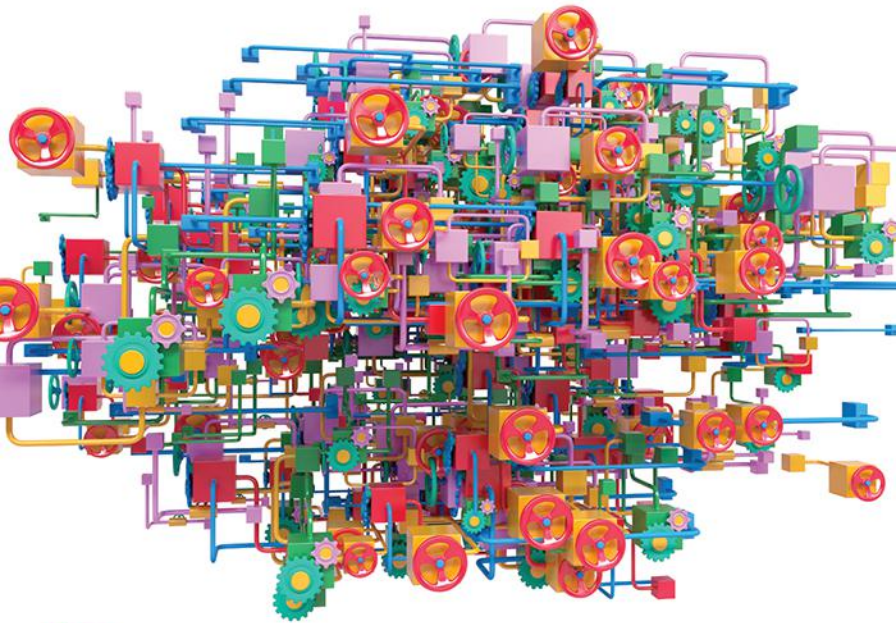
# PROCESSES, SYSTEMS, AND INFORMATION

An Introduction to MIS



4E

Earl H. McKinney Jr. | David M. Kroenke

# PROCESSES, SYSTEMS, AND INFORMATION

## An Introduction to MIS

*This page is intentionally left blank*

# PROCESSES, SYSTEMS, AND INFORMATION

## An Introduction to MIS

FOURTH EDITION

EARL McKINNEY JR.
Bowling Green State University

DAVID M. KROENKE

Pearson

**Content Management:** Stephanie Kiel
**Content Production:** Jaimie Noy
**Product Management:** Marcus Scherer
**Product Marketing:** Wayne Stevens
**Rights and Permissions:** Jenell Forschler

Please contact *https://support.pearson.com/getsupport/s/* with any queries on this content

**Cover Image:** Movie Elements/Shutterstock



**Library of Congress Cataloging-in-Publication Data**
Names: McKinney, Earl H., Jr. author. | Kroenke, David M., author.
Title: Processes, systems, and information : an introduction to MIS / Earl H. McKinney Jr., Bowling Green State University, David M. Kroenke.
Description: Fourth edition. | Hoboken, NJ : Pearson, [2022] | Includes bibliographical references and index.
Identifiers: LCCN 2020044185 (print) | LCCN 2020044186 (ebook) | ISBN 9780136926238 (paperback) | ISBN 9780136926160 (ebook)
Subjects: LCSH: Management information systems.
Classification: LCC T58.6 .K7733 2021 (print) | LCC T58.6 (ebook) | DDC 658.4/038011—dc23
LC record available at https://lccn.loc.gov/2020044185
LC ebook record available at https://lccn.loc.gov/2020044186

ScoutAutomatedPrintCode

ISBN 10: 0-13-692623-1
ISBN 13: 978-0-13-692623-8

# Brief Contents

*This page is intentionally left blank*

# Contents

# Preface

Since the emergence of ERP and EAI systems in the early 1990s, the MIS discipline has undergone a slow but persistent change. Whereas the early emphasis of MIS was on the management and use of information systems *per se,* emerging cross-functional systems began to place the focus on processes that utilize such systems. We believe that existing MIS textbooks, particularly those at the introductory level, do not sufficiently recognize this change in emphasis. Hence, we offer this textbook that provides a strong process orientation.

## Why This Fourth Edition?

We have made a number of changes to this fourth edition; these are listed in Table 1. While Table 1 spells out the changes in detail, there are several significant changes that warrant a short explanation.

First, the technology landscape has changed rapidly from the time the third edition was written. At that time, the significance of AI, 5G, SAP HANA S/4, analytics, and work at home were just beginning to emerge. These changes led to updates of many of the chapters. Further, security has continued to evolve at a pace that demands updating.

One key change is the addition of a new chapter on AI and robots. The business environment is rapidly discovering effective applications of these technologies, so we created this new chapter from a chapter extension in the previous edition. We greatly expanded our treatment of machine learning and deep learning as well as added new descriptions of the impact of AI and robots on the job market.

As we were writing this edition, the Coronavirus pandemic hit. This event had a number of implications for business that we added to different sections of the book. These topics included work from home collaboration, the ethics of contact tracing, the rapid use of Zoom and other teleconferencing apps, the opportunity to 3D print health care products, expanded telemedicine, fake virus news via social media, and the challenges of analyzing health data.

Another significant update to the text is the change in SAP to S/4. SAP has been transitioning from the R/3 environment for several years, and many universities are seeking to prepare graduates to work with S/4. We changed all the SAP tutorials and updated our discussion of the SAP platform in Chapter 8. We also produced a new Introduction to SAP tutorial for first-time students to learn about the SAP interface so that the procurement, sales, and production tutorials would be more effective. While the new tutorials are a part of this text, the old R/3 tutorials are still available on the IRC.

A significant change is our coverage of security. Security is becoming more essential for all business students. Often the only exposure business students get to security is in an MIS class. For this reason we greatly expanded our discussion of security, particularly security of mobile devices and personal safeguards and habits all students and professionals should learn to practice.

We also restructured our SAP chapters on procurement and sales. In the previous edition we contrasted a company before its initial implementation of SAP and after implementation to explain the benefits and challenges of ERP systems. Now that virtually all companies use some type of ERP system, we changed the contrast to with ERP and without. For this reason we also added a section on ERP upgrades.

Finally, we renamed and reorganized our Analytics chapter. In the previous edition this topic was labeled *Business Intelligence*; here we use the broader term *Analytics*, a term already known by most students and a subject they will know is essential. With this change, we also restructured the chapter into the widely used analytics categories of descriptive, predictive, and prescriptive analytics.

Many colleagues have told us they are "flipping" their classrooms and are using more student engagement activities during class meeting times. As a result, we updated half of the MIS InClass exercises and improved the instructions on the others.

At times introductory classes like MIS can devolve into a mastery of vocabulary lists. We've tried to counter this by helping the student see the value of using the vocabulary and

the usefulness of the models presented in the text by consistently applying the course vocabulary to familiar domains such as a hospital, a bicycle company, and a university. We also ask students to self-inspect; we don't ask them to memorize the definition of collaboration and experimentation—we ask them to evaluate themselves and find ways to improve. Just as important, we tried to identify key themes for entire chapters highlighting them in the introduction and returning to them at various points in the chapters. For example, the security chapter theme is that security is a tradeoff; a tradeoff between freedom and security and between cost and security. All these changes seek to make student engagement more natural and frequent.

Finally, to improve currency and readability all the chapters were updated, and many new figures added or repurposed. In addition, 8 opening vignettes, 10 end of chapter cases, and 7 application exercises were completely rewritten. We also tried to be more efficient with page use, reducing the length of chapter opening vignettes, cases, and ethical guides.

