

Introduction to Information Systems

R. KELLY RAINER • BRAD PRINCE

SEVENTH EDITION

WILEY

Introduction to Information Systems

Introduction to Information Systems

Supporting and Transforming Business

Seventh Edition

R. KELLY RAINER JR.

BRAD PRINCE

WILEY

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What Do Information Systems Have to Do with Business?

This edition of Rainer and Prince's *Introduction to Information Systems* will answer this question for you. In every chapter, you will see how real global businesses use technology and information systems to increase their profitability, gain market share, develop and improve their customer relations, and manage their daily operations. In other words, you will learn how information systems provide the foundation for all modern organizations, whether they are public sector, private sector, for-profit, or not-for-profit.

We have several goals for all business majors, particularly undergraduates. First, we want to teach you how to use information technology to help you master your current or future jobs to help ensure the success of your organizations. Second, we want you to become *informed users* of information systems and information technology. Third, we want you to understand the digital transformation that your organization will likely be undergoing. The digital transformation of organizations is the acceleration of existing business processes, and the development of new processes and business models. In this way, organizations can capitalize on the capabilities and opportunities of various technologies to improve performance. Examples of these technologies include Big Data, cloud computing, artificial intelligence, the Internet of Things, and mobile computing and commerce. We address each of these in our book.

To accomplish these goals, we focus not on merely *learning* the concepts of information technology but rather on *applying* those concepts to perform business more effectively and efficiently. We concentrate on placing information systems in the context of business, so that you will more readily grasp the concepts we present in the text.

What's in IT For Me?

The theme of this book, What's in IT for Me?, is a question asked by most students who take this course. Our book will show you that IT is the backbone of any business, whether you're majoring in Accounting, Finance, Marketing, Human Resources, Operations Management, or MIS.

New to This Edition

The seventh edition contains many exciting additions and changes. These elements make the text more interesting and

more readable for students of all majors, while still providing the most current information possible in the rapidly changing field of information systems.

Overall

- A brand new chapter titled “Business Analytics” replaces the Business Intelligence chapter. This new chapter will help you understand both the business analytics process and the relationship between statistics and analytics. The chapter also clearly defines descriptive analytics, predictive analytics, and prescriptive analytics, and provides extensive examples of each type of analytics.
- A brand new Technology Guide, titled “Artificial Intelligence,” replaces the Intelligent Systems Technology Guide from the sixth edition. In this Technology Guide, we pay particular attention to machine learning, deep learning, and neural networks, and offer extensive examples. We then look at artificial intelligence applications such as computer vision, natural language processing, robotics, speech recognition, and intelligent agents.
- All new or updated chapter-opening and closing cases.
- All new or updated *IT's About Business* boxes in every chapter.

Key Features

We have been guided by the following goals that we believe will enhance the teaching and learning experience.

“What's in IT for Me?” Theme

- We show why IT is important by calling attention in each chapter to how that chapter's IT topic relates to students in each major.
- A feature of this edition is chapter-opening “teasers” that list specific tasks for each major that the chapter will help prepare students to do.
- Throughout each chapter, icons guide the reader to relevant issues for their specific functional area—Accounting (ACC), Finance (FIN), Marketing (MKT), Operations Management (POM), Management Information Systems (MIS), and Human Resources Management (HRM).
- Every chapter concludes with a summary of how the concepts relate to each functional area (“What's in IT for Me?”).

Active Learning

We recognize the need to actively involve students in problem solving, creative thinking, and capitalizing on opportunities. Therefore, we have included in every chapter a variety of hands-on exercises, activities, and mini-cases, including exercises that require students to use software application tools. Through these activities and an interactive website, we enable students to apply the concepts they learn.

Diversified and Unique Examples from Different Industries

Extensive use of vivid examples from large corporations, small businesses, and government and not-for-profit organizations helps to enliven concepts by demonstrating the capabilities of IT, its cost and justification, and innovative ways in which real corporations are using IT in their operations. Each chapter constantly highlights the integral connection between IT and business. This is especially evident in the “IT’s About Business” boxes.

Misuse of IS

Like other textbooks, this text presents many examples of IS success. But we also provide numerous examples of IS failures, in the context of lessons that can be learned from such failures. Misuse of IS can be very expensive, as we illustrate.

Innovation and Creativity

In today’s rapidly changing environment, creativity and innovation are essential for a business to operate effectively and profitably. Throughout the text we demonstrate how IT facilitates these concepts.

Global Focus

Because an understanding of global competition, partnerships, and trading is essential to success in business, we provide a broad selection of international cases and examples. We discuss how IT facilitates export and import, the management of multinational companies, and electronic trading around the globe.

Focus on Ethics

With corporate scandals appearing daily in the news, ethics and ethical questions have come to the forefront of business people’s minds. In addition to a chapter that concentrates on ethics and privacy (Chapter 3), we have included examples and cases that focus on business ethics throughout the chapters.

Pedagogical Structure

Other pedagogical features provide a structured learning system that reinforces the concepts through features such as chapter-opening organizers, section reviews, frequent applications, and hands-on exercises and activities.

Chapter-opening organizers include the following pedagogical features:

- The *Learning Objectives* provide an overview of the key concepts students should come away with after reading the chapter.
- *Web Resources* highlight ancillary materials available on the book companion site and within *WileyPLUS* for both instructors and students.
- The *Chapter Outline* lists the major chapter headings.
- An *opening case* identifies a business problem faced by an actual company, describes the IT solution applied to the business problem, presents the results of the IT solution, and summarizes what students can learn from the case.
- New “What’s in IT for Me?” “teasers” give students a quick hint about skills in their majors for which this chapter will help prepare them.

