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MANAGING & USING INFORMATION SYSTEMS
A STRATEGIC APPROACH

SEVENTH
EDITION

WILEY

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

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SEVENTH EDITION

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Consumerization of IT
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Integrating Business
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MANAGING AND USING INFORMATION SYSTEMS

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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[1]

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[2]

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 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.

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[1] Bill Gates, *Business @ the Speed of Thought* (New York: Warner Books, Inc. 1999).

[2] Private conversation with one of the authors.

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. Guiter, 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.

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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!

From Carol: I would like to thank Moez Limayem, Dean of the Muma College of Business at the University of South Florida, for graciously supporting conference travel related to my research. Rusty, thank you for being my compass and my release valve. I couldn't do it without you. Paraphrasing the words of an Alan Jackson song ("Work in Progress"): I may not be what you want me to be, but I'm trying really hard. Just be patient because I'm *still* a work in progress. I love you, Kristin, Russell, and Janel very much!

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*.

Dr. Dennis F. Galletta is Ben L. Fryrear Faculty Fellow and Professor of Business Administration at the Katz Graduate School of Business, University of Pittsburgh in Pennsylvania. He is also the Director of the Katz School's doctoral program and has taught IS Management graduate courses in Harvard's summer program each year since 2009. He obtained his doctorate from the University of Minnesota in 1985 and is a Certified Public Accountant. Dr. Galletta served as President of the Association of Information Systems (AIS) in 2007. Like Dr. Saunders, he is a Fellow of the AIS and has won a LEO lifetime achievement award. He was a member of the AIS Council for five years. He also served in leadership roles for the International Conference on Information Systems (ICIS): Program Co-Chair in 2005

(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.[1] 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.[2]

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%,[3] 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.[4] Pew also noted that 90% of American adults use the Internet, and about 75% have high speed (broadband) access at home.[5]

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 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.

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[1] 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).

[2] 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).

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

[4] 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).

[5] 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).

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).[6] 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.[7] In so doing, Google has further expanded into infrastructure and on-demand services and shows no signs of slowing its progress.[8]

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

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[6] List, Fortune.com, 2019, http://fortune.com/fortune500/list (accessed January 10, 2019).

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

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

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.[9] 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).[10]

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.

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[9] 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).

[10] 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."*[11]

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

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[11] 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 Profit = Revenue − 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.[12]

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 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.

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[12] 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).

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

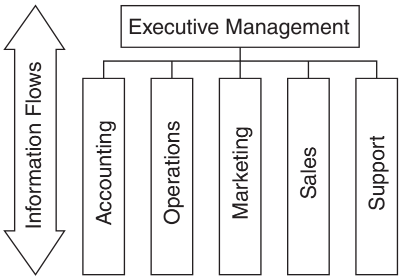
Executive Management
Information Flows
Accounting
Operations
Marketing
Sales
Support

FIGURE I-4 Hierarchical view of the firm.

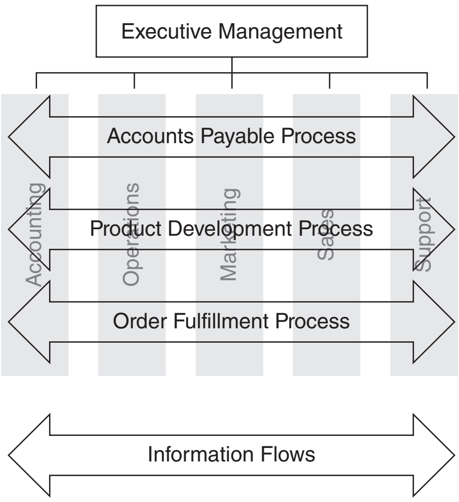
Executive Management
Accounts Payable Process
Product Development Process
Order Fulfillment Process
Accounting
Operations
Marketing
Sales
Support
Information Flows

FIGURE I-5 Process view of the firm: cross-functional processes.

the accounting department pays. Likewise, the product creation process might begin with an idea from R&D, which is transferred to an operations organization that builds the actual product and involves marketing to get the word out, sales to sell and deliver the product, and support to provide customer assistance as needed. This view takes into account the activities in each functional area that are needed to complete a process, and any organization can be described by the processes it performs. Improving coordination among activities increases business profit. Organizations that effectively manage core processes across functional boundaries are often the industry leaders because they have made efficiencies that are not visible from the functional viewpoint. IS are often the key to process improvement and cross-functional coordination.

Both the process and functional views are important to understanding IS. The functional view is useful when similar activities must be explained, coordinated, executed, or communicated. For example, understanding a marketing information system means understanding the functional approach to business in general and the marketing function in particular. The process view, on the other hand, is useful when examining the flow of information throughout a business. For example, understanding the information associated with order fulfillment, product development, or customer service means taking a process view of the business. This text assumes that both views are important for participating in IS decisions, and the plethora of enterprise-wide systems and platforms further emphasize that every portion of a business needs access to that information.

Assumptions about Information Systems

Consider the components of an information system from the manager's viewpoint rather than from the technologist's viewpoint. Both the nature of information (hierarchy and economics) and the context of an information system must be examined to understand the basic assumptions of this text.

	Data	**Information**	**Knowledge**
Definition	Simple observations of the state of the world	Data endowed with relevance and purpose	Information from the human mind (includes reflection, synthesis, context)
Characteristics	• Easily structured • Easily captured on machines • Often quantified • Easily transferred • Mere facts	• Requires unit of analysis • Data that have been processed • Human mediation necessary	• Hard to structure • Difficult to capture on machines • Often tacit • Hard to transfer
Example	Daily inventory report of all inventory items sent to the CEO of a large manufacturing company	Daily inventory report of items that are below economic order quantity levels sent to inventory manager	Inventory manager's knowledge of which items need to be reordered in light of daily inventory report, anticipated labor strikes, and a flood in Brazil that affects the supply of a major component

FIGURE I-6 Comparison of data, information, and knowledge.
Source: Adapted from Thomas Davenport, *Information Ecology* (New York: Oxford University Press, 1997).

Information Hierarchy

The terms *data*, *information*, and *knowledge* are often used interchangeably, but have significant and discrete meanings within the knowledge management domain (and are more fully explored in Chapter 12). Tom Davenport, in his book *Information Ecology*, pointed out that getting everyone in any given organization to agree on common definitions is difficult. However, his work (summarized in Figure I-6) provides a nice starting point for understanding the subtle but important differences.

The information hierarchy begins with data, or simple observations; **data** are sets of specific, objective facts or observations, such as "inventory contains 45 units." Standing alone, such facts have no intrinsic meaning but can be easily captured, transmitted, and stored electronically.

Information is data endowed with relevance and purpose.[13] People turn data into information by organizing data into some unit of analysis (e.g., dollars, dates, or customers). For example, a mash-up of location data and housing prices (from separate sources) adds something beyond what the data provide individually, and that makes it information.

To be relevant and have a purpose, information must be considered within the context in which it is received and used. Because of differences in context, information needs vary across functions and hierarchical levels. For example, when considering functional differences related to a sales transaction, a marketing department manager may be interested in the demographic characteristics of buyers, such as their age, gender, and home address. A manager in the accounting department probably won't be interested in any of these details, but instead wants to know details about the transaction itself, such as method of payment and date of payment.

Similarly, information needs may vary across hierarchical levels. These needs are summarized in Figure I-7 and reflect the different activities performed at each level. At the supervisory level, activities are narrow in scope and focused on the production or the execution of the business's basic transactions. At this level, information is focused on day-to-day activities that are internally oriented and accurately defined in a detailed manner. The activities of senior management are much broader in scope. Senior management performs long-term planning and needs information that is aggregated, externally oriented, and more subjective than supervisors require. The information needs of middle managers in terms of these characteristics fall between the needs of supervisors and of senior management. Because information needs vary across levels, a daily inventory report of a large manufacturing firm may serve as information for a low-level inventory manager whereas the CEO would consider such a report to be merely data. The context in which the report is used must be considered in determining whether it is information.

Knowledge is information that is synthesized and contextualized to provide value. It is information with the most value. Knowledge consists of a mix of contextual information, values, experiences, and rules. For example, the mash-up of locations and housing prices means one thing to a real estate agent,

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[13] Peter F. Drucker, "The Coming of the New Organization," *Harvard Business Review* (January–February 1988), 45–53.

	Top management	**Middle management**	**Supervisory and lower-level management**
Time horizon	Long: years	Medium: weeks, months, years	Short: day to day
Level of detail	Highly aggregated Less accurate More predictive	Summarized Integrated Often financial	Very detailed Very accurate Often nonfinancial
Source	Primarily external	Primarily internal with limited external	Internal
Decision	Extremely judgmental Uses creativity and analytical skills	Relatively judgmental	Heavily reliant on rules

FIGURE I-7 Information characteristics across hierarchical levels.

Source: Adapted from Anthony Gorry and Michael S. Scott Morton, "A Framework for Management Information Systems," *Sloan Management Review* 13, no. 1 (1971), 55–70.

another thing to a potential buyer, and yet something else to an economist. It is richer and deeper than information and more valuable because someone thought deeply about that information and added his or her own unique experience and judgment. Knowledge also involves the synthesis of multiple sources of information over time.[14] The amount of human contribution increases along the continuum from data to information to knowledge. Computers work well for managing data but are less efficient at managing information and knowledge.

Some people think that there is a fourth level in the information hierarchy: wisdom. **Wisdom** is knowledge fused with intuition and judgment that facilitates making decisions. Wisdom is that level of the information hierarchy used by subject matter experts, gurus, and individuals with a high degree of experience who seem to "just know" what to do and how to apply the knowledge they gain. This is consistent with Aristotle's view of wisdom as the ability to balance different and conflicting elements together in ways that are only learned through experience.

Economics of Information versus Economics of Things

In their groundbreaking book, *Blown to Bits*, Evans and Wurster argued that every business is in the information business.[15] Even those businesses not typically considered information businesses have business strategies in which information plays a critical role. The physical world of manufacturing is shaped by information that dominates products as well as processes. For example, a conventional automobile contains as much computing power as a personal computer, with specialized processors and sensors alerting the driver of its health. Autonomous (self-driving) vehicles have extended that power to another order of magnitude, merging location awareness (through GPS data) with visual input (using cameras).

Several current manufacturers see a future market for automobiles as a "subscription" or "sharing" model rather than a "purchase" model. Made possible only by IT, such a model would eliminate the need to search, negotiate, own, and maintain a vehicle.[16] Perhaps in the future a user will be able to signal for a car on a watch or smartphone to autonomously drive to her location, ride to the proper destination, and then dismiss the car to return to its "home base." The car can make its own appointment at the repair shop when it senses that maintenance is needed, and then navigate to the facility by itself. Close coordination of manufacturers, software developers, mobile platform developers, and many other partners will each take an important role in the digital business model necessary to make this a reality.

As our world is reshaped by information-intensive industries, it becomes even more important for business strategies to differentiate the timeworn economics of things from the evolving economics of information. Things wear out; things can be replicated at the expense of the manufacturer; things exist in a tangible location. When sold, the seller no longer owns the thing. The price of a thing is typically based on production costs. In contrast, information never wears out, although it can become obsolete or untrue. Information can be replicated at virtually no cost without limit; information exists in the ether. When sold, the seller still retains the information, but this ownership provides little value if others have no legal limit in their ability to copy it. Finally, information is often costly to produce but cheap to reproduce. Rather than pricing it to recover the sunk cost of its initial production, its price is typically based on its value to the consumer. Figure I-8 summarizes the major differences between the economics of goods and the economics of information.

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[14] Thomas H. Davenport, *Information Ecology* (New York: Oxford University Press, 1997), 9–10.

[15] Philip Evans and Thomas Wurster, *Blown to Bits* (Boston, MA: Harvard Business School Press, 2000).

[16] Rhinehart, "Car Subscription Services Are the Future of Vehicle Ownership," MutualMobile.com, February 26, 2018, https://mutualmobile.com/resources/car-subscription-services-are-the-future-of-vehicle-ownership (accessed January 11, 2019).

