

EMEA EDITION

KERI E. PEARLSON | CAROL S. SAUNDERS | DENNIS F. GALLETTA

# MANAGING & USING INFORMATION SYSTEMS

A STRATEGIC APPROACH

SEVENTH EDITION



WILEY



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A STRATEGIC APPROACH

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*To Hana*

*To Rusty, Russell, Janel & Kristin*

*To Carole, Christy and Matt, Lauren and Jacob, Gracie, Matthew, and Claire*



# PREFACE

*Information technology and business are becoming inextricably interwoven. I don't think anybody can talk meaningfully about one without the talking about the other.*

Bill Gates  
Microsoft<sup>1</sup>

*I'm not hiring MBA students for the technology you learn while in school, but for your ability to learn about, use and subsequently manage new technologies when you get out.*

IT Executive  
Federal Express<sup>2</sup>

*Give me a fish and I eat for a day; teach me to fish and I eat for a lifetime.*

Proverb

Managers do not have the luxury of abdicating participation in decisions regarding information systems (IS). Managers who choose to do so risk limiting their future business options. IS are at the heart of virtually every business interaction, process, and decision, especially when the vast penetration of the web over the last 25 years is considered. Mobile and social technologies, the Internet of Things, cloud computing, big data, and business analytics have brought IS to an entirely new level within firms and between individuals in their personal lives. Managers who let someone else make decisions about their IS are abdicating responsibilities that concern the very foundation of their business. This is a textbook about managing and using information written for current and future managers as a way to introduce the broader implications of the impact of IS.

This is the 20th anniversary of the first edition of this book. Information systems and technologies have changed significantly since the first edition, but the principles for managing and using information systems have, remarkably, stayed relatively constant. As with that initial book, the goal of this book continues to be assisting managers in becoming knowledgeable participants in IS decisions. Becoming a knowledgeable participant means learning the basics about information systems and feeling comfortable enough with information technology to ask questions. It does not mean having all the answers or having a deep understanding of all the technologies out in the world today. No text will provide managers everything they need to know to make important IS decisions. Some texts instruct on the basic technical background of IS. Others discuss applications and their life cycles. Some take a comprehensive view of the management information systems (MIS) field and offer readers snapshots of current systems along with chapters describing how those technologies are designed, used, and integrated into business life.

This book takes a different approach. It is intended to provide the reader a foundation of basic concepts relevant to using and managing information. This text is not intended to provide a comprehensive treatment on any one aspect of MIS, for certainly each aspect is itself a topic of many books. This text is not intended to provide readers enough technological knowledge to make them MIS experts. It is not intended to be a source of discussion of any particular technology. This text is written to help managers begin to form a point of view of how IS will help or hinder their organizations and create opportunities for them.

The idea for this text grew out of discussions with colleagues in the MIS area. Many instructors use a series of case studies, trade and popular press readings, and websites to teach their MIS courses. Others simply rely on one of the classic texts, which include dozens of pages of diagrams, frameworks, and technologies. The initial idea for this text emerged from a core MIS course taught at the business school at the University of Texas at Austin in 1999. That course was considered an “appetizer” course—a brief introduction into the world of MIS for MBA students. The course had two main topics: using information

<sup>1</sup> Bill Gates, *Business @ the Speed of Thought* (New York: Warner Books, Inc. 1999).

<sup>2</sup> Private conversation with one of the authors.

and managing information. At the time, there was no text like this one; hence, students had to purchase thick reading packets made up of articles and case studies to provide them the basic concepts. The course was structured to provide general MBA students enough knowledge of the MIS field so that they could recognize opportunities to use the rapidly changing technologies available to them. The course was an appetizer to the menu of specialty courses, each of which went much more deeply into the various topics. But completion of the appetizer course meant that students were able to feel comfortable listening to, contributing to, and ultimately participating in IS decisions. Those needs still exist.

Today, many students are digital natives—people who have grown up using information technologies (IT) all of their lives. They have never lived in a world without IT. Many have never had to function without a smartphone, and hence have instant access to information, in their pocket. That means that students come to their courses with significantly more knowledge about things such as tablets, apps, personal computers, smartphones, texting, the web, social networking, file downloading, online purchasing, and social media than their counterparts in school just a few years ago. This is a significant trend and it will continue; students will be increasingly knowledgeable about the personal use of technologies. That knowledge has begun to change the corporate environment. Today's digital natives expect to find at least the functionality they have at home everywhere they go, but especially in their work locations. At the same time, these users expect to be able to work in ways that take advantage of the technologies they have grown to depend on for social interaction, collaboration, and innovation. We believe that a basic foundation is still needed for managing and using IS, but we understand that the assumptions and knowledge base of today's students is significantly different than previous generations.

Also different today is the vast amount of information amassed by firms, sometimes called the “big data” problem. Organizations have figured out that there is an enormous amount of data around their processes, their interactions with customers, their products, and their suppliers. These organizations also recognize that with the increase in communities and social interactions on the web, there is additional pressure to collect and analyze vast amounts of unstructured information contained in these conversations to identify trends, needs, and projections. We believe that today's managers face an increasing amount of pressure to understand what is being said by those inside and outside their corporations and to join those conversations reasonably and responsibly. That is significantly different from just a few years ago.