**TABLE 1 Changes in the 4th Edition**

| Chapter | Change |
|---|---|
| **1** | 2 new Figures, 2 updated |
| | New examples, data, and job opportunities related to current technology |
| | New case study on Apple |
| **2** | 1 new Figure, 2 updated |
| | New chapter opening vignette describing a process |
| | New application of topics to work |
| | New case study on Amazon |
| **3** | 1 new Figure, 8 updated |
| | New chapter opening vignette describing the impact of the cloud |
| | 5G discussion added |
| | Cloud market share updated |
| | New vocabulary—IoT, dated vocabulary dropped |
| | New case study on cashless payment systems |
| **4** | 4 updated Figures |
| | New chapter opening vignette describing data challenges |
| | Role of data administrator added |
| | New MIS In Class |
| | New Ethics Guide |
| | New case study on the impact of data to sports |
| **5** | 8 new Figures, 10 updated |
| | New chapter opening vignette describing new scooter supply chain in Vietnam |
| | Current examples and the impact of AI updated, AI and robots brief history added |
| | AI discussion reorganized into reasoning and pattern matching systems |
| | Machine and deep learning discussion widely expanded |
| | Impact of AI and robots on job market added |
| | New discussion of AI and robots in 2031 added |
| | New ethics guide and MIS In-Class |
| | 15 new vocabulary added |
| | New case study on Alpha Go |
| **6** | 3 new Figures, 8 updated |
| | New chapter opening vignette describing security and data loss prevention |
| | New current examples of attacks added |

| Chapter | Change |
|---|---|
| | Discussion of privacy and risk expanded |
| | Types of threats organized in categories |
| | Mobile device threats and losses discussion added |
| | Personal and smartphone security precautions, and graceful degradation discussion expanded |
| | New discussion of security issues in 2031 added |
| | New ethics guide |
| | 11 new vocabulary added, 5 dated vocabulary dropped |
| | New case study on Bitcoin and Blockchain |
| **7** | 1 new Figure, 1 updated |
| | New chapter opening vignette describing process improvement |
| | New S/4 screen Figures |
| | New case study on Alexa |
| **8** | 4 new Figures, 1 updated |
| | Chapter reorganized, contrast now between a company with and without SAP |
| | New S/4 screen Figures |
| | New section on ERP upgrade options added |
| | New current examples of ERP failures and ERP trends added |
| | Data on ERP market share updated |
| | New vocabulary—ERP upgrade, functional test, performance test |
| | New case study on EPIC |
| **9** | 1 new Figure, 7 updated |
| | New chapter opening vignette describing supply chain process problems |
| | Chapter reorganized, contrast now between a company with and without SAP |
| | New S/4 screen Figures |
| | Impact of ERP systems on job skills added |
| | New topics in 2031—analytics of supply chains, AI/robots, and 3D printing |
| **10** | 6 new Figures, 4 updated |
| | Chapter reorganized, contrast now between a company with and without SAP |
| | New S/4 screen Figures |
| | New topics in 2031—social CRM, darknet, smartphone payment, and marketing services |
| **11** | 6 updated Figures |
| | New chapter opening vignette describing angry customer social media post |
| | Previous chapters on collaboration and social media combined into one chapter |
| | Collaboration and Social media use data and examples updated |
| | Discussion of business use of TikTok and Microsoft Teams added |
| | New example processes |
| | New case study on Zoom |
| **12** | 3 new Figures, 18 updated |
| | New chapter opening vignette on using customer data and privacy |
| | Renamed chapter Analytics |
| | Data on analytics use updated |
| | Discussion reorganized under descriptive, predictive, prescriptive categories |
| | New example processes |
| | Expanded people challenges |
| | New topics in 2031—augmented analytics, digital twins, and privacy |
| | New vocabulary—Analytics, digital twin, descriptive, predictive, prescriptive analytics |
| | New case study |

| Chapter | Change |
|---|---|
| **Extensions** | 2 new Figures, 5 updated |
| | Voice and NLP discussion added |
| | New current examples of technologies and job opportunities added |
| | Updated data on LBD use |
| **Tutorials** | Completely new with S/4 data and screens |
| | New Introduction to SAP tutorial available online at IRC |
| | New Analytics tutorial with Microsoft Power BI |

## Importance of MIS

Chapter 1 claims that MIS is the most important class in the business curriculum. That's a bold statement, and every year we ask whether it remains true. Is there any discipline having a greater impact on contemporary business and government than IS? We continue to doubt there is. Every year brings important new technology to organizations, and many of these organizations respond by creating innovative applications that increase productivity and otherwise help them accomplish their strategies. In the past year, AI, robots, 5G, new security challenges, and the Coronavirus are posing new opportunities and requirements on organizations. More sophisticated and demanding users push organizations into a rapidly changing future, one that requires continual adjustments in business planning. To participate, our graduates need to know how to apply emerging technologies to better achieve their organizations' strategies. Knowledge of MIS is critical to this application.

The effects of changing technology and new user demands fall on processes and information systems at all levels—workgroup, organizational, and inter-enterprise. The impact on the latter is especially dramatic because cloud-based hosting and mobile devices enable independent organizations to work together in ways previously unimaginable.

As stated, we continue to believe we can enter the classroom with the confidence that we are teaching the single most important course in the business school—an argument that relies on two observations. First, because of nearly free data storage and data communications, businesses are increasingly finding and, more important, increasingly *required* to find innovative applications for information systems. The incorporation of Facebook and Twitter into marketing systems is an obvious example, but this example is only the tip of the iceberg. For at least the next 10 years, every business professional will, at a minimum, need to assess the efficacy of proposed IS applications. To excel, business professionals will need to not only assess but define innovative IS applications. These applications will increasingly take advantage of advances in Big Data and analytical software.

Such skills will not be optional. Businesses that fail to create systems that take advantage of nearly free data storage and communication will fall prey to the competition that can create such systems. So, too, will business professionals.

The second premise for the singular importance of the MIS class relies on the work of Robert Reich, former Secretary of Labor for the Clinton administration. In *The Work of Nations*,[1] Reich identifies four essential employability skills for knowledge workers in the 21st century:

- Abstract reasoning
- Systems thinking
- Collaboration
- Experimentation

For reasons set out in Chapter 1, beginning on page 2, we believe the MIS course is the single best course in the curriculum for learning these four key skills.

While most Introduction to MIS textbooks address technical innovation and nonroutine skills, *Processes, Systems, and Information, Third Edition,* uniquely enables the Intro course to also address business processes. The process view of business is the dominant view of business today;

[1]Robert B. Reich, *The Work of Nations* (New York: Alfred A. Knopf, 1991), p. 229.

students need a consistent, extended opportunity to master the language and apply it. The Introduction to MIS class that uses this textbook can expose both IS and non-IS students to process concepts and appropriately place IS in its vital role of supporting and improving processes. With this process foundation, students are better able to understand the benefits and challenges of ERP systems.

## Background on Processes and IS

The relationship between business processes and information systems is complex. They are not one and the same; a given process might use several different information systems, and, at the same time, a given information system might support many different processes. So, we cannot say that a process encapsulates all of its information systems, nor can we say that an information system encapsulates all of its processes.

In part because of this complex relationship, we define *MIS* as creating, monitoring, and adapting *processes, information systems, and information* to help organizations achieve their strategy (Chapter 1). The fabric of this text is woven around and through these definitions.

Potential adopters of this textbook are departments that make business processes a key component or thread throughout their curricula. This group includes all of the universities that are part of the SAP University Alliance, those that are part of the Microsoft Dynamics Academic Alliance, and other institutions for which a business process orientation is important. Chapters 9 and 10 provide specific examples of the use of SAP, and the cases that conclude each of those chapters provide tutorial exercises that use the SAP University Alliance's Global Bikes Inc. (GBI) case. This is the same case and client data used in University Alliance training, so it will be familiar to many instructors.

