KERI E. PEARLSON & CAROL S. SAUNDERS

MANAGING AND USING INFORMATION SYSTEMS

A STRATEGIC APPROACH

Fourth Edition

4TH EDITION

Managing and Using Information Systems

A Strategic Approach

KERI E. PEARLSON
KP Partners

CAROL S. SAUNDERS
University of Central Florida

WILEY

JOHN WILEY & SONS, INC.

To Yale & Hana

To Rusty, Russell &Kristin

VICE PRESIDENT & EXECUTIVE PUBLISHER	Don Fowley
EXECUTIVE EDITOR	Beth Lang Golub
EDITORIAL ASSISTANT	Lyle Curry
MARKETING MANAGER	Carly DeCandia
DESIGN DIRECTOR	Harry Nolan
SENIOR DESIGNER	Kevin Murphy
SENIOR PRODUCTION EDITOR	Patricia McFadden
SENIOR MEDIA EDITOR	Lauren Sapira
PRODUCTION MANAGEMENT SERVICES	Pine Tree Composition

This book is printed on acid-free paper. ♾

ISBN 978-0-470-34381-4

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

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.[1]

Bill Gates
Microsoft

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

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 information systems decisions. Managers who choose to do so risk limiting their future business options. Information systems are at the heart of virtually every business interaction, process, and decision, especially when one considers the vast penetration of the Web in the last few years. Managers who let someone else make decisions about their information systems are letting someone else make decisions about the very foundation of their business. This is a textbook about managing and using information, written for current and future managers as a way of introducing the broader implications of the impact of information systems.

The goal of this book is to assist managers in becoming knowledgeable participants in information systems decisions. Becoming a knowledgeable participant means learning the basics and feeling comfortable enough to ask questions. It does not mean having all the answers nor having a deep understanding of all the technologies out in the world today. No text will provide managers with everything they need to know to make important information systems decisions. Some texts instruct on the basic technical background of information systems. Others discuss applications and their life cycle. 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. This text is intended to provide the reader with a foundation of basic concepts relevant to using and managing information. It is not intended to provide a comprehensive treatment on any one aspect of MIS,

[1] http://www.woopidoo.com/business_quotes/authors/bill-gates-quotes.htm.

for certainly each aspect is itself a topic of many books. It is not intended to provide readers with enough technological knowledge to make them MIS experts. It is not intended to be a source of discussion of any particular technology. This textbook is written to help managers begin to form a point of view of how information systems will help, hinder, and create opportunities for their organizations.

The idea for this text grew out of discussions with colleagues in the MIS area. Many faculty use a series of case studies, trade and popular press readings, and Web sites 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. 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 with the basic concepts. The course was structured to provide the general MBA with enough knowledge of the field of MIS 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 deeper 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 information systems decisions.

Today many students are digital natives—people who have grown up using information technologies all of their lives. That means that students come to their courses with significantly more knowledge about things like personal computers, cell phones, 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 that is projected to continue; students will be increasingly knowledgeable in personally using technologies. That knowledge has begun to change the corporate environment. Today's digital natives expect to find information systems in corporations that provide at least the functionality they have at home. At the same time, they 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. This edition of the text has been completely edited with this new group of students in mind. We believe the basic foundation is still needed for managing and using information systems, but we understand that the assumptions and knowledge base of today's students is significantly different.

This book includes an introduction, 12 chapters of text and minicases, and a set of case studies and supplemental readings on a Web site. The introduction makes the argument introduced in this preface that managers must be knowledgeable participants in information systems decisions. The first few chapters build a basic framework of relationships between business strategy, information systems strategy, and organizational strategy and explore the links between these strategies. Readers will also find a chapter on how information

systems relate to business transformation. Supplemental materials, including longer cases from all over the globe, can be found on the Web. Please visit http://www.wiley.com/college/pearlson for more information.

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, the sourcing of information systems, the organization and governance of the MIS function, the ethical issues, the funding of information systems resources, project management, and business analytics and knowledge management.

No text in the field of MIS is current. The process of writing the chapters, coupled with the publication process, makes a text somewhat out-of-date prior to delivery to its audience. With that in mind, this text is written to summarize the "timeless" elements of using and managing information. Although this text is complete in and of itself, learning is enhanced by coupling the chapters with the most current readings and cases. Students are encouraged to search the Web for examples and current events that further clarify the issues at hand. The format of each chapter begins with an example case and the basic language for a set of important management issues. This is followed up with a set of managerial concerns related to the topic. Each chapter then has a food for thought section on an additional, but relatively new, topic. The chapter concludes with a set of study questions, key words, and case studies.

This is the fourth edition of this text, and this version includes several significant additions and revisions. Gone is the chapter on "doing business on the Internet" because after all, virtually every business now uses the Internet. Instead, this edition has a new chapter on sourcing. Major changes include a new focus on Web 2.0 (Chapter 2); new framework of managerial levers (Chapter 3); new discussion on collaboration (Chapter 4); alignment and business processes (Chapter 5); SOA WOA, SaaS, enterprise architecture, and cloud computing (Chapter 6); sourcing (Chapter 7); new IT governance framework (Chapter 8); security and compliance (Chapter 9); new discussion of business cases (Chapter 10); new focus on managing business projects (Chapter 11); and on business analytics and business intelligence (Chapter 12). Many of the older cases have been replaced with newer examples throughout the text, and many of the food for thought issues are new.

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

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

Keri E. Pearlson and Carol S. Saunders

Acknowledgments

Books of this nature are written only with the support of many individuals. We would like to personally thank several individuals 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 off. We apologize in advance if that is the case here.

Philip Russell Saunders came to our rescue when we were in a pinch by researching various topics, finding cases, and verifying examples from previous editions. We really appreciate his efforts. We also appreciate the considerable efforts of Mihir Parikh at the University of Central Florida. Mihir wrote many of the new cases that appear in this fourth edition of the text. Thanks also go to Craig Tidwell who updated the teaching materials.