This book includes an introduction, 13 chapters of text and mini cases, and a set of case studies, supplemental readings, and teaching support on a community hub at <http://pearlsonandsaunders.com>. The Hub provides faculty members who adopt the text additional resources organized by chapter, including recent news items with teaching suggestions, videos with usage suggestions, blog posts and discussions from the community, class activities, additional cases, cartoons, and more. Supplemental materials, including longer cases from all over the globe, can be found on the web.

The introduction to this text explores the argument presented in this preface: managers must be knowledgeable participants in making IS decisions. The first few chapters build a basic framework of relationships among business strategy, IS strategy, and organizational strategy and explore the links among them. The strategy chapters are followed by ones on work design and business processes that discuss the use of IS. General managers also need some foundation on how IT is managed if they are to successfully discuss their next business needs with IT professionals who can help them. Therefore, the remaining chapters describe the basics of information architecture and infrastructure, IT security, the business of IT, the governance of the IS organization, IS sourcing, project management, business analytics, and relevant ethical issues.

Given the acceleration of security breaches, readers will find a significantly updated chapter on IS security in this seventh edition of the text. Also, the material on analytics and “big data” has been extensively updated to reflect the growing importance of the topic. The introduction has a stronger focus on disruption and digital business models. The chapter on strategic uses provides a new example that will be familiar with students—Facebook's use of user data for strategic purposes. Also, that chapter extends the timeline of computing eras to a new decade, and has a new ending case about Amazon Go, both of which should provide views of the future that will likely be current for several years. The governance chapter introduces platform governance and discusses digital ecosystems and IT consumerization. Other chapters explore how technologies such as robotic process automation, technology-mediated control, and robots are changing the way employees work and are managed in today's organizations. The ethics chapter describes the European Union's GDPR initiative. Many chapters have new end-of-chapter cases. Each of the other chapters has been revised with newer concepts added, discussions of more current topics fleshed out, and



old, outdated topics removed or at least their discussion shortened. Similar to the sixth edition, every chapter begins with a navigation “box” to help the reader understand the flow and key topics of the chapter.

No text in the field of MIS is completely current. The process of writing the text coupled with the publication process makes a book somewhat out-of-date prior to delivery to its audience. With that in mind, this text is written to provide the “timeless” elements of using and managing information. With this 20 year anniversary edition of this text, the timelessness of our frameworks and approaches have supported our initial vision that there are key foundational ideas in this area to assist managers. Although this text is complete in and of itself, learning is enhanced by combining the chapters with the most current readings and cases. Faculty are encouraged to read the news items on the faculty Hub before each class in case one might be relevant to the topic of the day. Students are encouraged to search the web for examples related to topics and current events and bring them into the discussions of the issues at hand. The format of each chapter begins with a navigational guide, a short case study, and the basic language for a set of important management issues. These are followed by a set of managerial concerns related to the topic. The chapter concludes with a summary, key terms, a set of discussion questions, and case studies.

Who should read this book? General managers interested in participating in IS decisions will find this a good reference resource for the language and concepts of IS. Managers in the IS field will find the book a good resource for beginning to understand the general manager’s view of how IS affect business decisions. IS students will be able to use the book’s readings and concepts as the beginning in their journey to become informed and successful businesspeople.

The information revolution is here. Where do you fit in?

KERI E. PEARLSON, CAROL S. SAUNDERS, AND DENNIS F. GALLETTA



# ACKNOWLEDGMENTS

As we come up on the 20th anniversary of the first edition of this text, we are reminded of the many people who have helped us with this book and all the previous editions. Books of this nature are written only with the support of many individuals. We would like to personally thank everyone who helped with this text. Although we've made every attempt to include everyone who helped make this book a reality, there is always the possibility of unintentionally leaving some out. We apologize in advance if that is the case here.

We have been blessed with the help of our colleagues in this and in previous editions of the book. They helped us by writing cases and reviewing the text. Thank you to Rajiv Kohli, who contributed a case in the governance chapter of this edition. Our thanks continue to go out to many who helped us with this and earlier editions including Jonathan Trower, Espen Andersen, Janis Gogan, Ashok Rho, Yvonne Lederer Antonucci, E. Jose Proenca, Bruce Rollier, Dave Oliver, Celia Romm, Ed Watson, D. Guter, S. Vaught, Kala Saravanamuthu, Ron Murch, John Greenwod, Tom Rohleder, Sam Lubbe, Thomas Kern, Mark Dekker, Anne Rutkowski, Kathy Hurtt, Kay Nelson, Janice Sipior, Craig Tidwell, and John Butler. The book would not have been started were it not for the initial suggestion of a wonderful editor in 1999 at John Wiley & Sons, Beth Lang Golub. Also, although we cannot thank them by name, we also greatly appreciate the comments of the anonymous reviewers who have made a mark on this and previous editions.

We also appreciate the help of our current editor, Lise Johnson. Special thanks go to Judy Howarth and Vinolia Fernando who helped us with the revision process. We also appreciate the help of all the staff at Wiley who have made this edition a reality.

We would be remiss if we did not also thank Lars Linden for the work he did in building the Pearson and Saunders Faculty Hub for this book. Our vision included a web-based community for discussing teaching ideas and posting current articles that supplement this text. Lars made that vision into a reality. Thank you, Lars!

We also want to acknowledge and thank pbwiki.com. Without its incredible and free wiki, we would have been relegated to e-mailing drafts of chapters back and forth, or saving countless files in an external drop box without any opportunity to include explanations or status messages. We found that having used the wiki for our previous editions, we were able to get up and running much faster than if we had to start over without the platform.