Study aids are provided throughout each chapter. These include the following:

- *IT’s About Business* cases provide real-world applications, with questions that relate to concepts covered in the text. Icons relate these sections to the specific functional areas.
- Highlighted *Examples* interspersed throughout the text illustrate the use (and misuse) of IT by real-world organizations, thus making the conceptual discussion more concrete.
- *Tables* list key points or summarize different concepts.
- End-of-section reviews (*Before You Go On . . .*) prompt students to pause and test their understanding of basic concepts before moving on to the next section.

End-of-chapter study aids provide extensive opportunity for the reader to review and actually do something with the concepts they have just studied:

- *What’s in IT for Me?* is a unique chapter summary section that demonstrates the relevance of topics for different functional areas (accounting, finance, marketing, production/operations management, and human resources management).
- The *Chapter Summary*, keyed to learning objectives listed at the beginning of the chapter, enables students to review the major concepts covered in the chapter.
- The end-of-chapter *Glossary* facilitates studying by listing and defining all of the key terms introduced in the chapter.
- *Discussion Questions* and *Problem-Solving Activities* provide practice through active learning. These exercises are hands-on opportunities to use the concepts discussed in the chapter.

- A *Case* presents a brief case study organized around a business problem and explains how IT helped to solve it. Questions at the end of the case relate it to concepts discussed in the chapter.

Online Resources

www.wiley.com/college/rainer

This text also facilitates the teaching of an introductory IS course by providing extensive support materials for instructors and students. Go to www.wiley.com/college/rainer to access the Student and Instructor websites.

Instructor's Manual

The *Instructor's Manual*, created by Dr. Bob Gehling, Professor Emeritus, Auburn University at Montgomery, includes a chapter overview, teaching tips and strategies, answers to all end-of-chapter questions, supplemental mini-cases with essay questions and answers, and experiential exercises that relate to particular topics.

Test Bank

The *Test Bank*, written by Jennifer Gerow of Virginia Military Institute, is a comprehensive resource for test questions. It contains multiple-choice, true/false, short answer, and essay questions for each chapter. The multiple-choice and true/false questions are labeled according to difficulty: easy, medium, or hard.

Respondus Computerized Test Bank

Respondus is a powerful tool for creating and managing exams that can be printed to paper or published directly to Blackboard, ANGEL, Brightspace by D2L, Canvas, Moodle, and other learning systems. Exams can be created offline using a familiar Windows environment, or moved from one LMS to another. Whether you are a veteran of online testing or relatively new to it, Respondus will save you hours on each project.

PowerPoint Presentations

The *PowerPoint Presentations*, updated by Amit Shah of Frostburg State University, consist of a series of slides for each chapter of the text that are designed around the text content, incorporating key points from the text and all text illustrations as appropriate.

Weekly Updates

Weekly updates, harvested from around the web by David Firth of the University of Montana, provide you with the latest IT news and issues. These are posted every Monday morning throughout the year at <http://wileyinformationsystemsupdates.com/> and include links to articles and videos as well as discussion questions to assign or use in class.

Image Library

All textbook figures are available for download from the website. These figures can easily be added to PowerPoint presentations.

OfficeGrader

OfficeGrader is an Access-based VBA macro that enables automatic grading of Office assignments. The macros compare Office files and grade them against a master file. OfficeGrader is available for Word, Access, Excel, and PowerPoint for Office 2010 and Office 2013. For more information, contact your Wiley sales representative or visit www.wiley.com/college/microsoft and click on "OfficeGrader."

Reef Polling

Reef Polling—by iClicker—a new mobile-optimized engagement system, Reef Polling increases engagement with students by allowing instructors to poll students during class. After a quick registration with Reef, students can use their own devices as a clicker. Instructors can take attendance, check for comprehension, or turn in-class activities—individual or group—into competitive games through polling.

Inside Track

A career-coaching program that offers free resources to students as they select their careers. Students get an initial counseling session at no additional cost, but can pay for additional sessions on their own.

CareerShift

A leading online job search tool, CareerShift enables students to conduct their own job search using the power of search and the power of organization. They can conduct campaigns for jobs and keep all their resources and communication in one spot.

WileyPlus with ORION

WileyPLUS with ORION adaptive practice improves outcomes with robust practice problems and feedback, fosters engagement with course content and educational videos, and gives students the flexibility to increase confidence as they learn and prepare outside of class. With ORION, instructors can see how their students learn best & adjust material appropriately. For students, ORION allows them to focus on their weakest areas to make study time more efficient.