Evans and Wurster suggested that traditionally the economics of information has been bundled with the economics of things. However, in this Information Age, firms are vulnerable if they do not separate the two. The Encyclopedia Britannica story serves as an example of the value of separating information from things. Encyclopedia Britannica published authoritative, richly bound, and colorful physical volumes every several years and used expert writers and well-trained door-to-door salespeople. In its last year of print publication, the publisher charged $1,395 for a set of 32 volumes weighing 129 lbs. in total.[17] The printing and binding alone had cost $250, and sales commissions were $500 to $600.[18] In 2012, the 244-year-old publisher announced that the print edition would be discontinued in favor of only digital editions.[19] Its revenue model is now based on subscriptions, with a 2019 price of $74.95 per year.[20] People who had purchased a physical set every three years at $1,395 would now only pay $225 for access to the content. Even after subtracting printing and commissions, the net revenue per sale to the publisher is now a fraction of what it had been in 2012, especially considering the increase in the cost of living since the 1990s.

Two threats weakened the publisher. The first threat was posed in 1989 by Comptons, an entire 26-volume, 32,000 article multimedia encyclopedia on a single CD-ROM[21] that was eventually given away to promote the sale of computers and required upgrades and peripheral devices. One of the authors of this textbook remembers buying a computer in the early 1990s that included Groliers and Encarta, not one but *two* different encyclopedias, at no cost. These threats to Britannica were merely a bellwether of what was to come, as only 15% of families owned a computer in 1990.[22]

Things	**Information**
Wear out	Doesn't wear out but can become obsolete or untrue
Are replicated at the expense of the manufacturer	Is replicated at almost zero cost without limit
Exist in a tangible location	Does not physically exist
When sold, possession changes hands	When sold, seller may still possess and sell again
Price based on production costs	Price based on value to consumer
Are based on a physical infrastructure	Is based on a digital infrastructure
Are fixed units, each needing physical handling	Can be repackaged/customized/generated on demand
Usually cannot be combined to operate with other physical units	Requires only translation software to be combined with, or augmented by, other data

FIGURE I-8 Comparison of the economics of things with the economics of information.

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[17] Julie Bosman, "After 244 Years, Encyclopaedia Britannica Stops the Presses," *New York Times* (March 13, 2012), https://mediadecoder.blogs.nytimes.com/2012/03/13/after-244-years-encyclopaedia-britannica-stops-the-presses/ (accessed January 26, 2019).

[18] Ibid., Evans and Wurster, *Blown to Bits*.

[19] Ibid., Bosman, "After 244 Years, Encyclopaedia Britannica Stops the Presses."

[20] According to the Britannica.com signup page at https://safe1.britannica.com/registrations/signup.do?partnerCode=FAQ_012610 (accessed January 26, 2019).

[21] David English, "Compton's MultiMedia Encyclopedia (Evaluation)," *Compute!* no. 136 (December 1991), 198, https://www.atarimagazines.com/compute/issue136/98_Comptons_MultiMedia.php (accessed January 26, 2019).

[22] Bureau of Labor Statistics, "Computer Ownership Up Sharply in the 1990s," US Department of Labor, April 5, 1999, https://www.bls.gov/opub/ted/1999/apr/wk1/art01.htm (accessed January 26, 2019).

The second and more potent blow to Britannica was Wikipedia, which is freely available to all and updated on a nearly real-time basis continuously by thousands of volunteers. Not even Encarta could even survive the genesis of Wikipedia in 2001 and ceased production in 2009.[23] Currently, Wikipedia reports that it holds over 40 million articles in 301 different languages,[24] receives almost 2 edits per second globally, and boasts 559 new pages added each day.[25] A paid publication that is updated every three years is no match for a free resource that is updated constantly and almost instantly.

A strong two-century-old tradition of bundling the economics of things with the economics of information made it difficult for Encyclopedia Britannica to envision the threats looming against it. Only when it was threatened with its very survival by a surge of networked computers accessing Wikipedia did Encyclopedia Britannica grasp the need to separate the economics of information from economics of things and sell bits of information online. Clearly, Encyclopedia Britannica's business strategy, like that of many other companies, needed to reflect the difference between the economics of things from the economics of information.

Internet of Things

Even more recently, a new concept has emerged to describe the explosive growth in the data generated by sensors traveling over the web. The **Internet of things** (IoT) is the term used to refer to machines and sensors talking to each other over the network, taking Evans and Wurster's concepts even further. Although the term IoT was coined in 1999,[26] it was not widely discussed until the last few years. The earliest example of its functions was reported before the Internet even existed—in a Coke machine at Carnegie Mellon University in the mid-1970s. Staff members and students in the Computer Science Department were able to use a network connecting a minicomputer and sensors in the machine to monitor not only the machine's inventory but even which button to push for the coldest bottles.[27]

A more broadly used early application of IoT was provided by Otis Elevator in the late 1980s and later copied by most other elevator companies.[28] Sensors in elevators sent alerts over a network to a service center's computer when parts need replacing, and service technicians arrived without the building owner knowing about the potential problem. Extending IoT even further, today's elevator systems alert handheld devices of nearby repair technicians who then visit the elevator to make the repair.[29]

Many say that we are on the brink of a new revolution that will be as impactful as the popularization of the World Wide Web. The IoT has already been applied to billions of "things"—ranging from pills to airplanes.[30] Many people are familiar with smart bulbs, smart thermostats, and smart cars, which can be controlled by computers, smartphones, or voice-driven assistants such as those from Google or Amazon's Echo. However, consumers are not as familiar with the massive amounts of data generated by these devices and accessible by their manufacturers. Cisco estimates that in 2021, the data transmitted by "things" will account for 5% of global Internet traffic.[31]

The potential impact of IoT, and the amount of data generated in the near future, is only limited by the number of objects connected and apps available to monitor and control them. Pundits expect an exponential increase in IoT functionality, usage, and accompanying data.[32]

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[23] Noam Cohen, "Microsoft Encarta Dies After Long Battle with Wikipedia," *New York Times BITS,* March 30, 2009, https://bits.blogs.nytimes.com/2009/03/30/microsoft-encarta-dies-after-long-battle-with-wikipedia/ (accessed January 26, 2019).

[24] Wikipedia, https://en.wikipedia.org/wiki/Wikipedia (accessed January 26, 2019).

[25] Wikipedia Statistics, http://en.wikipedia.org/wiki/Wikipedia:Statistics (accessed January 26, 2019).

[26] K. Ashton, "That 'Internet of Things' Thing," *RFID Journal,* June 22, 2009, http://www.rfidjournal.com/articles/view?4986 (accessed May 26, 2015).

[27] Attributed to The Carnegie Mellon University Computer Science Department Coke Machine, "The 'Only' Coke Machine on the Internet," https://www.cs.cmu.edu/~coke/history_long.txt (accessed May 26, 2015).

[28] D. Freedman, "The Myth of Strategic IS," *CIO Magazine* (July 1991), 42–48.

[29] Internet of Things, Whatis.com, http://whatis.techtarget.com/definition/Internet-of-Things (accessed May 26, 2015).

[30] Steve Ranger, "What Is the IoT? Everything You Need to Know about the Internet of Things Right Now: Updated," ZDNet, August 21, 2018, https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/ (accessed January 26, 2019).

[31] Ibid.

[32] JaredNewman, "Right Now, the Internet of Things Is Like the Internet of the 1990s," *Fast Company,* March 27, 2015, http://www.fastcompany.com/3044375/sector-forecasting/the-future-of-the-internet-of-things-is-like-the-internet-of-the-1990s (accessed May 26, 2015).

Consumerization and Social Business

The explosion of consumer-based technologies, coupled with applications such as Facebook, Renren, Sina Weibo, WeChat, Twitter, LinkedIn, YouTube, Foursquare, Skype, Pinterest, and more, have brought into focus the concept of a social business. Some call this trend Information Technology (IT) consumerization. **IT consumerization** means that technologies such as social tools, smartphones, and web applications targeted at individual, personal users are creating pressures for companies in new and unexpected ways. At the same time, technologies initially intended for the corporation, such as cloud computing, are being retooled and "consumerized" to appeal to individuals outside the corporation.

In this text, we use the term **social business** to refer to an enterprise using social IT for business applications, activities, and processes. We sometimes say that social business has infused social capabilities into business processes.

Social business is permeating every facet of business. There are new business models based on a social IT platform that offer new ways of connecting with stakeholders in functions such as governing, collaborating, doing work, and measuring results. In this book, we are particular about the terminology we use. Social IT is the term we use for all technologies in this space. We define **social IT** as the technologies used for people to collaborate, network, and interact over the web. These include social networks and other applications that provide for interaction between people.

Many use the term social media as an overarching term for this space, but increasingly, social media refers to the marketing and sales applications of social IT, and we use it that way. **Social networks** are IT-enabled networks that link individuals together in ways that enable them to find experts, get to know colleagues, and see who has relevant experience for projects across traditional organizational lines. Social networking is the use of these types of social IT tools in a community. As of the writing of this text, the social space is still like the Wild West; there are no widely accepted conventions about the terms and their meanings or the uses and their impacts. But we have enough experience with social IT that we know it's a major force bursting on to the enterprise scene and it must be addressed in discussions of managing and using IS.

System Hierarchy

IS are composed of three main elements: technology, people, and process (see Figure I-9 and further discussion in Chapter 12). When most people use the term *information system*, they actually refer only to the technology element as defined by the organization's infrastructure. In this text, the term **infrastructure** refers to everything that supports the flow and processing of information in an organization, including hardware, software, data, and network components, whereas **architecture** refers to the blueprint that reflects strategy implicit in combining these components. **IS** are defined more broadly as the *combination* of technology (the "what"), people (the "who"), and process (the "how") that an organization uses to produce and manage information. In contrast, IT focuses only on the technical devices and tools used in the system. We define

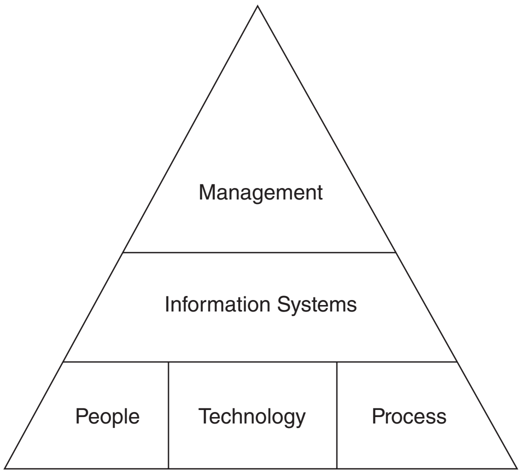

FIGURE I-9 System hierarchy.

information technology as all forms of technology used to create, store, exchange, and use information. Many people use the terms IS and IT interchangeably. In recent years, "IT" has become more fashionable, but terminology in IS can change quickly when new important technologies are introduced.

SUMMARY

Aligning IS and business decisions is no longer an option; it's an imperative for business. Every business operates as an information-based enterprise. In addition, the explosive growth of smart phones, tablets, social tools, and web-based businesses provides all managers with some experience in IS and some idea of the complexity involved in providing enterprise-level systems. This highlights the need for all managers to be skilled in managing and using IS.

It is no longer acceptable to delegate IS decisions to the management information systems (MIS) department alone. The general manager must be involved to both execute business plans and protect options for future business vision. IS and business maturity must be aligned to provide the right level of information resources to the business.

This chapter makes the case for general managers' full participation in strategic business decisions concerning IS. It outlines the skills required for such participation, and it makes explicit certain key assumptions about the nature of business, management, and IS that will underlie the remaining discussions. Subsequent chapters are designed to build on these concepts by addressing the following questions.

Frameworks and Foundations

- How should information strategy be aligned with business and organizational strategies? (Chapter 1)
- How can a business achieve competitive advantages using its IS? (Chapter 2)
- How do organizational decisions impact IS decisions? (Chapter 3)
- How is the work of the individual in an organization and society affected by decisions concerning IS? (Chapter 4)
- How are information systems integrated with business processes? (Chapter 5)

IS Management Issues

- What are the components of an IS architecture? (Chapter 6)
- How are IS kept secure? (Chapter 7)
- How is the IT organization managed and funded? (Chapter 8)
- How are IS decisions made and the IT organization governed? (Chapter 9)
- What source should provide IS services/products and how and where should they be provided? (Chapter 10)
- How are IS projects managed and risks from change management mitigated? (Chapter 11)
- How is business intelligence managed within an organization? (Chapter 12)
- What ethical and moral considerations bind the uses of information in business? (Chapter 13)

KEY TERMS

architecture, 15
data, 11
digital immigrants, 5
digital natives, 4
information, 11
information technology, 16
Information Technology (IT) consumerization, 15
infrastructure, 15
Internet of things, 14
IS, 15
knowledge, 11
social business, 15
social IT, 15
social media, 5
social network, 15
wisdom, 12

The Information Systems Strategy Triangle

1

The Information Systems Strategy Triangle highlights the alignment necessary between decisions regarding business strategy, information systems, and organizational design. This chapter reviews models of business strategy, organizational strategy and design, and information systems strategy. It concludes with a simple framework for creating a social business strategy.