From Keri: Thank you to my daughter, Hana, a graduate of Tulane University with an emphasis in finance, data science, and analytics, and a now a consultant at EY. Over the years, she has watched and encouraged my professional endeavors in so many ways. But now she's also a professional in this area and her comments and suggestions for this edition were even more insightful. Writing a book like this happens in the white space of our lives—the time in between everything else going on. This edition was written at a particularly frenetic time, but my family and friends listened to ideas, made suggestions, and celebrated the book's completion. I know how lucky I am to have this support. I love you guys!

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From Dennis: Thanks to my terrific family: my wife Carole, my daughters Christy and Lauren, my granddaughter Gracie, and my grandson Matthew and his baby sister Claire, who arrived just before this book was published. Also thanks to Matt and Jacob, two lovable and loving sons-in-law. Finally, thanks to our parents and sisters' families. We are also blessed with a large number of great, caring neighbors whom we see quite often. I love you all, and you make it all worthwhile!



# ABOUT THE AUTHORS

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**Dr. Carol S. Saunders** is Professor Emerita at the University of Central Florida, a Schoeller Senior Fellow at the Friedrich-Alexander University of Erlangen-Nuremberg, Germany, and associated with the University of South Florida. She served as General Conference Chair of the International Conference on Information Systems (ICIS) in 1999, Program Co-Chair of the Americas Conference on Information Systems (AMCIS) in 2015, and the Association for Information Systems (AIS) Vice President of Publications from 2016 to 2019. Dr. Saunders was the Chair of the ICIS Executive Committee in 2000. For three years, she served as Editor-in-Chief of *MIS Quarterly*. She is currently on the editorial boards of *Journal of Strategic Information Systems* and *Organization Science* and serves on the advisory board of *Business & Information Systems Engineering*, *Journal of the AIS*, and *Pacific Asia Journal of the AIS*. Dr. Saunders has been recognized for her lifetime achievements by the AIS with a LEO award and by the Organizational Communication and Information Systems Division of the Academy of Management. She is a Fellow of the AIS. Dr. Saunders' research interests include the impact of IS on power and communication, overload, virtual teams, time, sourcing, control, big data business models, coopetition, and interorganizational linkages. Her research is published in a number of journals including *MIS Quarterly*, *Information Systems Research*, *Journal of the AIS*, *Journal of MIS*, *Communications of the ACM*, *Journal of Strategic Information Systems*, *European Journal of Information Systems*, *Academy of Management Journal*, *Academy of Management Review*, *Communications Research*, and *Organization Science*. In 2019, she and A-F Rutkowski coauthored the book entitled *Emotional and Cognitive Overload: The Dark Side of Information Technology*.

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(Las Vegas) and Conference Co-Chair in 2011 (Shanghai); as Program Co-Chair for the Americas Conference on Information Systems (AMCIS) in 2003 (Tampa, Florida) and Inaugural Conference Chair in 1995 (Pittsburgh). The Pittsburgh conference had several “firsts” for an IS conference, including the first on-line submissions, reviews, conference registration and payment, placement service, and storage of all papers in advance on a website. Dr. Galletta served as ICIS Treasurer from 1994 to 1998 and Chair of the ICIS Executive Committee in 2012. He taught IS courses on the Fall 1999 Semester at Sea voyage (Institute for Shipboard Education) and established the concept of Special Interest Groups in AIS in 2000. In 2014, he won an Emerald Citation of Excellence for a coauthored article that reached the top 50 in citations and ratings from the fields of management, business, and economics. Dr. Galletta’s current research addresses online and mobile usability and behavioral security issues such as phishing, protection motivation, and antecedents of security-related decision making. He has published his research in journals such as *Management Science*; *MIS Quarterly*; *Information Systems Research*; *Journal of MIS*; *European Journal of Information Systems*; *Journal of the AIS*; *Communications of the ACM*; *Accounting, Management, and Information Technologies*; *Data Base*; and *Decision Sciences* and in proceedings of conferences such as ICIS, AMCIS, and the Hawaii International Conference on Systems Sciences. Dr. Galletta is a senior editor at *MIS Quarterly* and is an editorial board member at *Journal of MIS*. In the past, he served as founding Coeditor in Chief for *AIS Transactions on Human-Computer Interaction*, senior editor at *Journal of AIS*, associate editor for *MIS Quarterly* and *Information Systems Research*. He is currently on the Pre-eminent Scholars Board of *Data Base*. He won a Developmental Associate Editor Award at the *MIS Quarterly* in 2006. And during the off-hours, Dr. Galletta’s fervent hobby and obsession is digital photography, often squinting through his eyepiece to make portrait, macro, Milky Way, and lightning photos when he should be writing more papers.

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# Introduction

Why do managers need to understand and participate in the information systems (IS) decisions of their organizations? After all, most corporations maintain entire departments dedicated to the management of IS. These departments are staffed with highly skilled professionals devoted to the field of technology. Shouldn't managers rely on experts to analyze all aspects of IS and to make the best decisions for the organization? The answer to that question is an emphatic "no."

Managing information is a critical skill for success in today's business environment. While in the past, making better management decisions was the sole focus of information technology (IT), today every business has to go further and develop a digital business strategy. For example, it is no longer an issue for organizations to decide *whether* they want to collect and manage large amounts of information, develop websites, and engage social networks, but *how* to initiate, manage, and nurture all those channels. A successful manager continuously re-evaluates a company's vision in light of new opportunities and threats from IT. A successful process begins with the realization that customers, colleagues, and trading partners have ubiquitous access to sophisticated technologies, and all perhaps unreasonably expect nearly instant responses in a business world that is more dynamic than ever before.