We also want to acknowledge and thank pbwiki.com. Without their incredible, and free, wiki, we would have been relegated to e-mailing drafts of chapters back and forth. For this edition, we wanted to use Web2.0 tools as we wrote about them.

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. Our thanks continue to go out to 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, and John Butler. In addition, the students of the spring 2008 Technology Management and summer 2008 Information Resource Management classes at the University of Central Florida provided comments that proved helpful in writing some cases and making revisions. Though we cannot thank them by name, we also greatly appreciate the comments of the anonymous reviewers who have made a mark on this edition.

The book would not have been started were it not for the initial suggestion of a wonderful editor at John Wiley & Sons, Inc., Beth Lang Golub. Her persistence and patience have helped shepherd this book through many months of creation, modification, evaluation, and production, and she will shepherd it through translation into other languages. Special thanks go to Maria Guarascio, who very cheerfully and very competently helped us through the revision process. We also appreciate the help of (Jennifer Snyder, Lorraina Raccuia, Gitti Lindner, and Sujin Hong) and others at Wiley, who have made this edition a reality.

From Keri: Thank you to my husband, Dr. Yale Pearlson, and my daughter, Hana Pearlson. Their patience with me while I worked on this project was incredible. They celebrated and commiserated the ups and downs that came with the process of writing this book. I love you guys!

From Carol: Rusty, thank you for being my compass (always keeping me headed in the right direction) and my release valve (patiently walking me through stressful times). I couldn't do it without you. I love you, Russell, and Kristin very much!

About the Authors

Keri E. Pearlson

Dr. Keri E. Pearlson is president of KP Partners, a consultancy specializing in creating leaders skilled in the strategic use of information systems and organizational design in the Web 2.0 world.

Dr. Pearlson has held various positions in academia and industry. She was a member of the information systems faculty at the Graduate School of Business at the University of Texas at Austin, where she taught management information systems courses to MBAs and executives. She was a research director at the Research Board, held positions at the Harvard Business School, CSC-Index's Prism Group, nGenera (formerly the Concours Group), AT&T, and Hughes Aircraft Company.

She is co-author of *Zero Time: Providing Instant Customer Value—Every Time, All the Time* (John Wiley & Sons, 2000). Her work has been published in *Sloan Management Review, Academy of Management Executive, Information Resources Management Journal*, and *Beyond Computing*. Many of her case studies have been published by Harvard Business School Publishing and are used all over the world.

Dr. Pearlson holds a Doctorate in Business Administration (DBA) in Management Information Systems from the Harvard Business School and both a Master's Degree in Industrial Engineering Management and a Bachelor's Degree in Applied Mathematics from Stanford University.

Carol S. Saunders

Dr. Carol S. Saunders is professor of MIS at the University of Central Florida in Orlando, Florida. She served as General Conference Chair of the International Conference on Information Systems (ICIS) in 1999 and Telecommuting in 1996. She was the chair of the ICIS Executive Committee in 2000. She was editor-in-chief of *MIS Quarterly* and is a Fellow of the Association of Information Systems (AIS). Her current research interests include the impact of information system on power and communication, virtual teams, virtual worlds, time, information overload, sourcing, and interorganizational linkages.

Her research is published in a number of journals including *MIS Quarterly, Information Systems Research, Journal of MIS, Communications of the ACM, Academy of Management Journal, Academy of Management Review, Communications Research*, and *Organization Science*.

Contents

Introduction 1

The Case for Participating in Decisions about Information Systems **2**
What If A Manager Doesn't Participate? **5**
What Skills Are Needed to Participate Effectively in Information Technology Decisions? **7**
Basic Assumptions **9**
Food for Thought: Economics of Information Versus Economics of Things **16**
Summary **18**
Key Terms **18**
Discussion Questions **19**
Case Study I-1: Terry Cannon, MBA **19**
Case Study I-2: Anyglobal Company Inc. **21**

▸ CHAPTER 1 The Information Systems Strategy Triangle 22

Brief Overview of Business Strategy Frameworks **25**
Brief Overview of Organizational Strategies **34**
Brief Overview of Information Systems Strategy **37**
Food for Thought: The Halo Effect and Other Business Delusions **38**
Summary **40**
Key Terms **40**
Discussion Questions **41**
Case Study 1-1: Roche's New Scientific Method **41**
Case Study 1-2: Google **43**

▸ CHAPTER 2 Strategic Use of Information Resources 46

Evolution of Information Resources **47**
Information Resources as Strategic Tools **48**
How Can Information Resources Be Used Strategically? **52**
Strategic Alliances **66**
Risks **68**
Food for Thought: Co-creating IT and Business Strategy **69**

Summary **71**
Key Terms **71**
Discussion Questions **71**
Case Study 2-1: Lear Won't Take A Backseat **73**
Case Study 2-2: Zipcar **74**

► **CHAPTER 3** Organizational Impacts of Information Systems Use **76**

Information Technology and Organizational Design **77**
Information Technology and Management Control Systems **85**
Information Technology and Culture **89**
Food for Thought: Immediately Responsive Organizations **92**
Summary **93**
Key Terms **94**
Discussion Questions **94**
Case Study 3-1: US Air and America West Merger Case **94**
Case Study 3-2: The FBI **96**

► **CHAPTER 4** Information Technology and the Design of Work **98**

Work Design Framework **101**
How Information Technology Supports Communication and Collaboration **102**
How Information Technology Changes the Nature of Work **108**
How Information Technology Changes Where Work Is Done and Who Does It **115**
Virtual Teams **120**
Gaining Acceptance for IT-Induced Change **125**
Food for Thought: Security With Remote Workers **127**
Summary **129**
Key Terms **130**
Discussion Questions **130**
Case Study 4-1: Automated Waste Disposal, Inc. **131**
Case Study 4-2: Virtually There? **132**