In February 2015,[1] health-care giant Kaiser Permanente named Dick Daniels to the CIO position and the leadership team for the next stage of the company's business strategy: to provide better health care at lower costs. To achieve those goals, Kaiser Permanente, one of the nation's largest not-for-profit health-care systems with over 9.5 million members and 2014 operating revenue of $56.4 billion, invested in numerous information systems (IS) projects aimed at streamlining operations, offering new services, and meeting government obligations. For example, in 2014, 13% of all the medical appointments were fulfilled digitally—through e-mail—to the delight of patients who did not have to make a trip to the doctor's office and to the delight of doctors who were able to check in on their patients, particularly those with chronic conditions, more frequently. Doctors particularly liked this because their annual bonuses were based, in part, on improvements in patient health metrics such as lower blood pressure, reduced blood sugar levels if at risk for diabetes, and improvement in cholesterol scores rather than on the number of tests they ordered or the total billing they brought in. The organization invested heavily in video conferencing technology, mobile apps, and analytics as they finished implementing a $4 billion electronic health records system, KP HealthConnect.

KP HealthConnect began in 2003, but by 2008, all members had online access to their health records; by 2010, all system services were available at all medical offices and hospitals in the system; and by 2012, all members had access to their health records on mobile devices. As one of the first health-care organizations to experiment with chat rooms, secure messaging, and private e-mail correspondence between patients, physicians, and care providers, Kaiser Permanente has been a regular innovator in the use of technologies. The new system connects each member to all caregivers and services available at Kaiser Permanente. Further, it enables patients to participate in the health care they receive at a new level and access information directly from the system.

The organizational design supports the business strategy of better health care at lower costs.[2] At the core of this strategy was a shift from a "fix-me system" with which patients seek health care when something is broken and needs repair to a system that is truly proactive and focused on promoting health. Under the "fix-me system," health care was expensive and often sought too late to fix the problem. Instead, the Kaiser Permanente strategy now focuses on promoting health and enabling identification of problems before they become serious issues. For example, those in need of more exercise may receive a prescription to take a walk and an e-mail reminder from health-care providers to reinforce the new behavior. Staff incentive systems are aligned with this behavior, too. Physicians are all paid a flat salary and end-of-year bonuses if their patients achieve better health. All caregivers are rewarded for guiding people into making behavioral choices that are likely to keep them well.

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[1] Clint Boulton, "Kaiser Permanente Names Richard Dick Daniels CIO," *Wall Street Journal*, February 9, 2015, http://blogs.wsj.com/cio/2015/02/09/kaiser-permanente-names-richard-dick-daniels-cio/; http://fortune.com/2015/04/29/kaiser-ceo-on-healthcare/; Geoff Colvin, "A Health Care Model That's Working," *Fortune*, July 24, 2014, http://fortune.com/2014/07/24/a-health-care-model-thats-working/; and Paul Gray, Omar Sawy, Guillermo Asper, and Magnus Thordarson, "Realizing Strategic Value through Center-Edge Digital Transformation in Consumer-Centric Industries," *MIS Quarterly Executive* 12, no. 1 (March 2013).

[2] Note that the organizational design puts the organizational strategy into practice. For instance, rewarding billings, sharing little information, and late involvement with patients are organizational design elements of a "fix-me" organizational strategy.

Kaiser Permanente has reported higher quality of care and fewer malpractice cases as a result of HealthConnect.[3] Kaiser reported that HealthConnect is the largest civilian health information system in the United States. The clinical information system is highly integrated, including clinical information, appointments, services, registration, and billing. Before HealthConnect, patients seldom were able to find chart information by phone or in the emergency room. Even by visiting, only 40–70% could find that information. But now 100% is available through all of those mechanisms. New features include integrated video visits, express check-in, web-accessible lab results, electronic notifications of room and prescription availability, a mobile app, tablet entry of outpatient information into a mobile-enabled "dashboard," and other features, which assist both clinicians and patients. In total, 61% of transactions on the website are accomplished via mobile devices. Perhaps most importantly, users of the portal are 2.6 times more likely to remain loyal to Kaiser Permanente than nonusers.[4]

In 2014, Kaiser Permanente's cloud-based Generation 2 Platform was launched to support the development of clinical and operational services. Within two years, more than 1,000 systems had been delivered with the help of the platform—all within a day of their request.[5]

Between 2014 and the beginning of 2019, Kaiser Permanente had grown from 9.5 million to 12.2 million health plan members,[6] and total operating revenue had grown from $56.4 billion to $79.7 billion.[7] This growth provides some confidence that the new system has been successful and meets the needs of patients, clinicians, and management. Given the material in this chapter, the reader is likely to assume that we will claim that the success at Kaiser Permanente was achieved in part because of the alignment between its business strategy, its IS strategy, and its organization design. Kaiser actually did that for us, by stating that they credit their success to the clarity of its mission statement, alignment of the organization's structure and incentives, and the integrated information technology.[8] Physicians were part of the decision-making processes. Managers were involved in the design and implementation of the IS. The decision to move from a "fix-me system" to a "proactive health system" was not made in isolation from the organization or the IS.

The IS department is not an island within a firm. Rather, IS manages an infrastructure that is essential to the firm's functioning. Further, the Kaiser Permanente case illustrates that a firm's IS must be aligned with the way it manages its employees and processes. For Kaiser Permanente, it was clear that not only did the physicians need a fast, inexpensive, and useful way to communicate with patients outside of regular in-person appointments but also incentive systems and patient service processes had to be updated. IS provided a solution in conjunction with new operational and control processes.

This chapter introduces a simple framework for describing the alignment necessary with business systems and for understanding the impact of IS on organizations. This framework is called the **Information Systems Strategy Triangle** because it relates business strategy with IS strategy and organizational strategy. This chapter also presents key frameworks from organization theory that describe the context in which IS operates as well as the business imperatives that IS support. The Information Systems Strategy Triangle presented in Figure 1.1 suggests three key points about strategy.

1. Successful firms have an overriding business strategy that drives both organizational strategy and IS strategy. The decisions made regarding the structure, hiring practices, vendor policies, and other components of the organizational design, as well as decisions regarding applications, hardware, and other IS components, are all driven by the firm's business objectives, strategies, and tactics. Successful firms

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[3] Karin Cooke, "Kaiser Permanente: Integration, Innovation, and Transformation in Health Care," https://www.himss.eu/sites/himsseu/files/community/community_presentations/Kaiser_03-02-2018%20KP%20Cooke%20Overview.pdf (accessed February 6, 2019).

[4] Ibid.

[5] I. M. Sebastian, J. W. Ross, C. Beath, M. Mocker, K. G. Moloney, and N. O. Fonstad, "How Big Old Companies Navigate Digital Transformation," *MIS Quarterly Executive* 16, no. 3 (2017), 197–213.

[6] Kaiser Permanente, "At a Glance," https://ataglance.kaiserpermanente.org (accessed February 6, 2019).

[7] Kaiser Permanente Health Plan and Hospitals Report 2018 Financial Results, https://share.kaiserpermanente.org/article/kaiser-foundation-health-plan-and-hospitals-report-2018-financial-results (accessed March 5, 2019).

[8] Cooke, "Kaiser Permanente: Integration, Innovation, and Transformation in Health Care."

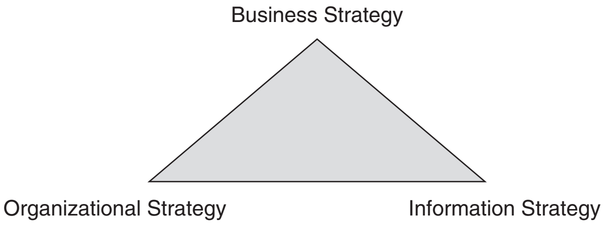

FIGURE 1.1 The Information Systems Strategy Triangle.

carefully balance these three strategies—they purposely design their organizational and IS strategies to complement their business strategy.

2. IS strategy can itself affect and is affected by changes in a firm's business and organizational design. To perpetuate the balance needed for successful operation, changes in the IS strategy must be accompanied by changes in the organizational strategy and must accommodate the overall business strategy. If a firm designs its business strategy to use IS to gain strategic advantage, the leadership position in IS can be sustained only by constant innovation. The business, IS, and organizational strategies must constantly be adjusted.
3. IS strategy always involves consequences—intended or not—within business and organizational strategies. Avoiding harmful unintended consequences means remembering to consider business and organizational strategies when designing IS implementation. For example, deploying tablets to employees without an accompanying set of changes to job expectations, process design, compensation plans, and business tactics will fail to achieve expected productivity improvements. Success can be achieved only by specifically designing all three components of the strategy triangle so they properly complement each other.

Before the changes at Kaiser Permanente, incentives for doctors were misaligned with the goals of better health care. Its IS Strategy Triangle was out of alignment at that time. Its organizational strategy (e.g., a "fix-me" system) was not supported by the IS strategy (e.g., tracking and reporting billable procedures). Neither the organizational strategy nor the IS strategy adequately supported their purported business strategy (helping patients at lower cost). For Kaiser Permanente, success could be achieved only by specifically designing all three components of the strategy triangle to work together.

Of course, once a firm is out of alignment, it does not mean that it has to stay that way. To correct the misalignment described earlier, Kaiser Permanente used online services to enable quick communications between patients, physicians, and care providers. Further, it changed its bonus structure to focus on health rather than billing amounts. The new systems realign people, process, and technology to provide better service, save time, and save money.

What does *alignment* mean? The book *Winning the 3-Legged Race* defines **alignment** as the situation in which a company's current and emerging business strategy is enabled and supported, yet unconstrained, by technology. The authors suggest that although alignment is good, there are higher goals, namely, synchronization and convergence, toward which companies should strive. With synchronization, technology not only enables current business strategy but also anticipates and shapes future business strategy. Convergence goes one step further by exhibiting a state in which business strategy and technology strategy are intertwined and the leadership team members operate almost interchangeably. Although we appreciate the distinction and agree that firms should strive for synchronization and convergence, *alignment* in this text means any of these states, and it pertains to the balance between organizational strategy, IS strategy, and business strategy.[9]

A word of explanation is needed here. Studying IS alone does not provide general managers with the appropriate perspective. This chapter and subsequent chapters address questions of IS strategy squarely within the context of business strategy. Although this is not a textbook of business strategy, a foundation for IS discussions is built on some basic business strategy frameworks and organizational theories presented in this and the next chapter. To be effective, managers need a solid sense of how IS are used and managed within the organization. Studying details of technologies is also outside the scope of this text. Details of the technologies are relevant, of course, and it is important that any organization maintain a sufficient knowledge base to plan for and adequately align with business priorities. However, because technologies change so rapidly, keeping a textbook current is impossible. Instead, this text takes the perspective that understanding what questions to ask and having a framework for interpreting the answers are skills more fundamental to the general manager than understanding any particular technology. That understanding must be constantly refreshed using the most current articles and information from experts. This text provides readers with an appreciation of the need to ask questions, a framework from which to derive the questions to ask, and a foundation sufficient to understand the answers received. The remaining chapters build on the foundation provided in the Information Systems Strategy Triangle.

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[9] F. Hogue, V. Sambamurthy, R. Zmud, T. Trainer, and C. Wilson, *Winning the 3-Legged Race* (Upper Saddle River, NJ: Prentice Hall, 2005).

Brief Overview of Business Strategy Frameworks

A **strategy** is a coordinated set of actions to fulfill objectives, purposes, and goals. The essence of a strategy is setting limits on what the business will seek to accomplish. Strategy starts with a mission. A **mission** is a clear and compelling statement that unifies an organization's effort and describes what the firm is all about (i.e., its purpose). Mark Zuckerberg's reflection on the mission of Facebook provides an interesting example. Originally conceived as a product rather than a service, the CEO of Facebook commented: "after we started hiring more people and building out the team, I began to get an appreciation that a company is a great way to get a lot of people involved in a mission you're trying to push forward. Our mission is getting people to connect."[10]

In a few words, the mission statement sums up what is unique about the firm. The information in Figure 1.2 indicates that even though Zappos, Amazon, and L.L. Bean are all in the retail industry, they view their missions quite differently. For example, Zappos' focus is on customer service, Amazon is about customer sets, and L.L. Bean is about the outdoors. It's interesting to note that although Amazon purchased Zappos in 2009, the acquisition agreement specified that Zappos would continue to run independently of its new parent. Today, Zappos continues to remain both culturally and physically separate from Amazon. Zappos is located near Las Vegas, Nevada, and Amazon is in Seattle, Washington.