Most importantly, change can come from unforeseen directions. New information-based products have emerged that have endangered businesses that were managed as if they were going to last forever. One need to only examine how Uber and Lyft suddenly led to sharp reductions in taxicab use, how Amazon has shrunk the number of brick-and-mortar stores such as Sears and K-Mart, how music streaming has all but eliminated music stores, and how on-line video streaming has challenged cable television companies.<sup>1</sup> Hence, understanding how to manage and use IS is no longer a luxury; it is a necessity to understand how to take advantage of IT, rather than to become a victim of IT.

The disruption from Uber and Lyft are most remarkable. In 2018, Forbes reported that between the first quarter of 2014 and the same time period in 2018, the share enjoyed by taxicabs shrank from 37% to 6% of the business traveler ground transportation market. Rental cars also suffered, declining from 55% to 23.5%. However, ride-hailing rose from 8% to 70.5% of the market between 2014 and 2018.<sup>2</sup>

The business traveler ground transportation market is an excellent illustration of market disruption afforded by creative uses of IT, especially when providing connections between a firm's IT and customers' smartphones. The vast majority of U.S. adults today own a smart phone and access online apps. According to the Pew Research Center, in 2018, 95% of U.S. adults had a cell phone of some kind, and, from 2011 to 2018, the percent of U.S. adults who own a smartphone rose from 31% to 77%,<sup>3</sup> which now has surpassed the percent of Americans who use computers. Computer usage diminished from a high of 78% in 2012 to 73% in 2018.<sup>4</sup> Pew also noted that 90% of American adults use the Internet, and about 75% have high speed (broadband) access at home.<sup>5</sup>

The use of these types of devices implies that individuals now manage a "personal IS" and make decisions about usage, data, and applications. Many even manage their own wireless network at home. Doesn't

<sup>1</sup> Robert Hof, "How Amazon Cleared the Profitability Hurdle," February 4, 2002, <http://www.bloomberg.com/bw/stories/2002-02-03/how-amazon-cleared-the-profitability-hurdle> (accessed October 29, 2015).

<sup>2</sup> M. Goldstein, "Dislocation and Its Discontents: Ride-Sharing's Impact on the Taxi Industry," Forbes.com, June 8, 2018, <https://www.forbes.com/sites/michaelgoldstein/2018/06/08/uber-lyft-taxi-drivers/#454cd99259f0> (accessed January 10, 2019).

<sup>3</sup> Pew Research Center, "Mobile Fact Sheet," February 5, 2018, <http://www.pewinternet.org/fact-sheet/mobile/> (accessed January 10, 2019).

<sup>4</sup> Pew Research Center, "Internet, Social Media Use and Device Ownership in U.S. Have Plateaued After Years of Growth," September 28, 2018, <http://www.pewresearch.org/fact-tank/2018/09/28/internet-social-media-use-and-device-ownership-in-u-s-have-plateaued-after-years-of-growth/> (accessed January 10, 2019).

<sup>5</sup> Pew Research Center, "Internet Use and Cell Phone Demographics," <http://www.pewinternet.org/data-trend/internet-use/internet-use-over-time> (accessed June 22, 2019).

that give them insight into managing IS in corporations? Students often think they are experts in corporate IS because of their personal experience with technology. Although there is a glimmer of truth in that perspective, it's a very dangerous perspective for managers to take. Certainly knowing about interesting apps, being able to use a variety of technologies for different personal purposes, and being familiar with the ups and downs of networking for their personal IS provide some experience that is useful in the corporate setting. But in a corporate setting, IS must be ready for use by an enterprise and beyond. These systems must be scalable for a large number of employees and customers, often simultaneously; they must be delivered in an appropriate manner for the enterprise; and they must be managed with corporate guidelines and appropriate governmental regulations in mind. Issues such as security, privacy, risk, support, and architecture take on new meaning within an enterprise, and someone has to manage them. Enterprise-level management and use of IS require a unique perspective and a different skill set.

Consider the now-historic rise of the so-called FANG group of companies (Facebook, Amazon.com, Netflix, and Google). All began as small startups only two decades ago, and now each occupies a position in the Fortune 500 list of largest companies, while two have reached Fortune's top 25 with ranks of 8 (Amazon) and 22 (Google/Alphabet).<sup>6</sup> Amazon.com's rise is meteoric. It began as an online bookseller and expanded rapidly by leveraging its business model into other marketplaces, such as music, electronics, health and beauty products, lawn and garden products, auctions, tools and hardware, groceries, and more. It succeeded by achieving a good mix of IS and business basics: capitalizing on operational efficiencies derived from inventory software and smarter storage, cost cutting, and effectively partnering with companies ranging from suppliers (such as the U.S. Postal Service) to competitors (such as Target) to customers (who can sell their used goods on its platform).

More recently, Amazon.com changed the basis of competition in another market, but this time it was the web services business. Amazon.com web services offer clients the extensive technology platform used for Amazon.com but in an on-demand fashion for developing and running the client's own applications.

