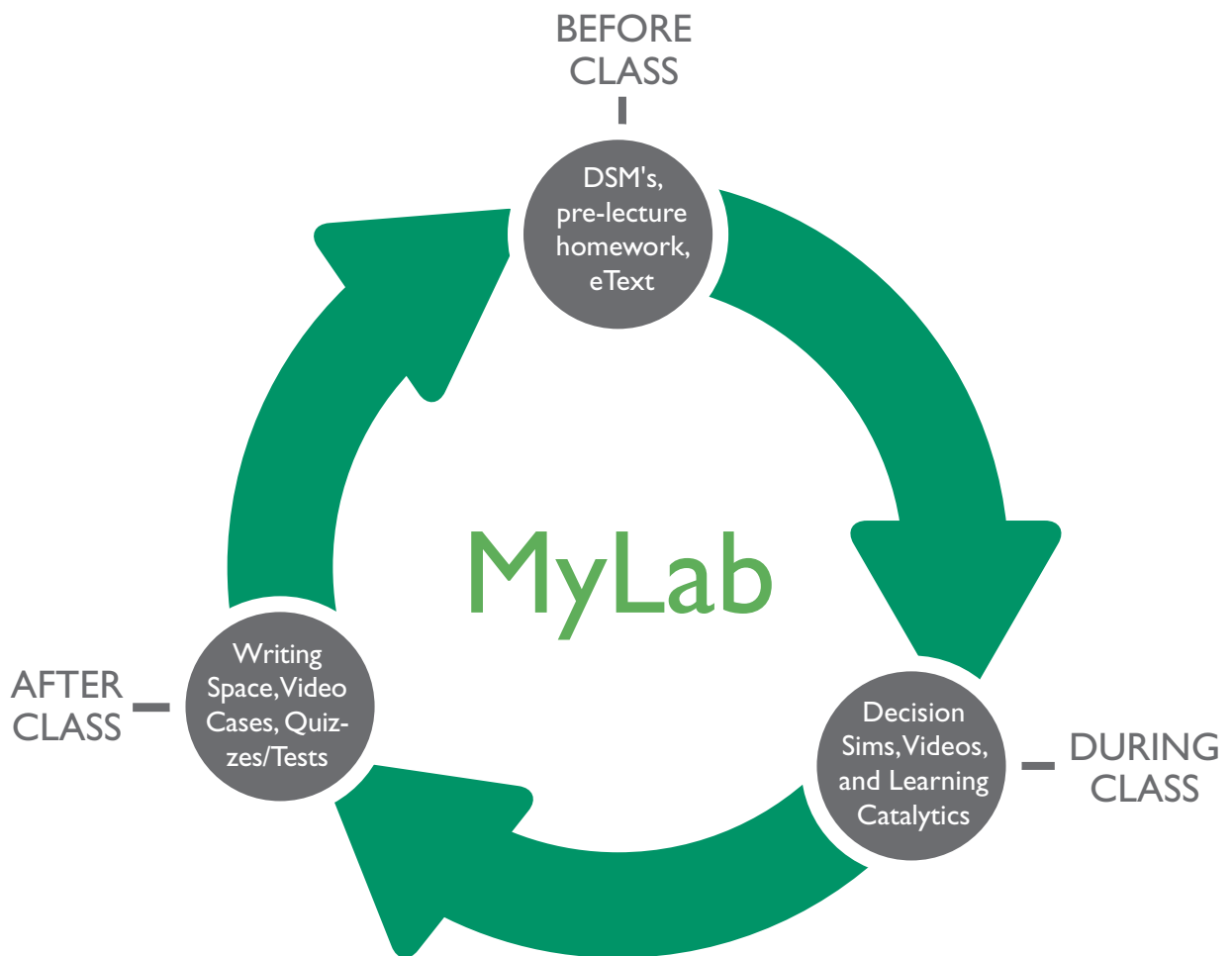
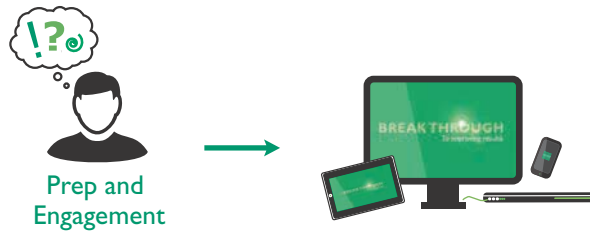


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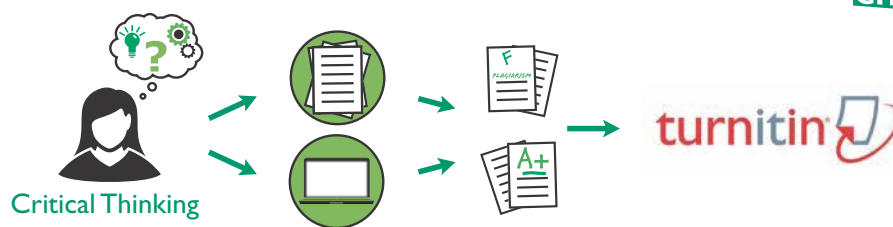
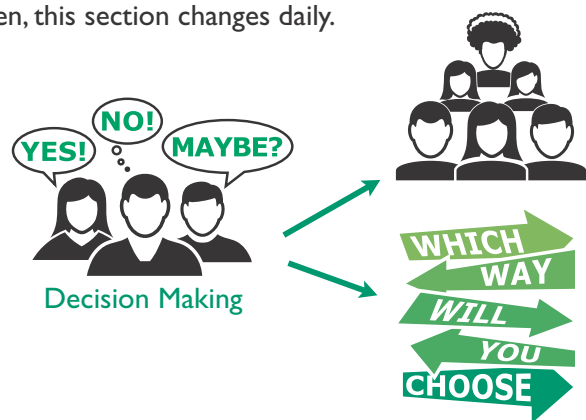


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SEVENTH EDITION

Information Systems Today

Managing in the Digital World

Joseph Valacich

University of Arizona

Christoph Schneider

City University of Hong Kong

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Dedication

To my mother Mary, you are the best.

—**Joe**

To Birgit for your love and support.

—**Christoph**

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Preface

APPROACH

Information systems have become *pervasive*. *Mobile devices*, *social media*, and *cloud computing* have transformed organizations and society. Organizations see the possibilities of the *Internet of Things*, in that not only computers, but various sensors, motors, actuators, or even cameras can generate a wealth of potentially useful data. Businesses face unprecedented opportunities, but also challenges, through the ability to utilize *Big Data*. What does all this mean? What are the catalysts of these concepts and of all this change? More important, how can organizations thrive in this dynamic and highly competitive marketplace? The answer to these and many similar questions is that information systems and related information technologies are driving globalization, new business models, and hypercompetition. It is little wonder that teaching an introductory course on information systems has never been more crucial—or more challenging.