A **business strategy** is a plan articulating where a business seeks to go and how it expects to get there. It is the means by which a business communicates its goals. Management constructs this plan in response to market forces, customer demands, and organizational capabilities. Market forces create the competitive context for the business. Some markets, such as those faced by package delivery firms, laptop computer manufacturers, and credit card issuers, face many competitors and a high level of competition, such that product differentiation becomes increasingly difficult. Other markets, such as those for airlines and

Company	**Mission Statement**
Zappos	To provide the best customer service possible. Internally we call this our WOW philosophy.[a]
Amazon	To be Earth's most customer-centric company, where customers can find and discover anything they might want to buy online, and endeavors to offer its customers the lowest possible prices. . .(recognizing the importance of). . . Consumers, Sellers, Content Creators, and Developers & Enterprises.[b]
L.L. Bean	Being outside brings out the best in us. That's why we design products that make it easier to take longer walks, have deeper talks and never worry about the weather.[c]

[a] http://www.inboundmarketingagents.com/inbound-marketing-agents-blog/bid/361859/Zappos-WOW-Philosophy-Tips-for-Fostering-Customer-Delight (accessed February 12, 2019).

[b] https://www.amazon.jobs/en/working/working-amazon Mission Statement on Amazon Jobs page (accessed February 12, 2019).

[c] https://www.llbean.com/llb/shop/516917?lndrNbr=516884&nav=leftnav-cust (accessed February 12, 2019).

FIGURE 1.2 Mission statements of three retail businesses.

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[10] Shayndi Raice, "Is Facebook Ready for the Big Time?" *The Wall Street Journal*, January 14–15, 2012, B1.

automobiles, are similarly characterized by high competition, but product differentiation is better established. Customer demands comprise the wants and needs of the individuals and companies who purchase the products and services available in the marketplace. Organizational capabilities include the skills and experience that give the corporation a currency that can add value in the marketplace.

Consider Dell, originally a personal computer company. Initially Dell's business strategy was to sell personal computers directly to the customer without going through an intermediary. Reaching customers in this way was less expensive and more responsive than selling the computers in retail stores. The Internet, combined with Dell's well-designed IS infrastructure, allowed customers to electronically contact Dell, which then designed a PC for a customer's specific needs. Dell's ordering system was integrated with its production system and shared information automatically with each supplier of PC components. This IS enabled the assembly of the most current computers without the expense of storing large inventories, and inventory uncertainties were pushed back to the vendors. Cost savings were passed on to the customer, and the direct-to-customer model allowed Dell to focus its production capacity on building only the most current products. With small profit margins and new products quickly able to replace existing products, IS aligned with Dell's business strategy to provide low-cost PCs. The cost savings from the IS were reflected in the price of systems. In addition, Dell executives achieved a strategic advantage in reducing response time, building custom computers that had one of the industry's lowest costs, and eliminating inventories that could become obsolete before they were sold. Thus, this strategy was consistent with Dell's mission of delivering the best customer experience in the business.

But things aren't always as they seem. If the direct-to-customer strategy was so effective, why is Dell now also selling its computers at major retail outlets such as Walmart, Staples, and Best Buy? It is likely that the sales figures and profit margins were not measuring up to Dell's stated objectives and performance targets. And Dell has branched out to other hardware, such as printers and servers, and, more recently, is providing IT services. Consequently, Dell has adjusted its business strategy, and we can expect to see changes in its organizational design and IS to reflect its altered direction.

Business Models versus Business Strategy

Some new managers confuse the concept of a business model with the concept of a business strategy. The business strategy, as discussed in this chapter, is the coordinated set of actions used to meet the business goals and objectives. It's the path a company takes to achieve its goals. One component of the business strategy is the **business model**, or the "blueprint of how a company does business."[11] The business model can be used to create new products and services that add value to its customers and partners (value creation) and to describe how it will make money from that value it has created (value capture). Some might argue that a business model is the outcome of strategy.[12]

One way to capture the value created by a business model is to employ a *revenue model*, which generates revenue for the company and captures some of the value created by the business model. Pricing strategies such as those examples listed below represent different types of revenue models:

- *Selling products or services:* Customers make purchases.
- *Subscription:* Customers pay a recurring fee for the product or service.
- *Advertising:* Customers access the product or service for "free," and sponsors or vendors pay fees for advertising that goes with the product or service.
- *Cost plus:* Somewhat like a traditional retailer, customers purchase the product or service for a specific price that is usually the cost plus some markup for profit.

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[11] A. Osterwalder, Y. Pigneur, and C. L. Tucci, "Clarifying Business Models: Origins, Present, and Future of the Concept," *Communications of the Association for Information Systems* 16, no. 1 (2005), Article 1, page 2.

[12] For a more detailed treatment of the concepts of business models, strategy, and tactics, see Ramon Casadesus-Masanell and Joan Ricart, "From Strategy to Business Models and to Tactics," Harvard Business School Working Paper 10-036, http://www.hbs.edu/faculty/Publication%20Files/10-036.pdf (accessed August 21, 2015). For a list of 15 different business models, see http://www.digitalbusinessmodelguru.com/2012/12/15-business-models-complete-list.html (accessed August 21, 2015).

- *Renting/Licensing:* Customers pay a fee to use the product or service for a specified period of time.
- *All-you-can-eat:* Customers pay one fee for access to as much of the product or service as they want to consume, usually over a specific period of time.
- *Freemium:* Customers get something for "free," and the company makes money from selling customers something after they get the giveaway. This is similar to a business model used in brick-and-mortar businesses that give away something or sell something for a very low price, but the customer has to pay for refills or upgrades such as giving razors away but making money from selling razor blades.

A business model can create value without bringing in new revenue from customers. A common business model can use *cost displacement*, in which case a firm funds a project or creates a new service by cost savings, such as replacing personnel by adding new customer self-service options. A striking example is that of Federal Express, which is said to deliver 14 million packages a day.[13] A simple analysis reveals the importance of FedEx's PowerShip. If only 10% of those shipments are tracked, and only 10% of those would have resulted in a 10-minute phone call to FedEx, there would need to be enough operators to handle 1.4 million minutes of phone calls daily. If the business day covered only 8 hours (480 minutes), then FedEx would need to employ almost 3,000 phone operators to cover the calls. If a phone operator is paid a salary of $30,000 (including benefits), the total annual savings PowerShip provides to FedEx is $90 million. This is clearly value creation derived from an information system.

Data-driven business models are equally powerful and relatively new. They are enabled by big data and business analytics tools. In data-driven business models, customers benefit directly or indirectly from how a company employs big data. There are three types of data-driven business models: (1) *data users*, companies that leverage big data for internal purposes to improve their operations or develop new products and services for its customers; (2) *data suppliers*, companies that sell big data that they have harvested, and (3) *data facilitators*, companies that supply data users and suppliers with big data infrastructure solutions (e.g., hardware and software tools) and services (e.g., consulting and outsourced analytics services).[14]

Firms need their processes to be aligned with their strategy. FedEx provides access to their PowerShip platform to customers to provide better service, and as demonstrated above, with substantial efficiency. Connecting that platform electronically to merchants, such as Amazon or Walmart, is an additional link in the chain. Providing web-based tools to the merchants completes the circle and enables information to flow without any manual intervention. The end customer provides digital data with minimal effort, and the merchant transmits to the shipper the data from the order almost instantaneously. Adding any manual steps at this volume would be silly.

Imagine what would happen to a large dot-com retailer such as Amazon or Walmart if all orders were made on paper or telephone call to an operator. The IS process would not match the business strategy and business goals of how to respond to outside business forces such as competitors or suppliers. Further, their IS strategy must also be aligned with their processes. It would be equally silly to expect information to be stored on paper files rather than electronic files.

A classic, widely used model developed by Michael Porter still frames most discussions of business strategy. In the next section, we review Porter's generic strategies framework as well as dynamic environment strategies.[15] We then share questions that a general manager must answer to understand the business strategy.

The Generic Strategies Framework

Companies sell their products and services in a marketplace populated with competitors. Michael Porter's framework helps managers understand the strategies they may choose to build a competitive advantage. In his book, *Competitive Advantage*, Porter claims that the "fundamental basis of above-average performance

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[13] Andra Picincu, "How to Find a FedEx Tracking Number," Bizfluent.com, January 22, 2019, https://bizfluent.com/how-8077705-fedex-tracking-number.html (accessed March 6, 2019).

[14] R. Schroeder, "Big Data Business Models: Challenges and Opportunities," *Cogent Social Sciences* 2 (2016), 1166924.

[15] Another popular model by Michael Porter, the value chain, provides a useful model for discussing internal operations of an organization. Some find it a useful model for understanding how to link two firms. This framework is used in Chapter 5 to examine business process design. For further information, see M. Porter, *Competitive Advantage*, 1st ed. (New York: The Free Press, 1985).

<table>
<tr><th colspan="4">Strategic Advantage</th></tr>
<tr><td rowspan="3">Strategic Target</td><td></td><td>Uniqueness perceived by customer</td><td>Low-cost position</td></tr>
<tr><td>Industrywide</td><td>Differentiation</td><td>Cost leadership</td></tr>
<tr><td>Particular segment only</td><td colspan="2">Focus</td></tr>
</table>

FIGURE 1.3 Three strategies for achieving competitive advantage.
Source: Adapted from M. Porter, *Competitive Advantage*, 1st ed. (New York: The Free Press, 1985) and *Competitive Advantage: Creating and Sustaining Superior Performance*, 2nd ed. (New York: The Free Press, 1998).

in the long run is sustainable competitive advantage."[16] Porter identified three primary strategies for achieving competitive advantage: (1) cost leadership, (2) differentiation, and (3) focus. These advantages derive from the company's relative position in the marketplace, and they depend on the strategies and tactics used by competitors. See Figure 1.3 for a summary of these three strategies for achieving competitive advantage.

Cost leadership results when the organization aims to be the lowest-cost producer in the marketplace. The organization enjoys above-average performance by minimizing costs. The product or service offered must be comparable in quality to those offered by others in the industry so that customers perceive its relative value. Typically, only one cost leader exists within an industry. If more than one organization seeks an advantage with this strategy, a price war ensues, which eventually may drive the organization with the higher cost structure out of the marketplace. Through mass distribution, economies of scale, and IS to generate operating efficiencies, Walmart epitomizes the cost-leadership strategy.

Through **differentiation**, the organization offers its product or service in a way that appears unique in the marketplace. The organization identifies which qualitative dimensions are most important to its customers and then finds ways to add value along one or more of those dimensions. For this strategy to work, the price charged to customers for the differentiator must seem fair relative to the price charged by competitors. Typically, multiple firms in any given market employ this strategy.

The Progressive Casualty Insurance Company is able to differentiate itself from other automobile insurance companies. In its earlier days, Progressive's service was unique. Representatives responded to accident claims 24-7, arriving at the scene of the accident with laptop hardware and software that enabled them to settle claims and even cut a check on the spot. Subsequently, Progressive was the first to offer a usage-based insurance product, called Snapshot, that bases insurance rates on the miles driven by customers. More recently, Progressive provided a "Name Your Price" product that allows the customer to decide how much to spend on insurance, which triggers software that scales up or down coverage to fit that price. These innovations enabled a strategy that spurred Progressive's growth and widened its profit margins.

Focus allows an organization to limit its scope to a narrower segment of the market and tailor its offerings to that group of customers. This strategy has two variants: (1) *cost focus*, in which the organization seeks a cost advantage within its segment, and (2) *differentiation focus*, in which it seeks to distinguish its products or services within the segment. This strategy allows the organization to achieve a local competitive advantage even if it does not achieve competitive advantage in the marketplace overall. Porter explains how the focuser can achieve competitive advantage by focusing exclusively on certain market segments:

> *Breadth of target is clearly a matter of degree, but the essence of focus is the exploitation of a narrow target's differences from the balance of the industry. Narrow focus in and of itself is not sufficient for above-average performance.*[17]

Marriott International demonstrates both types of focus with two of its hotel chains: Marriott has a cost focus, and Ritz-Carlton has a differentiation focus. To better serve its business travelers and cut operational expenses, Marriott properties have check-in kiosks that interface with their Marriott Rewards loyalty program. A guest can swipe a credit card or Marriott Rewards card at the kiosk in the lobby and receive a room assignment and keycard from the machine. She can also print airline boarding passes at the kiosks. Further, the kiosks help the Marriott chain implement its cost focus by cutting down on the personnel needed at the front desk. The kiosk system is integrated with other systems such as billing and customer relationship management (CRM) to generate operating efficiencies and enhanced corporate standardization.