Likewise, Google (now listed as its holding company "Alphabet") built a business that has revolutionized the way information is found. Google began in 1999 as a basic search company but its managers quickly learned that its unique business model could be leveraged for future success in seemingly unrelated areas. The company changed the way people think about web content by making it available in a searchable format with incredibly fast response time and in a host of languages. Further, Google's keyword-targeted advertising program and Google Analytics revolutionized the way companies advertise and track their progress in reaching customers. Then Google expanded, offering a suite of web-based applications, such as calendaring, office tools, e-mail, collaboration, shopping, and maps. Google Drive is one of the most popular file-sharing tools and Gmail one of the most popular e-mail services. As of January 2019, in 19 cities it offered its customers very inexpensive fiber connections.<sup>7</sup> In so doing, Google has further expanded into infrastructure and on-demand services and shows no signs of slowing its progress.<sup>8</sup>

These and other online businesses are able to succeed where traditional companies have not, in part because their management understood the power of information, IS, and the web. These exemplary online businesses aren't succeeding because their managers could build web pages or assemble an IS network. Rather, the executives in these new businesses understand the fundamentals of managing and using information and can marry that knowledge with a sound, unique business vision to dominate their intended market spaces.

The goal of this book is to provide the foundation to help the general business manager become a knowledgeable participant in IS decisions because any IS decision in which the manager doesn't participate can greatly affect the organization's ability to succeed in the future. This introduction outlines the fundamental reasons for taking the initiative to participate in IS decisions. Moreover, because effective participation requires a unique set of managerial skills, this introduction identifies the most important ones. These skills are helpful for making both IS decisions and all business decisions. We describe how managers should participate in the decision-making process. Finally, this introduction presents relevant

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<sup>6</sup> List, Fortune.com, 2019, <http://fortune.com/fortune500/list> (accessed January 10, 2019).

<sup>7</sup> Google.com, "Our Cities," January 10, 2019, <https://fiber.google.com/ourcities/> (accessed January 10, 2019).

<sup>8</sup> For more information on the latest services by these two companies, see <http://aws.amazon.com/ec2> and <http://www.google.com/enterprise/cloud/>.

models for understanding the nature of business and IS. These models provide a framework for the discussions that follow in subsequent chapters.

## The Case for Participating in Decisions about Information Systems

In today's business environment, maintaining a back-office view of technology is certain to cost market share and could ultimately lead to the failure of the organization. Managers who claim ignorance of IS can damage their reputation. Technology has become entwined with all the classic functions of business—operations, marketing, accounting, finance—to such an extent that understanding its role is necessary for making intelligent and effective decisions about any of them. Furthermore, as firms find digital business models at the core of just about every business today, failing to align IT decisions between business and technology leaders can cause a firm to fail to meet corporate objectives. As is covered in Chapter 9 on Governance, many decisions historically made by the IS group are increasingly being made by individuals outside that group. Envisioning new or enhanced digital business models requires an understanding of technologies and their capabilities and impacts on firms.

Therefore, understanding basic fundamentals about using and managing information is worth the investment of time. The reasons for this investment are summarized in Figure I-1 and are discussed next.

### A Business View of Critical Resources

IT is a critical resource for today's businesses. It both supports and consumes a significant amount of an organization's resources. Just like the other three major types of business resources—people, money, and machines—it needs to be managed wisely.

IT spending represents a significant portion of corporate budgets. Worldwide IT spending topped \$3.8 trillion in 2018. It is projected to continue to increase another hundred million in 2019.<sup>9</sup> Gartner sorts IT spending into five categories including devices (e.g., PCs, tablets, and smartphones), data center systems (e.g., network equipment, servers, and storage equipment), enterprise software and apps (e.g., companywide software applications), IT services (e.g., support and consulting services), and communications services (e.g., the expenses paid to vendors for voice and data services).<sup>10</sup>

Reasons
IS must be managed as a critical resource since it permeates almost every aspect of business.
IS enable change in the way people work both inside and outside of the enterprise.
IS are at the heart of integrated Internet-based or mobile solutions that are replacing standard business processes.
IS enable or inhibit business opportunities and new strategies.
IS can be used to combat business challenges from competitors.
IS enable customers to have greater pull on businesses and communities by giving them new options for voicing their concerns and opinions using social media.
IS can support data-driven decision making.
IS can help ensure the security of key assets.

**FIGURE I-1** Reasons why business managers should participate in IS decisions.

<sup>9</sup> Gartner, "Gartner Says Global IT Spending to Grow 3.2 Percent in 2019," October 17, 2018, <https://www.gartner.com/en/newsroom/press-releases/2018-10-17-gartner-says-global-it-spending-to-grow-3-2-percent-in-2019> (accessed June 22, 2019).

<sup>10</sup> Ibid.

Resources must return value, or they will be invested elsewhere. The business manager, not the IS specialist, decides which activities receive funding, estimates the risk associated with the investment, and develops metrics for evaluating the investment's performance. Therefore, the business manager needs a basic grounding in managing and using information. On the flip side, IS managers need a business view to be able to explain how technology impacts the business and what its trade-offs are.

## People and Technology Work Together

In addition to financial issues, managers must know how to mesh technology and people to create effective work processes. Collaboration is increasingly common, especially with the rise of social networking. Companies are reaching out to individual customers using social technologies such as Facebook, Twitter, Reddit, Renren, YouTube, and numerous other tools. Platform-based systems are generating widespread contributions, as well as use, across organizational boundaries. Technology is facilitating the work that people do and the way they interact with each other. Appropriately incorporating IS into the design of a business model enables managers to focus their time and resources on issues that bear directly on customer satisfaction and other revenue- and profit-generating activities.