One of the greatest challenges that we face in teaching information systems courses is how to keep pace in the classroom with what is happening out in the real world. Being relevant to students while at the same time providing the necessary foundation for understanding the breadth, depth, and complexity of information systems has never been more difficult. We wrote *Information Systems Today*, Seventh Edition, with this overarching goal in mind, to be both rigorous and relevant. To accomplish this, we want students not only to learn about information systems, but also to clearly understand the importance of information systems for individuals, organizations, and society. Additionally, we do not want to simply spoon-feed students with technical terms and the history of information systems. Instead, students must understand exactly what innovative organizations are doing with contemporary information systems and, more important, where things are heading. Finally, we want to empower students with the essential knowledge needed to be successful in the use and understanding of information systems in their careers.

To this end, we wrote *Information Systems Today*, Seventh Edition, so that it is contemporary, fun to read, and useful, focusing on what business students need to know about information systems to survive and thrive in the digital world.

AUDIENCE

Information Systems Today, Seventh Edition, is primarily for the undergraduate introductory information systems course required of all business students. The introductory information systems course typically has a diverse audience of students majoring in many different areas, such as accounting, economics, finance, marketing, general management, human resource management, production and operations, international business, entrepreneurship, and information systems. This book was also written for students studying topics outside of business, especially in the growing and broad area of information sciences. Given the range of students taking this type of course, we have written this book so that it is a valuable guide to all students, providing them with the essential information they need to know. Therefore, this book has been written to appeal to a diverse audience.

Information Systems Today, Seventh Edition, can also be used for the introductory course offered at the graduate level—for example, in the first year of an MBA program. Such usage would be especially appropriate if the course heavily focused on the diverse set of cases provided in each chapter.

WHAT'S NEW TO THE SEVENTH EDITION

Our primary goal for *Information Systems Today*, Seventh Edition, was to emphasize the importance of information systems to all business students as the role of information technology and systems continues to expand within organizations and society. Most notably, we extensively

examine how five big megatrends—mobile, social media, the Internet of Things, cloud computing, and Big Data—are transforming how individuals and organizations use information systems. Given this clear focus, we are better able to identify those topics most critical to students and future business professionals. Consequently, we have made substantial revisions to the basic content of the chapters and pedagogical elements that we believe achieve this goal. New or expanded chapter topics include the following:

- A revised chapter—Chapter 1, “Managing in the Digital World”—focuses on not only on defining what an information system consists of but also provides an update on the role of the five big megatrends as catalysts for tremendous change, as evidenced by the rise of globalization and emerging ethical issues.
- An extensively revised chapter—Chapter 2, “Gaining Competitive Advantage Through Information Systems”—provides new content describing how information systems play a key part in the business and revenue models of most organizations.
- A revised chapter—Chapter 3, “Managing the Information Systems Infrastructure and Services”—provides a stronger focus on the need for a reliable, adaptable, and scalable infrastructure to support the needs of today’s organizations. Chapter 3 also covers essential infrastructure concepts related to hardware, software, storage, networking and the Internet, and data centers, and provides an extended discussion on cloud computing and related concepts and their role in supporting an organization’s information systems infrastructure.
- A revised chapter—Chapter 4, “Enabling Business-to-Consumer Electronic Commerce”—focuses primarily on topics related to e-commerce involving the end consumer, with expanded coverage of mobile commerce and payment and related issues.
- A revised chapter—Chapter 5, “Enhancing Organizational Communication and Collaboration Using Social Media”—centers around various topics related to the need for organizational communication, and discusses how organizations use both traditional communication and collaboration tools and social media for communication, collaboration, cooperation, and connection.
- A revised chapter—Chapter 6, “Enhancing Business Intelligence Using Information Systems”—provides extended coverage on databases to include Big Data and organizations’ use of non-relational databases for handling and analyzing the ever-increasing amount of data.
- An extensively revised chapter—Chapter 8, “Strengthening Business-to-Business Relationships Via Supply Chain and Customer Relationship Management”—greatly expands the coverage of supply chain management by including foundational topics of business-to-business electronic commerce. This chapter further provides extended coverage of customer relationship management (CRM) by including evolving topics such as social CRM.
- An extensively revised chapter—Chapter 10, “Securing Information Systems”—provides extended coverage on pertinent topics such as IS risk management.
- A revised Technology Briefing covers foundational concepts related to various information technologies. The Technology Briefing provides the foundations for a deeper understanding of the topics introduced in Chapter 3 and is intended for use in more technically oriented courses. Each section of this briefing was designed to stand alone—it can be read with or without the other sections.

Beyond the chapter content and features, we have also made substantial changes and refinements to the end of each chapter. First, we carefully revised many of the end-of-chapter problems and exercises to reflect content changes and new material. Second, we have carefully updated the end-of-chapter cases about contemporary organizations and issues to illustrate the complexities of the digital world. Each case mirrors the primary content of its chapter to better emphasize its relevancy within the context of a real organization. Third, we have updated the Team Work Exercises based on interesting, important trends related to Internet usage within a variety of contexts; these exercises encourage students to keep up to date on these topics, discuss the significance of changes brought about by the Internet, and visualize and present the most pertinent findings. All these elements are discussed more thoroughly next.

Our goal has always been to provide only the information that is relevant to all business students, nothing more and nothing less. We believe that we have again achieved this goal with *Information Systems Today*, Seventh Edition. We hope you agree.

KEY FEATURES

As authors, teachers, developers, and managers of information systems, we understand that in order for students to best learn about information systems with this book, they must be motivated to learn. To this end, we have included a number of unique features to help students quickly and easily assess the true value of information systems and their impact on everyday life. We show how today's professionals are using information systems to help modern organizations become more efficient and competitive. Our focus is on the application of technology to real-world, contemporary situations. Next, we describe each of the features that contribute to that focus.

A Multitiered Approach

Each chapter utilizes cases in a variety of ways to emphasize and highlight how contemporary organizations are utilizing information systems to gain competitive advantage, streamline organizational processes, or improve customer relationships.

OPENING CASE—MANAGING IN THE DIGITAL WORLD. All chapters begin with an opening case describing a real-world company, technology, and/or issue to spark students' interest in the chapter topic. We have chosen engaging cases that relate to students' interests and concerns by highlighting why information systems have become central for managing in the digital world. Each opening case includes a series of associated questions the students will be able to answer after reading the chapter contents. The organizations, technologies, or issues highlighted in these cases include the following:

- Apple's rise, fall, and reemergence as a global technology giant
- How Groupon achieved a first-mover advantage by reinventing the business model of group buying
- Google's meteoric rise and the challenges associated with maintaining its success
- How Chinese e-commerce company Taobao became a leader in the world of e-commerce
- How Facebook has emerged as one of the most successful and powerful social media sites
- Intelligence agencies' use of social media to gather intelligence about changes in world-wide public sentiment
- Amazon.com's use of its sophisticated infrastructure to automate the supply chain for both large and small customers
- How Walmart became a leader in managing its global supply chains
- How Microsoft's Xbox rose to the top with the help of an ecosystem of devices and apps
- How the hacking group "Anonymous" uses various tactics to further its ideological goals

BRIEF CASE. Each chapter also includes a brief case that discusses important issues related to companies, technologies, or society. These are embedded in the text of the chapter and highlight concepts from the surrounding chapter material. Discussion questions are provided to seed critical thinking assignments or class discussions. The organizations, trends, and products highlighted in these cases include the following:

- How Starbuck's CIO is turning the organizational IS-ship around by introducing various internal and external IS-based innovations
- How broadband Internet access in airplanes has overcome its teething problems
- How domainers—those who buy and sell lucrative domain names on the Internet—have grown into a multibillion-dollar industry
- How organizations such as CrowdSpring enable the crowdsourcing of services
- How crowdfunding is transforming startup companies
- How companies such as eLoyalty use business intelligence to identify hotline callers' personality types
- How Amazon Studios crowdsources movie ideas and scripts, allowing aspiring screenwriters to bypass Hollywood production companies
- How Demand Media creates a supply chain for content published on sites such as eHow, Livestrong.com, and Trails.com
- How hardware and software companies are fighting a global patent war
- How law enforcement uses 3D technology to re-create crime scenes

END-OF-CHAPTER CASE. To test and reinforce chapter content, we present two current real-world cases at the end of each chapter. Sources for these cases include *BusinessWeek*, *CIO* magazine, *InformationWeek*, *Wired*, and various Web sites. Like the Brief Cases within the chapter, these cases are taken from the news and are contemporary. However, these are longer and more substantive than the Brief Cases. They too are followed by discussion questions that help the student apply and master the chapter content. The organizations, products, and issues highlighted in these cases include the following:

- How the One Laptop per Child program is attempting to bridge the digital divide
- How YouTube has grown into a mainstream Web marvel
- How LinkedIn, a social networking site for professionals, can help people find jobs, useful business contacts, and business opportunities
- How streaming video is disrupting the movie rental and TV broadcasting industries
- How creators of social games like FarmVille and Candy Crush Sage struggle to overcome infrastructure challenges
- How the deep Web fuels legal and illegal activities
- How Bitcoin created a shadow currency
- How PayPal created a global currency to enable worldwide collaboration and commerce
- How social media giants have joined the world’s most valuable companies
- How Wikipedia has become both a useful and a sometimes controversial Web resource
- How the National Security Agency, or NSA, is being viewed as the National *Surveillance* Agency
- How web analytics are providing unprecedented insights into consumer behavior on the Internet
- How Software as a Service has enabled small and medium-sized organizations to utilize enterprise resource planning (ERP) systems
- How Bridgestone’s ERP failure turned into a blame game
- How natural disasters disrupt global supply chains
- How customer relationship management is evolving to include social media capabilities
- How the Federal Bureau of Investigation and Department of Homeland Security joined forces in developing a comprehensive database of biometric information to better track and apprehend criminals
- How the rise of open source software systems, such as the Linux operating system, Apache Web server, and Firefox Web browser, is transforming the software industry
- How the National Security Agency is attempting to stop insider leaks
- How China limits information exchange within its society through its “great firewall”

COMMON CHAPTER FEATURES

Throughout every chapter, various short pedagogical elements are presented to highlight key information systems issues and concepts in a variety of contexts. These elements help to show students the broader organizational and societal implications of various topics.

Industry Analysis

Every industry is being transformed by the Internet and the increasing use of information systems by individuals and organizations. To give you a feel for just how pervasive and profound these changes are, each chapter presents an analysis of a specific industry to highlight the new rules for operating in the digital world. Given that no industry or profession is immune from these changes, each Industry Analysis highlights the importance of understanding information systems for *every* business student, not only for information systems majors. Discussion questions help students better understand the rapidly changing opportunities and risks of operating in the digital world. Chapter 1 examines how the digital world is transforming the opportunities for virtually all business professions. Subsequent chapters examine how globalization and the digital world have forever transformed various industries, including education, entertainment, retail, travel, health care, automobile, manufacturing, broadcasting, and law enforcement. Clearly, we are in a time of tremendous change, and understanding this evolution will better equip students to not only survive but also thrive in the digital world.

Coming Attractions

We worked to ensure that this book is contemporary. We cover literally hundreds of different current and emerging technologies throughout the book. This feature, however, focuses on innovations that are likely to soon have an impact on organizations or society. Topics include the following:

- Wearable electronics saving lives
- Google’s augmented reality glasses
- Google’s Project Loon
- Carbon nanocomputers
- Dissolvable electronics to fight bacteria
- Intelligence through drones
- Combating counterfeits using liquid crystal lasers
- Saving lives through 3D bioprinting
- IBM’s predictions for the future
- Speeding security screening using the AVATAR kiosk

When Things Go Wrong

Textbooks don’t usually describe what not to do, but this can be very helpful to students. This feature enables students to learn about a real-world situation in which information systems did not work or were not built or used well. Topics include the following:

- Apple’s numerous product and strategy failures
- Groupon and the dangers of miscalculating coupons
- Dirty data centers and the environmental impact of cloud computing
- How companies are trying to rig “likes” and reputation on social networking sites
- JP Morgan’s social media fiasco
- How Twitter can quickly disseminate *misinformation*, with unforeseen consequences
- Avon’s not-so-beautiful implementation
- How supply chain issues exacerbated GM’s problems with faulty ignition switches
- How an Internet security startup couldn’t fight fire with fire
- How the “heartbleed” bug almost killed the Internet

Who’s Going Mobile

Mobile technologies have become pervasive throughout society. New opportunities and issues have emerged with the growing importance of mobile devices, such as smartphones and tablets, which are in people’s immediate reach 24/7. Related to each chapter’s content, this feature examines topics related to the growth in mobile device usage throughout the world. Topics include the following:

- The rise of wearable technologies
- The battle of mobile phone platforms
- How mobile phones have transformed developing countries
- The rise of mobile payments
- Going SoLoMo: Yelp
- The location-based service AroundMe
- Managing businesses on the road using mobile ERP
- The power of mobile CRM
- How to succeed in mobile app development
- Mobile security threats

Ethical Dilemma

Ethical business practices are now a predominant part of contemporary management education and practice. This feature examines contemporary dilemmas related to the chapter content and highlights the implications of these dilemmas for managers, organizations, and society. Topics include the following:

- The human cost of the newest gadgets
- An underground gaming industry selling virtual goods for “real” money

- The ethics of publishing street photography on the Web
- The ethics of reputation management
- The negative impacts of social media use
- Tracking shoppers using mobile phone signals
- Privacy of radio-frequency identification
- Using CRM systems to target or exploit consumers
- Ethical app development
- Industrial espionage

Key Players

A variety of key companies have shaped the information technology industry. While there are countless companies that have contributed to today's digital world, this feature presents some of the more prominent organizations that have significantly advanced technologies or are the leaders in their respective markets. These key players include the following:

- Wipro and Infosys, the global outsourcing leaders
- Huawei, Foxconn, et al.: The global technology elite
- Dell, IBM, Rackspace, and other giants of the infrastructure
- Amazon, GoDaddy, Shopify, and other players behind online storefronts
- The “other” social networking giants
- SAS, MicroStrategy, and other business intelligence leaders
- SAP, Oracle, and Microsoft: The titans of ERP
- Salesforce.com, an SaaS pioneer
- Activision Blizzard, Electronics Arts, and other players in game development
- TrendMicro, McAfee, and other white knights of the Internet Age

End-of-Chapter Material

Our end-of-chapter material is designed to accommodate various teaching and learning styles. It promotes learning beyond the book and the classroom. Elements include the following:

- **Key Terms**—Highlight key concepts within the chapter.
- **Review Questions**—Test students' understanding of basic content.
- **Self-Study Questions**—Enable students to assess whether they are ready for a test.
- **Matching Questions**—Check quickly to see if students understand basic terms.
- **Problems and Exercises**—Push students deeper into the material and encourage them to synthesize and apply it.
- **Application Exercises**—Challenge students to solve two real-world management problems using spreadsheet and database applications from a running case centered on a university travel agency. Student data files referenced within the exercises are available on the book's Web site: www.pearsonhighered.com/valacich.
- **Team Work Exercise**—Encourage students to keep up with, discuss, visualize, and present interesting, important trends and forecasts related to Internet usage within a variety of contexts.