► **CHAPTER 5** Information Technology and Changing Business Processes **134**

Silo Perspective Versus Business Process Perspective **135**
The Tools for Change **141**
Shared Services **145**
Enterprise Systems **147**
Integrated Supply Chains **152**
Food for Thought: Is ERP a Universal Solution? **155**

Summary **157**
Key Terms **158**
Discussion Questions **158**
Case Study 5-1: Santa Cruz Bicycles **159**
Case Study 5-2: Boeing 787 Dreamliner **160**

▶ **CHAPTER 6** Architecture and Infrastructure **162**

From Vision to Implementation **163**
The Leap from Strategy to Architecture to Infrastructure **165**
Architectural Principles **171**
Enterprise Architecture **171**
Other Managerial Considerations **174**
From Strategy to Architecture to Infrastructure: An Example **181**
Food for Thought: Cloud Computing **183**
Summary **186**
Key Terms **187**
Discussion Questions **187**
Case Study 6-1: Hasbro **188**
Case Study 6-2: Johnson & Johnson's Enterprise Architecture **189**

▶ **CHAPTER 7** Information Systems Sourcing **190**

Sourcing Decision Cycle Framework **192**
Insourcing **193**
Outsourcing **193**
Outsourcing Abroad **198**
Backsourcing **206**
Outsourcing Models **207**
Food for Thought: Outsourcing and Strategic Networks **211**
Summary **212**
Key Terms **212**
Discussion Questions **213**
Case Study 7-1: Sodexho Asia Pacific **213**
Case Study 7-2: Overseas Outsourcing of Medical Transcribing **215**

▶ **CHAPTER 8** Governance of the Information Systems Organization **218**

Understanding the IS Organization **219**
What a Manager Can Expect from the IS Organization **224**
What the IS Organization Does Not Do **230**
IT Governance **231**
Food for Thought: CIO Leadership Profiles **240**

Summary **241**
Key Terms **242**
Discussion Questions **242**
Case Study 8-1: IT Governance at UPS **242**
Case Study 8-2: The Big Fix at Toyota Motor Sales (TMS) **243**

▸ **CHAPTER 9** Using Information Ethically **246**

Normative Theories of Business Ethics **248**
Control of Information **253**
Security and Controls **259**
IT Governance and Security **262**
Sarbanes–Oxley Act of 2002 **265**
Food for Thought: Green Computing **270**
Summary **272**
Key Terms **272**
Discussion Questions **273**
Case Study 9-1: Ethical Decision Making **274**
Case Study 9-2: Midwest Family Mutual Goes Green **276**

▸ **CHAPTER 10** Funding IT **278**

Funding IT Resources **278**
How Much Does IT Cost? **281**
Building a Business Case **287**
IT Portfolio Management **290**
Valuing IT Investments **292**
Monitoring IT Investments **296**
Options Pricing **300**
Food For Thought: Who Pays for the Internet? **304**
Summary **305**
Key Terms **306**
Discussion Questions **306**
Case Study 10-1: Troon Golf **306**
Case Study 10-2: Valuing IT **307**

▸ **CHAPTER 11** Project Management **309**

What Defines a Project? **310**
What is Project Management? **312**
Project Elements **314**
IT Projects **319**
IT Project Development Methodologies **322**

Managerial Influences **328**
Managing Project Risk **330**
The PMO **338**
Food for Thought: Open Sourcing **339**
Summary **341**
Key Terms **342**
Discussion Questions **342**
Case Study 11-1: Sabre Holdings **343**
Case Study 11-2: Dealing with Traffic Jams in London **344**

▶ **CHAPTER 12** Managing Business Knowledge **346**

Knowledge Management **347**
Data, Information, and Knowledge **348**
From Managing Knowledge to Business Intelligence **351**
Why Manage Knowledge? **352**
Knowledge Management Processes **356**
Competing with Business Analytics **365**
Components of Business Analytics **366**
Caveats for Managing Knowledge **368**
Food for Thought: Business Experimentation **369**
Summary **370**
Key Terms **371**
Discussion Questions **371**
Case Study 12-1: GSD&M's Virtual Crowd Uses Analytics **372**
Case Study 12-2: The Brain Behind the Big, Bad Burger **373**

Glossary **375**

Index **385**

INTRODUCTION

Why do managers need to understand and participate in the information decisions of their organizations? After all, most corporations maintain entire departments dedicated to the management of information systems (IS). These departments are staffed with highly skilled professionals devoted to the field of technology. Shouldn't managers rely on experts to analyze all the aspects of IS and to make the best decisions for the organization? The answer to that question is no. Managing information is a critical skill for success in today's business environment. All decisions made by companies involve, at some level, the management and use of IS. Managers today need to know about their organization's capabilities and uses of information as much as they need to understand how to obtain and budget financial resources. The ubiquity of personal computers (PCs) and the Internet highlights this fact because together they form the backbone for virtually all new business models. Further, the proliferation of supply chain partnerships has extended the urgent need for business managers to be involved in technology decisions. In addition, the availability of seemingly free (or at least very inexpensive) applications and collaboration in the consumer area has changed the landscape once again, increasing the integration of IS and business processes. A manager who does not understand the basics of managing and using information cannot be successful in this business environment.

Consider the now-historic rise of companies such as Amazon.com and Google. Amazon.com began as an online bookseller and rapidly outpaced traditional brick-and-mortar businesses like Barnes and Noble, Borders, and Waterstones. Management at the traditional companies responded by having their IS support personnel build Web sites to compete. But upstart Amazon.com moved on ahead, keeping its leadership position on the Web by leveraging its new business model into other marketplaces, such as music, electronics, health and beauty products, lawn and garden products, auctions, tools and hardware, and more. It cleared the profitability hurdle in the fourth quarter of 2001 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 such companies as Toys "R" Us Inc. and Target Corporation.[1] In 2008, Amazon.com once again changed the basis of competition in another market, but this time it was the Web services business. Amazon.com Web services offers clients the extensive technology platform used for Amazon.com, but in an on-demand fashion for developing and running the client's own applications.

