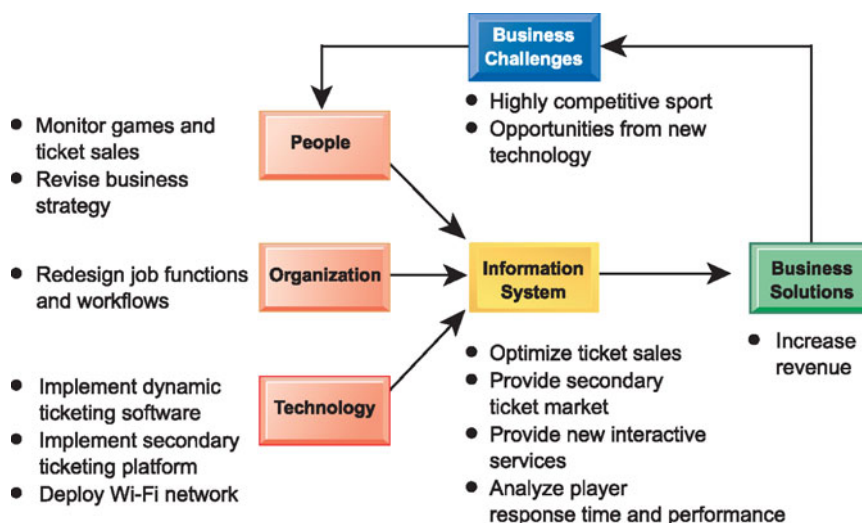
The Giants have also taken advantage of wireless technology to enhance their fans' experience. AT&T Park, the Giants' stadium, has a large high-speed wireless network, which fans can use to check scores and video highlights or do e-mail. A "social media headquarters" called @Cafe provides a space for fans to congregate, plug in, buy an iced coffee, read tweets, view other fans' photos, and even connect with the players.

Sources: Peter High, "Interview with World Champion San Francisco Giants CIO and San Jose Giants Chairman, Bill Schlough," *Forbes*, February 4, 2013; Nicole Laskowski, "Tech-savvy San Francisco Giants Aim for Bleachers with @Café," *SearchCIO.com*, June 20, 2013; Michael Vizard, "Sport Franchises Use IT to Keep Fans in Seats," *CIO Insight*, January 18, 2013; www.sanfranciscogiants.mlb.com, accessed April 19, 2013; and Fritz Nelson, "Chief of the Year," *Information Week*, December 17, 2012.

The challenges facing the San Francisco Giants and other baseball teams show why information systems are so essential today. Major league baseball is a business as well as a sport, and teams such as the Giants need to take in revenue from games in order to stay in business. Major league baseball is also a business where what matters above all is winning, and any way of using information to improve player performance is a competitive edge.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. To increase stadium revenue, the San Francisco Giants developed a dynamic ticket pricing system designed to adjust ticket prices to customer demand and to sell seats at the optimum price. The team developed another ticketing system that enables existing ticketholders to sell their tickets easily online to someone else. An additional way of cultivating customers is to deploy modern information technology at AT&T Park, including a massive Wi-Fi wireless network with interactive services. To improve player performance, the Giants implemented a system that captures video on players and then uses the data to analyze player speed and reaction times.

Here are some questions to think about: What role does technology play in the San Francisco Giants's success as a baseball team? Assess the contributions of the systems described in this case study.



1.1 The Role of Information Systems in Business Today

It's not business as usual in America any more, or the rest of the global economy. In 2013, American businesses will invest nearly \$1 trillion in information systems hardware, software, and telecommunications equipment—more than half of all capital investment in the United States. In addition, they will spend another \$600 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. More than half of all business investment in the United States each year involves information systems and technologies, and these expenditures grew at around 4 percent in 2012, far faster than the economy as a whole (BEA, 2013; Gartner 2013). Worldwide, expenditures for information technology exceeded \$3.6 trillion.

HOW INFORMATION SYSTEMS ARE TRANSFORMING BUSINESS

You can see the results of this massive spending around you every day by observing how people conduct business. Cell phones, smartphones, tablet computers, e-mail, and online conferencing over the Internet have all become essential tools of business. In 2012, more than 102 million businesses had dot-com Internet sites registered. Approximately 193 million adult Americans are online, 19 million purchase something every day on the Internet, 40 million research a product, and 116 million use a search engine. What this means is that if you and your business aren't connected to the Internet and wireless networks, chances are you are not being as effective as you could be (Pew Internet and American Life, 2013).

Despite the economic downturn, in 2012 FedEx moved over one billion packages in the United States, mostly overnight, and United Parcel Service (UPS) moved more than 4 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. Supply chains have become more fast 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 in order to reduce their overhead costs and get to market faster. If you are not a part of this new supply chain management economy, chances are your business is not as efficient as it could be.

As newspaper readership continues to decline, 150 million people read at least some of their news online, 110 million read actual newspapers online, and 170 million use a social networking site like Facebook, Tumblr, or Google+. Over 100 million bank online, and around 74 million now read blogs, creating an explosion of new writers, readers, and new forms of

customer feedback that did not exist before. Adding to this mix of new social media, about 100 million people use Twitter, the online and cellular text messaging service, 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 are growing in 2013 at around 7 percent at a time when traditional advertising and commerce have been flat. Google's online ad revenues surpassed \$50 billion in 2012. Is your advertising department reaching this new Web-based customer?

New federal security and accounting laws require many businesses to keep e-mail 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 1.8 zettabytes (1.8 trillion gigabytes), equivalent to more than 50,000 Libraries of Congress. Does your compliance department meet the minimal requirements for storing financial, health, and occupational information? If they don'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.

WHAT'S NEW IN MANAGEMENT INFORMATION SYSTEMS?

Lots! What makes management information systems the most exciting topic in business is the continual change in technology, management use of the technology, and the impact on business success. New businesses and industries appear, old ones decline, and successful firms are those that learn how to use the new technologies. Table 1.1 summarizes the major new themes in business uses of information systems. These themes will appear throughout the book in all the chapters, so it might be a good idea to take some time now and discuss these with your professor and other students.

In the technology area are three interrelated changes: (1) the mobile digital platform composed of smartphones and tablet devices, (2) the growing business use of "big data," and (3) the growth in "cloud computing," where more and more business software runs over the Internet.