In our opinion, a text must go beyond the operational processes that comprise Chapters 9 and 10. Of course, operational processes are most important, and five chapters and an Appendix of our text include or are devoted to them. However, other dynamic processes, such as collaboration, project management, problem solving, business intelligence, and social networking, are also important. Hence, we -believe that this text should include much more than SAP-oriented processes.

## Text Features

A challenge of teaching the Introduction to MIS course from a process orientation is the lack of business knowledge and experience on the part of most students. Many universities offer the Introduction to MIS course at the sophomore and even freshman levels. Most of these students have completed few business courses. Even when this course is taught to higher-level students, however, few of them have significant business or process experience. They have been lifeguards or baristas. When we attempt to talk about, for example, the impact of process change on departmental power, that discussion goes over the heads of students. They may memorize the terms, but they often lose the essence of the discussion. The features of this text are designed, in part, to address this problem.

### Question-Based Pedagogy

Research by Marilla Svinicki in the Psychology Department of the University of Texas indicates that today's students need help managing their time. She asserts that we should never give homework assignments such as "read pages 75–95." The problem, she says, is that students will fiddle with those pages for 30 minutes and not know when they're done. Instead, she recommends that we give our students a list of questions and the assignment that they be able to answer those questions. When they can answer the questions, they're done studying. We have used this approach in our classrooms, and we believe that it is most effective. Students like it as well. Hence, we have organized each chapter as a list of questions.

### Opening Vignettes

Each chapter opens with a short vignette of a business situation and problem that necessitates knowledge of that chapter. We use Chuck's Bikes, Inc., a bicycle manufacturer for this 4th edition. CBI is also the organization used for the SAP tutorials. CBI is a bicycle assembly company that purchases parts from vendors, assembles final products, and ships them to customers

who sell to individuals. CBI recently added a scooter division and expanded its supply chain to Vietnam.

Each of these vignettes presents a situation that illustrates the use of the chapter's contents in an applied setting. Most contain a problem that requires knowledge of the chapter to understand and solve.

## MIS InClass Exercises

Every chapter includes a student group exercise that is intended to be completed during class. These exercises are designed for teachers who seek to use active learning exercises, also called flipping the classroom. The purpose of the exercise is to engage the student with knowledge gained from the chapter. These exercises are part lab and part case study in nature. In our experience, some of them lead to spirited discussions, and we could have let them run on for two or three class periods, had we had that luxury.

## SAP Tutorial Exercises

The appendices to Chapters 9 and 10 as well as Appendix A contain business process exercises that involve the SAP Alliance's Global Bike case. Professors at institutions that are members of the alliance can use these with their students. Because not every department that uses this book is a member of that alliance, we have made these exercises optional appendices. You can omit the exercises without any loss of continuity.

New to the 4th Edition is an Introduction to SAP tutorial. Available from the IRC, this tutorial is designed to help first-time students learn to use SAP so that subsequent tutorials on the business processes are more effective. The exercises are, we hope, purposeful yet simple to do. Our goal is to make it possible for them to be conducted by teaching assistants and faculty who have not yet attended the SAP university training. To that end, we provide extensive instructor support materials. Instructors who have had training by the SAP University Alliance will immediately recognize that these tutorials use exactly the same data and screens they used during training.

Earl McKinney, the author of the tutorial exercises, has been teaching SAP for 12 years at Bowling Green State University. The tutorial exercises included in this book have been tested extensively with Introduction to MIS students in a BGSU lab setting. In addition to the exercises, Earl has written a detailed teaching guide on how to best use the exercises as well as tips and pointers about their use and his experience about where students are most likely to struggle.

A fourth tutorial is offered at the end of the Chapter 12 on analytics. This tutorial uses Microsoft PowerBI to analyze Chuck's Bikes data. While a particular set of data is specified in the tutorial, students and instructors can also simply read the tutorial, learn how the operations like slicing and filtering are done, and use these skills on any dataset.

Over these years, Earl learned that when doing SAP exercises, it is far too easy for students to slip into "monkey-see, monkey-do" mode without any clear understanding of what they are doing or why. Based on this classroom experience, we believe that the setup to procurement and sales in Chapters 9 and 10, together with the exercises themselves, help students move beyond simple copy mode, in which they learn the SAP keystrokes, to learn the nature of process—oriented software and its role in organizations.

Like all who have used the GBI case, we are grateful to the SAP Alliance and to the case's authors. In accordance with both the letter and spirit of the SAP Alliance community's policy, we have placed these exercises on the SAP University Alliance Web site. We hope you will find sufficient value in this text to use it in your classroom, but please feel free to use these exercises even if you do not adopt this text.

By the way, the body of Chapters 9 and 10 uses the example of Chuck's Bikes, Inc., rather than GBI. We made this change at the request of the SAP Alliance. The alliance prefers that authors not add new material to GBI, change any characters, make videos, and so forth. We created CBI so as to comply with that request while at the same time providing more detailed business scenarios that are compatible with GBI.

## Ethics Guides

We believe that business ethics are a critically important component of the Introduction to MIS course and that the best way to teach ethics is in the context of case-like situations. We also believe that ethics ought not to be relegated to a single chapter or chapter section. Including ethics in one

place leads to the inoculation theory of education: "We don't need to discuss ethics, we've already done that." Accordingly, each chapter contains one two-page spread called an Ethics Guide. They are shown in the table of contents; to sample just one of them, turn to page 20.

In recent years, we believe there has been a shift in students' attitudes about ethics. Many students seem to be increasingly cynical and callous about ethical issues. As a result, when we try to raise interest with them about unethical behavior, we find ourselves interjecting and defending a particular set of values, a role that strikes many students as inappropriate. A common attitude seems to be, "We should think for ourselves, thank you anyway."

In frustration about the situation, we turned to a good friend of many years, Dr. Chuck Yoos, emeritus professor from the U.S. Air Force Academy. We told him our goals for presenting the Ethics Guides and asked him what criteria he would use with his students if he only had 20 minutes per guide. His response was that while there are many ways of addressing ethics in business, Kant's categorical imperative and the utilitarianism of Bentham and Mill would be at the top of his list. We investigated both and decided to use them with this edition.

Our goal in doing so is to ask students, whose ethical standards may be immature, to learn and apply the categorical imperative and utilitarianism perspectives. By doing so, students are asked to "try on" those perspectives and in the process think more deeply about ethical principles than they do when we allow them simply to apply their personal ethical standards.

The Ethics Guide in Chapter 1 introduces the categorical imperative, whereas the Ethics Guide in Chapter 2 introduces utilitarianism. If you choose to use these perspectives, you will need to assign both of those guides.

## Collaboration Exercises

As stated in Chapter 1, collaboration is a key skill for today's business professionals. Accordingly, we believe that teaching collaboration, collaboration processes, and collaboration information systems is an important component of this course. To that end, each chapter includes a collaboration exercise to be accomplished by a student team. In our opinion, it is not possible for students to complete all of these in one term. Instead, we recommend using three or four of them throughout the term.

In doing these exercises, we recommend that students not meet face to face, at least not most of the time, but use modern collaboration tools for their meetings. Google Docs and related tools are one possibility. We prefer requiring students to use Microsoft OneDrive.

## End-of-Chapter Cases

The chapter-opening vignettes are based on real-life experience, but the organizations they describe are fictitious. We use fictitious companies because we want students to learn from organizational mistakes and, at times, even organizational foolishness. We have not found many real companies that will allow us to share their laundry in this way, and, in any case, it seems unfair to ask for an organization's cooperation and then turn around and publish its problems.

However, we do believe students need to see examples of the role of MIS in actual organizations to help them bridge the chapter content to the real world. Hence, each chapter concludes with a case that illustrates some aspect of the chapter's contents in a real-world company.

## Active Reviews

Each chapter includes an Active Review at the end. These reviews help students ensure that they have learned the most essential material. They also serve as a list of potential exam questions and thus help students prepare for exams.