Adding a new IS to an existing organization, however, requires the ability to manage change. Skilled business managers must balance the benefits of introducing new technology with the costs associated with changing the existing behaviors of people in the workplace. There are many choices of technology solutions, each with a different impact. Managers' decisions must incorporate a clear understanding of the consequences. Making this assessment doesn't require detailed technical knowledge. It does require an understanding of short-term and long-term consequences, risk mitigation, and why adopting new technology may be more appropriate in some instances than in others. Understanding these issues also helps managers know when it may prove effective to replace people with technology at certain steps in a process.

## Integrating Business with Information Systems

According to Jeremy King, Chief Technology Officer of @Walmart Labs, to achieve success, companies must realize that they are becoming technology companies. As King wrote in a blog, that in the past, there was a way to distinguish between companies, because some develop the technologies for enterprises, and some depended on those technologies. However, King went on to state:

*“. . . that distinction is now diminishing for this simple reason: every global company is becoming a tech company. . . . we're seeing technology as a critical component for business success.”<sup>11</sup>*

Walmart built platforms to support all of its ecommerce and digital shopping experiences around the world. Walmart's teams created a new search engine to enable engaging and efficient ways for online customers to find items in inventory. IS placed information in the hands of Walmart associates so that decisions could be made closer to the customer. IS simplified organizational activities and processes such as moving goods, stocking shelves, and communicating with suppliers. For example, handheld scanners provide floor associates with immediate and real-time access to inventory in their store and the ability to locate items in surrounding stores, if necessary.

## Opportunities and New Strategies Derived from Rapid Changes in Technology

The proliferation of new technologies creates a business environment filled with opportunities. The rate of adoption of these new technologies has increased due in part to the changing demographics of the workforce and the integration of “**digital natives**,” individuals whose entire lives have been lived in an era with

<sup>11</sup> Jeremy King, “Why Every Company Is a Tech Company,” November 21, 2013, <http://www.walmartlabs.com/2013/11/21/why-every-company-is-a-tech-company-by-jeremy-king-cto-of-walmartlabs> (accessed August 18, 2015).

Internet availability through the web. Therefore, digital natives are completely fluent in the use of personal technologies and the web, whereas “**digital immigrants**,” or people born before the 1990s, weren’t always around computers when they were young. Even today, innovative uses of the Internet produce new types of online businesses that keep every manager and executive on alert. New business opportunities spring up with little advance warning. The manager’s role is to frame these opportunities so that others can understand them, evaluate them against existing business needs and choices, and then pursue those that fit with an articulated business strategy. The quality of the information at hand affects the quality of both decisions and their implementation. Managers must develop an understanding of what information is crucial to the decisions, how to get it, and how to use it. They must lead the changes driven by IS.

## Competitive Challenges

Competitors come from both expected and unexpected places. General managers are in the best position to see the emerging threats and utilize IS effectively to combat ever-changing competitive challenges. Further, general managers are often called on to demonstrate a clear understanding of how their own technology programs and products compare with those of their competitors. A deep understanding of the capabilities of the organization coupled with existing IS can create competitive advantages and change the competitive landscape for the entire industry.

## Customer Pull

With the emergence of social networks such as Facebook, microblogs such as Twitter, and other web applications such as Yelp, businesses have had to redesign their existing business models to account for the change in power now wielded by customers and others in their communities. **Social media** and other web apps have given powerful voices to customers and communities, and businesses must listen. Redesigning the customer experience when interacting with a company is paramount for many managers and the key driver is IS. Social IT enables new and often deeper relationships with a large number of customers, and companies are learning how to integrate and leverage this capability into existing and new business models.

## Data-Driven Decision Making

Managers are increasingly using evidence-based management to make decisions based on data gathered from experiments, internal files, and other relevant sources. Data-driven decision making, based on new techniques for analytics, data management, and business intelligence, has taken on increased importance. Social media and the sensors associated with the Internet of Things (IoT) have created rich streams of real-time data that give managers increased insights to the impact of decisions much faster than traditional systems. Mid-course corrections are much easier to make. Predictive and prescriptive analytics give suggestions that are eerily close to what eventually happens. Big data stores can be mined for insights that were unavailable with traditional IS, creating competitive advantage for companies with the right tools and techniques.

## Securing Key Assets

As the use of the Internet grows, so does the opportunity for new and unforeseen threats to company assets. Taking measures to ensure the security of these assets is increasingly important. But decisions about security measures also impact the way IS can be used. It’s possible to put so much security around IT assets that they are locked down in a manner that gets in the way of business. At the same time, too little security opens up the possibility of theft, hacking, phishing, and other web-based mischief that can disrupt business. Managers must be involved in decisions about risk and security to ensure that business operations are in sync with the resulting security measures.

## What If a Manager Doesn't Participate?

Decisions about IS directly affect the profits of a business. The basic formula  $\text{Profit} = \text{Revenue} - \text{Expenses}$  can be used to evaluate the impact of these decisions, from the purchase of large-scale software to the adoption of a new digital business model. Choosing the wrong digital business model can cause a company to miss business opportunities and any revenues those opportunities would generate. Inadequate IS can cause a breakdown in servicing customers, which hurts sales. Poorly deployed social IT resources can badly damage the reputation of a strong brand. On the expense side, a miscalculated investment in technology can lead to overspending and excess capacity or underspending and restricted opportunity. Inefficient business processes sustained by ill-fitting IS also increase expenses. Lags in implementation or poor process adaptation reduces profits and therefore growth. All of these situations demonstrate that IS decisions can dramatically affect the bottom line.