[1] Robert Hof, "How Amazon Cleared the Profitability Hurdle," *BusinessWeek Online* (February 4, 2002), http://www.businessweek.com/magazine/content/02_05/b3768079.htm (accessed May 23, 2002).

Likewise, Google played an important role in revolutionizing the way information is located and used as well as revolutionizing the world of advertising and publishing. Google began in 1999 as a basic search company but quickly learned that a unique business model was a critical factor for future success. The company changed the way people thought about Web content by making it available in a searchable format with an incredibly fast response time. Further, Google's keyword-targeted advertising program revolutionized the way companies advertise. By 2001, Google announced its first quarter of profitability, solidifying the way the world finds information, publishes, and advertises.[2] By 2008, Google had expanded into a complete suite of Web-based applications, such as calendaring, e-mail, collaboration, shopping, and maps. Further, like Amazon.com, Google also offers clients similar on-demand services.[3]

These and other online businesses are able to succeed where traditional companies were not, in part because their management understood the power of information, IS, and the Web. They did not succeed because their managers could build Web pages or assemble an IS network. Quite the contrary. The executives in these new businesses understood the fundamentals of managing and using information and could marry that knowledge with a sound, unique business vision to achieve domination of 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 does not 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 will be helpful not just in making IS decisions, but all business decisions. We describe how a manager should participate in the decision-making process and outline how the remaining chapters of this book develop this point of view. Finally, the introduction presents current models for understanding the nature of a business and that of an information system to provide a framework for the discussions that follow in subsequent chapters.

► THE CASE FOR PARTICIPATING IN DECISIONS ABOUT INFORMATION SYSTEMS

Experience shows that business managers have no problem participating in most organizational decisions, even those outside their normal business expertise. For example, ask a plant manager about marketing problems, and the result will probably be a detailed opinion on both key issues and recommended solutions. Dialogue among managers routinely crosses all business functions in formal as

[2] Adapted from information at www.google.com/corporate/history.html (accessed June 17, 2005).

[3] For more information on the latest services by these two companies, see http://www.amazon.com and http://code.google.com/.

Reasons
IS must be managed as a critical resource.
IS enable change in the way people work together.
IS are part of almost every aspect of business.
IS enable business opportunities and new strategies.
IS can be used to combat business challenges from competitors.

FIGURE I.1 Reasons why business managers should participate in information systems decisions.

well as informal settings, with one general exception: IS. Management continues to tolerate ignorance in this area relative to other specialized business functions. Culturally, managers can claim ignorance of IS issues without losing prestige among colleagues. On the other hand, admitting a lack of knowledge regarding marketing or financial aspects of the business will earn colleagues' contempt.

These attitudes are attributable to the historic role that IS played in businesses. For many years, technology was regarded as a support function and treated as administrative overhead. Its value as a factor in important management decisions was minimal. It often took a great deal of technical knowledge to understand even the most basic concepts. However, in today's business environment, maintaining this back-office view of technology is certain to cost market share and could ultimately lead to the failure of the organization. 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, a general understanding of key IS concepts is possible without the extensive technological knowledge required just a few years ago. Finally, with the robust number of consumer applications available on the Web, many decisions made by the IS group are increasingly being made by individuals.

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

Information technology (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 spends a significant portion of corporate budgets. Worldwide IT spending topped $3 trillion in 2007, a jump of 8% from the previous year. It's projected to continue to increase.[4] U.S. corporations spent about $3,500 per worker in 1994

[4] www.cio.com/article/144551/IT_Spending_to_Surpass_Trillion (accessed July 31, 2008).

on IT and about $8,000 in 2005.[5] Industry-level research from the Gartner group found that the typical level of IT operating budget as a percentage of gross revenue ranges from 2.3% to 2.5% for consumer packaged goods companies and even higher for pharmaceuticals (4% to 6%) and logistics companies (5% to 6%).

These 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 performance of the investment. Therefore, the business manager needs a basic grounding in managing and using information. On the flip side, IS managers need a business view.

People and Technology Work Together

In addition to financial issues, a manager must know how to mesh technology and people to create effective work. Collaboration is increasingly common, especially with the rise of social networking. Companies are reaching out to individual customers using social media. In fact, the term **Web 2.0** has emerged to describe the use of the World Wide Web (the Internet) to enhance creativity, information sharing, and collaboration among users.[6] Technology facilitates the work that people do and the way they interact with each other. Correctly incorporating IS into the design of a business enables people to focus their time and resources on issues that bear directly on customer satisfaction and other revenue- and profit-generating activities. Adding IS to an existing organization, however, requires the ability to manage change. The skilled business manager must balance the benefits of introducing new technology with the costs associated with changing the existing behaviors of people in the workplace. Making this assessment does not require a detailed technical knowledge. It does require an understanding of what the short-term and long-term consequences are likely to be 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 Technology

IS are now integrated with almost every aspect of business. For example, as CEO of Wal-Mart Stores International, Bob L. Martin described IS's role, "Today technology plays a role in almost everything we do, from every aspect of customer service to customizing our store formats or matching our merchandising strategies to individual markets in order to meet varied customer preferences."[7] IS place information in the hands of Wal-Mart associates so that decisions can be made

[5] A. McAfee and E. Brynjolfsson, "Investing in the IT that Makes a Competitive Difference," *Harvard Business Review* (2008).

[6] Wikipedia, www.wikipedia.com (accessed July 31, 2008).

[7] "The End of Delegation? Information Technology and the CEO," *Harvard Business Review* (September–October 1995), 161.

closer to the customer. IS help simplify organizational activities and processes such as moving goods, stocking shelves, or communicating with suppliers.