WileyPLUS helps instructors:

- Save time by automating grading of practice, homework, quizzes and exams
- Create a focused and personalized course that reflects their teaching style
- Quickly identify and understand student learning trends to improve classroom engagement
- Improve their course year over year using WileyPLUS data

Instructor Resources include:

- Video Lectures—The authors are featured in these video lectures which provide explanations of key concepts throughout the book. Note: This feature is only available in WileyPLUS.
- Activity Links and Starter Files—Apply the Concept activities link out to the web providing videos for students to view and use in the activities. When appropriate, students are provided with starter files to complete as part of the deliverable.
- Database Activity Solution Files—Every database activity in the book comes with a solution file that can be used in the Office Grader Application or by an individual to grade the students' submissions.
- Database Activity Starter Files—When appropriate, students are provided with starter files to complete as part of the deliverable.
- Instructor's Solutions Manual—Contains detailed solutions to all questions, exercises, and problems in the textbook.
- Practice Quizzes—These quizzes give students a way to test themselves on course material before exams. Each chapter exam contains fill in the blank, application, and multiple choice questions that provide immediate feedback with the correct answer.
- Reading Quizzes—These quizzes reinforce basic concepts from the reading.
- Spreadsheet Activity Solution Files—Every spreadsheet activity in the book comes with a solution file that can be used in the Office Grader Application or by an individual to grade the students' submissions.
- Access Relational Database—Magic Inventory & Magic Vendor

Student Resources include:

- Video Lectures—The authors are featured in these video lectures which provide explanations of key concepts throughout the book. Note: This feature is only available in WileyPLUS.
- Practice Quizzes—These quizzes give students a way to test themselves on course material before exams. Each chapter exam contains fill in the blank, application, and multiple choice questions that provide immediate feedback with the correct answer.
- Microsoft Office 2010/2013/2016 Lab Manual & Instructor Resources—by Ed Martin, CUNY-Queensborough—a thorough introduction to the Microsoft Office products of Word, Excel, Access, & PowerPoint with screenshots that show students step-by-step instructions on basic MS Office tasks.

Wiley E-Textbook

E-Textbooks are complete digital versions of the text that help students study more efficiently as they:

- Access content online and offline on your desktop, laptop, and mobile device
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Introduction to Information Systems

CHAPTER OUTLINE

LEARNING OBJECTIVES

1.1 Why Should I Study Information Systems?

1.1 Identify the reasons why being an informed user of information systems is important in today's world.

1.2 Overview of Computer-Based Information Systems

1.2 Describe the various types of computer-based information systems in an organization.

1.3 How Does IT Impact Organizations?

1.3 Discuss ways in which information technology can affect managers and nonmanagerial workers.

1.4 Importance of Information Systems to Society

1.4 Identify positive and negative societal effects of the increased use of information technology.

Opening Case

POM **MKT** FanDuel and DraftKings

FanDuel (www.fanduel.com), founded in 2009, and DraftKings (www.draftkings.com), founded in 2012, operate web-based daily fantasy sports (DFS) games. The two companies began operations by taking advantage of an exclusion in the 2006 Unlawful Internet Gambling Enforcement Act. This statute bans credit card issuers and banks from working with poker and sports-betting websites, effectively preventing U.S. customers from participating in those industries. The federal statute, however, exempts fantasy sports because they are considered games of skill, not luck. To maintain legal status, the operator of a fantasy sports business must follow four rules: (1) publish prize amounts before the games begin, (2) make prize amounts independent of the number of players in the game, (3) level the playing field by allowing anyone in a league to draft any player they want, and (4) disregard point spreads and game scores.

FanDuel and DraftKings deliver simple and fast fantasy betting. After paying an entry fee, players become eligible to win daily cash payouts based on the statistical performance of athletes in games played that day. Traditional fantasy sports often frustrate players because the

experience lasts for an entire season. If a player drafts a bad team, then he or she is stuck with that team for several months. Serious fantasy league players also analyze large amounts of statistics, roster changes, and injury reports. Many casual players do not have time for such analyses. In contrast to these leagues, FanDuel and DraftKings allow customers to play for just a day, a weekend, or a week.

The companies allow players to participate for free or bet up to \$5,000 to draft a team of players in the National Football League (NFL), the National Basketball Association (NBA), Major League Baseball (MLB), and the National Hockey League (NHL). Players can compete head-to-head against another individual or in a league with up to 125,000 teams. The winner is the one with the best player statistics, which translate into fantasy points. The companies take an average of 9 percent of each prize.

MIS FanDuel and DraftKings spend millions of dollars on computing power from Amazon Web Services and other cloud computing providers. Cloud computing (discussed in Technology Guide 3) enables the companies to manage, as only one example, the increase in web traffic just before Sunday's NFL kickoff. At that time, the firms must manage hundreds of thousands of simultaneous users, who make a

myriad of roster changes per hour. The companies also provide millions of live scoring updates per minute during games, meaning that they must manage almost 10 terabytes of network traffic during game day. (A terabyte equals 1 trillion bytes.)

Professional sports have noted that FanDuel and DraftKings, with their easy-to-use apps, appeal to young and mobile sports fans. Furthermore, these fans have money at stake, so they are more inclined to watch games on television than they otherwise would. An increase in viewers leads to an increase in advertising rates for the teams. In fact, in 2015, FanDuel signed multiyear sponsorship agreements with 15 NFL teams. These deals generally include stadium signage, radio and digital advertising, and other promotions. Interestingly, the NBA owns an equity stake in FanDuel.

The two companies had tremendous success. In 2015, they processed a combined \$3 billion in player-entry fees and realized a combined revenue of \$280 million. By the fall of 2016, the companies claimed to have almost 60 million players in the United States.

Despite their success, FanDuel and DraftKings faced serious problems. Their first problem is that they can operate only as long as the federal government and state governments allowed them to do so. At the federal level, the government could close the fantasy loophole in the 2006 statute at any time. At the state level, each state can decide that DFS constitutes gambling and prohibit DFS in that state.