We have extensively updated these elements to reflect new chapter content and the natural evolution of the material.

Pedagogy

In addition to the features described above, we provide a list of learning objectives to lay the foundation for each chapter. At the end of the chapter, the Key Points Review repeats these learning objectives and describes how each objective was achieved. A list of references appears at the end of each chapter.

Organization

The content and organization of this book are based on our own teaching as well as on feedback from reviewers and colleagues throughout the field. Each chapter builds on the others to reinforce key concepts and allow for a seamless learning experience. Essentially, the book has been structured to answer three fundamental questions:

1. What are contemporary information systems, and how are they being used in innovative ways?
2. Why are information systems so important and interesting?
3. How best can we build, acquire, manage, and safeguard information systems?

The ordering and content of our chapters were also significantly influenced by the “IS 2010 Curriculum Guidelines for Undergraduate Degree Programs in Information Systems,” with a particular focus on “What Every Business Student Needs to Know About Information Systems.”¹ These articles, written by prominent information systems scholars, define the information systems core body of knowledge for all business students. By design, the content of *Information Systems Today*, Seventh Edition, carefully follows the guidance of these articles. We are, therefore, very confident that our book provides a solid and widely agreed-on foundation for any introductory information systems course.

The chapters are organized as follows:

- **Chapter 1: Managing in the Digital World**—This chapter helps the student understand what information systems are, how the big five megatrends—mobile, social media, the Internet of Things, cloud computing, and Big Data—influence organizations and society, and how information systems have become a vital part of modern organizations. We walk the student through the technology, people, and organizational components of an information system, and lay out types of jobs and career opportunities in information systems and in related fields. We also focus on how technology is driving globalization and creating countless ethical concerns. We use a number of cases and examples, such as that of Apple, to show the student the types of systems being used and to point out common “best practices” in information systems use and management.
- **Chapter 2: Gaining Competitive Advantage Through Information Systems**—In this extensively updated chapter, we discuss how companies such as Groupon can use information systems for automation, organizational learning, and strategic advantage by creating new and innovative business models. Given the rapid advancement of new technologies, we explain why and how companies are continually looking for innovative ways to use information systems for competitive advantage, and how information systems support organizations’ international business strategies.
- **Chapter 3: Managing the Information Systems Infrastructure and Services**—Here, we provide an overview of the essential information systems infrastructure components and describe why they are necessary for satisfying an organization’s informational needs. With the ever-increasing complexity of maintaining a solid information systems infrastructure, it becomes increasingly important for organizations such as Google to design a reliable, robust, and secure infrastructure. We also examine the rapid evolution toward the delivery of infrastructure capabilities through a variety of cloud-based services.
- **Chapter 4: Enabling Business-to-Consumer Electronic Commerce**—Perhaps nothing has changed the landscape of business more than the use of the Internet for electronic commerce. In this extensively updated chapter, we describe how firms such as Taobao, Travelocity, or Timbuk2, and also governments, use the Internet to conduct commerce in cyberspace. Further, we describe the requirements for successful e-commerce Web sites and discuss Internet marketing and mobile commerce, as well as consumer-to-consumer and consumer-to-business e-commerce. Finally, we discuss payment and legal issues in e-commerce.

¹Topi, H., Valacich, J., Wright, R. T., Kaiser, K., Nunamaker Jr., J. F., Sipior, J. C., & de Vreede, G. J. (2010). IS 2010: Curriculum guidelines for undergraduate degree programs in information systems. *Communications of the Association for Information Systems*, 26(18); Ives, B., Valacich, J., Watson, R., & Zmud, R. (2002). What every business student needs to know about information systems. *Communications of the Association for Information Systems*, 9(30). Other contributing scholars to this article include Maryam Alavi, Richard Baskerville, Jack J. Baroudi, Cynthia Beath, Thomas Clark, Eric K. Clemons, Gordon B. Davis, Fred Davis, Alan R. Dennis, Omar A. El Sawy, Jane Fedorowicz, Robert D. Galliers, Joey George, Michael Ginzberg, Paul Gray, Rudy Hirschheim, Sirkka Jarvenpaa, Len Jessup, Chris F. Kemerer, John L. King, Benn Konsynski, Ken Kraemer, Jerry N. Luftman, Salvatore T. March, M. Lynne Markus, Richard O. Mason, F. Warren McFarlan, Ephraim R. McLean, Lorne Olfman, Margrethe H. Olsson, John Rockart, V. Sambamurthy, Peter Todd, Michael Vitale, Ron Weber, and Andrew B. Whinston.

- **Chapter 5: Enhancing Organizational Communication and Collaboration Using Social Media**—Social media have forever changed how people interact. In addition to enabling various business opportunities, social media have also enabled companies to better harness the power and creativity of their workforce. In this extensively updated chapter, we provide an overview of traditional communication and collaboration tools, and examine how different social media can enhance communication, collaboration, cooperation, and connection within organizations but also between organizations and their customers. Further, we discuss the importance of carefully managing an Enterprise 2.0 strategy. Finally, using examples such as Twitter and Facebook, we describe how companies can deal with potential pitfalls associated with social media.
- **Chapter 6: Enhancing Business Intelligence Using Information Systems**—Given how many different types of information systems organizations use to run their businesses and gain business intelligence, in this chapter we describe key business intelligence concepts and explain how databases serve as a foundation for gaining business intelligence. Further, we discuss three components of business intelligence: information and knowledge discovery, business analytics, and information visualization.
- **Chapter 7: Enhancing Business Processes Using Enterprise Information Systems**—In this updated chapter, we focus on enterprise systems, which are a popular type of information system used to integrate information and span organizations' boundaries to better connect a firm with customers, suppliers, and other partners. We walk students through various core business processes and then examine how enterprise resource planning systems can be applied to improve these processes and organizational performance.
- **Chapter 8: Strengthening Business-to-Business Relationships via Supply Chain and Customer Relationship Management**—In this extensively updated chapter, we continue our focus on enterprise systems by examining the complexities of supply networks and the rise of business-to-business electronic commerce, before examining how supply chain management systems can support the effective management of supply networks. Additionally, we examine customer relationship management systems and their role in attracting and retaining customers, and, using examples from companies such as Dell, discuss how organizations can integrate social media in their CRM efforts.
- **Chapter 9: Developing and Acquiring Information Systems**—In this chapter, we begin by describing how to formulate and present the business case to build or acquire a new information system. We then walk the student through the traditional systems development approach and explain how numerous other approaches, such as prototyping, rapid application development, and object-oriented analysis and design, can be utilized depending on the situation. Finally, we examine the steps followed when acquiring an information system from an outside vendor.
- **Chapter 10: Securing Information Systems**—With the pervasive use of information systems, new dangers have arisen for organizations, and the interplay between threats, vulnerabilities, and potential impacts has become a paramount issue within the context of global information management. In this extensively updated chapter, we define computer crime and contrast several types of computer crime, and discuss the growing significance of cyberwar and cyberterrorism. We then highlight the primary threats to information systems security and explain how systems can be compromised and safeguarded. We conclude this chapter with a discussion of the role of auditing, information systems controls, and the Sarbanes–Oxley Act. Note that some instructors may choose to introduce this chapter prior to the discussion of the information systems infrastructure in Chapter 3.
- **Technology Briefing**—In addition to these 10 chapters, we include a Technology Briefing that focuses on foundational concepts regarding hardware, software, networking and the Internet, and databases. While Chapter 3, “Managing the Information Systems Infrastructure and Services,” provides a more managerial focus to these enabling technologies, this foundational material is intended to provide a more in-depth examination of these topics. By delivering this material as a Technology Briefing, we provide instructors the greatest flexibility in how and when they can apply it.

