Kenneth C. Laudon | Jane P. Laudon

# ESSENTIALS OF MIS

FOURTEENTH EDITION

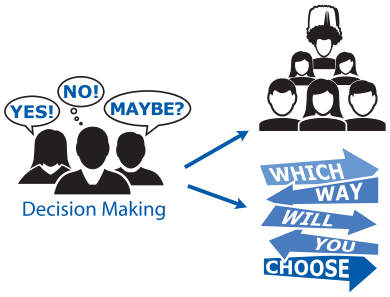
# MyLab MIS: Fostering Employability Skills for Today's Learner

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

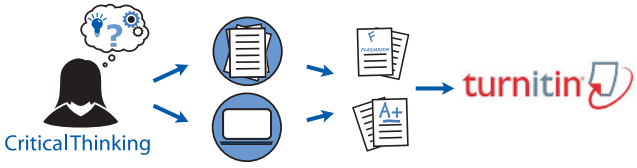

**MyLab MIS™ Grader**

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

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

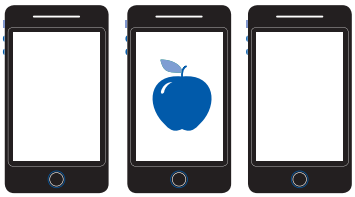



- **Engaging Videos** explore a variety of business topics related to the theory students are learning in class.
- **Exercise Quizzes** assess students' comprehension of the concepts in each video.




Pearson

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



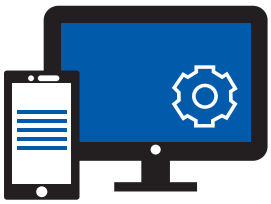
- **Learning Catalytics™** is a student response tool that helps you generate class discussion, customize your lecture, and promote peer-to-peer learning based on real-time analytics. Learning Catalytics uses students' smartphones, tablets, or laptops to engage them in more interactive tasks.

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

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

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

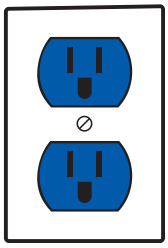
- **Pearson eText** enhances learning—both in and out of the classroom. Students can take notes, highlight, and bookmark important content, or engage with interactive lecture and example videos that bring learning to life anytime, anywhere via MyLab or the app.



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

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

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



http://www.pearsonmylabandmastering.com

# Integrating Business with Technology

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

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

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

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

*** Dirt Bikes Running Case in MyLabMIS**

## Business Application Skills

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

| | | |
|---|---|---|
| Customer service analysis | Database design<br>Database querying and reporting | Chapter 9 |
| Sales lead and customer analysis | Database design<br>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<br>Evaluating Web sites for auto sales | Chapter 3 |
| Analyzing Web browser privacy protection | Chapter 4 |
| Researching travel costs using online travel sites | Chapter 5 |
| Searching online databases for products and services | Chapter 6 |
| Using Web search engines for business research | Chapter 7 |
| Researching and evaluating business outsourcing services | Chapter 8 |
| Researching and evaluating supply chain management services | Chapter 9 |
| Evaluating e-commerce hosting services | Chapter 10 |
| Using shopping bots to compare product price, features, and availability | Chapter 11 |
| Analyzing Web site design | Chapter 12 |