IPhones, Android phones, BlackBerrys, and high definition tablet computers are not just gadgets or entertainment outlets. They represent new emerging computing and media platforms based on an array of new hardware and software technologies. More and more business computing is moving from PCs and desktop machines to these mobile devices. Managers are increasingly using these devices to coordinate work, communicate with employees, and provide information for decision making. In 2013, more than half of Internet users will access the Web through mobile devices. To a large extent these devices change the character of corporate computing.

Managers routinely use online collaboration and social technologies in order to make better, faster decisions. As management behavior changes, how work gets organized, coordinated, and measured also changes. By connecting employees working on teams and projects, the social network is where work gets done, where plans are executed, and where managers manage. Output from social networks as well as from Web traffic and machine-generated data from sensors is creating vast pools of Big Data, with the potential for much more fine-grained data analysis and insights.

The strength of cloud computing, and the growth of the mobile digital platform, mean that organizations can rely more on telework, remote work, and distributed decision making.

TABLE 1.1

What's New in MIS

Change	Business Impact
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 on corporate computers. Major business applications are delivered online as an Internet service (Software as a Service-SaaS).
Big Data	Businesses look for insights from huge volumes of data from Web traffic, e-mail messages, social media content, and machines (sensors).
A mobile digital platform emerges to compete with the PC as a business system	The Apple iPhone and Android mobile devices are able to download hundreds of thousands of applications to support collaboration, location-based services, and communication with colleagues. Small tablet computers, including the iPad and Kindle Fire, challenge conventional laptops as platforms for consumer and corporate computing.
MANAGEMENT	
Managers adopt online collaboration and social networking software to improve coordination, collaboration, and knowledge sharing.	Google Apps, Google Sites, Microsoft's Windows SharePoint Services, and IBM's Lotus Connections are used by over 100 million business professionals worldwide to support blogs, project management, online meetings, personal profiles, social bookmarks, and online communities.
Business intelligence applications accelerate.	More powerful data analytics and interactive dashboards provide real-time performance information to managers to enhance decision making.
Virtual meetings proliferate.	Managers adopt telepresence, video conferencing, and Web conferencing technologies to reduce travel time, and cost, while improving collaboration and decision making.
ORGANIZATIONS	
Social business	Businesses use social networking platforms, including Facebook, Twitter, and internal corporate social tools, to deepen interactions with employees, customers, and suppliers. Employees use blogs, wikis, e-mail texting, and messaging to interact in online communities.
Telework gains momentum in the workplace.	The Internet, wireless laptops, smartphones, and tablet computers make it possible for growing numbers of people to work away from the traditional office. 55 percent of U.S. businesses have some form of remote work program.
Co-creation of business value	Sources of business value shift from products to solutions and experiences and from internal sources to networks of suppliers and collaboration with customers. Supply chains and product development become more global and collaborative; customer interactions help firms define new products and services.

This same platform means firms can outsource more work, and rely on markets (rather than employees) to build value. It also means that firms can collaborate with suppliers and customers to create new products, or make existing products more efficiently.

You can see some of these trends at work in the Interactive Session on People. Millions of managers and employees rely heavily on the mobile digital platform to coordinate suppliers

INTERACTIVE SESSION: PEOPLE**Meet the New Mobile Workers**

How much of your job can you do from the palm of your hand? Probably more than you think. There are many job functions today that can be performed using an iPad, iPhone, BlackBerry, or Android mobile device, both for rank-and-file employees and their managers. Businesses large and small are benefiting.

The BlackBerry used to be the favorite mobile handheld for business because it was optimized for e-mail and messaging, with strong security and tools for accessing internal corporate systems. Now that's changing. Companies large and small are starting to deploy Apple's iPhone and iPad as well as Android devices to conduct more of their work. They are enhancing their security systems so that mobile users can remotely access corporate systems with confidence. And they are developing more far-reaching applications to take advantage of the stunning mobile and graphic capabilities.

Many of the recent mobile applications have been for e-mailing, or for supplementing existing workplace tasks, like digital flight manuals for airplane pilots on iPads or checking in guests at hotels. But now, as mobile technology becomes more affordable and easy to use, it's spreading core work functions as well, such as marketing materials for pharmaceutical reps, customer account software for service technicians, and apps for farmers to test the quality of cow's milk.

Jackson Kayak is the leading whitewater kayak manufacturer. Its president, Eric Jackson, is a champion kayaker who spends half of each year following competitions and events throughout North America. Eric's job requires that he participate in athletic events, monitor industry trends in the field, and meet directly with dealers and customers. With the iPhone and iPad, Jackson claims he can run the entire 120-person company from afar.

Jackson's Wi-Fi-equipped RV connects wirelessly to company headquarters in Sparta, Tennessee. When Jackson's not on Wi-Fi, he uses his iPad 3G cellular connection. The iPad gives him instant access to his entire operation, so he can analyze customer data, refresh Website content, or approve new designs. Jackson's iPad includes calendars, e-mail, contact management, and the ability to create and edit documents, spreadsheets, and presentations—all the tools this executive needs to communicate with the home office, dealers, and customers.

Back at the shop, Jackson Kayak's managers and employees find iPad and iPhone equally invaluable. In the factory, Chief Operations Officer John Ratliff can compare Jackson Kayak's manufacturing equipment side-by-side with images of replacement parts on

the iPad to make sure he's getting the correct pieces. The iPhone and iPad have become so indispensable that the company outfitted its entire workforce, from customer service, to design, to quality control, with iPhones. Many have iPads as well.

Using handhelds to run the business is not limited to small companies. PepsiCo manufactures and sells brands including Pepsi, Gatorade, Mountain Dew, Tropicana, Quaker, and Frito-Lay worldwide and has over 300,000 employees. The company uses a complex web of interlocking distribution systems to move its products from its manufacturing and warehouse facilities onto trucks and then into stores in time to meet customer demand. PepsiCo runs about 17,000 distribution routes each day. The iPhone and iPad help employees of PepsiCo's North America Beverages division ensure that the right products arrive in the right locations as quickly and efficiently as possible.

In the past, PepsiCo drivers and merchandisers began each day by picking up printed schedules with order quantities and tasks to be performed at each outlet, from unloading cases of soda to setting up new product displays. It was difficult to accommodate last-minute changes in orders because communicating with the delivery drivers was difficult when they were on the road.

PepsiCo North America Beverages created a custom in-house app for the iPhone called Power4Merch, which immediately notifies merchandisers when a driver has arrived at a store. The merchandiser's iPhone has an electronic timecard, and he can see his schedule, the store details, the account profiles, and everything he needs to know to service the store.