## Application Exercises

For courses that involve a Microsoft Office component, we have developed a set of Excel and Access exercises for all chapters. These exercises, which assume the student has beginner's level expertise with these products, appear beginning on page 448. They are listed approximately in increasing order of difficulty.

## What We Left Out

We chose to keep this book to the traditional 12-chapter length because we find that this number of chapters fits best into the number of class lessons of most courses. Because we are adding

substantial process-oriented material, however, that meant we needed to remove some content from the typical Introduction to MIS text.

In this text, we have reduced and simplified the discussions of hardware, software, and data communications. Furthermore, we simplified and shortened the discussion of information systems development. Finally, you will find no mention of IS departmental management in this text. It is not that we believe the shortened and omitted content is unimportant; rather, we think the opportunity cost is the least for these topics.

This text includes some material that has been previously published in David Kroenke's text *Using MIS*. The two texts differ in that *Using MIS* makes information systems primary, whereas this text makes business processes primary. Both texts will continue to be published. Because of this difference, however, every sentence that was brought over was examined from the perspective of business processes and much of that content was changed in both minor and major ways. The discussion of collaboration, for example, is reframed into the context of dynamic business processes. That said, the majority of the material in this text is new.

## Chapter Outline

This text is organized into four parts: Introduction, Technology, Structured Processes, and Dynamic Processes.

### Introduction

Chapter 1 sets the stage by illustrating the need for this course and especially for the behaviors and skills that students gain in the course. It defines *MIS* and summarizes the means by which organizations obtain goals and objectives. Porter's industry, five forces, and value chain models are presented.

Chapter 2 defines and illustrates processes, information systems, and information. It uses a common fast food restaurant to illustrate the relationship of processes and information systems. It also defines information using the Gregory Bateson definition that *information* is a difference that makes a difference.

### Technology

Chapters 3, 4, 5, and 6 address technology. Chapter 3 provides a quick summary of networks and the cloud. Chapter 4 discusses database processing. Security is the topic of Chapter 5. Chapter 6 is a new chapter that describes AI and robots. These chapters serve as a technology platform for the discussions in the remaining chapters.

### Structured Processes

Chapters 7 through 10 discuss structured processes and related information systems and information. Chapter 7 provides an overview of the scope and objectives of business processes. It also discusses process adaptation and improvement and the use of process objectives and measures in making process changes. Chapter 8 is a survey of ERP information systems, their benefits, and their challenges.

Chapters 9 and 10 are "applied" chapters. They show how SAP is used in two representative processes: procurement and sales. Two processes were chosen so that students could begin to see what is common to all processes and what might differ between processes. These two processes, buying and selling, are fundamental to business and are widely used. Each chapter includes a student lab exercise appendix that uses the Global Bikes case from the SAP Alliance's curriculum.

### Dynamic Processes

Chapters 11 and 12 address what we term *dynamic processes*. Such processes are neither as structured nor as rigid as the more structured operational processes. We dislike the term *unstructured processes* because we believe that such processes do have structure, at least at a meta-level. Both of these chapters follow a similar flow: The IS that supports each process is discussed first, followed by the activities in the process, and concluding with the business processes supported by the dynamic process.

Chapter 11 discusses two dynamic processes—collaboration and social media. We discuss Lin's theory of social capital, apply that theory to organizational use of social media systems, and survey the processes supported by social media systems. Chapter 12 considers business processes supported by analytics and discusses analytics systems, data warehouses, data mining, and Big Data.

### Extensions

Four Extensions to this edition of the textbook discuss, in order, IS Careers, Software and Hardware, Process Management and IS Design, and Location Based Data IS.

### Appendix

The appendix is a third structured process SAP tutorial. This tutorial takes a student through the SAP inputs required to accomplish the Production process.

## Supplements

The following supplements are available at the Online Instructor Resource Center, accessible through *www.pearsonhighered.com/kroenke*.

### MyLab MIS

MIS Video Exercises—videos illustrating MIS concepts, paired with brief quizzes
MIS Decision Simulations—interactive exercises allowing students to play the role of a manager and make business decisions
Chapter Warm Ups and Quizzes—objective-based quizzing to test knowledge
Discussion Questions—end of chapter short essay style questions
Dynamic Study Modules—on-the-go adaptive quizzing, also available for mobile devices
Learning Catalytics—bring your own device classroom response tools
Enhanced eText—an accessible, mobile-friendly eText
Excel and Access Grader Projects—live in the application auto-graded Grader projects provided inside MyLab MIS to support classes covering Office tools.

### Instructor's Manual

The Instructor's Manual, prepared by Hasan Bassam of the University of Toledo, includes a chapter outline, list of key terms, suggested answers to the MIS InClass questions, and answers to all end-of-chapter questions.

### Test Item File

This Test Item File, prepared by Noreen Power of Bentley University, contains more than 1,500 questions, including multiple-choice, true/false, and essay questions. Each question is followed by the correct answer, the learning objective it ties to, page reference, AACSB category, and difficulty rating.

### PowerPoint Presentations

The PowerPoints, prepared by Nancy Lamm of N. Lamm Consulting Associates, Ltd., highlight text learning objectives and key topics and serve as an excellent aid for classroom presentations and lectures.

### Image Library

This collection of the figures and tables from the text offers another aid for classroom presentations and PowerPoint slides.

### TestGen

Pearson Education's test-generating software is available from *www.pearsonhighered.com/irc*. The software is PC/MAC compatible and preloaded with all of the Test Item File questions. You can manually or randomly view test questions and drag and drop to create a test.

You can add or modify test bank questions as needed. Our TestGens are converted for use in BlackBoard, WebCT, Moodle, D2L, and Angel. These conversions can be found on the Instructor's Resource Center. The TestGen is also available in Respondus and can be found on *www.respondus.com*.

## Acknowledgments

First, we thank the numerous fellow-traveler professors and professionals who encouraged the development of this text and who have helped us in many ways along our path. In particular, we thank:

Yvonne Antonucci, *Widener University*
Cynthia Barnes, *Lamar University*
John Baxter, *SAP*
William Cantor, *Pennsylvania State University–York Campus*
Thomas Case, *Georgia Southern University*
Gail Corbitt, *SAP*
Darice Corey, *Albertus Magnus College*
Mike Curry, *Oregon State University*
Heather Czech, *SAP*
Peter Daboul, *Western New England University*
Janelle Daugherty, *Microsoft Dynamics*
Peter DeVries, *University of Houston, Downtown*
Denise Duncan, *Regis University*
Lauren Eder, *Rider University*
Kevin Elder, *Georgia Southern University*
John Erickson, *University of Nebraska at Omaha*
Donna Everett, *Morehead State University*
David Firth, *The University of Montana*
Jerry Flatto, *University of Indianapolis*
Kent Foster, *Microsoft*
Biswadip Ghosh, *Metropolitan State College of Denver*
Bin Gu, *University of Texas at Austin*
Bassam Hasan, *University of Toledo*
William Haseman, *University of Wisconsin–Milwaukee*
Jun He, *University of Michigan–Dearborn*
Lingbo Hu, *University of Buffalo*
Mark Hwang, *Central Michigan University*
Gerald Isaacs, *Carroll University*
Stephen Klein, *Ramapo University*
Bih-Ru Lea, *University of Missouri*
Ben Martz, *University of Northern Kentucky*
William McMillan, *Madonna University*
Bethany Niese, *University of North Georgia*
Natalie Nazarenko, *SUNY College at Fredonia*
Timothy O'Keefe, *University of North Dakota*
Tony Pittarese, *East Tennessee State University*
Martin Ruddy, *Bowling Green State University*

James Sager, *California State University–Chico*
Narcissus Shambare, *College of Saint Mary*
Jeff Smith, *Bowling Green State University*
Robert Szymanski, *Georgia Southern University*
Lou Thompson, *University of Texas, Dallas*
Ming Wang, *California State University*
Harold Webb, *University of Tampa*
Jan Weissman, *California State University, Los Angeles*

We wish to thank the unique production team that helped us bring this book into existence. First and foremost, we thank Stephanie Kiel, our editor, for her vision for this process-oriented introductory MIS text, for her untiring support throughout the process and her many excellent additions. Thanks, too, to Jenifer Niles, Manager Global Content Strategy at Pearson, for her help. We thank Gowthaman Sadhanandham of Integra, who helped us marshal this text and all its supplements through the Pearson production process. Finally, Jaimie Noy, our Content Producer at Pearson, has patiently helped us add new educational features to make this material more widely available.