Rapid Change in Technology

The proliferation of new technologies creates a business environment filled with opportunities. The changing demographics of the workforce and the integration of "'digital natives," individuals who have grown up completely fluent in the use of personal technologies and the Web, also increase the rate of adoption of new technologies beyond the pace of traditional organizations. Even today, new 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, to evaluate them against existing business needs, and finally to pursue any that fit with an articulated business strategy. The quality of the information at hand affects the quality of both the decision and its implementation. Managers must develop an understanding of what information is crucial to the decision, 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.

▶ 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. Adopting the wrong technologies 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. On the expense side, a poorly calculated investment in technology can lead to overspending and excess capacity. Inefficient business processes sustained by ill-fitting IS also increase expenses. Lags in implementation or poor process adaptation each reduce profits and therefore growth. 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 and organizational strategies. These consequences are discussed briefly in this section and in more detail in later chapters. While examining IS-related consequences in greater detail, consider their potential effects on an organization's ability to achieve its business goals. How would each consequence change the way people work? Which customers would be most affected and how? Would the organization still be able to implement its business strategy?

Information Systems Must Support Business Goals

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. If the systems do not allow the organization to realize its goals, or if IS lack the capacity needed to collect, store, and transfer critical information for the business, the results can be disastrous. 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. Toys "R" Us experienced such a calamity when its well-publicized Web site was unable to process and fulfill orders fast enough. It not only lost those customers, but it also had a major customer relations issue to manage as a result. Consider the well-intended Web designer who was charged with building a Web site to disseminate information to investors, customers, and potential customers. If the business goal is to do business over the Web, then the decision to build an informational Web site, rather than a transactional Web site, is misdirected and could potentially cost the company customers by not taking orders online. Even though it is possible to redesign a Web site, the task requires expending additional resources that might have been saved if business goals and IS strategy were discussed together.

Information Systems Must Support Organizational Systems

Organizational systems represent the fundamental elements of a business—its people, work processes, and structure—and the plan that enables them to work efficiently to achieve business goals. If the company's IS fail to support its organizational systems, the result is a misalignment of the resources needed to achieve its goals. It seems odd to think that a manager might add functionality to a corporate Web site without providing the training these same employees need to use the tool effectively, and yet this mistake—and many more costly ones—occur in businesses every day. Managers make major decisions, such as switching to a new major IS or implementing a standard that prohibits access to an external Web site, without informing all the affected staff of necessary changes in their daily work. For example, when companies put in an enterprise resource planning (ERP) system, the system often dictates how many business processes are executed. Deploying technology without thinking through how it actually will be used in the organization—who will use it, how they will use it, how to make sure the applications chosen actually accomplish what is intended—results in significant expense without a lot to show for it. In another example, a company may decide to prohibit access to the Internet, thinking that they are prohibiting employees from accessing offensive or unsecure sites. But that decision also means that employees can't access social networking sites, which may be useful for collaboration, or new Web-based applications, which may offer functionality to make the business more efficient. The general manager, who, after all, is charged with ensuring that company resources are used effectively, must ensure that the company's IS support its organizational systems and that changes made in one system are reflected in

other related systems. For example, a company that plans to institute a wide-scale telecommuting program needs an information system strategy compatible with its organization strategy. Desktop PCs located within the corporate office are not the right solution for a telecommuting organization. Instead, laptop computers, applications that are accessible online anywhere and anytime, and networks that facilitate information sharing are needed. If the organization only allows the purchase of desktop PCs and only builds systems accessible from desks within the office, the telecommuting program is doomed to failure.

SKILLS NEEDED TO PARTICIPATE EFFECTIVELY IN INFORMATION TECHNOLOGY DECISIONS

Participating in IT decisions means bringing a clear set of skills to the table. Managers are asked to take on tasks that require different skills at different times. Those tasks can be divided into visionary tasks, or tasks that provide leadership and direction for the group; informational/interpersonal tasks, or tasks that provide information and knowledge the group needs to have to be successful; and structural tasks, tasks that organize the group. Figure I.2 lists basic skills required of managers who wish to participate successfully in key IT decisions. This list emphasizes understanding, organizing, planning, and solving the business needs of the organization. Individuals who want to develop fully as managers will find this an excellent checklist for 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 is not required to become a knowledgeable participant in the IS decisions of a business. What a manager needs includes curiosity, creativity, and the confidence to question 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.

The goal of this book is to provide that framework. The way in which managers use and manage information is directly linked to business goals and the business strategy that drive both organizational and IS decisions. Business, organizational, and information strategies are fundamentally linked in what is called the Information Systems Strategy Triangle. Failing to understand this relationship is detrimental to a business. Failing to plan for the consequences in all three areas can cost a manager his or her job. This book provides managers with a foundation for understanding business issues related to IS from a managerial perspective.

Managerial Role	Skill
Visionary	**Creativity**—the ability to transform resources and create something entirely new to the organization **Curiosity**—the ability to question and learn about new ideas, applications, technologies, and business models **Confidence**—the ability to believe in oneself and assert one's ideas at the proper time **Focus on Business Solutions**—the ability to bring experience and insight to bear on current business opportunities and challenges **Flexibility**—the ability to change rapidly and effectively, such as by adapting work processes, shifting perspectives on an issue, or adjusting a plan to achieve a new goal
Informational and Interpersonal	**Communication**—the ability to share thoughts through text, images, and speech **Information gathering**—the ability to gather thoughts of others through listening, reading, and observing **Interpersonal skills**—the ability to cooperate and collaborate with others on a team, among groups, or across a chain of command to achieve results
Structural	**Project management**—the ability to plan, organize, direct, and control company resources to effectively complete a project **Analytical skills**—the ability to break down a whole into its elements for ease of understanding and analysis **Organizational skills**—the ability to bring together distinct elements and combine them into an effective whole **Planning skills**—the ability to develop objectives and to allocate resources to ensure objectives are met

FIGURE I.2 Skills of successful managers.