PepsiCo managers use iPads with custom applications to monitor their teams' performance; pull up pricing, planograms, and contracts; and help coordinate deliveries with merchandising. The Manager's Briefcase app provides territory sales managers with electronic versions of all the paperwork and resources they need to manage their teams, including store audits, employee coaching forms, and automated notifications to merchandisers. A manager can make manpower assignments directly on the iPad. The iPad automatically sends a notification to the merchandiser's iPhone informing him he has an additional stop to make, for example. In the past, managers had to spend much of their time on the phone, checking e-mail in the office, and checking paperwork. With the iPad, the manager starts and ends his day with his team.

The second iPad app, called SPOTLight, gives managers instant access to their Web-based SharePoint

content. They can pull out pricing, display planograms, customer development agreements, or new contracts.

PepsiCo's iPhone and iPad systems are integrated with its established corporate information systems. The company uses Mobile Device Management from AirWatch to securely deploy and manage its mobile applications and also takes advantage of the built-in security on iPhone and iPad to protect them from unauthorized access.

PepsiCo's main competitor, beverage-bottling company Coca-Cola Enterprises Inc. (CCE), is benefiting from mobile technology as well. CCE uses mobile field service software from ServiceMax Inc. to streamline the work activities of its technicians, who service restaurant soda fountains and fix vending machines. Previously, after a technician visited a customer on site, he would go back to his car, transfer information from paper notes into a database on his

laptop, and transmit it to Coca-Cola's aging centralized software system. Many technicians spent an extra half hour at the end of each day polishing their paperwork.

In 2012 about 100 CCE employees started using ServiceMax apps on iPhones to dispatch technicians to a day's worth of service calls, provide detailed customer information, automatically update lists of service parts stored in their vans, and transfer information to the billing department. The new system cut administration time for service technicians by a third, and employees are freed up to service other companies' equipment in addition to CCE's own. ServiceMax charges about \$1000 per person per year for a subscription.

Sources: Shira Ovide, "Meet the New Mobile Workers," *The Wall Street Journal*, March 11, 2013; "Apple iPad in Business," www.apple.com, accessed April 18, 2013; and Aaron Freimark, "Apple Offers More iPad Management Features Than You Might Think," searchconsumerization.com, April 2, 2013.

CASE STUDY QUESTIONS

1. What kinds of applications are described here? What business functions do they support? How do they improve operational efficiency and decision making?
2. Identify the problems that businesses in this case study solved by using mobile digital devices.
3. What kinds of businesses are most likely to benefit from equipping their employees with mobile digital devices such as iPhones and iPads?
4. One company deploying iPhones has said, "The iPhone is not a game changer, it's an industry changer. It changes the way that you can interact with your customers" and "with your suppliers." Discuss the implications of this statement.

iPhone and iPad Business Applications

1. *Salesforce Mobile*
2. *Cisco WebEx*
3. *SAP Business ByDesign*
4. *iWork*
5. *QuickBooks Online*
6. *Adobe Reader*
7. *Oracle Business Intelligence*
8. *Dropbox*



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Whether it's attending an online meeting, checking orders, working with files and documents, or obtaining business intelligence, Apple's iPhone and iPad offer unlimited possibilities for business users. A stunning multitouch display, full Internet browsing, and capabilities for messaging, video and audio transmission, and document management, make each an all-purpose platform for mobile computing.

and shipments, satisfy customers, and organize work activities. A business day without these mobile devices or Internet access would be unthinkable. As you read this case, note how the mobile platform has changed the way people do their work and make decisions.

GLOBALIZATION CHALLENGES AND OPPORTUNITIES: A FLATTENED WORLD

Prior to 1492 and the voyages of Columbus and others to the Americas, there was no truly global economic system of trade that connected all the continents on earth. After the fifteenth century, a global trading system began to emerge. The world trade that ensued after these voyages 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. Until the Internet was invented and refined, the global economy was inefficient because it was difficult and costly to communicate from one corner of the earth to another.

By 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. U.S. and European countries were in a fight for their economic lives, 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 2013, more than 33 percent of the U.S. economy resulted from foreign trade, both imports and exports. In Europe and Asia, the number exceeds 50 percent. Half of the Fortune 500 U.S. firms derive at least half their revenues from foreign operations. For instance, more than 50 percent of Intel’s revenues in 2012 came from overseas sales of its microprocessors, and the same is true for General Electric, Ford Motor Company, IBM, Dow Chemical, and McDonald’s. Toys for chips: 80 percent of the toys sold in the United States are manufactured in China, while 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 decade, the United States lost several million manufacturing jobs to offshore, low-wage producers. But manufacturing is now a very small part of U.S. employment (less than 12 percent). 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 include “tradable service” jobs in architecture, financial services, customer call centers, consulting, engineering, and even radiology.

On the plus side, the U.S. economy creates over 3.5 million new jobs in a normal year. Employment in information systems and the other service occupations listed previously have 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. In the midst of an economic recession, jobs in information systems are among the most in demand.

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. You will find throughout this book 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? That’s 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, are able to 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 in order 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 brilliant business practices and supportive management to achieve world-class operational efficiency. In fiscal year 2013, Walmart achieved more than \$469 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 9,600 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 the industry, achieving sales of more than \$450 per square foot, compared to its closest competitor, Target, at \$425 a square foot, with other large retail firms producing less than \$12 a square foot.

Amazon, the largest online retailer on earth, generating \$61 billion in sales in 2012, invested \$2.1 billion in information systems so that when one of its estimated 170 million customers 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 distribution model based on its own operating system and iTunes store. Apple has prospered from a continuing stream of innovations, including the original iPod, iPod nano, 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 to really 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 computers 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 computer 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 to 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. In the past 10 years, information systems and technologies have made it possible for managers to use real-time data from the marketplace when making decisions.

For instance, Verizon Corporation, one of the largest regional Bell 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 U.S. 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 e-mails, 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 greatly expand their public reporting on derivatives and other financial instruments.

1.2 Perspectives on Information Systems and Information Technology

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 in order to achieve its business objectives. This includes not only computer machines, disk drives, 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 best understood 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.