Significantly, the federal statute does not give daily fantasy sports businesses immunity from state laws. In November 2015, New York Attorney General Eric Schneiderman sent cease-and-desist letters to both companies, declaring that their games constituted illegal gambling under state law and ordering both to stop accepting bets from New York residents.

Shortly thereafter, the two companies agreed on a strategy to push for legislation clarifying daily fantasy sport's legality in each state. On June 18, 2016, the DFS bill passed the New York state legislature and on August 3, New York Governor Andrew Cuomo signed it into law. FanDuel and DraftKings immediately began allowing New York residents to play again.

Their second problem involves litigation. Three federal grand juries—in Boston, New York, and Tampa, Florida—have notified one or both companies that they are under criminal investigation. Furthermore, a class-action lawsuit, consolidated in Massachusetts, alleges conspiracy, fraud, negligence, and other claims. The lawsuit represents losing DFS players from 25 states and the District of Columbia.

Their third problem is that industry analysts estimate that 60 percent of the firms' revenue comes from approximately 15,000 high-volume players wagering at least \$10,000 per year. Some 50 players who are analytics-driven professionals each wager at least \$1 million per year. These figures underscore the fact that the vast majority of DFS players lose.

As of the fall of 2016, FanDuel and DraftKings are conducting expensive state-by-state campaigns seeking regulatory and legal clarity on the gambling issue. To be permitted to operate in various states, the two companies had to make needed improvements in their

operations. Specifically, they now provide areas for players of all skill levels, particularly to make beginning players feel comfortable and welcome. Both companies' employees are prohibited from competing on rival sites. The firms have created tiers of players so that beginning players can avoid playing against professional players. Along these lines, FanDuel introduced "Experienced Player Indicators" and DraftKings introduced "Experienced Player Badges."

Interestingly, in the spring of 2016, FanDuel suspended contests on college sports in all states as part of a negotiation with the National Collegiate Athletic Association.

As a result of their problems, the companies' market values have decreased markedly and neither company was profitable in 2016. As of fall 2016, some 20 states have pending legislation permitting DFS.

And the unanswered question? Why have the two DFS companies not yet merged?

Sources: Compiled from D. Van Natta, "Welcome to the Big Time," *ESPN*, August 24, 2016; A. Carr, "The Most Dangerous CEO in Sports," *Fast Company*, May 2016; D. Purdum, "DraftKings, FanDuel to Stop Offering College Fantasy Games," *ESPN.com*, March 31, 2016; A. Berzon, "Fantasy Sports Industry Mounts Lobbying Blitz," *Wall Street Journal*, February 15, 2016; M. Brown, "FanDuel Lays Off Workers as Legal Pressure Mounts," *Forbes*, January 20, 2016; J. Brustein, "New York Gambles on a Daily Fantasy Ban," *Bloomberg BusinessWeek*, November 23–29, 2015; R. Axon, "Facing Threat from N.Y. Attorney General, FanDuel Suspends Entries in State," *USA Today*, November 17, 2015; L. Baker, "FanDuel, DraftKings Vow to Fight New York's Halt on Bets," *Reuters*, November 12, 2015; D. Alba, "DraftKings and FanDuel Scandal Is a Cautionary Startup Tale," *Wired*, October 9, 2015; D. Roberts, "Flight of Fantasy," *Fortune*, October 1, 2015; D. Roberts, "Are DraftKings and FanDuel Legal?" *Fortune*, September 24, 2015; J. Brustein and I. Boudway, "Just a Fantasy," *Bloomberg BusinessWeek*, September 14–20, 2015; K. Wagner, "DraftKings and FanDuel Are Battling over Your Favorite Teams," www.recodet.net, July 17, 2015; R. Sandomir, "FanDuel and DraftKings, Leaders in Daily Fantasy Sports, Are Quickly Gaining Clout," *New York Times*, July 13, 2015; S. Rodriguez, "Yahoo Enters World of Daily Fantasy Sports, Takes on DraftKings and FanDuel," *International Business Times*, July 8, 2015; B. Schrotenboer, "FanDuel Signs Deals with 15 NFL Teams, Escalating Daily Fantasy Integration," *USA Today*, April 21, 2015; D. Primack, "DraftKings and FanDuel Close in on Massive New Investments," *Fortune*, April 6, 2015; S. Bertoni, "Fantasy Sports, Real Money," *Forbes*, January 19, 2015; B. Schrotenboer, "Fantasy Sports Debate: Gambling or Not Gambling?" *USA Today*, January 12, 2015; www.fanduel.com, www.draftkings.com, accessed September 20, 2016.

Questions

1. Describe how information technology is essential to the companies' operations.
2. Is information technology one of the companies' problems? Explain your answer.
3. Describe the companies' information technology infrastructure. Now discuss possible technological problems that the companies might have.
4. The companies face serious problems that are not related to information technology. Can information technology help them address these problems? Why or why not? Explain your answer.

Introduction

Before we proceed, we need to define information technology and information systems. **Information technology (IT)** refers to any computer-based tool that people use to work with information and to support the information and information-processing needs of an organization.

An **information system (IS)** collects, processes, stores, analyzes, and disseminates information for a specific purpose.

IT has far-reaching effects on individuals, organizations, and our planet. Although this text is largely devoted to the many ways in which IT has transformed modern organizations, you will also learn about the significant impacts of IT on individuals and societies, the global economy, and our physical environment. IT is also making our world smaller, enabling more and more people to communicate, collaborate, and compete, thereby leveling the competitive playing field.