We thank our friend and colleague, Chuck Yoos, of Fort Lewis College, for hours and hours and hours of conversation on the meaning of information, the role of information in organizations today, and how to address the instruction of business ethics. Chuck is responsible for the helpful distinction between *perceiving data* and *conceiving information* and many other insights that have shaped this text's material. Chuck recently passed away, and Chuck's Bikes is named in honor of him.

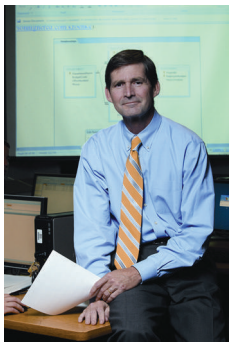
Finally, we are most grateful to our families, who have lovingly supported us through these processes; to them we dedicate this book.

Earl McKinney Jr.
*Bowling Green, Ohio*

David Kroenke
*Whidbey Island, Washington*

*This page is intentionally left blank*

# About the Authors



**Earl McKinney Jr.** Teaching the introduction to MIS course has been Earl McKinney's passion for 20 years. He first caught the bug at his alma mater, the U.S. Air Force Academy, and has continued his addiction during his tenure at Bowling Green State University. While teaching that class and other undergraduate and graduate classes, Earl has also introduced a half dozen new courses on security, social media, ERP, and information. He has been awarded a number of department and college teaching awards by students and fellow faculty. His interest in the broader context of the business curriculum is reflected in several of his publications and by the Decision Science Institute's National Instructional Innovation Award.

Earl's research in e-commerce, small team communication during a crisis, and theoretical work on the notion of information has been published in *Behaviour and Information Technology, Human Factors*, *Information and Management, European Journal of IS,* and *MIS Quarterly*. He consults with James Hall, the former head of the NTSB for British Petroleum, the U.S. Forest Service, and several Air Force agencies on human factors and aviation communication issues. He recently was awarded a Fulbright Scholarship to teach and study ambiguity in analytics at the Salzburg University of Applied Sciences in Austria. He holds an undergraduate economics degree from the Air Force Academy, a Master's of Engineering from Cornell University, and a PhD in MIS from the University of Texas. A former Air Force fighter pilot, Earl lives in Bowling Green with his wife and has two grown sons.

**David Kroenke** David Kroenke has many years of teaching experience at Colorado State University, Seattle University, and the University of Washington. He has led dozens of seminars for college professors on the teaching of information systems and technology; in 1991 the International Association of Information Systems named him Computer Educator of the Year. In 2009, David was named Educator of the Year by the Association of Information Technology Professionals-Education Special Interest Group (AITP-EDSIG).

David worked for the U.S. Air Force and Boeing Computer Services. He was a principal in the start-up of three companies. He also was vice president of product marketing and development for the Microrim Corporation and was chief of technologies for the database division of Wall Data, Inc. He is the father of the semantic object data model. David's consulting clients have included IBM, Microsoft, and Computer Sciences Corporations, as well as numerous smaller companies. Recently, David has focused on using information systems for collaboration in education and industry.

His text *Database Processing* was first published in 1977 and is now in its 13th edition. He has published many other textbooks, including *Database Concepts,* 6th ed. (2013), *Using MIS*, 7th ed. (2015), *Experiencing MIS,* 5th ed. (2015), *MIS Essentials,* 4th ed. (2015), *SharePoint for Students* (2012), and *Office 365 in Business* (2012). David lives on Whidbey Island, Washington. He has two children and three grandchildren.

To Susan, James, and Daniel —Earl McKinney

To C.J., Carter, and Charlotte —David Kroenke

*This page is intentionally left blank*

# Part 1

# Why MIS?

Knowledge of information systems will be critical to your success in business. If you major in accounting, marketing, management, or another major, you may not yet know how important such knowledge will be to you. The purposes of Part 1 of this textbook are to demonstrate why this subject is so important to every business professional today and to introduce important terms and concepts that you will need to succeed in business.

Chapter 1 lays the foundation. First, we discuss why this course is of critical importance to every business student today. We claim, in fact, that it is the most important course you will take. Then we define *MIS* and explain how organizational strategy determines the structure and functions of MIS components.

In Chapter 2, we will define and illustrate business processes, information systems, and information. As you will see, these three constructs are closely interwoven. Understanding the relationships among them sets the foundation for the rest of this text.

We begin each chapter with a short business vignette to help you relate the chapter's concepts to the business world. Chapter 1 begins with Chuck's Bikes, Inc. (CBI), a bicycle wholesaler that also assembles its own line of bicycles. Throughout the text, we'll meet various employees of CBI; in Chapter 1, we see Kelly terminating an employee, for reasons that you will soon learn.

In Chapter 2, we will investigate the processes at Chuck's Bikes Inc. At CBI we'll meet Jake and see how he puts the ideas of this textbook to work.

Extension 1 describes IS careers. It provides the student an opportunity to consider the types of jobs MIS graduates have, the characteristics of those jobs, and what IS professionals like about those jobs.

Chapter 1

# The Importance of MIS

"Fired? You're firing me?"

"Well, *fired* is a harsh word, but . . . well, Chuck's Bikes has no further need for your services."

"But, Kelly, I don't get it. I really don't. I worked hard, and I did everything you told me to do."

"Jennifer, that's just it. You did everything *I* told you to do."

"I put in so many hours. How could you fire me?"

"Your job was to find ways we can generate additional revenue from our existing retailers."

"Right! And I did that."

"No, you didn't. You followed up on ideas *that I gave you*. But we don't need someone who can follow up on my plans. We need someone who can figure out what we need to do, create her own plans, and bring them back to me . . . and others."

"How could you expect me to do that? I've only been here 4 months!"

"It's called teamwork. Sure, you're just learning our business, but I made sure all of our best salespeople would be available to you . . ."

"I didn't want to bother them."

"Well, you succeeded. I asked Jason what he thought of the plans you're working on. 'Who's Jennifer?' he asked."

"But doesn't he work out of our other office?"

"Right . . . and 37 percent of our sales come out of that office. Probably worth talking to him."

"I'll go do that!"

"Jennifer, do you see what just happened? I gave you an idea, and you said you'll do it. That's not what I need. I need you to find solutions on your own."

"I worked really hard. I put in a lot of hours. I've got all these sales reports written."

"Has anyone seen them?"

"I talked to you about some of them, but I was waiting until I was satisfied with them."

"Right. That's not how we do things here. We develop ideas and then kick them around with each other. Nobody has all the answers. Our plans get better when we discuss and rework them . . . I think I told you that."

"Maybe you did. But I'm just not comfortable with that."

"Well, it's a required skill here."

"I know I can do this job."

"Jennifer, you've been here almost 4 months; you have a degree in business. Several weeks ago, I asked you for your first idea about how to up-sell our customers. Do you remember what you said?"

"Yes, I wasn't sure how to proceed. I didn't want to just throw something out that might not work."

"But how would you find out if it would work?"

"I don't want to waste money . . ."