## Analytical, Writing, and Presentation Skills*

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

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*Fourteenth Edition*

# Essentials of Management Information Systems

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New York University

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Azimuth Information Systems

Pearson

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# About the Authors

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

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

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

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

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

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

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

# Brief Contents

# Complete Contents







# Business Cases and Interactive Sessions

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

### Chapter 1: Business Information Systems in Your Career

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

### Chapter 2: Global E-business and Collaboration

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

### Chapter 3: Achieving Competitive Advantage with Information Systems

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

### Chapter 4: Ethical and Social Issues in Information Systems

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

### Chapter 5: IT Infrastructure: Hardware and Software

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

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

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

### Chapter 7: Telecommunications, the Internet, and Wireless Technology

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

### Chapter 8: Securing Information Systems

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

# Preface

## New To This Edition

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

### MyLab MIS™

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

### WHAT'S INCLUDED

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

## ENHANCED STAND-ALONE PEARSON eTEXT

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

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

## NEW AND UPDATED TOPICS

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

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

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

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

## Solving Teaching and Learning Challenges

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

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

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

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

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

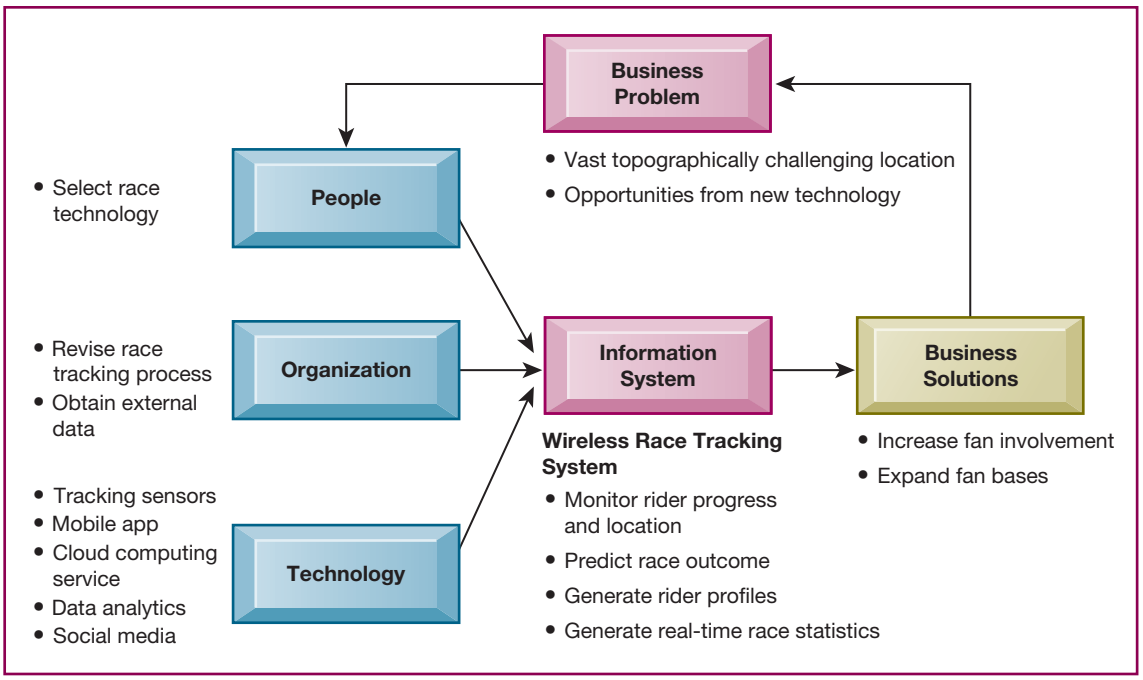
## THE CORE TEXT

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

### Chapter Organization

Each chapter contains the following elements:

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




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

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

### Student Learning-Focused

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

## KEY FEATURES

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

### Business-Driven with Real-World Business Cases and Examples

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

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

## Hands-On Text Activities

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

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

INTERACTIVE SESSION: TECHNOLOGY

### The Internet of Things Aids Waste Management

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

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

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

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

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

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

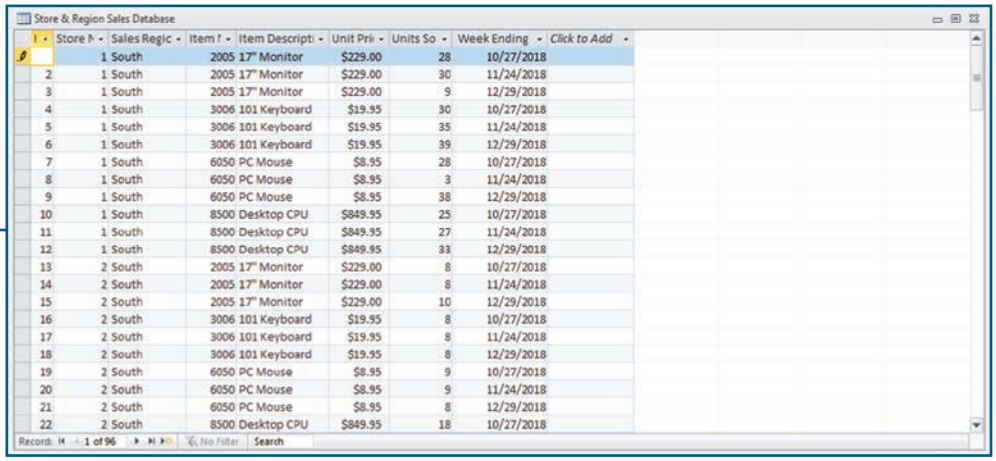
Each chapter contains two Interactive Sessions on People, Organizations, or Technology using real-world companies to illustrate chapter concepts and issues.