Instructor Resources

At the Instructor Resource Center, www.pearsonhighered.com/irc, instructors can easily register to gain access to a variety of instructor resources available with this text in downloadable format. If assistance is needed, our dedicated technical support team is ready to help with the media supplements that accompany this text. Visit <http://247.pearsoned.com> for answers to frequently asked questions and toll-free user support phone numbers.

The following supplements are available with this text:

- Instructor's Resource Manual
- Test Bank
- TestGen[®] Computerized Test Bank
- PowerPoint Presentation
- Image Library

Reviewers

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1

Managing in the Digital World

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

1. Describe the characteristics of the digital world and the advent of the Information Age.
2. Define globalization, describe how it evolved over time, and describe the key drivers of globalization.
3. Explain what an information system is, contrasting its data, technology, people, and organizational components.
4. Describe the dual nature of information systems in the success and failure of modern organizations.
5. Describe how computer ethics impact the use of information systems and discuss the ethical concerns associated with information privacy and intellectual property.

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Preview

Today, organizations from Apple to Zales Jewelers use information systems to better manage their organizations in the digital world. These organizations use information systems to provide high-quality goods and services as well as to gain or sustain competitive advantage over rivals. In addition to helping organizations to be competitive, information systems have contributed to tremendous societal changes. Our objective for this chapter is to help you understand the role of information systems as we continue to move further into the digital world, and how they have helped fuel globalization. We then highlight what information systems are, how they have evolved to become a vital part of modern organizations, and why this understanding is necessary for you to become an effective manager in the digital world. We conclude by discussing ethical issues associated with the use of information systems.

Managing in the Digital World: Apple

Apple is one of the largest, most profitable technology companies in world. Each year, Apple sells hundreds of millions of its popular iMacs, MacBooks, iPods, iPads, and iPhones. Apple's products—and the technology that supports them—have influenced the way people behave and interact. Think how waiting in line at the grocery store or waiting for the next train is more productive, or at least no longer tedious, when you get to check your inbox or play a round of Angry Birds (Figure 1.1). Now remember how insecure you felt the last time you left your smartphone sitting on your living room sofa. Whichever way you look at it, the Apple craze is certainly here to stay, with people camping out for days to get their hands on the latest Apple gadgets.

Over the course of its history, Apple had its ups and downs, with Steve Wozniak and Steve Jobs, the company's founders, leaving Apple in the 1980s. After Steve Jobs' return to Apple in 1997, Apple has had an impressive run of successful products, including the iMac, the PowerBook, the iPod, and iTunes. Building on its success



FIGURE 1.1

Smartphones have taken the dreadfulness out of waiting.
Source: Diego Cervo/Fotolia.

with the iPod, Apple introduced the iPhone in 2007 and, shortly thereafter, the “App Store,” revolutionizing the way we purchase and use applications on mobile devices. The era of iPhones continued as successive updates to the iPhone line were introduced year after year, each garnering wider adoption than the last. In 2010, Apple introduced the revolutionary iPad, touted as a “third-category” device between smartphones and laptop personal computers (PCs). Clearly, innovations fueled by Apple have changed the lives of many people all over the world, and have contributed to the move into the post-PC era.

Because of this wild success, Apple has managed to become not only a hardware vendor, but also a keeper of people's (often private) information. As it is being stored in the cloud, personal information can easily be (ab)used to predict future behavior, potential trends, music tastes, and more. Connected as we may be to the rest of the world, salient concerns are warranted regarding issues of privacy and information property—that is, who has access to what and how private information is being used. Certainly, there are potential risks associated with being an active participant in the digital world, so the next time you purchase an app, think about how much you reveal about yourself with the swipe of your finger.

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

1. Given the pace at which technology is converging (e.g., phones, music players, cameras, and so on), what do you think is next in the post-PC era?
2. How have Apple's products influenced the way we work and socialize?
3. What are the ethical concerns associated with storing and analyzing user data?

Based on:
Apple Inc. (2014, May 2). In *Wikipedia, The Free Encyclopedia*. Retrieved May 7, 2014, from http://en.wikipedia.org/w/index.php?title=Apple_Inc.&oldid=606715547.

INFORMATION SYSTEMS TODAY

Today, computers—the core components of information systems (IS)—are ubiquitous: Be it e-book readers, laptop computers, digital cameras, smartphones, etc., you name it; computers are all around us, whether you see them or not. Companies such as FedEx and UPS use information systems to route trucks and track packages. Retailers such as Walgreens and Walmart use information systems for everything from optimizing supply chains to recording purchases and analyzing customer tastes and preferences. Cities use information systems for adaptive traffic control systems or variable speed limits. Cars use computers for everything from ignition control to airbags to distance control and park assist systems; in fact, U.S. automaker Ford now considers itself a technology company, pioneering, for example, applications that allow accessing smartphone apps from an in-dash touchscreen. Alternatively, just look around your school or place of work. At your school, you register for classes online; use e-mail, Twitter, or Facebook to communicate with fellow students and your instructors; access e-books from your library; and complete or submit assignments on online learning platforms such as BlackBoard, Moodle, or Sakai. At work, you may use a PC for e-mail and many other tasks. Your paychecks are probably generated by computer and automatically deposited in your banking account via high-speed networks. Even in your spare time, information technology is ubiquitous: You use social networking sites like Facebook to stay connected with your friends and family, you watch videos on YouTube, you upload pictures taken with your cell phone or digital camera to picture-sharing sites like Flickr, and you use your smartphone for playing games, sending e-mails, or even reading books. Chances are that each year you see more information technology than you did the year before, and this technology is a more fundamental and important part of your social, learning, and work life than ever before.

Over the past decades, the advent of powerful, relatively inexpensive, easy-to-use computers has had a major impact on business. When you stop and think about it, it is easy to see why information technology is important. Increasing global competitiveness has forced companies to find ways to be better and to do things less expensively. The answer for many firms continues to be to use information systems to do things better, faster, and cheaper. Using global telecommunications networks, companies can more easily integrate their operations to access new markets for their products and services as well as access a large pool of talented labor in countries with lower wages.