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 the San Francisco Giants system for selling tickets, the raw input consists of order data for tickets, such as the purchaser's name, address, credit card number, number of tickets ordered, and the date of the game for which the ticket is being purchased. Another input would be the ticket price, which would fluctuate based on computer analysis of how much could optimally be charged for a ticket for a particular game. Computers store these data and process them to calculate order totals, to track ticket purchases, and to send requests for payment to credit card companies. The output consists of tickets to print out, receipts for orders, and reports on online ticket orders. The system provides meaningful information, such as

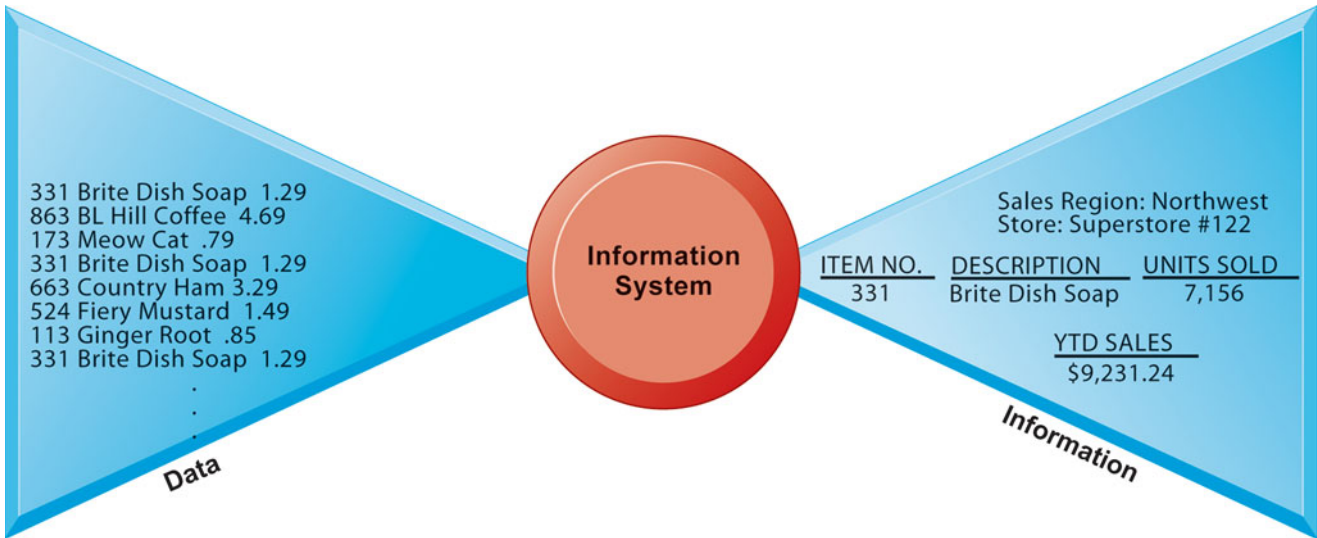


Figure 1.1
Data and Information

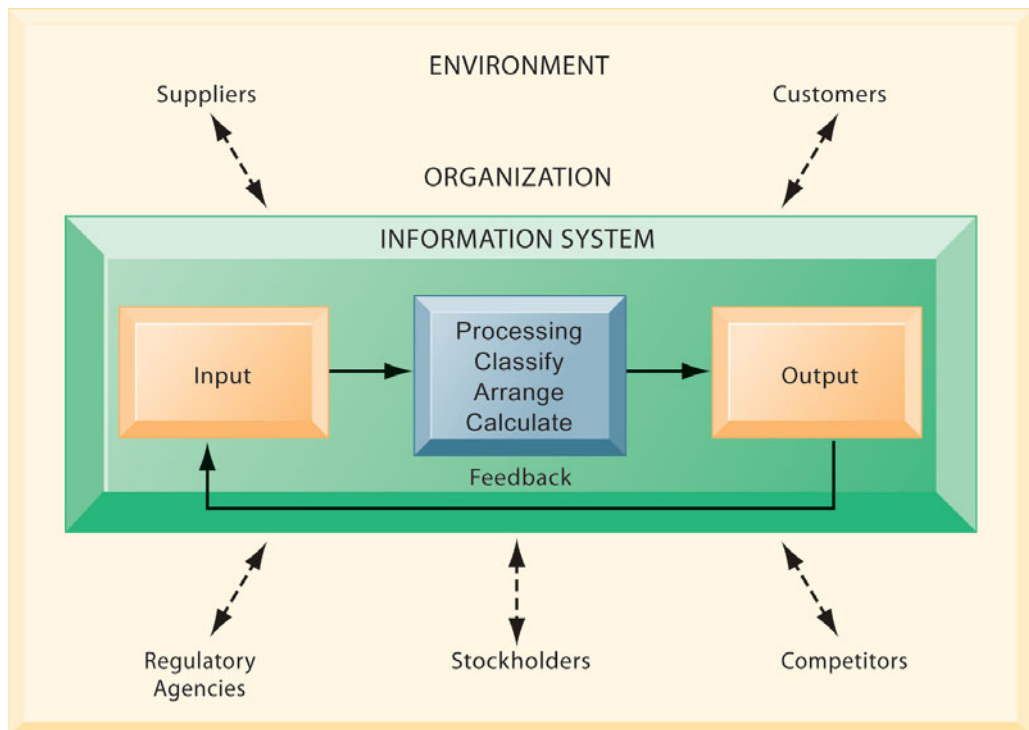
Raw data from a supermarket checkout counter can be processed and organized to produce meaningful information, such as the total unit sales of dish detergent or the total sales revenue from dish detergent for a specific store or sales territory.

the number of tickets sold for a particular game or at a particular price, the total number of tickets sold each year, and frequent customers.

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. Electronic computers and related

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.



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.

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 fully understand information systems, 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 used by managers and employees in the firm.

DIMENSIONS OF INFORMATION SYSTEMS

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



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

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. In order to understand how a specific business firm uses information systems, you need to know something about the structure, history, and culture of the company.

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. Information systems are built by the firm in order to serve these different specialties and different levels of the firm. Chapter 2 provides more detail on these business functions and organizational levels and the ways in which they are supported by information systems.

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, and without 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 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 different 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 faced by organizations, 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.

But 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 telecommunications devices that link computers together.

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 used by firms 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**. The Internet is a global "network of networks" that uses universal standards (described in Chapter 7) to connect millions of different networks in over 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 provided by the Internet 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 on 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 of 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 through 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.

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 different 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 Web site.

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 using 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 World Wide 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 Understanding Information Systems: A Business Problem-Solving Approach

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 of 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 are able to 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

INTERACTIVE SESSION: TECHNOLOGY**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 nearly 400,000 employees, 96,000 vehicles, and the world’s ninth largest airline.