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

## CASE STUDY QUESTIONS

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

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


Store & Region Sales Database

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

Record: 1 of 96 | No Filter | Search

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

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

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

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

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

## Developing Career Skills

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

### CAREER OPPORTUNITIES AND RESOURCES

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

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

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

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

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

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

# Instructor Teaching Resources

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

## Learning Tracks

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

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

## Video Cases and Instructional Videos

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

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

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# Essentials of Management Information Systems

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PART I



# Information Systems in the Digital Age

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

CHAPTER

# 1

# Business Information Systems in Your Career

## LEARNING OBJECTIVES

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

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

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

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

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

**I-5** How will MIS help my career?

## CHAPTER CASES

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

## VIDEO CASES

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

*Instructional Video:*

- Tour IBM's Raleigh Data Center

**MyLab MIS**

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

## PCL CONSTRUCTION: THE NEW DIGITAL FIRM

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

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

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

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

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

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

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

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

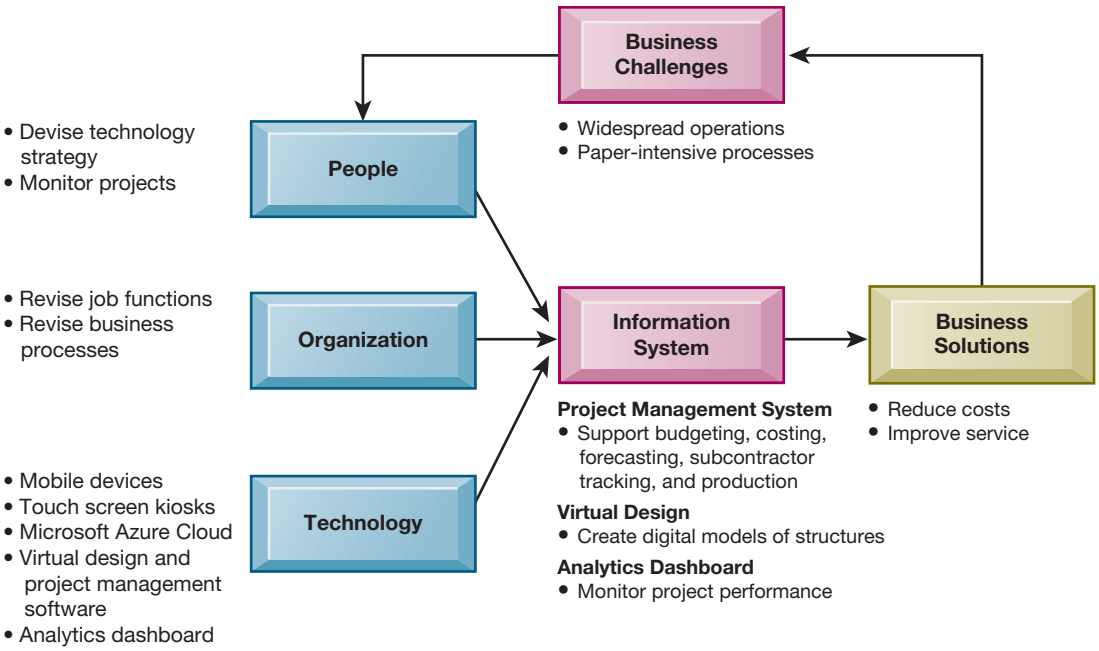
Sources: "Technology and Innovation," pcl.com, accessed February 9, 2019; "PCL: Capitalizing on the Cloud," itworldcanada.com, accessed February 9, 2019; Brian Jackson, "PCL Constructors Reach New Heights with Real-time Analytics Solution in the Cloud," *IT World Canada*, November 9, 2017.

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

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

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

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




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

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

### HOW INFORMATION SYSTEMS ARE TRANSFORMING BUSINESS

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

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

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

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

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

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

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

## KEY CHALLENGES IN MANAGEMENT INFORMATION SYSTEMS

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

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

**TABLE 1.1**

Keys Challenges in MIS

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

## GLOBALIZATION CHALLENGES AND OPPORTUNITIES: A FLATTENED WORLD

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

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

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

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

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

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

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

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

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

## BUSINESS DRIVERS OF INFORMATION SYSTEMS

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

### Operational Excellence

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

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

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

### New Products, Services, and Business Models

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

### Customer and Supplier Intimacy

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

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