Clearly, we are living in a digital world. Given the proliferation of new form factors, such as tablets or smartphones, some even argue that we are living in the **post-PC era**, where wireless, mobile devices allow for novel ways of interacting with information systems. In fact, already in 2011, the majority of Apple's revenues came from "post-PC devices," and in the last quarter of 2011, Apple sold more iPads than HP (traditionally one of the world's leading PC makers) sold PCs. With Apple's introduction of the latest iPads in late 2013, this trend is likely to continue; analysts estimate 285 million name-brand tablets worldwide. Forrester research predicts that by 2016, one in every three U.S. adults will own a tablet, be it Apple's iPad; a tablet manufactured by electronics manufacturers such as Samsung, ASUS, or Motorola; or a tablet designed by the online bookseller Amazon.com (Kindle) or Barnes & Noble (Nook). Initially created as consumer devices, tablets have already made their way into various business settings, including warehouses, showrooms, airplane cockpits, and hospitals (Figure 1.2).

Yet, desktop PCs and laptops are unlikely to go away. Rather, devices with newer form factors will work in tandem with older form factors to provide truly ubiquitous experiences, and the changes we've seen so far will give rise to future developments, including wearable computers, augmented reality devices, or surface computers (Epps, Gownder, Golvin, Bodine, & Corbett, 2011).

Changes in technology have enabled new ways of working and socializing; whereas traditionally, people were bound to a stationary PC to do essential tasks, they can now perform such tasks from almost anywhere they have a cell phone signal. At the same time, workdays traditionally had a clear beginning and a clear end—from when you power your computer on to when you turn it off at night. Today, many tasks (especially more casual tasks such as reading or sending e-mails) can be done at any time, often in small chunks in between other tasks, such as when waiting in line at the supermarket cashier.

Computing has changed from an activity primarily focused on automating work to encompass various social and casual activities. Devices such as smartphones or tablets, paired with mobile broadband networks, allow for instant-on computing experiences, whenever and wherever; advances

**FIGURE 1.2**

Post-PC devices are increasingly being used in various business settings.

Source: Minerva Studio/Fotolia.

in *cloud computing* (think Gmail, Office Online, or DropBox) allow for accessing e-mails, files, notes, and the like from different devices, further enhancing portability and mobility.

In effect, we are in a virtuous cycle (or in a vicious cycle, considering the creep of work life into people's leisure time, and the increasing fixation on being permanently "on call"), where changes in technology enable social changes, and social changes shape technological changes. For example, communication, social networking, and online investing almost necessitate mobility and connectivity, as people have grown accustomed to checking e-mails, posting status updates, or checking on real-time stock quotes while on the go. In addition, the boundaries between work and leisure time are blurring, so that employees increasingly demand devices that can support both, often bringing their own devices into the workplace. In fact, a study conducted by research firm Forrester in 2011 found that 54 percent of online consumers in the United States and 70 percent of iPad owners believe that technology helps them to optimize both work and personal life.

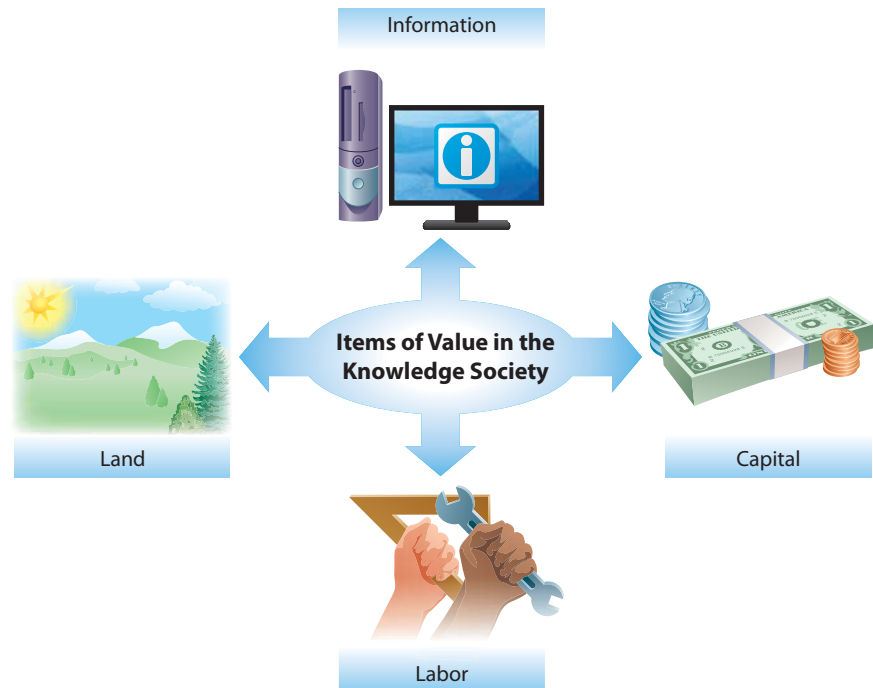
In 1959, Peter Drucker predicted that information and information technology (IT) would become increasingly important, and at that point, over half a century ago, he coined the term **knowledge worker**. Knowledge workers are typically professionals who are relatively well educated and who create, modify, and/or synthesize knowledge as a fundamental part of their jobs.

Drucker's predictions about knowledge workers were accurate. As he predicted, they are generally paid better than their prior agricultural and industrial counterparts; they rely on and are empowered by formal education, yet they often also possess valuable real-world skills; they are continually learning how to do their jobs better; they have much better career opportunities and far more bargaining power than workers ever had before; they make up about a quarter of the workforce in the United States and in other developed nations; and their numbers are rising quickly.

Drucker also predicted that, with the growth in the number of knowledge workers and with their rise in importance and leadership, a **knowledge society** would emerge. He reasoned that, given the importance of education and learning to knowledge workers and the firms that need them, education would become the cornerstone of the knowledge society. Possessing knowledge, he argued, would be as important as possessing land, labor, or capital (if not more so) (Figure 1.3). Indeed, research shows that people equipped to prosper in the knowledge society, such as those with a college education, earn far more on average than people without a college education, and that gap is increasing. In fact, the most recent data from the American Community Survey (2012 data) reinforce the value of a college education: Median earnings for workers 18 and over with a bachelor's degree were US\$49,157 a year, while those for workers with a high school diploma were US\$27,024. Median earnings for workers with a graduate or professional degree were US\$65,164, and of those without a high school diploma US\$19,404. These data suggest that a bachelor's degree is worth about US\$1 million in additional lifetime earnings compared to a worker with only a high school diploma. Additionally, getting a college degree will qualify you for many jobs that would not be available to you otherwise and will distinguish

FIGURE 1.3

In the knowledge society, information has become as important as—and many feel more important than—land, labor, and capital resources.



you from other job candidates. Finally, a college degree is often a requirement to qualify for career advancement and promotion opportunities once you do get that job.

People generally agree that Drucker was accurate about knowledge workers and the evolution of society. While people have settled on Drucker's term "knowledge worker," there are many alternatives to the term "knowledge society." Others have referred to this phenomenon as the knowledge economy, new economy, the digital society, the network era, the Internet era, and other names. We simply refer to this as the *digital world*. All these ideas have in common the premise that information and related technologies and systems have become very important to us and that knowledge workers are vital.