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[16] M. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance*, 2nd ed. (New York: The Free Press, 1998).

[17] Porter, *Competitive Advantage: Creating and Sustaining*.

In contrast, stand-alone kiosks in the lobby would destroy the feeling that the Ritz-Carlton chain, acquired by Marriott in 1995, creates. To the Ritz-Carlton chain, CRM means capturing and using information about guests, such as their preference for wines, a hometown newspaper, or a sunny room. Each Ritz-Carlton employee is expected to promote personalized service by identifying and recording individual guest preferences. To demonstrate how this rule could be implemented, a waiter, after hearing a guest exclaim that she loves tulips, could log the guest's comments into the Ritz-Carlton CRM system called "Class." On her next visit to a Ritz-Carlton hotel, tulips could be placed in the guest's room after querying Class to learn more about her as her visit approaches. The CRM is instrumental in implementing the differentiation-focus strategy of the Ritz-Carlton chain.[18] Its strategy allows the Ritz-Carlton chain to live up to its unique motto, which emphasizes that its staff members are distinguished people with distinguished customers.

Airline JetBlue adopted a differentiation strategy based on low costs coupled with unique customer experience. It might be called a "value-based strategy." It is not the lowest cost carrier in the airline industry; at 12.3 cents per passenger seat mile, JetBlue has one of the lowest costs, but Virgin America, Spirit, and Allegiant had even lower per seat mile costs in 2013. But JetBlue manages its operational costs carefully, making decisions that keep its per passenger costs among the lowest in the business, such as a limited number of fuel-efficient airplane models in its fleet, gates at less congested airports, paperless cockpit and many other operations, and snacks instead of meals on flights. JetBlue has one of the longest stage length averages (the length of the average flight) in the industry, and the longer the flight, the lower the unit costs. Competing network carriers, who are more well known and established, may have different pay scales because they've been in the business longer and have a different composition of staff. These carriers also have higher maintenance costs for their older, more diverse fleets. If it could realize its plans for growth while maintaining its low cost structure, JetBlue could move from its cost focus based on serving a limited, but growing, number of market segments to a cost leadership strategy.[19]

While sustaining a cost focus, JetBlue's chairman believes that JetBlue can compete on more than price, which is part of its unique differentiation strategy. It is why the airline continually strives to keep customers satisfied with frills such as extra leg room, leather seats, prompt baggage delivery, DirectTV, and movies. It is also offering a premium service, Mint, on some transcontinental flights.[20] It has been recognized with many awards for customer satisfaction in the North American airline industry.

Dynamic Environment Strategies

Porter's generic strategies model is useful for diagnostics, for understanding how a business seeks to profit in its chosen marketplace, and for prescriptions, or building new opportunities for advantage. It reflects a careful balancing of countervailing competitive forces posed by buyers, suppliers, competitors, new entrants, and substitute products and services within an industry. As is the case with many models, dynamic environment strategies offer managers useful tools for thinking about strategy.

However, the Porter model was developed at a time when competitive advantage was sustainable because the rate of change in any given industry was relatively slow and manageable. Since the late 1980s, when this framework was at the height of its popularity, newer models were developed to take into account the increasing turbulence and velocity of the marketplace. Organizations need to be able to respond instantly and change rapidly, which requires dynamic structures and processes. One example of this type of approach is the hypercompetition framework. Discussions of hypercompetition take a perspective different from that of the previous framework. Porter's framework focuses on creating competitive advantage in relatively stable markets, whereas **hypercompetition** frameworks suggest that the speed and aggressiveness of the moves and countermoves in a highly competitive and turbulent market create an environment in which advantages are rapidly created and eroded. In a hypercompetitive market, trying to sustain a specific competitive advantage can be a deadly distraction because the environment and the marketplace change rapidly. To manage the rapid speed of change, firms value agility and focus on quickly adjusting their organizational resources to gain competitive advantage. Successful concepts in hypercompetitive markets include dynamic capabilities, creative destruction, blue ocean strategy, and digital strategies.[21]

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[18] Scott Berinato, "Room for Two," CIO.com, May 15, 2002, http://www.cio.com/archive/051502/two_content.html.

[19] Bob Hazel, Tom Stalnaker, Aaron Taylor, and Khalid Usman, "Airline Economic Analysis," November 2014, http://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2014/nov/Airline_Economic_Analysis_Screen_OW_Nov_2014.pdf (accessed March 23, 2015).

[20] Trefis Team, "A Closer Look at JetBlue's Strategy," *Forbes*, October 15, 2015, https://www.forbes.com/sites/greatspeculations/2015/10/15/a-closer-look-at-jetblues-strategy/#6fb5b0b93795 (accessed March 1, 2019).

Dynamic capabilities are means of orchestrating a firm's resources in the face of turbulent environments. In particular, the dynamic capabilities framework focuses on the ways a firm can integrate, build, and reconfigure internal and external capabilities, or abilities, to address rapidly changing environments. These capabilities are built rather than bought. They are embedded in firm-specific routines, processes, and asset positions. Thus, they are difficult for rivals to imitate. In sum, they help determine the speed and degree to which the firm can marshal and align its resources and competences to match the opportunities and requirements of the business environment.[22]

Since the 1990s, a competitive practice, called **creative destruction**, emerged. First predicted over 60 years ago by the economist Joseph Schumpeter, it was made popular more recently by Harvard Professor Clay Christensen. Coincidentally (or maybe not), the accelerated competition has occurred concomitantly with sharp increases in the quality and quantity of information technology (IT) investment. The changes in competitive dynamics are particularly striking in sectors that spend the most on IT.[23] An example of creative destruction is provided in Apple's cannibalizing its own products. Steve Jobs, Apple's founder and former CEO, felt strongly that if a company was not willing to cannibalize its own products, someone else would come along and do it for them. That was evident in the way Apple introduced the iPhone while iPod sales were brisk and the iPad while its Macintosh sales were strong.[24] Apple continues to exhibit this strategy with subsequent releases of new models of all of its products.

Most discussions of strategy focus on gaining competitive advantage in currently existing industries and marketplaces, which are referred to by Kim and Mauborgne as **red ocean strategy**. Using a red ocean strategy, firms fiercely compete to earn a larger share of existing demand. Kim and Mauborgne recommend a better approach: Firms adopt a **blue ocean strategy** in which they create new demand in untapped marketspaces where they have the "water" to themselves. When applying the blue ocean strategy, the goal is not to beat the competition but to make it irrelevant. This is what Dell did when it challenged current industry logic by changing the computer purchasing and delivery experiences of its customers. "With its direct sales to customers, Dell was able to sell its PCs for 40 percent less than IBM dealers while still making money."[25] Dell also introduced into unchartered seas an unprecedented delivery process that allowed buyers to receive customized new computers within four days of ordering them as compared to the traditional processes, which typically required 10 weeks.

A type of business strategy existing companies that face a dynamic environment might choose is a digital strategy. A **digital strategy** is defined as "a business strategy inspired by the capabilities of powerful, readily accessible digital technologies (like social media, analytics, cloud, and Internet of Things), intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions"[26] (p. 198). This can be enacted by building customer loyalty and trust with excellent personalized and integrated customer experiences (customer engagement) or by integrating data, services, and products to create digital solutions (digitized solutions strategy). A digital strategy perforce requires a close alignment with the IS strategy. In order to execute a digital strategy, a company must have an *operational backbone* (or the technology and business capability to deliver efficient and reliable core operations) and a *digital service platform* (or the technology and business capability to pave the way

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[21] For more information, see Don Goeltz, "Hypercompetition," vol. 1 of *The Encyclopedia of Management Theory*, ed. Eric Kessler (Los Angeles, CA: Sage, 2013), 359–60.

[22] D. J. Teece, G. Pisano, and A. Shuen, "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* 18 (1997), 509–33 and David Teece, "Dynamic Capabilities," vol. 1 of *The Encyclopedia of Management Theory*, ed. Eric Kessler (Los Angeles, CA: Sage, 2013), 221–24.

[23] Andrew McAfee and Erik Brynjolfsson, "Investing in the IT That Makes a Competitive Difference," *Harvard Business Review* (July–August 2008), 98–107.

[24] Walter Isaacson, *Steve Jobs* (New York: Simon and Shuster, 2011).

[25] W. Chan Kim and Renee Mauborgne, *Blue Ocean Strategy* (Cambridge, MA: Harvard Business School, 2005), 202.

[26] I. M. Sebastian, J. W. Ross, C. Beath, M. Mocker, K. G. Moloney, and N. O. Fonstad, "How Big Old Companies Navigate Digital Transformation," *MIS Quarterly Executive* 16, no. 3, (2017), 197–213.

Strategic Approach	Key Idea	Application to Information Systems
Porter's generic strategies	Firms achieve competitive advantage through cost leadership, differentiation, or focus.	Understanding which strategy is chosen by a firm is critical to choosing IS to complement the strategy.
Dynamic environment strategies	Speed, agility, and aggressive moves and countermoves by a firm create competitive advantage.	The speed of change is too fast for manual response, making IS critical to achieving business goals.

FIGURE 1.4 Summary of strategic approaches and IT applications.

for developing and implementing digital innovations). Kaiser Permanente's HealthConnect provided the operational backbone to integrate various systems to effectively and efficiently use clinical information. Its Generation 2 Platform is a digital service platform that has made it possible to more easily produce digital innovations across clinical and operational departments.

Why Are Strategic Advantage Models Essential to Planning for Information Systems?

A general manager who relies solely on IS personnel to make all IS decisions not only gives up authority over IS strategy but also hampers crucial future business decisions. In fact, business strategy should drive IS decision making, and changes in business strategy should entail reassessments of IS. Moreover, changes in IS capabilities or potential should trigger reassessments of business strategy—as in the case of the Internet when companies that understood or even considered its implications for the marketplace quickly outpaced their competitors who failed to do so. For the purposes of our model, the Information Systems Strategy Triangle, understanding business strategy means answering the following questions:

1. What is the business goal or objective?
2. What is the plan for achieving it? What is the role of IS in this plan?
3. Who are the crucial competitors and partners, and what is required of a successful player in this marketplace?
4. What are the industry forces in this marketplace?

Porter's generic strategies framework and the dynamic frameworks (summarized in Figure 1.4) are revisited in the next few chapters. They are especially helpful in discussing the role of IS in building and sustaining competitive advantages (Chapter 2) and for incorporating IS into business strategy. The next section of this chapter establishes a foundation for understanding organizational strategies.

Brief Overview of Organizational Strategies

Organizational strategy includes the organization's design as well as the choices it makes to define, set up, coordinate, and control its work processes. How a manager designs the organization impacts every aspect of operations from dealing with innovation to relationships with customers, suppliers, and employees. The organizational strategy is a plan that answers the question: "How will the company organize to achieve its goals and implement its business strategy?"

A useful framework for organizational design can be found in the book *Building the Information Age Organization* by Cash, Eccles, Nohria, and Nolan.[27] This framework (Figure 1.5) suggests that the successful execution of a company's organizational strategy comprises the best combination of organizational, control, and cultural variables. Organizational variables include decision rights, business processes, formal reporting relationships, and informal networks. Control variables include the availability of data, nature and quality of planning, effectiveness of performance measurement and evaluation systems, and incentives

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[27] James I. Cash, Robert G. Eccles, Nitin Nohria, and Richard L. Nolan, *Building the Information Age Organization* (Homewood, IL: Richard D. Irwin, 1994).