This text focuses on the successful applications of IT in organizations. That is, how organizations can use IT to solve business problems and gain a competitive advantage in the marketplace. However, as you see in this chapter's opening case, not all business problems can be solved with IT. This situation means that you must continue to develop your business skills!

When you graduate, you either will start your own business or you will work for an organization, whether it is public sector, private sector, for-profit, or not-for-profit. Your organization will have to survive and compete in an environment that has been radically transformed by information technology. This environment is global, massively interconnected, intensely competitive, 24/7/365, real-time, rapidly changing, and information-intensive. To compete successfully, your organization must use IT effectively.

As you read this chapter and this text, keep in mind that the information technologies you will learn about are important to businesses of all sizes. No matter what area of business you major in, what industry you work for, or the size of your company, you will benefit from learning about IT. Who knows? Maybe you will use the tools you learn about in this class to make your great idea a reality by becoming an entrepreneur and starting your own business! In fact, as you see in the chapter opening case and IT's About Business 1.1, you can use information technology to help you start your own business.

The modern environment is intensely competitive not only for your organization, but for you as well. You must compete with human talent from around the world. Therefore, you personally will have to make effective use of IT.

Accordingly, this chapter begins with a discussion of why you should become knowledgeable about IT. Next, it distinguishes among data, information, and knowledge, and differentiates computer-based information systems from application programs. Finally, it considers the impacts of information systems on organizations and on society in general.

IT's About Business 1.1

New Delivery Services Use Information Technology

POM

Webvan, an online grocery business that went bankrupt in 2001, is considered to be the largest dotcom failure in history. The company's business model was to deliver products to customers' homes within 30 minutes of a time the customer chose.

Today, busy consumers are increasingly looking for the convenience of having many items delivered on demand, with food being the largest category. In fact, despite the well-known failure of Webvan, many same-day, third-party delivery services are emerging to compete in the delivery industry, which is worth about \$70 billion a year. Delivery services are an excellent strategy for small businesses to differentiate themselves from their competitors and to compete with giant online retailers.

Delivery service providers include some of the largest firms in technology and retail, as well as specialized startups. The major challenge facing these companies is how to deliver groceries and other items door-to-door without incurring unmanageable costs.

These companies use information technology, such as apps on GPS-enabled smartphones, to bypass the need for warehouses

and delivery fleets in their attempt to serve customers who are willing to pay a bit extra to have things done quickly. These companies also often do not hire their workers. Rather, they use independent contractors who are willing to forgo benefits packages (e.g., health insurance, 401(k) plans) for jobs they can perform whenever they want to.

The delivery services differ from more established grocery delivery companies such as FreshDirect (www.freshdirect.com), Peapod (www.peapod.com), and AmazonFresh (<https://fresh.amazon.com>) because they do not actually sell groceries directly to you. Instead, you select what you want online or through an app and choose a delivery time. The service then sends a contractor to the store to pick up your order and deliver it to your door. Let's take a look at some of these services.

Instacart. Instacart (www.instacart.com) delivers items from chains such as Safeway, Whole Foods, and Costco as well as local markets. Instacart has no physical infrastructure. In fact, the company consists of two grocery-delivery smartphone apps.

Customers place orders using Instacart's website or mobile app. A separate app, used by more than 4,000 personal shoppers

whom Instacart has hired across 15 cities, guides the shoppers to stores from which they buy goods. The app can actually identify the aisle and the shelf where an item is located. The goal is to deliver orders within one hour of the order being placed.

Personal shoppers fill several orders at once as they go from store to store. The app suggests the optimal driving route to a customer's home, taking into account weather, traffic, sporting events, and local construction. Instacart charges a premium based on the size of each purchase. The company also offers a \$99-per-year membership that waives the delivery fee for orders greater than \$35.

Postmates. Postmates (<https://postmates.com>) works like this: The company's 13,000 couriers receive orders on their smartphones. For example, a customer wants 18 pounds of crushed ice, and Postmates offers the courier \$4.80 to pick up the ice and deliver it. When the courier accepts the job, his phone guides him to the grocery store and then to the customer.

The majority of deliveries made by Postmates are hot meals. The company analyzes data such as food-preparation times to become more effective at *stacking*—as their couriers drop off one order, their next pickup is already assigned and being prepared.

Although roughly 80 percent of Postmates' orders are prepared food, the company is expanding to deliver other commodities; for example, healthcare and beauty products. Postmates has also reached a deal with Apple to deliver MacBooks and other products the same day that customers purchase them online.

Uber. In 2015, Uber (www.uber.com) launched an option on its app, called UberEats, in New York and Chicago. UberEats delivers meals from local restaurants, with the "menu" items changing daily. UberEats is displayed on the Uber app only when a user is in an area that is covered.

GrubHub/Seamless. GrubHub/Seamless (www.grubhub.com) is a top online ordering provider, partnering with more than 45,000 restaurants. The app allows customers to flip through menus, place orders, and pay for delivery through the web or a mobile app. In 2015, the company bought out competitors Restaurants on the Run and DiningIn. These acquisitions enable GrubHub/Seamless to own the "last mile" of the supply chain and become a one-stop shop for food, from ordering to delivery.