Similarly, many "traditional" occupations now increasingly use information technologies—from the UPS package delivery person using global positioning system (GPS) technology to plan the best route to deliver parcels, to the farmer in Iowa who uses precision agriculture to plan the use of fertilizers to increase crop yield. In essence, (almost) every organization can now be considered an e-business. Like the term "e-commerce," "e-business" refers to the use of information technologies and systems to support the business. Whereas "e-commerce" generally means the use of the Internet and related technologies to support commerce, **e-business** has a broader meaning: the use of nearly any information technologies or systems to support every part of the business. The lines between "knowledge workers" and "manual workers" are blurring, to the point that some argue that "every worker is a knowledge worker" (Rosen, 2011). The people at the front lines typically have a very good understanding of how certain business processes work, and can provide valuable input for improving or optimizing those processes; further, knowing how their work contributes to business results can foster commitment, leading to higher job performance.

Some have argued, however, that there is a downside to being a knowledge worker and to living in the digital world. For example, some have argued that knowledge workers will be the first to be replaced by automation with information technology. Others have argued that in the new economy there is a **digital divide**, where those with access to information technology have great advantages over those without access to information technology. The digital divide is one of the major ethical challenges facing society today when you consider the strong linkage between computer literacy and a person's ability to compete in the Information Age. For example, access to raw materials and money fueled the Industrial Revolution, "but in the informational society, the fuel, the power, is knowledge," emphasized John Kenneth Galbraith, an American economist who specialized in emerging trends in the U.S. economy. "One has now come to see a new class structure divided by those who have information and those who must function out of ignorance. This new class has its power not from money, not from land, but from knowledge" (Galbraith, 1987).

The good news is that the digital divide in America is rapidly shrinking, but there are still major challenges to overcome. In particular, people in rural communities, the elderly, people with disabilities, and minorities lag behind national averages for Internet access and computer literacy. Outside the United States and other developed countries, the gap gets even wider and the obstacles get much more difficult to overcome, particularly in the developing countries where infrastructure and financial resources are lacking (see also Case 1 at the end of this chapter). For example, most developing countries are lacking modern informational resources such as affordable Internet access or efficient electronic payment methods like credit cards.

To be sure, there is a downside to overreliance on information technology, but one thing is for certain: Knowledge workers and information technologies are now critical to the success of modern organizations, economies, and societies. How did information systems become so pervasive throughout our lives and society? This is examined next.

The Rise of the Information Age

In his book *The Third Wave*, futurist Alvin Toffler describes three distinct phases, or “waves of change,” that have taken place in the past or are presently taking place within the world’s civilizations (Figure 1.4). The first wave—a civilization based on agriculture and handwork—was a comparatively primitive stage that replaced hunter-gatherer cultures and lasted for thousands of years. The second wave of change—the Industrial Revolution—overlapped with the first wave. The Industrial Revolution began in Great Britain toward the end of the eighteenth century and

BRIEF CASE Technology at Starbucks

Since its founding in Seattle in the early 1970s, Starbucks has opened nearly 20,000 stores in 58 countries; most Starbucks’ stores attract a loyal crowd of customers, not only by offering a variety of coffees and related drinks, but also by providing a comfortable place to meet, study, work, or just hang out. In 2008, Starbucks hired Steve Gillett (named “Chief Information Officer, or CIO, of the Year” by *InformationWeek* in 2011) to improve the company’s information systems to better support its operations. Blending marketing with technology, Gillett started a number of initiatives, with a focus on both the customers and Starbucks’ employees. Here are just a few examples of how technology is being used at Starbucks:

1. **Connecting with Customers**—A key component of the Starbucks coffeehouse atmosphere is connectivity. In addition to free Wi-Fi access, customers can enjoy free access to premium content from the *Wall Street Journal* and other sources. Another way to connect with customers is “My Starbucks Idea,” where customers can post ideas and suggestions, as well as vote on or discuss others’ ideas. Hundreds of customer-generated ideas have been launched over the years. The company’s Facebook page, which has more than 37 million “likes,” serves as another avenue for customers to stay connected.
2. **Mobile Payments**—Starbucks is a leader in mobile payments. A smartphone app tied to the customer’s loyalty and payment can be used to make transactions, while at the same time generating a wealth of information about Starbucks’ loyal customers. By late 2013, over 10 percent of all Starbucks sales were made using the mobile apps.
3. **Virtual Talent**—A new addition to Starbucks’ headquarters is the “Tech Cafe.” Resembling Apple’s “Genius

Bars,” this IS help desk allows employees to get help with IS-related problems, choose technologies they need for their own workplace, and discuss needs and suggestions. Having recognized the increasing IS-related knowledge of its employees, Starbucks hopes to obtain valuable new ideas and suggestions from each employee.

4. **Contextual Retailing**—Starbucks strives to offer an individualized experience for every customer. For example, using mobile technologies, the baristas at Starbucks can be alerted if a regular customer enters the store, know the customer’s preferred drinks, or suggest new alternatives based on the customer’s history. Even further, the music played within a store could be based on the collective preferences of the customers sitting in the store.

These are but some examples that show that in today’s highly competitive world, successful companies have to do more than just brew a good cup of coffee.

Questions

1. What are other ways in which Starbucks could use technology to connect with its customers?
2. To what extent do such innovations influence your choice of coffee shops? What would make you switch to another store? Why?

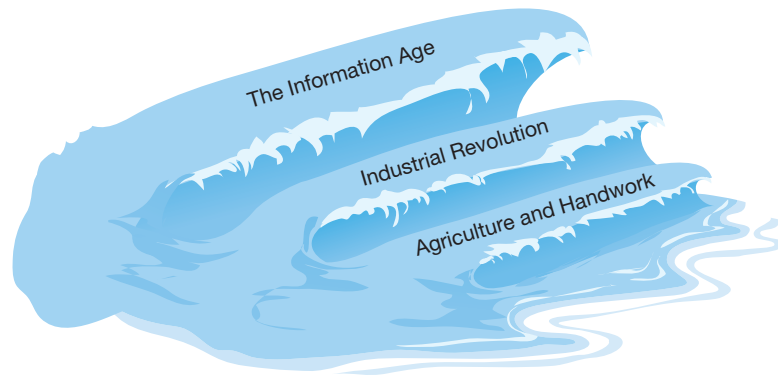
Based on:

Murphy, C. (2011, December 12). Starbucks’ Stephen Gillett: InformationWeek’s IT Chief of The Year. *InformationWeek*. Retrieved May 10, 2014, from <http://www.informationweek.com/news/global-cio/interviews/232200549>.

Starbucks. (2014, May 9). In *Wikipedia, The Free Encyclopedia*. Retrieved May 10, 2014, from <http://en.wikipedia.org/w/index.php?title=Starbucks&oldid=607798080>.

FIGURE 1.4

The Information Age is the biggest wave of change.



continued over the next 150 years, moving society from a predominantly agrarian culture to the urbanized machine age. Where once families supported themselves by working the land or hand-crafting items for sale or trade, now mothers, fathers, and children left home to work in factories. Steel mills, textile factories, and eventually automobile assembly lines replaced farming and handwork as the principal source of family income.