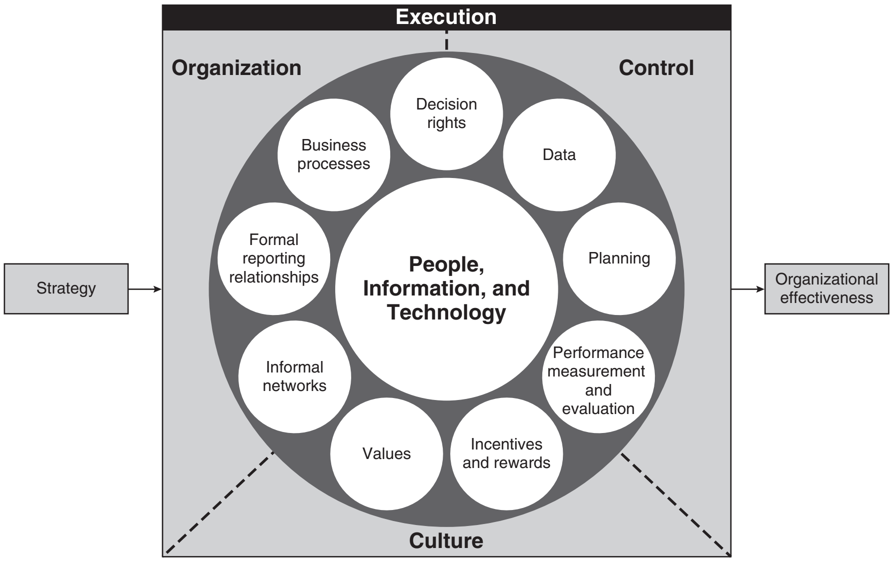
Execution
Organization
Control
Decision rights
Business processes
Data
Formal reporting relationships
People, Information, and Technology
Planning
Strategy
Organizational effectiveness
Informal networks
Performance measurement and evaluation
Values
Incentives and rewards
Culture

FIGURE 1.5 Managerial levers model.

Source: J. Cash, R. G. Eccles, N. Nohria, and R. L. Nolan, *Building the Information Age Organization* (Homewood, IL: Richard D. Irwin, 1994).

to do good work. Cultural variables comprise the values of the organization. These organizational, control, and cultural variables are **managerial levers** used by decision makers to effect changes in their organizations. These managerial levers are discussed in detail in Chapter 3.

Our objective is to give the manager a framework to use in evaluating various aspects of organizational design. In this way, the manager can review the current organization and assess which components may be missing and what future options are available. Understanding organizational design means answering the following questions:

1. What are the important structures and reporting relationships within the organization?
2. Who holds the decision rights to critical decisions?
3. What are the important people-based networks (social and informational), and how can we use them to get work done better?
4. What control systems (management and measurement systems) are in place?
5. What are the culture, values, and beliefs of the organization?
6. What is the work that is performed in organizations, who performs it, and where and when is it performed?
7. What are the key business processes?

The answers to these questions inform the assessment of the organization's use of IS. Chapters 3, 4, and 5 use the managerial levers model to assess the impact of IS on the firm. Chapters 8 and 9 use this same list to understand the business and governance of the IS organization.

Brief Overview of Information Systems Strategy

IS strategy is a plan an organization uses to provide information services. IS allow a company to implement its business strategy. JetBlue's former Vice President for People explained it nicely: "We define what the business needs and then go find the technology to support that."[28]

Business strategy is a function of competition (What does the customer want and what does the competition do?), positioning (In what way does the firm want to compete?), and capabilities (What can the firm do?). IS help determine the company's capabilities. An entire chapter is devoted to understanding key

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[28] Hogue et al., *Winning the 3-Legged Race*, 111.

	What	Who	Where
Hardware	The physical devices of the system	System users and managers	Physical location of devices (cloud, data center, etc.)
Software	The programs, applications, and utilities	System users and managers	The hardware it resides on and physical location of that hardware
Networking	The way hardware is connected to other hardware, to the Internet, and to other outside networks	System users and managers; company that provides the service	Where the nodes, the wires, and other transport media are located
Data	Bits of information stored in the system	Owners of data; data administrators	Where the information resides

FIGURE 1.6 IS strategy matrix.

issues facing general managers concerning IT architecture, but for now a more basic framework is used to understand the decisions related to IS that an organization must make.

The purpose of the matrix in Figure 1.6 is to give the manager a high-level view of the relation between the four IS infrastructure components and the other resource considerations that are keys to IS strategy. Infrastructure includes hardware, such as desktop units and servers. It also includes software, such as the programs used to do business, to manage the computer itself and to communicate between systems.

A Closer Look: Building a Social Business Strategy

Some companies use social IT as quick solutions for business opportunities, but others build a social business strategy that considers the application of social IT tools and capabilities to solve business opportunities holistically. A **social business strategy** is a plan of how the firm will use social IT that is aligned with its organizational strategy and IS strategy. Social business strategy includes a vision of how the business would operate if it seamlessly and thoroughly incorporated social and collaborative capabilities throughout the business model. It answers the same type of questions of what, who, and where, as do many other business strategies.

Social businesses infuse social capabilities into their business processes. Most social business opportunities fall into one of three categories:

Collaboration—using social IT to extend the reach of stakeholders, both employees and those outside the enterprise walls. Social IT such as social networks enable individuals to find and connect with each other to share ideas, information, and expertise.

Engagement—using social IT to involve stakeholders in the traditional business of the enterprise. Social IT such as communities and blogs provide a platform for individuals to join in conversations, create new conversations, and offer support to each other and other activities that create a deeper feeling of connection to the company, brand, or enterprise.

Innovation—using social IT to identify, describe, prioritize, and create new ideas for the enterprise. Social IT offers community members a "super idea box" where individuals suggest new ideas, comment on other ideas, and vote for their favorite idea, giving managers a new way to generate and decide on products and services.

National Instruments (ni.com) is an example of a company that has embraced social IT and created a social business strategy. Managers developed a branded community consisting of a number of social IT tools such as Facebook, Twitter, blogs, forums, and more. By thinking holistically about all the ways that customers and employees might interact with one another, the branded community has become the hub of collaboration, engagement, and idea generation.

Source: Adapted from Keri Pearlson, "Killer Apps for a Social Business," February 17, 2011, http://instantlyresponsive.wordpress.com/2011/02/27/killer-apps-for-a-social-business (accessed March 19, 2015). For more information on National Instruments, see Harvard Business School case study 813001, "National Instruments" by Lynda Applegate, Keri Pearlson, and Natalie Kindred.

The third component of IS infrastructure is the network, which is the physical means by which information is exchanged among hardware components. Examples include fiber networks such as Google Fiber; cable networks such as those provided by Time Warner, AT&T, and Comcast; Wi-Fi provided by many local services; and 4G/5G/WiMax technologies (which are actually Internet communication standards, but some phone companies adopt those terms as the name of networks they offer). Some communications are conducted through a private digital network, managed by an internal unit.

Finally, the fourth part of the infrastructure is the data. The data include the bits and bytes stored in the system. In current systems, data are not necessarily stored alongside the programs that use them; hence, it is important to understand what data are in the system and where they are stored. Many more detailed models of IS infrastructure exist, and interested readers may refer to any of the dozens of books that describe them. For the purposes of this text, the IS strategy matrix provides sufficient information to allow the general manager to assess the critical issues in information management.

Because of the advanced state of technology, many managers are familiar with the use of platforms and applications or apps. Platforms are technically any set of technologies upon which other technologies or applications run. Often they are a combination of hardware and operating system software. Microsoft Windows and Apple's Macintosh with its latest operating system are two examples of platforms. Also common are mobile platforms such as the iPhone and Samsung/Android phone. Applications or **apps**, on the other hand, are self-contained software programs that fulfill a specific purpose and run on a platform. The term "apps" became popular from the smart phone industry, beginning when Apple introduced the App Store. But more recently, because all platforms have applications that run on them, the term *apps* has taken on a broader meaning; some use the term to describe almost any software that users encounter.

SUMMARY

The Information Systems Strategy Triangle represents a simple framework for understanding the impact of IS on businesses. It relates business strategy with IS strategy and organizational strategy and implies the balance that must be maintained in business planning. The Information Systems Strategy Triangle suggests the following management principles.

Business Strategy

Business strategy drives organizational strategy and IS strategy. The organization and its IS should clearly support defined business goals and objectives.

- Definition: A well-articulated vision of where a business seeks to go and how it expects to get there
- Example Models: Porter's generic strategies model; dynamic environment models

Organizational Strategy

Organizational strategy must complement business strategy. The way a business is organized either supports the implementation of its business strategy or it gets in the way.

- Definition: The organization's design, as well as the choices it makes to define, set up, coordinate, and control its work processes
- Example Model: managerial levers

IS Strategy

IS strategy must complement business strategy. When IS support business goals, the business appears to be working well. IS strategy can itself affect and is affected by changes in a firm's business and organizational strategies. Moreover, IS strategy always has consequences—intended or not—on business and organizational strategies.

- Definition: The plan the organization uses in providing IS and services
- Models: A basic framework for understanding IS decisions for platform, applications, network and data-relating architecture (the "what"), and the other resource considerations ("who" and "where") that represent important planning constraints

Strategic Relationships

Organizational strategy and information strategy must complement each other. They must be designed so that they support, rather than hinder, each other. If a decision is made to change one corner of the triangle, it is necessary to evaluate the other two corners to ensure that balance is preserved. Changing business strategy without thinking through the effects on the organization and IS strategies will cause the business to struggle until balance is restored. Likewise, changing IS or the organization alone will cause an imbalance.

KEY TERMS

alignment, 19
apps, 29
blue ocean strategy, 25
business model, 21
business strategy, 20
collaboration, 28
cost leadership, 23
creative destruction, 25
differentiation, 23
digital strategy, 25
dynamic capabilities, 25
engagement, 28
focus, 23
hypercompetition, 24
Information Systems Strategy Triangle, 18
innovation, 28
IS strategy, 27
managerial levers, 27
mission, 20
organizational strategy, 26
red ocean strategy, 25
social business strategy, 28
strategy, 20

DISCUSSION QUESTIONS

1. Why is it important for business strategy to drive organizational strategy and IS strategy? What might happen if the business strategy was not the driver?

2. In 2015, the NFL decided to hand out Microsoft Surface tablets to all coaches for use during games, and there are reports that in the future, they will add HoloLens devices to provide augmented reality.[29] A HoloLens device is a high-definition, head-mounted display that allows coaches to see the plays with text and animation superimposed right on the live images. If the NFL simply handed them out without making any other formal changes in organizational strategy or business strategy, what might be the outcome? What unintended consequences might occur?

3. Consider a traditional manufacturing company that wants to build a social business strategy. What might be a reasonable business strategy, and how would organization and IS strategy need to change? How would this differ for a restaurant chain? A consumer products company? A nonprofit?

4. This chapter describes key components of an IS strategy. Describe the IS strategy of a consulting firm using the matrix framework.

5. What does this tip from Fast Company mean: "The job of the CIO is to provide organizational and strategic flexibility"?[30]

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[29] Sean Michael, "NFL Teams Will Use Surface Pro 3s in 2015 and May Use HoloLens in the Future," WinBeta, August 7, 2015, http://www.winbeta.org/news/nfl-teams-will-use-surface-pro-3s-2015-and-may-use-hololens-future (accessed August 21, 2015).

[30] Fast Company, "Technology: How Much? How Fast? How Revolutionary? How Expensive?" *Fast Company*, March 2002, http://www.fastcompany.com/44651/technology-how-much-how-fast-how-revolutionary-how-expensive (accessed August 21, 2015).

Case Study 1-1 Amazon in 2019

In the 4th quarter of 2018, Amazon reported a record $72.4 billion in revenues, which beat analysts' expectations as well as its previous year's 4th quarter earnings of $60.5 billion.[i] Net income was $3 billion, which was also a record for a quarter, beating the previous year's 4th quarter by over 50%. Since it was opened to the public for business selling books in 1995, Amazon has expanded into other lines of business, blindsided retail stores of virtually all kinds, putting many stores and chains out of business. Amazon has also expanded into other lines of business, such as web services, groceries, and media production and distribution.[ii] Amazon is currently working on adding several different health-care services,[iii] creating "Amazon Go!" stores that require no check-out counters,[iv] and even building its own product delivery network.[v]

It is easy to consider Amazon as a firm having instant success, but it began by targeting bookstores as "Cadabra" in 1994 in a Seattle basement, with initial funding from the parents of then 30-year-old CEO Jeffrey Bezos.[vi] Within a year, Bezos decided he had to rename the site due to some confusion about the name, and also because of his desire to reflect a strategic vision of Amazon.com becoming "Earth's Biggest Bookstore," just as Amazon is the Earth's biggest river. By the end of 1996, Amazon tallied almost $16 million in sales. After an IPO in 1997, Amazon shipped its 1 millionth order.