Failure to consider IS strategy when planning business strategy and organizational strategy leads to one of three business consequences: (1) IS that fail to support business goals, (2) IS that fail to support organizational systems, and (3) a misalignment between business goals and organizational capabilities. These consequences are discussed briefly in the following section and in more detail in later chapters. The driving questions to consider are the potential effects on an organization's ability to achieve its business goals. How will the consequences impact the way people work? Will the organization still be able to implement its business strategy?

## Information Systems Must Support Business Goals and Organizational Systems

IS represent a major investment for any firm in today's business environment. Yet poorly chosen IS can actually become an obstacle to achieving business goals. The results can be disastrous if the systems do not align IS with business goals and organizational systems. When IS lack the capacity needed to collect, store, and transfer critical information for the business, decisions can be impacted and options limited. Customers will be dissatisfied or even lost. Production costs may be excessive. Worst of all, management may not be able to pursue desired business directions that are blocked by inappropriate IS. Victoria's Secret experienced this problem when a Superbowl ad promoting an online fashion show generated so many inquiries to its website that the website crashed. Spending large amounts of money on the advertisement was wasted when potential customers could not access the site. Recently, after a 31% year over year increase in Black Friday sales in 2018, website failures struck several retailers such as Walmart, J. Crew, and Lowe's. J. Crew alone was estimated to have lost over three-quarters of a million dollars in sales due to the outage.<sup>12</sup>

Organizational systems represent the fundamental elements of a business—its people, work processes, tasks, structure, and control systems—and the plan that enables them to work efficiently to achieve business goals. It might seem odd to think that a manager might add functionality to a corporate website without providing the training employees need to use the tool effectively. Yet, this mistake—and many more costly ones—occur in businesses every day. Managers make major IS decisions without informing all the staff of resulting changes in their daily work. Deploying technology, from an individual's desktop to enterprise-wide systems, requires careful planning about how it actually will be used in the organization—who will use it, how they will use it, and how to make sure the applications chosen will actually accomplish what is intended.

The general manager, who, after all, is charged with ensuring that company resources are used effectively, must guarantee that the company's IS support its organizational systems and that changes made in one system are reflected in the other. For example, a company with traveling employees needs an information system strategy compatible with its organizational strategy. Purchasing smartphones and/or connected tablets would only be a superficial solution. Those employees need a careful analysis of information needs while on the road. Factors that make it difficult to close a sale should be anticipated and apps

<sup>12</sup> Kara Driscoll, "Retail Websites Crash on Black Friday: What to Expect Today," *Dayton Daily News* (November 26, 2018), <https://www.daytondailynews.com/business/retail-websites-crash-black-friday-what-expect-today/GE04DSFuxL1hUFdQf1YoJN/> (accessed January 26, 2019).



on their smartphones or connected tablets need to be able to respond to those information needs in real time. Sometimes it would involve pulling up product comparisons that highlight their strengths. In other situations, it requires displaying seasonal fluctuations in local, regional, national, or international sales. Analyses of impacts of product improvements on customer satisfaction might be just what is needed. If the organization tries to adopt traditional information retrieval systems that mirror those used in the past, the technologies are doomed to fail.

## Skills Needed to Participate Effectively in Information Technology Decisions

Participating in IT decisions means bringing a clear set of skills to the table. All managers are asked to take on tasks that require different skills at different times. Those tasks can be divided into three types: visionary tasks that provide leadership and direction for the group; informational/interpersonal tasks that provide information and knowledge the group needs to be successful; and structural tasks that organize the group. Figure I-2 lists basic skills required of managers who wish to participate successfully in key IT decisions. Not only does this list emphasize understanding, organizing, planning, and solving the business needs of the organization but also it is an excellent checklist for all managers' professional growth.

These skills may not look much different from those required of any successful manager, which is the main point of this book: General managers can be successful participants in IS decisions without an extensive technical background. General managers who understand a basic set of IS concepts and who have outstanding managerial skills, such as those listed in Figure I-2, are ready for the digital economy.

### How to Participate in Information Systems Decisions

Technical wizardry isn't required to become a knowledgeable participant in the IS decisions of a business. Managers need curiosity, creativity, and the confidence to ask questions in order to learn and understand. A solid framework that identifies key management issues and relates them to aspects of IS provides the background needed to participate in business IS decisions.

The goal of this book is to provide that framework. The way in which managers manage and use information is directly linked to business goals and the business strategy driving both organizational and IS decisions. Aligning business and IS decisions is critical. Business, organizational, and information strategies are fundamentally linked in what is called the *Information Systems Strategy Triangle*, discussed in the next chapter. Failing to understand this relationship is detrimental to a business. Failing to plan for

Managerial Role	Skills
Visionary	Creativity Curiosity Confidence Focus on business solutions Flexibility
Informational and interpersonal	Communication Listening Information gathering Interpersonal skills
Structural	Project management Analytical Organizational Planning Leading Controlling

**FIGURE I-2** Skills for successful IT use by managerial role.

the consequences in all three areas can cost a manager his or her job. This book provides a foundation for understanding business issues related to IS from a managerial perspective.