Today UPS delivers 16.3 million packages and documents each day in the United States and more than 220 other countries and territories. The firm has been able to maintain leadership in small-package delivery services despite stiff competition from FedEx and Airborne Express 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 Web site. 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 software to create the most efficient delivery route for each driver that considers traffic, weather conditions, and the location of each stop. In 2009, UPS began installing sensors in its delivery vehicles that can capture the truck’s speed and location, the number of times it’s placed in reverse and whether the driver’s seat belt is buckled. At the end of each day, this information is uploaded to a UPS central computer and analyzed overnight. By combining GPS information and data from fuel-efficiency sensors installed on more than 46,000 vehicles, UPS in 2011 reduced fuel consumption by 8.4 million gallons and cut 85 million miles off its routes.

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 com-

puter 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 Web site using their own computers or mobile phones. UPS now has mobile apps and a mobile Web site for iPhone, BlackBerry, and Android smartphone users.

Anyone with a package to ship can access the UPS Web site 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 Web site 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 Web sites so that they can track shipments without visiting the UPS site.

A Web-based Post Sales Order Management System (OMS) manages global service orders and inventory for critical parts fulfillment. The system enables high-tech electronics, aerospace, medical equipment, and other companies anywhere in the world that ship critical parts to quickly assess their critical parts inventory, determine the most optimal routing strategy to meet customer needs, place orders online, and track parts from the warehouse to the end user. An automated e-mail or fax feature keeps customers informed of each shipping milestone and can provide notification of any changes to flight schedules for commercial airlines carrying their parts.

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.

In 2006 UPS started managing the supply chains of medical device and pharmaceutical companies. For example, at UPS's Louisville, Kentucky headquarters, company pharmacists fill 4,000 orders a day for insulin pumps and other supplies from customers of Medtronic Inc., the Minneapolis-based medical-device company. UPS pharmacists in Louisville log into Medtronic's system, fill the orders with devices stocked on site, and arrange for UPS to ship them to patients. UPS's service has allowed Medtronic to close its own distribution warehouse and significantly reduce the costs of processing each order. UPS and other parcel-delivery companies are investing in giant warehouses that service multiple pharmaceutical companies at once, with freezers for medicines and high-security vaults for controlled substances.

UPS has partnered with Pratt & Whitney, a world leader in the design, manufacture, and service of aircraft engines, space propulsion systems, and industrial gas turbines, to run its Georgia Distribution Center, which processes 98 percent of the parts used to overhaul Pratt & Whitney jet engines for shipment around the world. UPS and Pratt & Whitney employees together keep track of about 25,000 different kinds of parts and fulfill up to 1,400 complex orders each day – ranging from a few nuts and bolts to kits comprising all the parts needed to build an entire engine. On the receiving side of the 250,000-square-foot building, UPS quality inspectors check newly arrived parts against blueprints.

Sources: Steve Rosenbush and Michael Totty, "How Big Data Is Transforming Business," *The Wall Street Journal*, March 10, 2013; Thomas H. Davenport, "Analytics That Tell You What to Do," *The Wall Street Journal*, April 3, 2013; Elana Varon, "How UPS Trains Front-Line Workers to Use Predictive Analytics," *DataInformed*, January 31, 2013; www.ups.com, accessed April 17, 2013; Jennifer Levitz and Timothy W. Martin, "UPS, Other Big Shippers, Carve Health Care Niches," *The Wall Street Journal*, June 27, 2012; and "Logistics in Action: At Pratt & Whitney Facility, Silence Is Golden," *UPS Compass*, August 2012.

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?

Using a handheld computer called a Delivery Information Acquisition Device (DIAD), UPS drivers automatically capture customers' signatures along with pickup, delivery, and time card information. UPS information systems use these data to track packages while they are being transported.



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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 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 what its causes are, and about what can be done about the problem 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 a older, out-of-date information system for keeping track of customers. Or it might be a combination of both poor employee incentives for treating 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.

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,

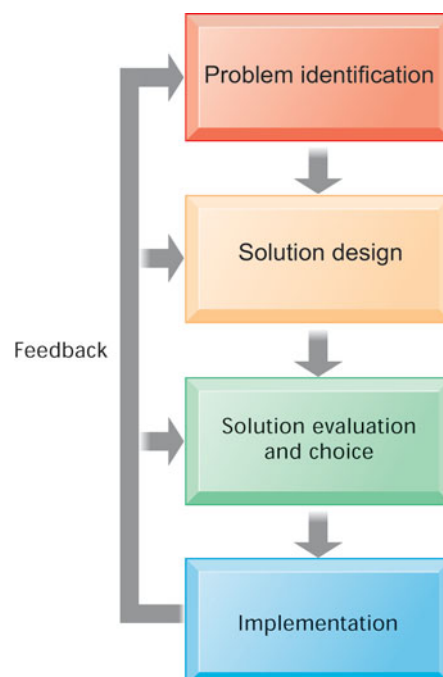


Figure 1.4
Problem Solving Is a Continuous Four-Step Process
 During implementation and thereafter, the outcome must be continually measured and the information about how well the solution is working is fed back to the problem solvers. In this way, the identification of the problem can change over time,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

political in-fighting, and changes in the organization’s surrounding environment. Typical technology problems include insufficient or aging hardware, outdated software, inadequate database capacity, insufficient telecommunications 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 different 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 new technologies are accompanied by changes in organization and people.

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

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 telecommunications 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

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 enthusiastically support the changes.

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 often assumed that once a problem is “solved,” it goes away and can be forgotten about. And 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 U.S. 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 truly “fit” the situation. Initial solutions are often rough approximations at first of what ultimately “works.” 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. Through the natural flow of decision making, it is essential that you 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:

- 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 very 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 being 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 CONNECTION BETWEEN 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 talked about the six reasons business firms invest in information systems and technologies. 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 the San Francisco Giants's systems solved the business problem presented by the need to generate revenue in a highly competitive industry. These systems create a solution that takes advantage of opportunities provided by new digital technology and the Internet. They opened up new channels for selling tickets and interacting with customers, optimized ticket pricing, and used new tools to analyze player performance. These systems were essential in improving the Giants'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 Information Systems and Your Career

Looking out to 2020, the U.S. economy will create 20 million new jobs and 24 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. The vast majority of these new jobs and replacement jobs will require a college degree to perform (Statistical Abstract, 2013; U.S. Bureau of Labor Statistics, 2013).

What this means is that U.S. 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, 2013; U.S. Census, 2011).