While this might not seem to dispel the "instant success," myth mentioned above, a deeper look is quite interesting. You might be surprised to learn that Amazon operated at a loss for just over 9 years.[vii] In fact, the losses increased as revenue increased, which was contrary to expectations at first glance. A deeper look reveals that the losses resulted from Amazon's reinvestment that focused on expansion and growth. But how did it eventually recover from what seemed at the time to be losses that appeared to be spiraling out of control? Is there a secret to its eventual success?

In 2012, Bezos was reported to have changed the vision from "Earth's Biggest Bookstore" to the "Biggest Store on Earth."[viii] Currently, Amazon boasts a more ambitious strategic vision of having "Earth's biggest selection and being the Earth's most customer-centric company."[ix]

Bezos has ascribed its success to using a "flywheel" strategy[x] where lower prices stimulate sales, which allows fixed costs to be spread over more items, lowering costs in the long run. A flywheel is a heavy object, which takes great force to move it, but once it moves, it has inertia that makes it difficult to slow or stop it.

Bezos explains that feeding the movement of the flywheel can occur in many different ways besides merely lowering prices.[xi] Procuring the Whole Foods chain not only builds revenues but also provides potential for online grocery sales because the widely dispersed inventories in those stores can enable them to serve as additional distribution centers.

Sources:

[i] Emil Protalinski, "Amazon Reports $72.4 Billion in Q4 2018 Revenue: AWS up 45%, Subscriptions up 25%, and 'Other' up 95%," *Venturebeat*, January 31, 2019, https://venturebeat.com/2019/01/31/amazon-earnings-q4-2018 (accessed February 9, 2019).

[ii] Protalinski, January 31, 2019.

[iii] Christina Farr, "Amazon's Vision for the Future of Health care Is Becoming Clear," CNBC.com, December 18, 2018, https://www.cnbc.com/2018/12/17/amazon-vision-future-health-care.html (accessed February 11, 2019).

[iv] Nick Statt, "Why Amazon's Future Depends on Moving from the Internet to the Physical World," *The Verge*, November 2, 2018, https://www.theverge.com/2018/11/2/18049672/amazon-go-offline-retail-future-competition-walmart-food-drink-grocery-sales (accessed February 9, 2019).

[v] Alyssa Newcomb, "Amazon Delivers Its Shipping Intentions to FedEx, UPS, USPS via Regulatory Filing," February 6, 2019, http://fortune.com/2019/02/05/amazon-shipping-delivery-ups-usps-fedex (accessed February 11, 2019).

[vi] Fundable.com, "Amazon Startup Story," https://www.fundable.com/learn/startup-stories/amazon (accessed February 9, 2019).

[vii] Juan Carlos Perez, "Amazon Records First Profitable Year in Its History," *Computerworld*, January 28, 2004, https://www.computerworld.com/article/2575106/amazon-records-first-profitable-year-in-its-history.html (accessed February 8, 2019).

[viii] Robin Lewis, *The Robin Report*, January 24, 2012, https://www.therobinreport.com/amazon-from-earths-biggest-bookstore-to-the-biggest-store-on-earth (accessed February 11, 2019).

[ix] Scott Davis, "How Amazon's Brand and Customer Experience Became Synonymous," *Forbes.com*, July 14, 2016, https://www.forbes.com/sites/scottdavis/2016/07/14/how-amazons-brand-and-customer-experience-became-synonymous/#1a4b9d643cd5 (accessed February 11, 2019).

Case Study 1-1 (Continued)

[x] Jeff Haden, "The 1 Principle Jeff Bezos and Amazon Follow to Fuel Incredible Growth," *Inc*., June 28, 2017, https://www.inc.com/jeff-haden/the-1-principle-jeff-bezos-and-amazon-follow-to-fuel-incredible-growth.html (accessed February 9, 2019).

[xi] Ibid.

Discussion Questions

1. How does Amazon's Flywheel strategy fits with its evolving vision statements over the years?
2. Focusing on online product sales, which of the generic strategies does Amazon appear to be using based on this case? Provide support for your choice.
3. How far could Bezos have gone in Amazon's evolution without using information technology?
4. Assume that there is hypercompetition in product sales. How is Amazon responding to that environment?
5. Are the newly announced endeavors in health care, Amazon Go! stores, and shipping services consistent with Amazon's vision? Defend your position.

Case Study 1-2 Lego

Lego has long been an industry leader in children's toys with its simple yet unique building block-style products. A Danish carpenter whose family still owns Lego today founded the privately held company in 1932. But by 2004, the company found itself close to extinction, losing $1 million a day. A new CEO was brought in, and within five years sales were strong, profits were up, and naysayers who felt the new strategy was going to fail were proved wrong. In fact, sales, revenues, and profits continued to be strong. Revenues more than doubled, rising from 16 billion Danish krone (DKK) in 2010 to over 37.9 billion DKK in 2016, and in the same period, profit more than tripled, growing from 3.7 billion DKK to 12.4 billion DKK.

With the advent of high-tech forms of entertainment, such as the iPod and PlayStation, Lego found itself more antique than cutting edge in the toy world. When new CEO Jorgen Vig Knudstorp, a father and former McKinsey consultant, took over, the company was struggling with poor performance, missed deadlines, long development times, and a poor delivery record. The most popular toys frequently would be out of stock, and the company was unable to ship enough products or manage the production of its more complicated sets. Retail stores were frustrated, and that translated into reduced shelf space and ultimately to business losses.

Knudstorp changed all of that. He reached out to top retailers, cut costs, and added missing links to the supply chain. For example, prior to the new strategy, 90% of the components were used in just one design. Designers were encouraged to reuse components in their new products, which resulted in a reduction from about 13,000 different Lego components to 7,000. Because each component's mold could cost up to 50,000 euros on average to create, this reduction saved significant expense.

Lego was known for its traditional blocks and components that allowed children to build just about anything their imagination could create. The new strategy broadened the products, targeting new customer segments. Lego managers created products based on themes of popular movies, such as *Star Wars* and the Indiana Jones series. The company moved into video games, which featured animated Lego characters sometimes based on movies. The company created a product strategy for adults and engaged the communities who had already set up thousands of websites and blogs featuring Lego creations. It embraced the community who thought of Lego as a way to create art rather than simply as a building toy. And the company designed a line of Legos aimed at girls because the majority of its products had primarily targeted boys.

The culture of Lego changed to one that refused to accept nonperformance. The company's past showed a tendency to focus on innovation and creativity, often at the expense of profits. But that changed. "Knudstorp . . . made it clear that results, not simply feeling good about making the best toys, would be essential if Lego was to succeed. . . . Its business may still be fun and games, but working here isn't,"[i] describes the current culture at Lego.

Case Study 1-2 **(Continued)**

Some of the most drastic changes came from within the Lego organization structure. After its massive losses in 2004, Lego switched its employee pay structure, offering incentives for appropriate product innovation and sales. Key performance indicators encouraged product innovation that catalyzed sales while decreasing costs. Development time dropped by 50%, and some manufacturing and distribution functions were moved to less expensive locations, but the focus on quality remained. The creation of reusable parts alleviated some of the strain on Lego's supply chain, which in turn helped its bottom line.

Lego also expanded into the virtual world, extending into video gaming and virtual-interaction games on the Internet. Thinking outside the company's previous product concepts cut costs while encouraging real-time feedback from customers across a global market. Additionally, Lego created brand ambassadors to build communities of fellow customers across the world.

The growth put strains on the IS supporting the business. Order management and fulfillment were particularly affected, resulting in the inability to meet customer demand. Employee management systems were stretched as new employees were added to support the growth and additional locations. Product design and development, especially the virtual and video games, required new technology, too.

To solve some of these problems, Lego managers used the same approach they used for their blocks. They created a modularized and standardized architecture for their IS, making it possible to expand more quickly and add capacity and functionality as needed. They implemented an integrated enterprise system that gave them new applications for human capital management, operations support, product life cycle management, and data management. The new systems and services, purchased from vendors such as SAP and IBM, simplified the IT architecture and the core management processes needed to oversee the IS. For instance, the SAP system was used to get its supply chain management under control.[ii]

One manager at Lego summed it up nicely: "The toy world moves onwards constantly, and Lego needs to re-invent itself continuously. Significant corporate re-shaping introduced new energy to the company."[iii] He went on to say that simplifying Lego's IT systems and implementing an efficient product development process that was able to maintain quality and cost favorably positioned Lego to respond to the fast changing pace of the toy industry.

In 2016, Lego appointed Bali Padda as CEO, taking over for Knudstorp while Knudstorp remains at Lego Group as its fourth owner and head of a new entity "Lego Brand Group."[iv] Almost a year later, Knudstorp moved into the role of Executive Chairman, and Lego hired another new CEO, Niels B. Christiansen, to replace Padda, who remains as a special advisor to Lego.[v]

These executive changes can be explained by an 8% decline in revenue and 17% decline in profit in 2017,[vi] from 2016, its best year ever.[vii] Besides making those executive changes, Lego also increased its digital offerings, added to its distribution network, and cut the workforce by 1,400 jobs in late 2017, a reduction of 8%.[viii] Christiansen reported that Lego was becoming too large and complex, while a toy analyst reported that the market for Legos was becoming saturated[ix] and the European shopping behavior for toys has changed. Spurred by a 4% growth in revenue in 2018, Lego is now turning its gaze to China where it plans to more than double its store count.[x]

Sources: Adapted from http://www.nytimes.com/2009/09/06/business/global/06lego.html (accessed August 21, 2015); Brad Wieners, "Lego Is for Girls," December 19, 2011, 68–73; information from Lego's 2012 annual report, http://www.lego.com/en-us/aboutus/news-room/2013/february/annual-result-2012 (accessed March 29, 2015); and "Lego Case Study," http://thelegocasestudy.com (accessed March 29, 2015).

[i] Nelson D. Schwartz, "Turning to Tie-Ins, Lego Thinks Beyond the Brick," *The New York Times*, September 5, 2009, http://www.nytimes.com/2009/09/06/business/global/06lego.html?pagewanted=all&_r=0 (accessed August 21, 2015); https://www.vmware.com/files/pdf/partners/sap/sap-vmware-lego-cs-en.pdf (accessed September 11, 2015).

[ii] I. M. Sebastian, J. W. Ross, C. Beath, M. Mocker, K. G. Moloney, and N. O. Fonstad, "How Big Old Companies Navigate Digital Transformation," *MIS Quarterly Executive* 16, no. 3 (2017), 197–213.

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[iv] Roar Rude Trangbæk, "Bali Padda Appointed New CEO of the Lego Group," Lego.com, December 6, 2016, https://www.lego.com/en-us/aboutus/news-room/2016/december/bali-padda-new-ceo/ (accessed February 12, 2019).

Case Study 1-2 **(Continued)**

[v] Roar Rude Trangbæk, "The Lego Group Appoints Niels B. Christiansen as CEO," Lego.com, August 10, 2017, https://www.lego.com/en-us/aboutus/news-room/2017/august/niels-b-christiansen-new-ceo (accessed February 12, 2019).

[vi] Lego Group Media Relations, "Lego Group Reports Full Year Results from 2017," Lego.com, March 6, 2018, https://www.lego.com/en-us/aboutus/news-room/2018/march/annual-results-2017 (accessed February 12, 2019).

[vii] Roar Rude Trangbæk, "The Lego Group Reports Record Revenue in 2016," Lego.com, March 9, 2017, https://www.lego.com/en-us/aboutus/news-room/2017/march/annual-results-2016 (accessed February 12, 2019).

[viii] Ivana Kottasová, "Lego's Sales Drop for the First Time in 13 Years," *CNN Business*, March 6, 2018, https://money.cnn.com/2018/03/06/investing/lego-revenue-drop-star-wars/index.html (accessed February 12, 2019).

[ix] Ibid.

[x] Saabira Chaudhuri, Lego Steams Back into Growth, *Wall Street Journal*, February 28, 2019, B3.

Discussion Questions

1. How did the IS and the organization design changes implemented by Knudstorp align with the changes in business strategy?
2. Which of the generic strategies does Lego appear to be using based on this case? Provide support for your choice.
3. Are the changes implemented by Knudstorp an indication of hypercompetition? Defend your position.
4. What advice would you give Knudstorp and Christiansen to move Lego out of the recent doldrums and to return to growth and relevance?