Ola Cabs. Ola Cabs (Ola; <https://www.olacabs.com>) provides different types of cab service in India. Customers can reserve a cab through a web browser or a mobile app. The company commands about 60 percent of the market share in India. In 2015, Ola launched a grocery delivery service, Ola Store, that offers customers a choice of 12,000 items in 13 categories, everything from fruits and vegetables to baby items.

These companies do experience challenges. To begin with, the workforce that is essential to this business model may present a problem. That is, their labor costs will probably rise. Also, several on-demand companies are being sued for classifying their couriers as independent contractors rather than as employees to avoid providing them with benefits packages. In June 2015, California's labor commissioner ruled that a driver for Uber should be classified as a company employee.

Another challenge is that convenience can be expensive because delivery charges can vary greatly. For example, Instacart offers flat rates, whereas Postmates' fees depend on the distance of the delivery. Besides delivery costs, Instacart charges a premium

for items from some of the stores it delivers from. Another downside is that shoppers may miss out on using coupons or browsing for cheaper alternatives in the store. Also, the orders do not always go according to plan. For example, if an item is sold out, then the delivery person has to call the customer for instructions on what to do.

Perhaps the most serious challenge in the delivery market is competition from many large, established companies that offer delivery services. Consider these examples:

- Amazon (www.amazon.com) was looking into crowdsourcing (see Chapter 6) to use a mobile app to hook up individuals to deliver packages and existing brick-and-mortar stores to warehouse them.
- Walmart, which gets half of its sales from groceries, is exploring the online food business (<http://grocery.walmart.com>). Customers order online and Walmart employees select and bag the products. When customers arrive at the store, employees load the groceries into the customers' cars.
- Safeway grocery stores (<https://shop.safeway.com>) offers its "fresh to your door" delivery service.
- Starbucks (www.starbucks.com) offers a delivery service.

With the intense competition in the delivery services market, it is too early to predict any results. However, the companies discussed in this case are receiving large amounts of venture capital funding.

Sources: Compiled from B. Solomon, "Why GrubHub Is Building What Its CEO Calls 'A S***** Business,'" *Forbes*, April 20, 2016; J. Russell, "India's Ola Takes a Leaf Out of Uber's Book with New Grocery-Delivery Service," *TechCrunch*, July 21, 2015; L. Rao, "Instacart Is Asking Its Customers to Do Something New," *Fortune*, June 26, 2015; K. Kokalitcheva, "Why On-Demand Delivery Startup Postmates Really Raised \$80 Million," *Fortune*, June 25, 2015; M. Kosoff, "\$2 Billion Grocery Delivery Startup Instacart Is Reclassifying Some of Its Workers as Employees," *Business Insider*, June 22, 2015; G. Bensinger, "Amazon's Next Delivery Drone: You," *Wall Street Journal*, June 16, 2015; A. Connolly, "Amazon Considers Copying Postmates with New Crowdsourced Delivery Service," *The Next Web*, June 16, 2015; L. Heller, "Amazon's Uber-Like Delivery Service Could Be Coming Soon," *Forbes*, June 16, 2015; P. Vasan, "Tech Giants Serving Up Real Competition for FreshDirect," *CNBC*, June 12, 2015; J. Pinsker, "What Does the On-Demand Workforce Look Like?" *The Atlantic*, May 20, 2015; L. Jennings, "New Services Disrupt Restaurant Delivery Landscape," *Nation's Restaurant News*, May 18, 2015; K. Taylor, "We Tested Chipotle and McDonald's New Delivery Services. Here's What Happened," *Entrepreneur*, May 6, 2015; R. Paley, "Watch Out Seamless: New Delivery Services Are Invading Your Turf," *Yahoo!*, May 1, 2015; A. Stevenson, "Death to Amazon? Postmates' Boost to Small Business," *CNBC*, April 29, 2015; P. Sawers, "Uber Launches a Curated Meal-Delivery Service in New York and Chicago," *Venture Beat*, April 28, 2015; K. Steinmetz, "Go Fetch," *Time*, March 16, 2015; B. Solomon, "America's Most Promising Company: Instacart, the \$2 Billion Grocery App," *Forbes*, January 21, 2015; D. Matthews, "Watch Out, Seamless and GrubHub—Amazon Is Coming for You," *Fast Company*, December 3, 2014.

Questions

1. Describe the information technology used and developed by the entrepreneurs who founded Instacart, Postmates, GrubHub/Seamless, Uber, and Ola Cabs. What is the impact of these technologies on the costs of starting a business?
2. What are the advantages and disadvantages of being an independent contractor for a company?
3. Would you consider a job as a courier for one of these companies? Why or why not?

1.1 Why Should I Study Information Systems?

You are part of the most connected generation in history: You have grown up online; you are, quite literally, never out of touch; you use more information technologies (in the form of digital devices), for more tasks, and are bombarded with more information, than any generation in history. The *MIT Technology Review* refers to you as *Homo conexus*. Information technologies are so deeply embedded in your lives that your daily routines would be almost unrecognizable to a college student just 20 years ago.