Accounting

There are about 2 million accountants in the U.S. labor force today, and the field is expected to expand by 16 percent by the year 2020, adding nearly 200,000 new jobs, and a similar number of jobs to replace retirees. This above-average growth in accounting is in part driven 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. As a result of new public laws, accountants require an intimate knowledge of data bases, reporting systems, and networks in order 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, wireless, and mobile business environment.

Finance

If you include financial analysts, stock analysts, insurance underwriters, and related financial service occupations, there are currently about 2.2 million managers and employees in finance. Financial managers develop financial reports, direct investment activities, and implement cash management strategies. These financial occupations are expected to grow by about 20 percent by the year 2020, and add over 400,000 new jobs.

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 investments in information systems help achieve corporate goals and achieve 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 also co-major 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. As a result, Internet advertising is the fastest growing form of advertising, reaching \$40 billion in 2013. 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 U.S. labor force. This field is growing faster than average at about 12 percent, and is expected to add more than 300,000 jobs by 2020. There is a much larger group of 2.6 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 3.1 million jobs by 2020. Marketing and advertising managers 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.

Management

Management is the largest single group in the U.S. business labor force with more than 15 million members, not including an additional 627,000 management consultants. Overall, the management corps in the United States is expected to expand at an average pace of 15 percent, adding about 3.2 million new jobs by 2020. There are more than twenty different types of managers tracked by the Bureau of Labor Statistics, all the way from chief executive officer, to human resource managers, production managers, project managers, lodging managers, medical managers, and community service managers.

The job of management has been transformed by information systems. Arguably, it would be impossible to manage business firms today, even very small firms, without the extensive use of information systems. Nearly all U.S. managers use information systems and technologies every day to accomplish their jobs, from desktop productivity tools to applications coordinating the entire enterprise. Managers today manage through a variety of information technologies without which it would be impossible to control and lead the firm.

Information Systems

The information systems field is arguably one of the most fast-changing and dynamic of all the business professions because information technologies are among the most important tools for achieving business firms' key objectives. The explosive growth of business information systems has generated a growing demand for information systems employees and managers who work with other business professionals to design and develop new hardware and software systems to serve the needs of business. Of the top 20 fastest growing occupations through 2020, five are information systems occupations.

There are about 307,000 information system managers in the United States, with an estimated growth rate of 15 percent through 2020, expanding the number of new jobs by more than 55,000 new positions. As businesses and government agencies increasingly rely on the Internet for communication and computing resources, system and network security management positions are growing very rapidly. One of the fastest growing U.S. occupational groups is network systems and data communications analysts, with a projected growth rate of 21 percent.



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The job of management requires extensive use of information systems to support decision making and to monitor the performance of the firm.

Outsourcing and Offshoring The Internet has created new opportunities for outsourcing many information systems jobs, along with many other service sector and manufacturing jobs. There are two kinds of outsourcing: outsourcing to domestic U.S. firms and offshore outsourcing to low-wage countries, such as India, China, and eastern European countries. Even this distinction blurs as domestic service providers, such as IBM, develop global outsourcing centers in India.

The most common and successful offshore outsourcing projects involve production programming and system maintenance programming work, along with call center work related to customer relationship management systems. However, inflation in Indian and Chinese wages for technology work, coupled with the additional management costs incurred in outsourcing projects, is leading to a counter movement of jobs back to the United States. Moreover, although routine technical IS jobs like software maintenance can be outsourced easily, all those management and organizational tasks required in systems development—including business process design, customer interface, and supply chain management—often remain in the United States. Software design and new programming efforts are rarely outsourced because of their strategic importance to firms, and because domestic software designers are much closer to the American marketplace and customer base. Software outsourcing of routine IS work to low-wage countries lowers the cost of building and maintaining systems in the United States. As systems become less expensive, more are built. The net result is that offshore outsourcing will increase demand in the United States for managerial IS positions, as well as many of the IS occupations described above.

Given all these factors in the IT labor market, on what kinds of skills should information system majors focus? Following is a list of general skills we believe will optimize employment opportunities:

- An in-depth knowledge of how new and emerging hardware and software can be used by business firms to make them more efficient and effective, enhance customer and supplier intimacy, improve decision making, achieve competitive advantage, and ensure firm survival. This includes an in-depth understanding of databases, database design, implementation, and management.
- An ability to take a leadership role in the design and implementation of new information systems, work with other business professionals to ensure systems meet business objectives, and work with software packages providing new system solutions.

INFORMATION SYSTEMS AND YOUR CAREER: WRAP-UP

Looking back at the information system skills required for specific majors, there are some common themes that affect all business majors. Following is a list of these common requirements for information system skills and knowledge:

- All business students, regardless of major, should understand how information systems and technologies can help firms achieve business objectives such as achieving operational efficiency, developing new products and services, and maintaining customer intimacy.
- Perhaps the most dominant theme that pervades this review of necessary job skills is the central role of databases in a modern firm. Each of the careers we have just described relies heavily in practice on databases.
- With the pervasive growth in databases comes inevitably an exponential growth in digital information and a resulting challenge to managers trying to understand all this information. Regardless of major, business students need to develop skills in analysis of information and helping firms understand and make sense out of their environments. Business analytics and intelligence are important skill sets to analyze the mountains of big data being produced by the online environment of business firms.
- All business majors need to be able to work with specialists and system designers who build and implement information systems. This is necessary to ensure that the systems that are built actually service business purposes and provide the information and understanding required by managers and employees.
- Each of the business majors will be impacted by changes in the ethical, social, and legal environment of business. Business school students need to understand how information systems can be used to meet business requirements for reporting to government regulators and the public and how information systems impact the ethical issues in their fields.

HOW THIS BOOK PREPARES YOU FOR THE FUTURE

This book is explicitly designed to prepare you for your future business career. It provides you with the necessary knowledge and foundational concepts for understanding the role of information systems in business organizations. You will be able to use this knowledge to identify opportunities for increasing the effectiveness of your business. You will learn how to use information systems to improve operations, create new products and services, improve decision making, increase customer intimacy, and promote competitive advantage.

Equally important, this book develops your ability to use information systems to solve problems that you will encounter on the job. You will learn how to analyze and define a business problem and how to design an appropriate information system solution. You will deepen your critical-thinking and problem-solving skills. The following features of the text and the accompanying learning package reinforce this problem-solving and career orientation.

A Framework for Describing and Analyzing Information Systems

The text provides you with a framework for analyzing and solving problems by examining the people, organizational, and technology components of information systems. This framework is used repeatedly throughout the text to help you understand information systems in business and analyze information systems problems.