Strategic Use of Information Resources

2

This chapter introduces the concept of building competitive advantage using information systems-based applications. It begins with a discussion of a set of eras that describe the use of information resources historically. It then presents information resources as strategic tools, discussing information technology (*IT*) assets and IT capabilities. Michael Porter's Five Competitive Forces model then provides a framework for discussing strategic advantage, and his Value Chain model addresses tactical ways organizations link their business processes to create strategic partnerships. We then introduce the Piccoli and Ives model to show how strategic advantage may be sustained in light of competitive barriers while the Resource-Based View focuses on gaining and maintaining strategic advantage through information and other resources of the firm. The chapter concludes with a brief discussion of strategic alliances, co-opetition, risks of strategic use of IT, and cocreating IT and business strategy. Just as a note: this chapter uses the terms *competitive advantage* and *strategic advantage* interchangeably.

Zara, a global retail and apparel manufacturer based in Arteixo, Spain, needed a dynamic business model to keep up with the ever-changing demands of its customers and industry. At the heart of its model was a set of business processes and an information system that linked demand to manufacturing and manufacturing to distribution. The strategy at Zara stores was simply to have a continuous flow of new products that were typically in limited supply. As a result, regular customers visited their stores often—an average of 17 times a year, whereas many retail stores averaged only four times a year. When customers saw something they liked, they bought it on the spot because they knew it would probably be gone the next time they visited the store. The result was a very loyal and satisfied customer base and a wildly profitable business model.

How did Zara do it? It was possible in part because the company aligned its information system strategy with its business strategy. An early version of its corporate website gave some insight:

> *Zara's approach to design is closely linked to our customers. A non-stop flow of information from stores conveys shoppers' desires and demands, inspiring our 200-person strong creative team.*[1]

Zara described its revised core value statement on its corporate site, which was recently restated for a more general audience, only using four simple words: beauty, clarity, functionality, and sustainability.[2] However, accomplishing this is not so simple. Martin Roll showed in an extensive analysis of Zara that such a strategy is accomplished only through an amazing orchestration of information systems (IS), employing two important rules: "To give customers what they want" and "get it to them faster than anyone else."[3] While other brands can take six months to get their new designs into stores, Zara can get a new design created and in stores within two weeks. Producing about 12,000 new designs each year and manufacturing over 450 million items requires a well-oiled supply chain coupled with more than simple daily sales reports.

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[1] Inditex website, http://www.inditex.com/en/who_we_are/concepts/zara (accessed February 20, 2012).

[2] Inditex, "About Us," https://www.inditex.com/about-us/our-brands/zara (accessed February 17, 2019).

[3] Martin Roll, "The Secret of Zara's Success: A Culture of Customer Co-creation," March 2018, https://martinroll.com/resources/articles/strategy/the-secret-of-zaras-success-a-culture-of-customer-co-creation/ (accessed February 17, 2019).

Zara is constantly vigilant, on the lookout for new design trends, so they can stock their shelves with items that are still likely to be top-of-mind for customers. Those trends often come from fashion influencers such as actors, actresses, and other celebrities worldwide. Zara also captures comments from customers, visits college campuses and nightclubs, and even notes what their customers are wearing in their stores, to find new fashion ideas. In short, customers help co-create fashions that will appear in Zara stores.[4]

An interesting illustration of Zara's rapid response is that four women visited separate Zara stores in Tokyo, Toronto, San Francisco, and Frankfurt, asking for pink scarves. Over the next few days, this story was repeated in other stores globally. One week later, Zara sent 500,000 pink scarves to 2,000 stores globally, which sold out in three days. This story illustrates how trends begin on a small scale but develop rapidly. Thanks to meticulous use of IS, Zara is equipped to handle that rapid development and reach the fashion market before the inevitable decline.[5]

The entire process from factory to shop floor is coordinated from Zara's headquarters by using IS. The point-of-sale (POS) system on the shop floor records the information from each sale, and the information is transmitted to headquarters at the end of each business day. Using a handheld device, the Zara shop managers also report daily to the designers at headquarters to let them know what has sold and what the customers wanted but couldn't find. The information is used to determine which product lines and colors should be kept and which should be altered or dropped. The designers communicate directly with the production staff to plan for the incredible number of designs that are manufactured every year.[6]

The shop managers have the option to order new designs twice a week using mobile devices. Before ordering, they can use these devices to check out the new designs. Once an order is received at the manufacturing plant at headquarters, a large computer-controlled piece of equipment calculates how to position patterns to minimize scrap and cut up to 100 layers of fabric at a time. The cut fabric is then sent from Zara factories to external workshops for sewing. The completed products are sent to distribution centers where miles of automated conveyor belts are used to sort the garments and recombine them into shipments for each store. Zara's IS department wrote the applications controlling the conveyors, often in collaboration with vendors of the conveyor equipment.

As the Zara example illustrates, innovative use of a firm's information resources can provide it substantial and sustainable advantages over competitors. Every business depends on IS, making its use a necessary resource every manager must consider. IS can also create a strategic advantage for firms that bring creativity, vision, and innovation to their IS use. The Zara case is an example. This chapter uses the business strategy foundation from Chapter 1 to help general managers visualize how to use information resources for competitive advantage. This chapter highlights the difference between simply using IS and using IS strategically. It also explores the use of information resources to support the strategic goals of an organization.

The material in this chapter can enable a general manager to understand the linkages between business strategy and information strategy on the Information Systems Strategy Triangle. General managers want to find answers to questions such as: Does using information resources provide a sustainable and defendable competitive advantage? What tools are available to help shape strategic use of information? What are the risks of using information resources to gain strategic advantage?

Evolution of Information Resources

The Eras model (Figure 2.1) summarizes the evolution of information resources over the past six decades. To think strategically about how to use information resources now and in the future within the firm, a manager must understand how the company arrived at where it is today. This model provides a good overview of trends and uses that have gotten the company from simple automation of tasks to extending relationships and managing their business ecosystems to where it is today.

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[4] Ibid.

[5] Ibid.

[6] Shenay Kentish, "Zara," October 18, 2011, http://versemag.com.au/special-interest/zara/ (accessed February 17, 2019).

	Era I 1960s	**Era II 1970s**	**Era III 1980s**	**Era IV 1990s**	**Era V 2000s**	**Era VI 2010s**	**Era VII 2020+**
Primary Role of IT	Efficiency	Effectiveness	Strategy	Strategy	Value creation	Value extension	Value capture
	Automate existing paper-based processes	Solve problems and create opportunities	Increase individual and group effectiveness	Transform industry/ organization	Create collaborative partnerships	Create community and social business	Connect intelligent devices; Establish platforms; Harness big data
Justify IT Expenditures	Return on investment	Increase in productivity and better decision quality	Competitive position	Competitive position	Added value	Creation of relationships	New revenue models
Target of Systems	Organization	Organization/ Group	Individual manager/ Group	Business processes	Customer/ Supplier relationships	Customer/ Employee/ supplier ecosystem	Platforms
Information Models	Application specific	Data driven	User driven	Business driven	Knowledge driven	People driven (or relationship driven)	Big Data driven
Dominant Technology	Mainframe, “centralized intelligence”	Minicomputer, mostly “centralized intelligence”	Microcomputer, “decentralized intelligence”	Client server, “distributed intelligence”	Internet, global “ubiquitous intelligence”	Social platforms, social networks, mobile, cloud	Intelligent devices, sensors, electronics, platforms
Basis of Value	Scarcity	Scarcity	Scarcity	Plenitude	Plenitude	Hyperplenitude	
Underlying Economics	Economics of information bundled with economics of things	Economics of information bundled with economics of things	Economics of information bundled with economics of things	Economics of information separated from economics of things	Economics of information separated from economics of things	Economics of relationships bundled with economics of information	Economics of information and data bundled with economics of things

FIGURE 2.1 Eras of information usage in organizations.

IS strategy from the 1960s to the 1990s was driven by internal organizational needs. First came the need to lower existing transaction costs. Next was the need to provide support for managers by collecting and distributing information followed by the need to redesign business processes. As competitors built similar systems, organizations lost any advantages they had derived from their IS, and competition within a given industry once again was driven by forces that existed prior to the new technology. Most recently, enterprises have found that social IT platforms and capabilities drive a new evolution of applications, processes, and strategic opportunities that often involve an ecosystem of partners rather than a list of suppliers. **Business ecosystems** are collections of interacting participants, including vendors, customers, and other related parties, acting in concert to do business.[7]

In Eras I through III, the value of information was tied to physical delivery mechanisms. In these eras, value was derived from scarcity reflected in the cost to produce the information. Information, like diamonds, gold, and MBA degrees, was more valuable because it was found in limited quantities.

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[7] For further discussion of business ecosystems, refer to Nicholas Vitalari and Hayden Shaughnessy, *The Elastic Enterprise* (Longboat Key, FL: Telemachus Press, 2012).

However, the networked economy beginning in Era IV drove a new model of value—value from plenitude. **Network effects** offered a reason for value derived from plenitude; the value of a network node to a person or organization in the network increased when others joined the network. For example, an e-mail account has no value without at least one other e-mail account with which to communicate. As e-mail accounts become relatively ubiquitous, the value of having an e-mail account increases as its potential for use increases. Further, copying additional people on an e-mail is done at a very low cost (virtually zero), and the information does not wear out (although it can become obsolete). As the cost of producing an additional copy of an information product within a network becomes trivial, the value of that network increases. Therefore, rather than using production *costs* to guide the determination of price, information products might be priced to reflect their *value* to the buyer.[8]

As each era begins, organizations adopt a strategic role for IS to address not only the firm's internal circumstances but also its external circumstances. Thus, in the value-creation era (Era V), companies sought those applications that again provided them an advantage over their competition and kept them from being outgunned by start-ups with innovative business models or traditional companies entering new markets. For example, companies such as Microsoft, Google, Apple, and Facebook created and maintained a competitive advantage by building technical platforms and organizational competencies that allowed them to bring in partners as necessary to create new products and services for their customers. Their business ecosystems give them agility as well as access to talent and knowledge, extending the capabilities of their internal staff. Other firms simply try to solve all customer requests themselves.

Eras VI and VII have brought another paradigm shift in the use of information with an era of hyper-plenitude: seemingly unlimited availability of information resources as the Internet and processing and storage through cloud computing sparked new value sources such as community and social business and the Internet of Things (connecting intelligent devices, sensors, and other electronics).

The Information System Strategy Triangle introduced in Chapter 1 reflects the linkages between a firm's IS strategy, organizational strategy, and business strategy. Maximizing the effectiveness of the firm's business strategy requires that the general manager be able both to identify and use information resources, for either enhancing revenues or cutting costs. Many managers are fond of cost cutting because it enhances the "bottom line" (net income) results directly. Increasing sales, on the other hand, usually has costs that need to be deducted first. For instance, in the FedEx example in Chapter 1, cutting costs by $90 million would increase the bottom line by $90 million. However, selling $90 million of services will require staffing, wear and tear on trucks, and supplies such as gasoline. The net bottom line result will only increase after deducting those expenses.

This chapter describes how information resources can be used strategically by general managers, in searching for opportunities to fulfill both internal and external requirements of the firm.

Information Resources as Strategic Tools

Crafting a strategic advantage requires the general manager to cleverly combine all the firm's resources, including financial, production, human, and information, and to consider external resources such as the Internet, platform contributors outside the firm, and opportunities in the global arena. Information resources are more than just the infrastructure. This generic term, **information resources**, is defined as the available data, technology, people, and processes within an organization to be used by the manager to perform business processes and tasks. Information resources can either be assets or capabilities. An **IT asset** is anything, tangible or intangible, that can be used by a firm to create, produce, and/or offer its products (goods or services). Examples of IT assets include a firm's website, data files, or computer equipment. An **IT capability** is something that is learned or developed over time for the firm to create, produce, or offer its products. An IT capability makes it possible for a firm to use its IT assets effectively.[9] The ability and knowledge to create a website, work with data files, and take advantage of IT equipment are examples of capabilities.

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[8] Adapted from M. Broadbent, P. Weill, and D. Clair, "The Implications of Information Technology Infrastructure for Business Process Redesign," *MIS Quarterly* 23, no. 2 (1999), 163.

[9] G. Piccoli and B. Ives, "IT-Dependent Strategic Initiatives and Sustained Competitive Advantage: A Review and Synthesis of the Literature," *MIS Quarterly* 29, no. 4 (2003), 747–76.