"No, you don't. So, when you didn't get very far with that

## CHAPTER OVERVIEW

**Q1-1.** Why is Introduction to MIS the most important class in the business school?

**Q1-2.** What is MIS?

**Q1-3.** How does MIS relate to organizational strategy?

**Q1-4.** What five forces determine industry structure?

**Q1-5.** What is competitive strategy?

**Q1-6.** How does competitive strategy determine value chain structure?

**Q1-7.** How does competitive strategy determine business processes and information systems?

### PSI BIG PICTURE

**PROCESS:** A way of doing something

**IS:** A collection of components that produces information

**INFORMATION:** Meaningful insight in a person

task, I backed up and asked you to send me a diagram of the life cycle for new clients . . . how we first contact them, how we make our first sale, how we grow our sales to them . . ."

"Yes, I sent you that diagram."

"Jennifer, it made no sense. Your diagram had clients talking to Neil in accounts receivable before they were even customers."

"I know that process; I just couldn't put it down on paper. But I'll try again!"

"Well, I appreciate that attitude, but times are tight. We don't have room for trainees. When the economy was strong, I'd have been able to look for a spot for you, see if we can bring you along. But we can't afford to do that now."

"What about my references?"

"I'll be happy to tell anyone that you're reliable, that you work 40 to 45 hours a week, and that you're honest and have integrity."

"Those are important!"

"Yes, they are. But today, they're not enough."

For a similar story, see also *www.youtube.com/watch?v=8UQx-zUuGf4*.

## PREVIEW

"But today, they're not enough."

Do you find that statement sobering? And if timely hard work isn't enough, what is? We will begin this book by discussing the key skills that Jennifer (and you) needs and explain why this course is the single best course in all of the business school for teaching you those key skills.

You may find that last statement surprising. If you are like most students, you have no clear idea what your MIS class will be about. If someone were to ask you, "What do you study in that class?" you might respond that the class has something to do with computers and maybe computer programming. Beyond that, you might be hard-pressed to say more. You might add, "Well, it has something to do with computers in business," or maybe, "We are going to learn to solve business problems with computers using spreadsheets and other programs." So, how could this course be the most important one in the business school?

We begin with that question. Once you have gained an understanding of how important this class will be to your career, we will discuss fundamental concepts.

### MyLab MIS

- Using Your Knowledge Questions 1-1, 1-2, 1-3
- Essay Questions 1-10, 1-11
- Excel and Access Application Questions 1-1, 1-2

## Q1-1 Why Is Introduction to MIS the Most Important Class in the Business School?

Introduction to MIS is the most important class in the business school. That statement was not true in 2010, and it may not be true in 2031. But it is true in 2021.

Why?

The ultimate reason lies in a principle known as **Moore's Law**. In 1965, Gordon Moore, cofounder of Intel Corporation, stated that because of technology improvements in electronic chip design and manufacturing, "The number of transistors per square inch on an integrated chip doubles every 18 months." His statement has been commonly misunderstood to be "The speed of a computer doubles every 18 months," which is incorrect but captures the essence of his principle.

Because of Moore's Law, the ratio of price to performance of computers has fallen from something like $4,000 for a standard computing device to a fraction of a penny for that same computing device.[1] See Figure 1-1.

As a future business professional, however, you needn't care how fast a computer your company can buy for $100. That's not the point. Here's the point:

> Because of Moore's Law, the cost of data processing, communications, and storage is essentially zero.

Moore's Law is relentlessly driving down the cost of computing. As a result, computers are everywhere in business—every job requires extensive computer use, and every product you see needed IT to make it, deliver it, market it, and sell it. Seriously, every product. Look around.

This avalanche is not stopping. Moore's Law will continue to reduce costs, so Moore and Moore technology will flood business, and new opportunities will arise all the time as what was once too expensive becomes a very real possibility.

What happens when the cost of technology is essentially zero? Here are some of the recent consequences:

| | | | | |
|---|---|---|---|---|
| SoundCloud | Blockchain | Airbnb | Apply Pay | 3D printers |
| Siri | FitBits | TikTok | WhatsApp | driverless cars |
| Instagram | Venmo | Spotify | Big Data | Echo |
| FaceTime | Uber | Internet of Things | the cloud | virtual reality |

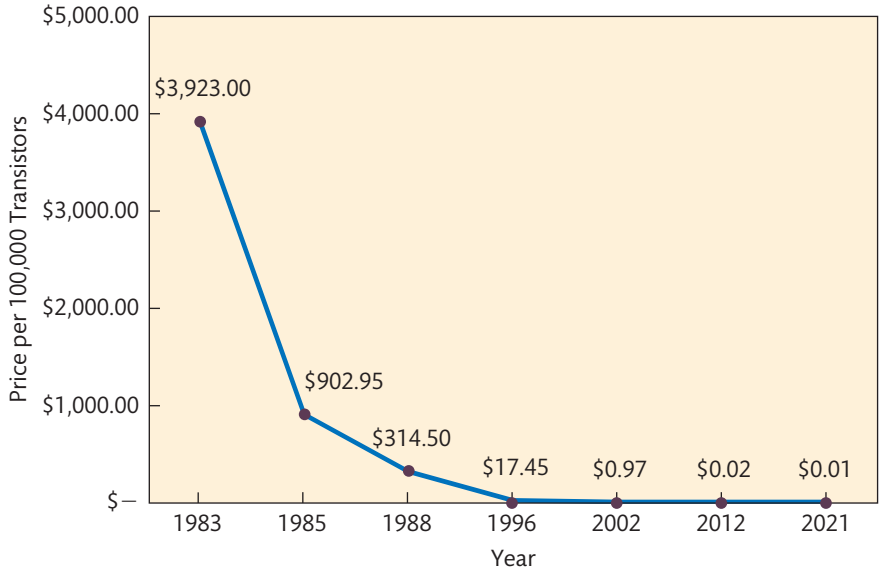



**FIGURE 1-1**
Changes in Price/Performance of Processors

These technologies and others before them have ushered in the **Information Age** where the production, distribution, and control of information are the primary drivers of the economy. Indicators of this age—the exploding quantities of data and the growth of Internet users—are shown in Figure 1-2.

There are two unique aspects of this age. First, the global world is *flat*. A new IT opportunity in India can quickly find the capital and connections needed to spread rapidly worldwide. Two, in such a flat and connected world, businesses must *adapt* quickly or be overtaken by those who do.

While the business world is driven by technology, so too are the people in it. Think about how many IT-enabled events you have participated in today—all the apps you have used, games you have played, music you have listened to, and videos you have watched as well as all your texts, posts, and tweets. In fact, the average adult spends more than 5 hours a day on their smartphones, social media, and laptops for work and entertainment.

Wherever we work or whatever we do, IT is there. Businesses need you to help them use IT wisely whether you are a graduate in MIS, accounting, marketing, or any other discipline. You need to use IT wisely to be effective at work, education, or even leisure. That's why MIS is the most important course in the business school today.

Jeff Bezos, CEO of Amazon, sees this unprecedented period of IT as the most exciting era of business: "It's pretty easy to wake up excited." We share Mr. Bezos's passion. It's an exciting time. We want you to be effective in it; we wrote this book for only that reason.

Future business professionals need to be able to assess, evaluate, and apply emerging information technology to business.

You need the knowledge of this course to attain these skills, and having these skills will lead to greater job security.

## How Can I Attain Job Security?

A wise and experienced business executive once said that the only job security that exists is "a marketable skill and the courage to use it." He continued, "There is no security in our company, there is no security in any government program, there is no security in your investments, and there is no security in Social Security." Alas, how right he turned out to be.

So, what is a marketable skill? Job seekers used to name particular skills, such as computer programming, tax accounting, or marketing. But today, because of Moore's Law, because the cost of data processing, storage, and communications is essentially zero, any routine skill can and will be outsourced to the lowest bidder. And if you live in the United States, Canada, Australia, Europe, and so on, that is unlikely to be you. Numerous organizations and experts have studied the question of what skills will be marketable during your career. Consider two of them.