Organization of the Book

To be a knowledgeable participant, managers must know about both using information and managing information. The first five chapters offer basic frameworks to make this understanding easier. Chapter 1 explains the Information Systems Strategy Triangle and 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 IT and business strategy (Chapter 2), organizational forms (Chapter 3), collaboration and individual work (Chapter 4), and business process transformation (Chapter 5).

The rest of the text looks at issues related to building IS strategy itself. Chapter 6 provides a framework for understanding the four components of IS architecture: hardware, software, networks, and data. Chapter 7 discusses sourcing and where companies look for IS resources. Chapter 8 looks at the governance and organization of IS resources. Chapter 9 presents some of the ethical issues that need to be considered. Chapter 10 focuses on the economics of managing IS. Chapter 11 discusses project management in general and the management of IS projects specifically. Finally, Chapter 12 provides an overview of how companies manage knowledge and create a competitive advantage using business analytics.

▶ 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 have a basic understanding of the business and technology issues related to IS. Because technology changes rapidly, this text also assumes that the technology of today is different from the technology of yesterday, and most likely, the technology available to readers of this text today differs significantly from that available when the text was written. Therefore, this text focuses on generic concepts that are, to the extent possible, technology independent. It provides a framework on which to hang more current information, such as new uses of the Internet or new networking technologies. It is assumed that the reader will seek out current sources to learn about the latest technology.

Although some may debate this next assumption, a second assumption is that the role of a general manager and the role of an IS manager are distinct. The general manager must have a basic knowledge of IS to make decisions that may have serious implications for the business. In addition to general business knowledge, the IS manager must have more in-depth knowledge of technology to manage IS and to partner with general managers who must use the information. As the digital natives take on increasingly more managerial roles in corporations, this second assumption may have to be altered. But for this text, we will assume a different skill set for the IS manager. Assumptions are also made about how business is done and what IS are in general. Knowing what assumptions are made about each will support an understanding of the material to come.

Assumptions about Management

The classic view of management includes four activities, each dependent on the others: planning, organizing, leading, and controlling (see Figure I.3). A manager

Classic Management Model	
Planning	Managers think through their goals and actions in advance. Their actions are usually based on some method, plan, or logic, rather than a hunch or gut feeling.
Organizing	Managers coordinate the human and material resources of the organization. The effectiveness of an organization depends on its ability to direct its resources to attain its goals.
Leading	Managers direct and influence subordinates, getting others to perform essential tasks. By establishing the proper atmosphere, they help their subordinates do their best.
Controlling	Managers attempt to assure that the organization is moving toward its goal. If part of their organization is on the wrong track, managers try to find out why and set things right.

FIGURE I.3 Classic management model.
Source: Adapted from James A. F. Stoner, *Management*, 2nd ed. (Upper Saddle River, NJ: Prentice Hall, 1982).

performs these activities with the people and resources of the organization to attain the established goals of the business. Conceptually, this simple model provides a framework of the key tasks of management, which is useful for both general business and IS management activities. Although many books have been written describing each of these activities, organizational theorist Henry Mintzberg offers a view that most closely details the 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.4). This model is useful because 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 is often seen as a tactical approach to management, whereas some describe 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 in 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.

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	Chief information officer works with the marketing and human resource vice presidents to make sure that the reward and compensation system is changed to encourage use of 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	Chief information officer 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	Division manager suggests an application of a new technology that improves the division's operational efficiency.
	Disturbance handler	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 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.4 Manager's roles.
Source: Adapted from H. Mintzberg, *The Nature of Managerial Work* (New York: Harper & Row, 1973).

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

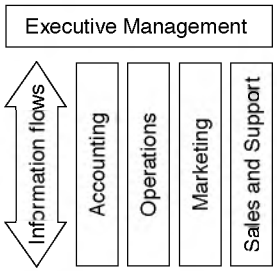

FIGURE I.5 Hierarchical view of the firm.

between line positions and management; after analysis it may be transmitted across other functions for use elsewhere in the company (see Figure I.5).

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 (see Figure I.6). The primary activities of inbound logistics, operations, outbound logistics, marketing and sales, and service are chained together in sequences that describe how a business transforms its raw materials into value-creating products. This value chain is supported by common activities shared across all the primary activities. For example, general management and legal services are distributed among the primary activities. Improving coordination among activities increases business profit. Organizations that effectively manage core processes across functional boundaries will be winners in the marketplace. IS are often the key to this process improvement and cross-functional coordination.

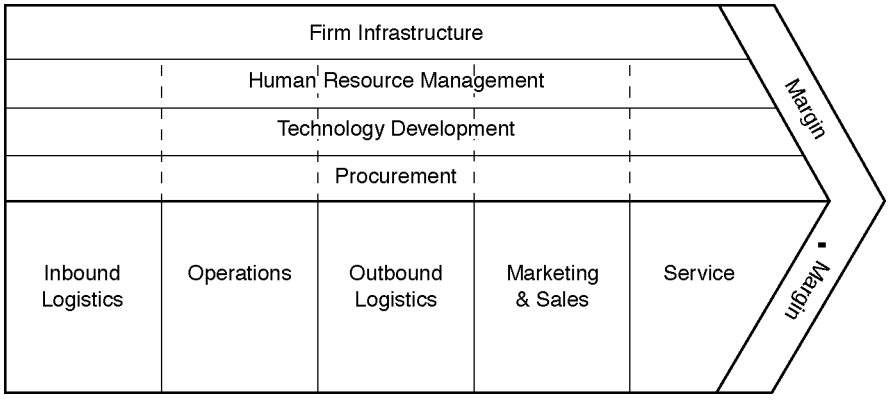

FIGURE I.6 Process view of the firm: the value chain.
Source: M. Porter, *Competitive Advantage* (New York: Free Press, 1985).

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 or 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.

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 and the context of an information system must be examined to understand the basic assumptions of this text.

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.7) provides a nice starting point for understanding the subtle but important differences.