A Four-Step Model for Problem Solving

The text provides you with a four-step method for solving business problems, which we introduced in this chapter. You will learn how to identify a business problem, design alternative solutions, choose the correct solution, and implement the solution. You will be asked to use this problem-solving method to solve the case studies in each chapter. Chapter 12 will show you how to use this approach to design and build new information systems.

Hands-On MIS Projects for Stimulating Critical Thinking and Problem Solving

Each chapter concludes with a series of hands-on MIS projects to sharpen your critical-thinking and problem-solving skills. These projects include two Management Decision Problems, hands-on application software problems, and projects for building Internet skills. For each of these projects, we identify both the business skills and the software skills required for the solution.

Career Resources

To make sure you know how the text is directly useful in your future business career, we've added a full set of Career Resources to help you with career development and job hunting.

Digital Portfolio MyMISLab™ includes a template for preparing a structured digital portfolio to demonstrate the business knowledge, application software skills, Internet skills, and analytical skills you have acquired in this course. You can include this portfolio in your resume or job applications. Your professors can also use the portfolio to assess the skills you have learned.

Career Resources A Career Resources section in MyMISLab shows you how to integrate what you have learned in this course in your resume, cover letter, and job interview to improve your chances for success in the job market.

Review Summary

1 How are information systems transforming business, and what is their relationship to globalization? E-mail, online conferencing, smartphones, and tablet computers have become essential tools for conducting business. Information systems are the foundation of fast-paced supply chains. The Internet allows businesses to buy, sell, advertise, and solicit customer feedback online. The Internet has stimulated globalization by dramatically reducing the costs of producing, buying, and selling goods on a global scale.

2 Why are information systems so essential for running and managing a business today? Information systems are a foundation for conducting business today. In many industries, survival and even existence is difficult without extensive use of information technology. Businesses use information systems to achieve six major objectives: operational excellence; new products, services, and business models; customer/supplier intimacy; improved decision making; competitive advantage; and day-to-day survival.

3 What exactly is an information system? How does it work? What are its people, organization, and technology components? From a technical perspective, an information system collects, stores, and disseminates information from an organization's environment and internal operations to support organizational functions and decision making, communication, coordination, control, analysis, and visualization. Information systems transform raw data into useful information through three basic activities: input, processing, and output. From a business perspective, an information system provides a solution to a problem or challenge facing a firm and represents a combination of people, organization, and technology elements.

The people dimension of information systems involves issues such as training, job attitudes, and management behavior. The technology dimension consists of computer hardware, software, data management technology, and networking/telecommunications technology, including the Internet. The organization dimension of information systems involves issues such as the organization's hierarchy, functional specialties, business processes, culture, and political interest groups.

4 How will a four-step method for business problem solving help you solve information system-related problems? Problem identification involves understanding what kind of problem is being presented, and identifying people, organizational, and technology factors. Solution design involves designing several alternative solutions to the problem that has been identified. Evaluation and choice entails selecting the best solution, taking into account its cost and the available resources and skills in the business. Implementation of an information system solution entails purchasing or building hardware and software, testing the software, providing employees with training and documentation, managing change as the system is introduced into the organization, and measuring the outcome. Problem solving requires critical thinking in which one suspends judgment to consider multiple perspectives and alternatives.

5 How will information systems affect business careers, and what information system skills and knowledge are essential? Business careers in accounting, finance, marketing, operations management, management and human resources, and information systems all will need an understanding of how information systems help firms achieve major business objectives; an appreciation of the central role of databases; skills in information analysis and business intelligence; sensitivity to the ethical, social, and legal issues raised by systems; and the ability to work with technology specialists and other business professionals in designing and building systems.

Key Terms

Business model, 11	Extranets, 17	Internet, 17
Business processes, 16	Feedback, 13	Intranets, 17
Change management, 23	Information, 13	Management information systems (MIS), 15
Computer hardware, 17	Information system (IS), 13	Network, 17
Computer literacy, 15	Information systems literacy, 15	Networking and telecommunications technology, 17
Computer software, 17	Information technology (IT), 13	Output, 13
Critical thinking, 23	Information technology (IT) infrastructure, 17	Processing, 13
Culture, 16	Input, 13	World Wide Web, 17
Data, 13		
Data management technology, 17		

Review Questions

- 1-1 How are information systems transforming business, and what is their relationship to globalization?
 - Describe how information systems have changed the way businesses operate and their products and services.
 - Describe the challenges and opportunities of globalization in a “flattened” world.
- 1-2 Why are information systems so essential for running and managing a business today?
 - List and describe the six reasons why information systems are so important for business today.
- 1-3 What exactly is an information system? How does it work? What are its people, organization, and technology components?
 - List and describe the organizational, people, and technology dimensions of information systems.
 - Define an information system and describe the activities it performs.
 - Distinguish between data and information and between information systems literacy and computer literacy.

- Explain how the Internet and the World Wide Web are related to the other technology components of information systems.
- 1-4 How will a four-step method for business problem solving help you solve information system-related problems?
- List and describe each of the four steps for solving business problems.
 - Give some examples of people, organizational, and technology problems found in businesses.
 - Describe the relationship of critical thinking to problem solving.
 - Describe the role of information systems in business problem solving.
- 1-5 How will information systems affect business careers, and what information system skills and knowledge are essential?
- Describe the role of information systems in careers in accounting, finance, marketing, management, and operations management, and explain how careers in information systems have been affected by new technologies and outsourcing.
 - List and describe the information system skills and knowledge that are essential for all business careers.

Discussion Questions

- 1-6 What are the implications of globalization when you have to look for a job? What can you do to prepare yourself for competing in a globalized business environment? How would knowledge of information systems help you compete?
- 1-7 If you were setting up the Web site for the San Francisco Giants, what people, organizational, and technology issues might you encounter?
- 1-8 Identify some of the people, organizational, and technology issues that UPS had to address when creating its successful information systems.

Hands-On MIS Projects

The projects in this section give you hands-on experience in analyzing financial reporting and inventory management problems, using data management software to improve management decision making about increasing sales, and using Internet software for researching job requirements.

MANAGEMENT DECISION PROBLEMS

- 1-9 Snyder's of Hanover, which sells about 80 million bags of pretzels, snack chips, and organic snack items each year, had its financial department use spreadsheets and manual processes for much of its data gathering and reporting. Hanover's financial analyst would spend the entire final week of every month collecting spreadsheets from the heads of more than 50 departments worldwide. She would then consolidate and re-enter all the data into another spreadsheet, which would serve as the company's monthly profit-and-loss statement. If a department needed to update its data after submitting the spreadsheet to the main office, the analyst had to return the original spreadsheet, then wait for the department to resubmit its data before finally submitting the updated data in the consolidated document. Assess the impact of this situation on business performance and management decision making.