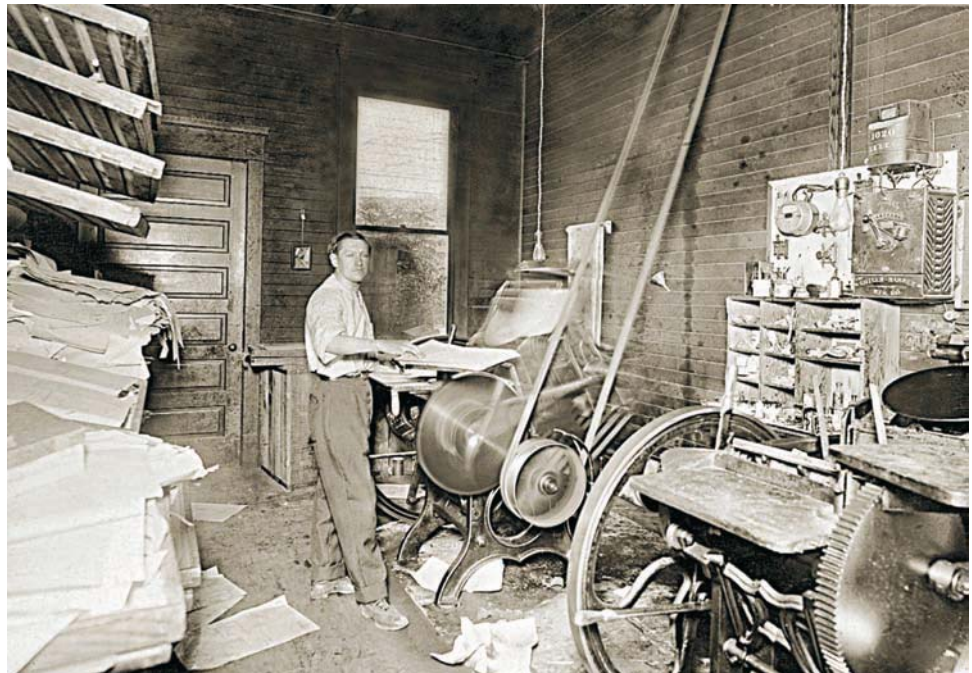
As the Industrial Revolution progressed, not only did occupations change to accommodate the mechanized society, but so did educational, business, social, and religious institutions. On an individual level, punctuality, obedience, and the ability to perform repetitive tasks became qualities to be instilled and valued in children in public schools and, ultimately, in workers.

In a much shorter period of time than it took for civilization to progress past the first wave, societies worldwide moved from the machine age into the **Information Age**—a period of change Toffler has dubbed the “third wave.” As the third wave gained speed, information became the currency of the realm. For thousands of years, from primitive times through the Middle Ages, information, or the body of knowledge known to that point, was limited. It was transmitted verbally within families, clans, and villages, from person to person and generation to generation. Then came Johannes Gutenberg’s invention of the printing press with movable type in the middle of the fifteenth century, and a tremendous acceleration occurred in the amount and kinds of information available to populations (Figure 1.5). Now knowledge could be imparted in written form and sometimes came from distant locations. Information could be saved, absorbed, debated, and written about in publications, thus adding to the exploding data pool.

FIGURE 1.5

The printing press gave birth to the Information Age.

Source: ChipPix/Shutterstock.



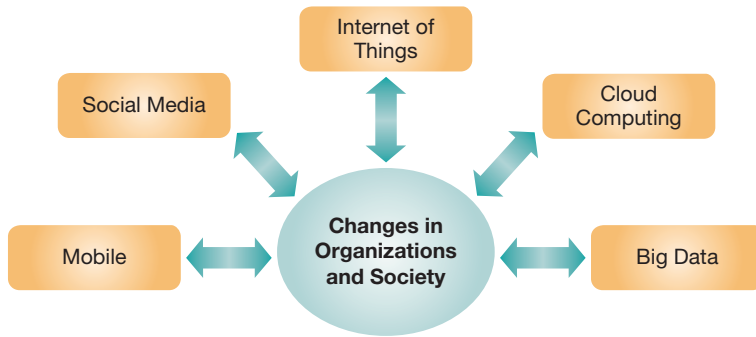


FIGURE 1.6
Five IT megatrends.

Five IT Megatrends in the Information Age

Today, in most developed societies, information technologies have become pervasive—information technologies are in fact used throughout society. The development of sophisticated Web technologies has brought about a fundamental shift in types of information technologies that are being used, and we’re seeing five (intertwined) “megatrends” that shape organizations and society (Figure 1.6). Knowing about the influence of these megatrends will be increasingly important for both your work life and your personal life.

- **Mobile.** Many believe that we’re living in a post-PC era, and one of the biggest trends we’re seeing today is the move toward mobile devices, as indicated in the opening section of this chapter. In most developed countries, the vast majority of adults has a mobile phone, and typically, people have their mobile phones within their reach 24/7. Compare that with the access to your laptop or PC. In the developing world, mobile devices are frequently seen leapfrogging traditional PCs, often owing to the lack of stable, reliable power or lacking landline telephone infrastructures, making mobile devices the primary means of accessing the Internet. For organizations, this increase in mobility has a wide range of implications, from increased collaboration to the ability to manage a business in real time—at any time, from anywhere—to changes in the way new (or existing) customers can be reached (Figure 1.7). With the increase in mobile devices, organizations not only have to create mobile-device-friendly versions of their Web sites, but often build mobile **apps** (software programs designed to perform a particular, well-defined function) to market their products or services. In addition, fueled by advances in consumer-oriented mobile devices (such as smartphones and tablets) and the ability to access data and applications

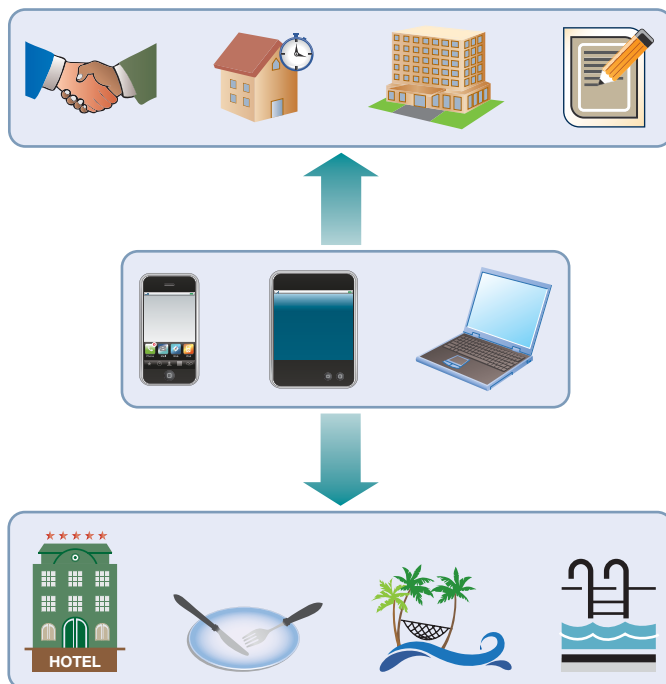


FIGURE 1.7
Mobile devices allow running business in real time—at any time, from anywhere.