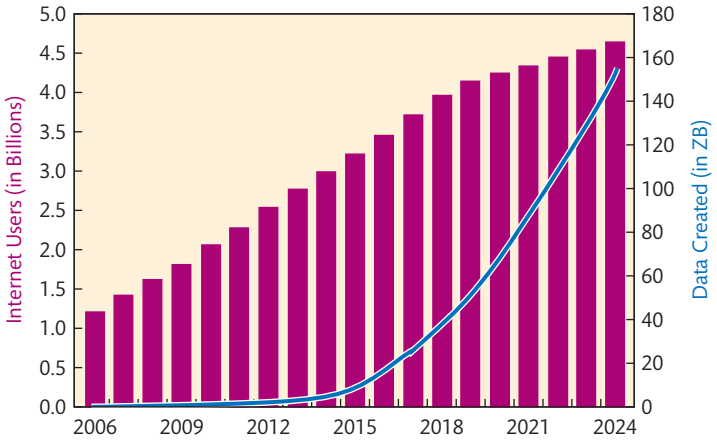



**FIGURE 1-2**
**Data Created and Worldwide Internet Users**

*Source:* https://recodetech.files.wordpress.com/2014/01/pimentel_graphic-1.jpghttp://www.internetlivestats.com/internet-users/

First, the RAND Corporation, a think tank located in Santa Monica, California, has published innovative and groundbreaking ideas for more than 70 years, including the initial design for the Internet. Recently, RAND published a description of the skills that workers in the twenty-first century will need:

> Rapid technological change and increased international competition place the spotlight on the skills and preparation of the workforce, particularly the ability to adapt to changing technology and shifting demand. These shifts in the nature of organizations . . . favor strong nonroutine cognitive skills.[2]

Whether you are majoring in accounting or marketing or finance or information systems, you need to develop these strong nonroutine cognitive skills. These nonroutine skills will be increasingly important in the near future as robots and artificial intelligence replace more and more people doing routine work.

A second study by Robert Reich, former Secretary of Labor, enumerates these nonroutine cognitive skills, which we call the four employability skills:[3]

- Abstract reasoning
- Systems thinking
- Collaboration
- Ability to experiment

Figure 1-3 shows an example of each. Reread the CBI case that started this chapter, and you will see that Jennifer lost her job because of her inability to practice these skills.

## How Can Intro to MIS Help You Learn Employability Skills?

The second reason Introduction to MIS is the best course in the business school is that it allows you to learn and practice these four key skills, because every topic will require you to apply and practice them. Here's how.

**ABSTRACT REASONING** **Abstract reasoning** is the ability to make and manipulate models. An abstraction is a simplification of an object; it is an idea, model, or concept that can then be manipulated with a logical or reasonable thought process. You will work with one or more models in every course topic and book chapter. For example, in Chapter 2, you will learn ways to *model* business processes, and you will also learn a *model* of the five components of an information system.

In this course, you will not just manipulate models provided in this text or a model that your instructor has developed; you will also be asked to construct models of your own. In Chapter 4, for example, you will learn how to create data models, and in Chapter 7, you will learn how to make process improvement models.

**SYSTEMS THINKING** Can you go to a grocery store, look at a can of green beans, and connect that can to U.S. immigration policy? Can you watch tractors dig up a forest of pulpwood trees and connect that woody trash to Moore's Law? Do you know why one of the major beneficiaries of YouTube is Cisco Systems? Answers to all of these questions require systems thinking.

**FIGURE 1-3**
Need for Employability Skills

| Skill | Example | Jennifer's Problem |
|---|---|---|
| Abstract reasoning | Construct a model or representation. | Confusion about life cycle for new clients. |
| Systems thinking | See the whole and show how inputs and outputs relate to one another. | Confusion about when/how customers contact accounts receivable. |
| Collaboration | Develop ideas and plans with others. Provide and receive critical feedback. | Unwilling to work with others with work-in-progress. |
| Experimentation | Create and test promising new alternatives, consistent with available resources. | Fear of failure prohibited discussion of new ideas. |

**Systems thinking** is the ability to see the whole, not just the parts; it is the ability to model the components of the system and to connect the inputs and outputs among those components into a sensible whole, one that explains the phenomenon observed. For example, why is Uber profitable as a whole, and how do inputs like riders and drivers get connected to create successful outcomes for both?

As you are about to learn, this class is about processes and information *systems.* Processes are parts of systems—the output of one process is the input to another process. For example, the process of acquiring the material to make bicycles is the input to the process of production; and the output of production is the input to the sales process. Systems thinking is also important to information systems. Throughout this book, we will discuss and illustrate systems. You will be asked to critique systems, compare alternative systems, and apply different systems to different situations. All of those tasks will prepare you for systems thinking as a professional.

**COLLABORATION** Here's a fact that surprises many students: Effective collaboration isn't about being nice. It includes planning discussions, anticipating reactions, being inquisitive and not defensive, educating, and influencing. Interestingly, surveys indicate the single most important skill for effective collaboration is to give and receive critical feedback. Advance a proposal in business that challenges the cherished program of the VP of marketing, and you will quickly learn that effective collaboration skills differ from party manners at the neighborhood barbeque. So, how do you advance your idea in the face of the VP's resistance? And without losing your job?

In this course, you can learn both skills and information systems that will be of use for such collaboration. Even better, you will have many opportunities to practice them. Chapter 10 will teach you collaboration skills and illustrate several sample collaboration information systems. In addition, every chapter of this book includes collaboration exercises that you may be assigned in class or as homework.

### ABILITY TO EXPERIMENT

"I've never done this before."
"I don't know how to do it."
"But will it work?"
"Is it too weird for the market?"

The fear of failure is a major stumbling block that paralyzes so many good people and so many good ideas. In the days when business was stable, when new ideas were just different verses of the same song, professionals could allow themselves to be limited by the fear of failure.

But think again about the application of social networking to the oil change business. Is there a legitimate application of social networking there? If so, has anyone ever done it? Is there anyone in the world who can tell you what to do? How to proceed? No. As Reich says, professionals in the twenty-first century need to develop experimentation skills.

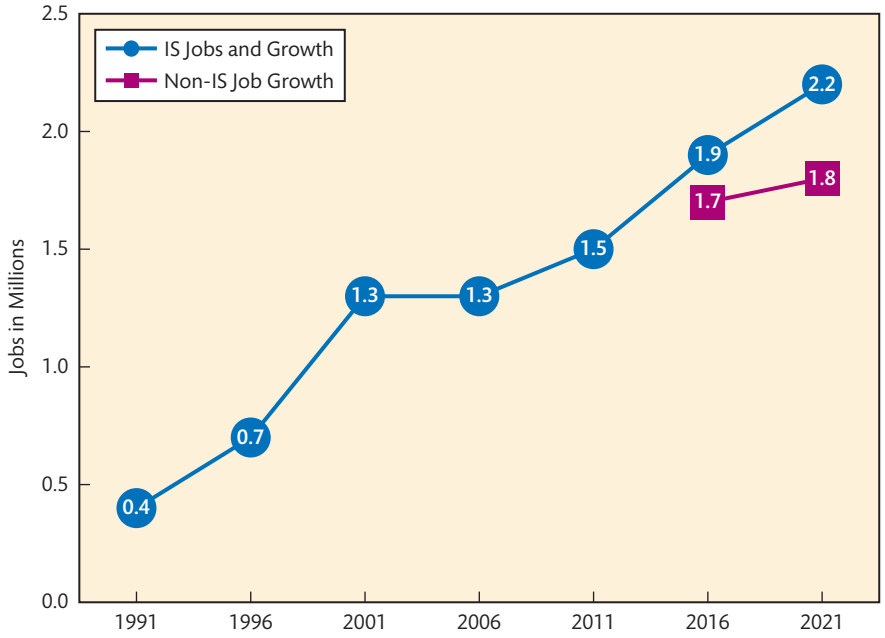
Successful experimentation is not throwing buckets of money at every crazy idea that enters your head. **Experimentation** is, however, making a careful and reasoned analysis of an opportunity, envisioning potential products or solutions or applications of technology, and then developing those ideas that seem to have the most promise, consistent with the resources you have. Successful experimentation also means learning from the experience: If it worked, why? If not, why not?