The information hierarchy begins with data, or simple observations. **Data** are a set 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.[8] People turn data into information by organizing it into some unit of analysis (e.g., dollars, dates, or customers). For example, a **mashup** of location data and housing prices adds something beyond what the data provides individually, and that makes it information. Deciding on the appropriate unit of analysis involves interpreting the context of the data and summarizing it into a more condensed form. Consensus must be reached on the unit of analysis.

To be relevant and have a purpose, information must be considered within the context that it is received and used. Because of differences in context, information needs vary across the function and hierarchical level. 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 will

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

	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 knowing 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.7 Comparison of data, information, and knowledge.
Source: Adapted from Thomas Davenport, *Information Ecology* (New York: Oxford University Press, 1997).

want 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.8 and reflect the different activities performed at each level. At the supervisory level, activities are narrow in scope and focused on 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. The information needs of middle managers in terms of these characteristics fall between the needs of supervisors and 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. A report does not necessarily mean information. The context in which the report is used must be considered.

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 mashup of locations and housing prices means one thing to a real estate agent, another

	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
Orientation	Primarily external	Primarily internal with limited external	Internal
Decision	Extremely judgmental Uses creativity and analytical skills	Relatively judgmental	Heavy reliance on rules

FIGURE I.8 Information characteristics across hierarchical level.

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, judgment, and wisdom. Knowledge also involves the synthesis of multiple sources of information over time.[9] 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.

Some people think there is a fourth level in the information hierarchy, **wisdom**. In this context, wisdom is knowledge, fused with intuition and judgment that facilitates the ability to make decisions. Wisdom is that level of the information hierarchy used by subject matter experts, gurus, and individuals with a high level of experience who seem to "just know" what to do and how to apply the knowledge they gain.

System Hierarchy

An information system comprises three main elements: technology, people, and process (see Figure I.9). 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 strategy implicit in these components. These ideas will be discussed in greater detail in Chapter 6. **Information system** is defined more broadly as the *combination* of technology (the "what"), people (the "who"), and process (the

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

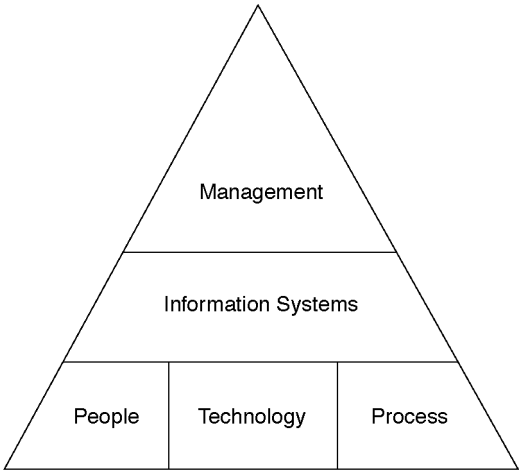

FIGURE I.9 System hierarchy.

"how") that an organization uses to produce and manage information. In contrast, information technology (IT) focuses only on the technical devices and tools used in the system. We define **information technology** as all forms of technology used to create, store, exchange, and use information.

Above the information system itself is management, which oversees the design and structure of the system and monitors its overall performance. Management develops the business requirements and the business strategy that the information system is meant to satisfy. The system's architecture provides a blueprint that translates this strategy into components, or infrastructure.[10]

▶ FOOD FOR THOUGHT: ECONOMICS OF INFORMATION VERSUS ECONOMICS OF THINGS

In their book, *Blown to Bits*, Evans and Wurster argued that every business is in the information business.[11] Even those businesses not typically considered to be 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 high-end Mercedes automobile contains as much computing power as a midrange personal computer. Information-intensive processes in the manufacturing and marketing of the automobile include market research, logistics, advertising, and inventory management.

[10] Gordon Hay and Rick Muñoz, "Establishing an IT Architecture Strategy," *Information Systems Management* 14 (Summer 1997), 67–69.

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

Things	Information
Wear out	Doesn't wear out, 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

FIGURE I.10 Comparison of the economics of things with the economics of information.

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, though 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 the ability of others to copy it is not limited. 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 the value to the consumer. Figure I.10 summarizes the major differences between the economics of goods and the economics of information.

Evans and Wurster suggest 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 Encyclopædia Britannica story serves as an example. Bundling the economics of things with the economics of information made it difficult for Encyclopædia Britannica to gauge the threat posed by Encarta, the encyclopedia on CD-ROM that was given away to promote the sale of computers and peripherals. Britannica focused on its centuries-old tradition of providing information in richly bound tomes sold to the public through a well-trained sales force. Only when it was threatened with its very survival did Encyclopædia Britannica grasp the need to separate the economics of information from economics of things and sell bits of information online. Clearly, Encyclopædia 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.[12]

[12] Ibid.

▶ SUMMARY

The explosive growth of Internet-based businesses 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. 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)
- What does it mean to align IT decisions with organizational decisions? (Chapter 3)
- How is the work of the individual in an organization affected by decisions concerning IS? (Chapter 4)
- How might IS enable business transformation? (Chapter 5)

IS Management Issues

- What are the components of an IT architecture? (Chapter 6)
- How should IS services be provided? (Chapter 7)
- What is an IS organization? How can a manager effectively manage IS? (Chapter 8)
- What ethical and moral considerations bind the uses of information in business? (Chapter 9)
- How are IS funded within an organization? What are the total costs of ownership of IS? (Chapter 10)
- What does it mean to manage a project? (Chapter 11)
- How should knowledge be managed within an organization? (Chapter 12)

▶ KEY TERMS

architecture (p. 15)
data (p. 13)
information (p. 13)
information system (p. 15)
information technology (p. 16)
infrastructure (p. 15)
knowledge (p. 14)
mashup (p. 13)
Web 2.0 (p. 4)
wisdom (p. 15)

▶ DISCUSSION QUESTIONS

1. Why is it important for a general manager to be knowledgeable about information technology?

2. Indicate whether each of the following is information, data, or knowledge:

   a. A daily sales report of each sales transaction that is sent to the chief operating officer

   b. A daily sales report of each sales transaction over $100,000 that is sent to the division marketing manager

   c. A monthly production report that is sent to shop floor supervisors who don't use the report because they believe the figures reported are outdated and inaccurate

   d. An exception report of all accounts that are more than 90 days past-due, which is sent to the Accounts Receivable Manager

   e. A list of Social Security numbers

   f. The contact list in an individual's LinkedIn account

3. Why, in your opinion, did the term Web 2.0 emerge? What is different in the way the Web is used today from the "Web 1.0" world?