Essentially, you practice continuous computing, surrounded by a movable information network. This network is created by constant cooperation between the digital devices you carry (for example, laptops, tablets, and smartphones); the wired and wireless networks that you access as you move about; and web-based tools for finding information and communicating and collaborating with other people. Your network enables you to pull information about virtually anything from anywhere, at any time, and to push your own ideas back to the web, from wherever you are, through a mobile device. Think of everything you do online, often with your smartphone: register for classes; take classes (and not just at your university); access class syllabi, information, PowerPoints, and lectures; research class papers and presentations; conduct banking; pay your bills; research, shop, and buy products from companies and other people; sell your “stuff”; search for, and apply for, jobs; make your travel reservations (hotel, airline, rental car); create your own blog and post your own podcasts and videocasts to it; design your own page on Facebook and LinkedIn; make and upload videos to YouTube; take, edit, and print your own digital photographs; stream music and movies to your personal libraries; use RSS feeds to create your personal electronic newspaper; text and tweet your friends and family throughout your day; send Snaps; and many other activities. (*Note:* If any of these terms are unfamiliar to you, don’t worry. You will learn about everything mentioned here in detail later in this text.)

The Informed User—You!

So, the question is: Why you should learn about information systems and information technologies? After all, you can comfortably use a computer (or other electronic devices) to perform many activities, you have been surfing the web for years, and you feel confident that you can manage any IT application that your organization’s MIS department installs.

The answer lies in you becoming an **informed user**; that is, a person knowledgeable about information systems and information technology. There are several reasons why you should become an informed user.

MIS In general, informed users tend to get more value from whatever technologies they use. You will enjoy many benefits from being an informed user of IT, including:

- You will benefit more from your organization’s IT applications because you will understand what is “behind” those applications (see **Figure 1.1**); that is, what you see on your computer screen is brought to you by your MIS department, who is operating behind your screen.
- You will be in a position to enhance the quality of your organization’s IT applications with your input.
- Even as a new graduate, you will quickly be in a position to recommend—and perhaps help select—the IT applications that your organization will use.
- Being an informed user will keep you abreast of both new information technologies and rapid developments in existing technologies. Remaining on top of things will help you to anticipate the impacts that new and improved technologies will have on your organization and to make recommendations on the adoption and use of these technologies.



FIGURE 1.1 MIS provides what users see and use on their computers.

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- You will understand how using IT can improve your organization's performance and teamwork as well as your own productivity.
- If you have ideas of becoming an entrepreneur, then being an informed user will help you use IT when you start your own business.

Going further, managing the IS function within an organization is no longer the exclusive responsibility of the IS department. Rather, users now play key roles in every step of this process. The overall objective in this text is to provide you with the necessary information to contribute immediately to managing the IS function in your organization. In short, the goal is to help you become a very informed user!

IT Offers Career Opportunities

MIS Because IT is vital to the operation of modern businesses, it offers many employment opportunities. The demand for traditional IT staff—programmers, business analysts, systems analysts, and designers—is substantial. In addition, many well-paid jobs exist in areas such as the Internet and electronic commerce (e-commerce), mobile commerce (m-commerce), network security, telecommunications, and multimedia design.

The IS field includes the people in various organizations who design and build information systems, the people who use those systems, and the people responsible for managing those systems. At the top of the list is the chief information officer (CIO).

The CIO is the executive who is in charge of the IS function. In most modern organizations, the CIO works with the chief executive officer (CEO), the chief financial officer (CFO), and other senior executives. Therefore, he or she actively participates in the organization's strategic planning process. In today's digital environment, the IS function has become increasingly strategic within organizations. As a result, although most CIOs still rise from the IS department, a growing number are coming up through the ranks in the business units (e.g., marketing or finance). Regardless of your major, you could become the CIO of your organization one day. This is another reason to be an informed user of information systems!

TABLE 1.1 Information Technology Jobs

Position	Job Description
Chief Information Officer	Highest-ranking IS manager; responsible for all strategic planning in the organization
IS Director	Manages all systems throughout the organization and the day-to-day operations of the entire IS organization
Information Center Manager	Manages IS services such as help desks, hot lines, training, and consulting
Applications Development Manager	Coordinates and manages new systems development projects
Project Manager	Manages a particular new systems development project
Systems Analyst	Interfaces between users and programmers; determines information requirements and technical specifications for new applications
Operations Manager	Supervises the day-to-day operations of the data or computer center
Programming Manager	Coordinates all applications programming efforts
Social Media Manager	Coordinates all social media development efforts and all social media monitoring and response efforts
Business Analyst	Focuses on designing solutions for business problems; interfaces closely with users to demonstrate how IT can be used innovatively
Systems Programmer	Creates the computer code for developing new systems software or maintaining existing systems software
Applications Programmer	Creates the computer code for developing new applications or maintaining existing applications
Emerging Technologies Manager	Forecasts technology trends; evaluates and experiments with new technologies
Network Manager	Coordinates and manages the organization's voice and data networks
Database Administrator	Manages the organization's databases and oversees the use of database-management software
Auditing or Computer Security Manager	Oversees the ethical and legal use of information systems
Webmaster	Manages the organization's website
Web Designer	Creates websites and pages

Table 1.1 provides a list of IT jobs, along with a description of each one. For further details about careers in IT, see www.computerworld.com/careertopics/careers and www.monster.com.

Career opportunities in IS are strong and are projected to remain strong over the next 10 years. In fact, the *U.S. News & World Report* listed its “100 best jobs of 2016,” *Money* listed its “best jobs in America for 2016,” and *Forbes* listed its “10 best jobs” for 2016. Let’s take a look at these rankings. (Note that the rankings differ because the magazines used different criteria in their research.) As you can see, jobs suited for MIS majors rank extremely high in all three lists. The magazines with their job rankings are as follows:

U.S. News & World Report (out of 100)

- 3: Computer systems analyst
- 13: Software developer
- 20: Web developer
- 29: IT manager

Money

- 1: Software engineer
- 7: IT Analyst

Forbes (out of 10)

- 3: Information security analyst
- 7: Software engineer
- 8: Computer systems analyst

Not only do IS careers offer strong job growth, the pay is excellent as well. The Bureau of Labor Statistics, an agency within the Department of Labor that is responsible for tracking and analyzing trends relating to the labor market, notes that the median salary in 2016 for “computer and information systems managers” was approximately \$130,000, and predicted that the profession would grow by an average of 15 percent per year through 2022.