## Organization of the Book

To be knowledgeable participants, managers must know about both managing and using information. The first five chapters offer basic frameworks to make this understanding easier. Chapter 1 introduces the Information Systems Strategy Triangle framework to discuss alignment of IS and the business. This chapter also provides a brief overview of relevant frameworks for business strategy and organizational strategy. It is provided as background for those who have not formally studied organization theory or business strategy. For those who have studied these areas, this chapter is a brief refresher of major concepts used throughout the remaining chapters of the book. Subsequent chapters provide frameworks and sets of examples for understanding the links between IS and business strategy (Chapter 2), links between IS and organizational strategy (Chapter 3), collaboration and individual work (Chapter 4), and business processes (Chapter 5).

The rest of the text covers issues related to the business manager's role in managing IS itself. These chapters are the building blocks of an IS strategy. Chapter 6 provides a framework for understanding the four components of IS architecture: hardware, software, networks, and data. Chapter 7 discusses how managers might participate in decisions about IS security. Chapter 8 focuses on the business of IT with a look at the IS organization, funding models, portfolios, and monitoring options. Chapter 9 describes the governance of IS resources. Chapter 10 explores sourcing and how companies provision IS resources. Chapter 11 focuses on project and change management. Chapter 12 concerns business intelligence, knowledge management, and analytics and provides an overview of how companies manage knowledge and create a competitive advantage using business analytics. And finally, Chapter 13 discusses privacy and the ethical use of information.

## Basic Assumptions

Every book is based on certain assumptions, and understanding those assumptions makes a difference in interpreting the text. The first assumption made by this text is that managers must be knowledgeable participants in the IS decisions made within and affecting their organizations. That means that the general manager must develop a basic understanding of the business and technology issues related to IS. Because technology changes rapidly, this text also assumes that today's technology is different from yesterday's technology. In fact, the technology available to readers of this text today might even differ significantly from that available when the text was being written. Therefore, this text focuses on generic concepts that are, to the extent possible, technology independent. It provides frameworks on which to hang more up-to-the-minute technological evolutions and revolutions, such as new uses of the web, big data, business analytics, new social tools, platform-based systems or new cloud-based services. We assume that the reader will supplement the discussions of this text with current case studies and up-to-date information about the latest technology.

A third, perhaps controversial, assumption is that the roles of a general manager and of an IS manager require different skill sets and levels of technical competency. General managers must have a basic understanding of IS in order to be a knowledgeable participant in business decisions. Without that level of understanding, their decisions may have serious negative implications for the business. On the other hand, IS managers must have more in-depth knowledge of technology so they can partner with general managers who will use the IS. As digital natives take on increasingly more managerial roles in corporations, this second assumption may change—all managers may need deeper technical understanding. But for this text, we assume a different, more technical skill set for the IS manager and we do not attempt to provide that here.

## Assumptions about Management

Although many books have been written describing the activities of managers, organizational theorist Henry Mintzberg offers a view that works especially well with a perspective relevant to IS management. Mintzberg's model describes management in behavioral terms by categorizing the three major roles a manager fills: interpersonal, informational, and decisional (see Figure I-3). This model is useful because

Type of roles	Manager's roles	IS examples
Interpersonal	Figurehead	CIO greets touring dignitaries.
	Leader	IS manager puts in long hours to help motivate project team to complete project on schedule in an environment of heavy budget cuts.
	Liaison	CIO works with the marketing and human resource vice presidents to make sure that the reward and compensation system is changed to encourage use of the new IS supporting sales.
Informational	Monitor	Division manager compares progress on IS project for the division with milestones developed during the project's initiation and feasibility phase.
	Disseminator	CIO conveys organization's business strategy to IS department and demonstrates how IS strategy supports the business strategy.
	Spokesperson	IS manager represents IS department at organization's recruiting fair.
Decisional	Entrepreneur	IS division manager suggests an application of a new technology that improves the division's operational efficiency.
	Disturbance handler	IS division manager, as project team leader, helps resolve design disagreements between division personnel who will be using the system and systems analysts who are designing it.
	Resource allocator	CIO allocates additional personnel positions to various departments based upon the business strategy.
	Negotiator	IS manager negotiates for additional personnel needed to respond to recent user requests for enhanced functionality in a system that is being implemented.

**FIGURE I-3** Managers' roles.

Source: Adapted from H. Mintzberg, *The Nature of Managerial Work* (New York: Harper & Row, 1973).

it considers the chaotic nature of the environment in which managers actually work. Managers rarely have time to be reflective in their approaches to problems. They work at an unrelenting pace, and their activities are brief and often interrupted. Thus, quality information becomes even more crucial to effective decision making. The classic view, described below, is often seen as a tactical approach to management, whereas some regard Mintzberg's view as more strategic.

## Assumptions about Business

Everyone has an internal understanding of what constitutes a business, which is based on readings and experiences with different firms. This understanding forms a model that provides the basis for comprehending actions, interpreting decisions, and communicating ideas. Managers use their internal model to make sense of otherwise chaotic and random activities. This book uses several conceptual models of business. Some take a functional view and others take a process view.

### Functional View

The classical view of a business is based on the functions that people perform, such as accounting, finance, marketing, operations, and human resources. The business organizes around these functions to coordinate them and to gain economies of scale within specialized sets of tasks. Information first flows vertically up and down between line positions and management; after analysis, it may be transmitted across other functions for use elsewhere in the company (see Figure I-4).

### Process View

Michael Porter of Harvard Business School describes a business in terms of the primary and support activities that are performed to create, deliver, and support a product or service. The primary activities are not limited to specific functions, but rather are cross-functional processes (see Figure I-5). For example, an accounts payable process might involve steps taken by other departments that generate obligations, which