1-10 Dollar General Corporation operates deep-discount stores offering housewares, cleaning supplies, clothing, health and beauty aids, and packaged food, with most items selling for \$1. Its business model calls for keeping costs as low as possible. The company has no automated method for keeping track of inventory at each store. Managers know approximately how many cases of a particular product the store is supposed to receive when a delivery truck arrives, but the stores lack technology for scanning the cases or verifying the item count inside the cases. Merchandise losses from theft or other mishaps have been rising and now represent over 3 percent of total sales. What decisions have to be made before investing in an information system solution?

IMPROVING DECISION MAKING: USING DATABASES TO ANALYZE SALES TRENDS

Software skills: Database querying and reporting

Business skills: Sales trend analysis

1-11 In this project, you will start out with raw transactional sales data and use Microsoft Access database software to develop queries and reports that help managers make better decisions about product pricing, sales promotions, and inventory replenishment. In MyMISLab, you can find a Store and Regional Sales Database developed in Microsoft Access. The database contains raw data on weekly store sales of computer equipment in various sales regions. The database includes fields for store identification number, sales region, item number, item description, unit price, units sold, and the weekly sales period when the sales were made. Use Access to develop some reports and queries to make this information more useful for running the business. Sales and production managers want answers to the following questions:

- Which products should be restocked?
- Which stores and sales regions would benefit from a promotional campaign and additional marketing?
- When (what time of year) should products be offered at full price, and when should discounts be used?

You can easily modify the database table to find and report your answers. Print your reports and results of queries.

IMPROVING DECISION MAKING: USING THE INTERNET TO LOCATE JOBS REQUIRING INFORMATION SYSTEMS KNOWLEDGE

Software skills: Internet-based software

Business skills: Job searching

1-12 Visit a job-posting Web site such as Monster.com. Spend some time at the site examining jobs for accounting, finance, sales, marketing, and human resources. Find two or three descriptions of jobs that require some information systems knowledge. What information systems knowledge do these jobs require? What do you need to do to prepare for these jobs? Write a one- to two-page report summarizing your findings.

Collaboration and Teamwork Project

1-13 In MyMISLab, you will find a Collaboration and Teamwork Project dealing with the concepts in this chapter. You will be able to use Google Drive, Google Docs, Google Sites, Google+, or other open-source tools to complete the assignment.

BUSINESS PROBLEM-SOLVING CASE

A New Look at Electronic Medical Records

During a typical trip to the doctor, you'll often see shelves full of folders and papers devoted to the storage of medical records. Every time you visit, your records are created or modified, and often duplicate copies are generated throughout the course of a visit to the doctor or a hospital. The majority of medical records are currently paper-based, making these records very difficult to access and share. It has been said that the U.S. health care industry is the world's most inefficient information enterprise.

Inefficiencies in medical record keeping are one reason why health care costs in the United States are the highest in the world. In 2012 health care costs reached \$2.8 trillion, representing 18 percent of the U.S. gross domestic product (GDP). Left unchecked, by 2037 health care costs will rise to 25% of GDP and consume approximately 40 percent of total federal spending. Since administrative costs and medical recordkeeping account for nearly 13 percent of U.S. health care spending, improving medical recordkeeping systems has been targeted as a major path to cost savings and even higher health care quality. Enter electronic medical record (EMR) systems.

An electronic medical record system contains all of a person's vital medical data, including personal information, a full medical history, test results, diagnoses, treatments, prescription medications, and the effect of those treatments. A physician would be able to immediately and directly access needed information from the EMR without having to pore through paper files. If the record holder went to the hospital, the records and results of any tests performed at that point would be immediately available online. Having a complete set of patient information at their fingertips would help physicians prevent prescription drug interactions and avoid redundant tests. Many experts believe that electronic records will reduce medical errors and improve care, create less paperwork, and provide quicker service, all of which will lead to dramatic savings in the future, as much as \$80 billion per year.

The U.S. government's short-term goal is for all health care providers in the United States to have EMR systems in place that meet a set of basic functional criteria by the year 2015. Its long-term goal is to have a fully functional nationwide electronic medical recordkeeping network. The consulting firm Accenture estimated that 50 percent of U.S. hospitals are potentially at risk of incurring penalties by 2015 for failing to meet federal requirements.

Evidence of EMR systems in use today suggests that electronic records offer significant advantages to hospitals and patients alike. The U.S. Veterans Affairs (VA) system of doctors and hospitals is considered a leading example. The VA system switched to digital records years ago, and far exceeds the private sector and Medicare in quality of preventive services and chronic care. The VA also provides the lowest cost health care in the nation. The 1,400 VA facilities use VistA, record-sharing software developed by the government that allows doctors and nurses to share patient history. A typical VistA record lists all of the patient's health problems; their weight and blood pressure since beginning treatment at the VA system; images of the patient's x-rays, lab results, and other test results; lists of medications; and reminders about upcoming appointments.

VistA has many features that improve quality of care. For example, nurses scan tags for patients and medications to ensure that the correct dosages of medicines are going to the correct patients. This feature reduces medication errors, which is one of the most common and costly types of medical errors, and speeds up treatment as well. The system also generates automatic warnings based on specified criteria. It can notify providers if a patient's blood pressure goes over a certain level or if a patient is overdue for a regularly scheduled procedure like a flu shot or a cancer screening. Devices that measure patients' vital signs can automatically transmit their results to the VistA system, which automatically updates doctors at the first sign of trouble. The 40,000 patients in the VA's in-home monitoring program reduced their hospital admissions by 25 percent and the length of their hospital stays by 20 percent.

Patients also report that the process of being treated at the VA is effortless compared to paper-based providers. That's because instant processing of claims and payments are among the benefits of EMR systems. Insurance companies traditionally pay claims around two weeks after receiving them, despite quickly processing them soon after they are received; governmental regulations only require insurers to pay claims within fifteen days of their receipt. Additionally, today's paper-based health care providers must assign the appropriate diagnostic codes and procedure codes to claims. Because there are thousands of these codes, the process is even slower, and most providers employ someone solely to perform this task. Electronic systems hold the promise of immediate processing, or "real-time claims