Managing Information Resources

Managing information systems in modern organizations is a difficult and complex task. Several factors contribute to this complexity. First, information systems have enormous strategic value to organizations. Firms rely on them so heavily that, in some cases, when these systems are not working (even for a short time), the firm cannot function. (This situation is called “being hostage to information systems”). Second, information systems are very expensive to acquire, operate, and maintain.

A third factor contributing to the difficulty in managing information systems is the evolution of the management information systems (MIS) function within the organization. When businesses first began to use computers in the early 1950s, the MIS department “owned” the only computing resource in the organization, the mainframe. At that time, end users did not interact directly with the mainframe.

In contrast, in the modern organization, computers are located in all departments, and almost all employees use computers in their work. This situation, known as *end user computing*, has led to a partnership between the MIS department and the end users. The MIS department now acts more as of a consultant to end users, viewing them as customers. In fact, the main function of the MIS department is to use IT to solve end users’ business problems.

MIS As a result of these developments, the responsibility for managing information resources is now divided between the MIS department and the end users. This arrangement raises several important questions: Which resources are managed by whom? What is the role of the MIS department, its structure, and its place within the organization? What is the appropriate relationship between the MIS department and the end users? Regardless of who is doing what, it is essential that the MIS department and the end users work in close cooperation.

There is no standard way to divide responsibility for developing and maintaining information resources between the MIS department and the end users. Instead, that division depends on several factors: the size and nature of the organization, the amount and type of IT resources, the organization’s attitudes toward computing, the attitudes of top management toward computing, the maturity level of the technology, the amount and nature of outsourced IT work, and even the countries in which the company operates. Generally speaking, the MIS department is responsible for corporate-level and shared resources, and the end users are responsible for departmental resources. **Table 1.2** identifies both the traditional functions and various new, consultative functions of the MIS department.

So, where do the end users come in? Take a close look at Table 1.2. Under the traditional MIS functions, you will see two functions for which you provide vital input: managing systems development and infrastructure planning. Under the consultative MIS functions, in contrast, you exercise the primary responsibility for each function, while the MIS department acts as your advisor.

Before you go on . . .

1. Rate yourself as an informed user. (Be honest; this isn’t a test!)
2. Explain the benefits of being an informed user of information systems.
3. Discuss the various career opportunities offered in the IT field.

TABLE 1.2 The Changing Role of the Information Systems Department**Traditional Functions of the MIS Department**

Managing systems development and systems project management

- As an end user, you will have critical input into the systems development process. You will learn about systems development in Chapter 13.

Managing computer operations, including the computer center

Staffing, training, and developing IS skills

Providing technical services

Infrastructure planning, development, and control

- As an end user, you will provide critical input about the IS infrastructure needs of your department.

New (Consultative) Functions of the MIS Department

Initiating and designing specific strategic information systems

- As an end user, your information needs will often mandate the development of new strategic information systems.

You will decide which strategic systems you need (because you know your business needs better than the MIS department does), and you will provide input into developing these systems.

Incorporating the Internet and electronic commerce into the business

- As an end user, you will be primarily responsible for effectively using the Internet and electronic commerce in your business. You will work with the MIS department to accomplish this task.

Managing system integration including the Internet, intranets, and extranets

- As an end user, your business needs will determine how you want to use the Internet, your corporate intranets, and extranets to accomplish your goals. You will be primarily responsible for advising the MIS department on the most effective use of the Internet, your corporate intranets, and extranets.

Educating the non-MIS managers about IT

- Your department will be primarily responsible for advising the MIS department on how best to educate and train your employees about IT.

Educating the MIS staff about the business

- Communication between the MIS department and the business units is a two-way street. You will be responsible for educating the MIS staff on your business, its needs, and its goals.

Partnering with business-unit executives

- Essentially, you will be in a partnership with the MIS department. You will be responsible for seeing that this partnership is one “between equals” and ensuring its success.

Managing outsourcing

- Outsourcing is driven by business needs. Therefore, the outsourcing decision resides largely with the business units (that is, with you). The MIS department, working closely with you, will advise you on technical issues such as communications bandwidth and security, as well as other issues.

Proactively using business and technical knowledge to seed innovative ideas about IT

- Your business needs will often drive innovative ideas about how to effectively use information systems to accomplish your goals. The best way to bring these innovative uses of IS to life is to partner closely with your MIS department. Such close partnerships have amazing synergies!

Creating business alliances with business partners

- The needs of your business unit will drive these alliances, typically along your supply chain. Again, your MIS department will act as your advisor on various issues, including hardware and software compatibility, implementing extranets, communications, and security.

1.2 Overview of Computer-Based Information Systems

Organizations refer to their management information systems functional area by several names, including the MIS Department, the Information Systems (IS) Department, the Information Technology (IT) Department, and the Information Services Department. Regardless of the name, however, this functional area deals with the planning for—and the development,