CASE STUDY I-1

TERRY CANNON, MBA[13]

Terry Cannon, a typical MBA, was about to graduate from a top-ten business school with an MBA and a desire to change the world while growing a significant savings account. Terry was debating among three job opportunities, each of which would be a big step up the professional ladder from the associates job held when working for Impressive Consulting Group (ICG) prior to returning to school to get an MBA. Terry wasn't sure which job to take, in part because Terry didn't feel the MBA classes at the business school had provided enough preparation in information systems.

Terry started business school after four years of experience at Impressive Consulting Group (ICG), a global consulting organization with practices in virtually every major city in the world. Terry worked in the Dallas office as an associate right out of undergraduate school, with a degree in business with a concentration in marketing. Terry had worked on a number of interesting strategic marketing projects while at ICG. Terry was just completing a standard MBA program after two years of full-time study and a summer working for MFG Corporation, a large manufacturing company in the Midwest. The internship at MFG Corporation involved working with the new Web marketing group, which Terry chose to see just how a company like MFG takes advantage of the Web. At the same time, Terry hoped to become more proficient in Web and Internet technologies. The experience at

[13] The names in this case are fictitious. This case is written to highlight administrative issues relevant to general managers, and any resemblance to real individuals or organizations is coincidental.

MFG's Web marketing group, however, only made Terry more anxious, highlighting how much more was involved in information systems and the Web than Terry had previously thought. Terry returned to business school in the fall of the second year wondering just how much information systems knowledge would be needed in future jobs. Further, Terry felt that becoming a knowledgeable participant in information decisions was critical to success in the fast-paced Internet-based business world waiting after graduation.

Terry wondered just what type of information systems knowledge was needed for each of the three jobs under consideration. All three jobs involved a competitive salary, a signing bonus, and stock/retirement benefits, so the decision came down to the knowledge needed to be a success on the job. The three jobs are summarized as follows.

1. *Return to ICG as a consultant.* This job was attractive to Terry because it meant returning to a former employer. Terry had left in good standing and liked the company that rewarded innovation and supported learning and growth among consultants. Terry figured a partnership was possible in the future. As a consultant, Terry could live anywhere and travel to the client site four days a week. The fifth day each week, Terry would be able to work at home, or if desired, in a company office. As a consultant, Terry initially thought engagements in strategic marketing would be the most interesting. ICG had a strong programming group that was brought into each engagement to do the programming and systems analysis work. The consultant role involved understanding client concerns and assisting in building a marketing strategy. Virtually all the projects would have some Internet component, if not entirely about building an Internet presence. This challenge interested Terry, but based on the summer job experience, Terry wondered just how much technical skill would be required of the consultants in this arena.
2. *Join start-up InfoMicro.* Several of Terry's friends from business school were joining together to form a new start-up company on the Internet. This business plan for this company projected that InfoMicro would be one of only two Internet start-ups in their marketplace, giving the company a good position and great opportunity for growth. The business plan showed the company intending to go public through an IPO as early as three years after inception, and Terry believed they could do it. Terry would join as VP of marketing, supplementing the other three friends who would hold president, VP of finance, and VP of operations positions. The friends who would be president and finance VP were just completing a techno-MBA at Terry's school and would provide the technical competence needed to get InfoMicro on the Web. Terry would focus on developing customers and setting marketing strategy, eventually building an organization to support that operation as necessary. Because InfoMicro was a Web-based business, Terry felt a significant amount of information systems knowledge would be required of a successful marketing executive.
3. *Return to MFG Corporation.* The job would be to join the marketing department as a manager responsible for new customer development. Many of MFG corporation's customers were older, established companies like MFG Corporation itself, but new customers were likely to be start-ups and up-and-coming companies, or highly successful new companies like Google or Whole Foods. Terry felt that some knowledge of information systems would be necessary simply to provide innovative interaction mechanisms such as customer Web pages. Terry knew that discussions with the MFG information systems group would be necessary to build these new interfaces. How knowledgeable must Terry be on information systems issues to hold this job?

As spring break approached, Terry knew a decision had to be made. Recruiters from all three companies had given Terry a deadline of the end of break week, and Terry wasn't at all sure which job to take. All sounded interesting, and all were reasonable alternatives for Terry's next career move.

▶ Discussion Questions

1. For each position Terry is considering, what types of information systems knowledge do you think Terry would need?

2. How could Terry be a knowledgeable participant in each of the three jobs? What would it mean to be a knowledgeable participant in each job? Give an example for each job.

3. As a marketing major and an MBA, is Terry prepared for the work world awaiting? Why or why not?

CASE STUDY I-2

ANYGLOBAL COMPANY INC.[14]

Memo

To: Chris Bytemaster, CIO

From: Ms. Hazel Hasslefree, CEO

It seems that the article "IT Doesn't Matter" by Nicholas Carr (*Harvard Business Review*, May 2003) has caught the attention of several members of our Board of Directors. I have been asked to prepare a short presentation about what the article means to our company and whether IT does, in fact, matter in our company.

Would you please prepare a short report, about a page or two, that I can use as a basis for my presentation to them? Would you please summarize the Carr article and respond to the major points that he raises?

Thanks.

[14] We appreciate the suggestions provided to us by Ron Murch at the University of Calgary concerning this case.