Experimentation is essential in a flat and connected global economy as the payoff for success in a global market is higher than ever. If a company does not experiment, it has lowered its chances of a breakthrough success. Experimentation is like drawing cards in poker or a game of cards. You do not know when a good card will come to you, but if you quit drawing cards, and your opponents continue, you're done.

In this course, you will be asked to use products with which you have no familiarity. Those products might be Microsoft Access, Visio, or something called SAP, or they might be features and functions of Blackboard that you have not used. You may be asked to collaborate using Microsoft Office 365 or Google Docs. Will your instructor explain every feature of those products that you will need? You should hope not. You should hope your instructor will leave it up to you to envision new possibilities on your own and to experiment with those possibilities, consistent with the time you have available.

**FIGURE 1-4**
**IS Job History and Forecast Growth**

*Source:* Bureau of Labor Statistics: https://www.bls.gov/opub/btn/volume-2/careers-in-growing-field-of-information-technology-services.htm




## Jobs

As shown in Figure 1-4, jobs in IS have grown rapidly over the past 25 years, from less than 0.5 million to now more than 2 million. The figure also shows that the growth of IS jobs for the last 5 years exceeded job growth by all non IS jobs. Many of the jobs fulfilled by IS trained graduates do not have IS in the job title. These jobs and their descriptions are described in Extension 1. Particularly hot now are jobs in security, analytics, and AI, many of which will be filled by IS graduates.

However, information systems and computer technology provide job and wage benefits beyond just IS professionals. Acemoglu and Autor published an impressive empirical study of job and wages in the United States and parts of Europe from the 1960s to 2010.[4] They found that early in this period, education and industry were the strongest determinants of employment and salary. However, since 1990, the most significant determinant of employment and salary is the nature of work performed. In short, as the price of computer technology plummets, the value of jobs that benefit from it increases dramatically. For example, plentiful, high-paying jobs are available to business professionals who know how to use information systems to improve business process quality, interpret data mining results for improved marketing, enhance information security, or use 3D printing to create new products and address new markets.

## What Is the Bottom Line?

The bottom line? This course is the most important course in the business school because:

1. It will give you the background you need to assess, evaluate, and apply emerging information systems technology to business.
2. It can give you the ultimate in job security—employability skills—by helping you learn abstract reasoning, systems thinking, collaboration, and experimentation.
3. Job opportunities.

Please give this course your best shot; we believe that effort will pay off handsomely. We understand everyone says this about their topic, so ask non-IS friends, teachers, friends of parents, and others how important is it for you to be able to use and understand how technology is employed by businesses. Think of it this way: If you were planning a future in Germany, wouldn't you want to be good with the German language? Same here—you're going into a high-tech business environment . . . so be good with technology language. With that introduction, let's get started![5]

## Q1-2 What Is MIS?

We've used the term *MIS* several times, and you may be wondering what it is. **MIS** stands for **management information systems**, which we define as creating, monitoring, and adapting processes, information systems, and information to help organizations achieve their strategies. This definition has three key elements:

- Processes, information systems, and information
- Creating, monitoring, and adapting
- Achieve strategies

Consider each, starting with processes, information systems, and information.

### Processes, Information Systems, and Information

Chapter 2 discusses these three terms and their interrelationships in detail. For now, however, consider the following intuitive definitions. A *process,* or, as it is sometimes called, a *business process,* is a way of doing something. CBI has a process for acquiring new customers. The process involves finding potential customers, contacting them, assigning a sales person, and so forth. Because organizations accomplish work via processes, focusing on them is key to improving organizational effectiveness and efficiency, as you will learn throughout this book.

An *information system* is a collection of components, including but not limited to a computer, that stores and retrieves data and produces information. Business processes and information systems are not the same things. A process may use multiple information systems, and an information system may touch many different processes. You can avoid considerable confusion by differentiating between these two concepts. Finally, *information* is a meaningful insight that helps employees do their jobs. But we're getting ahead of the story. In Chapter 2, we will formalize these definitions, explore them in detail, and investigate their relationships. Use these informal definitions as placeholders just to get started.

### Creating, Monitoring, and Adapting

The next element in our definition of MIS is creating, monitoring, and adapting processes, information systems, and information, as shown in Figure 1-5.

Consider CBI's process for acquiring new customers. That process did not just pop up like a mushroom after a hard rain; it was constructed by someone to meet CBI's needs. Over time, requirements for that process will change; perhaps CBI will introduce a discount for first-time customers. CBI needs to monitor its processes to detect when a new customer places an order. When it does, the process will need to be adapted to meet the new requirements.

Similar statements apply to information systems. Information systems need to be created; computers, programs, databases, and other elements need to be constructed in such a way that they meet the requirements of the business processes that they serve. Like processes, they need to be monitored to ensure that they continue to meet their requirements, and they need to be adapted when they do not.

The same comments pertain to information. For example, managers at CBI have a set of reports that show bike sales. Over time, monitoring of manager decisions about sales may indicate that new information is needed to help managers improve those decisions. If so, the information system will need to be adapted to help managers find more meaningful insights.

At this point, you might be saying, "Wait a minute. I'm a finance (or accounting or management) major, not an information systems major. I don't need to know how to build or adapt

| Processes | IS | Information |
|---|---|---|
| • Create | • Create | • Create |
| • Monitor | • Monitor | • Monitor |
| • Adapt | • Adapt | • Adapt |

→ **Achieve Strategies**

**FIGURE 1-5**
Scope of MIS

processes or information systems." If you are saying that, you are like a lamb headed for shearing. Like Jennifer, throughout your career, in whatever field you choose, you will work with processes, information systems, and information. To ensure these elements meet your needs, you need to take an *active role* in their management. Even if you are not a business analyst, a programmer, a database designer, or some other IS professional, you must take an active role in specifying process, system, and information requirements and in helping manage developmental projects to create or adapt them. Without active involvement on your part, it will only be good luck that causes processes, information systems, or information to meet your needs.

In addition to development tasks, you will also have important roles to play in the *use* of MIS. Of course, you will need to learn how to follow processes and employ information systems to accomplish your goals. But you will also have important ancillary functions as well. For example, when using an information system, you will have responsibilities for protecting the security of the system and its data. You may also have tasks for backing up data. When the system fails (most do, at some point), you will have tasks to perform while the system is down as well as tasks to accomplish to help recover the system correctly and quickly.

### Achieve Strategies

The last part of the definition of MIS is that MIS exists to help organizations achieve their *strategies.* First, realize that this statement hides an important fact: Businesses themselves do not "do" anything. A business is not alive, and it cannot act. It is the people within a business who sell, buy, design, produce, finance, market, account, and manage. So, MIS exists to help people who work in a business achieve the strategies of that business.

At times, it can be difficult for organizations to stay focused on business strategy because information technology is seductive: "Our competitor is using Twitter to announce products; we better do the same." Because of the rapid pace of technology development, it can be tempting to construct information systems just to be "modern," so that the company can claim to be "world-class," or for some other reason. Constructing systems for such reasons is unwise and wasteful of both time and money. Processes, information systems, and information need to be created for the purpose of achieving the organization's strategy. Period. They are not created because the IS department thinks they need to be created or because the company is "falling behind the technology curve."

This point may seem so obvious that you wonder why we mention it. Every day, however, some business somewhere is developing an information system for the wrong reasons. Right now, somewhere in the world, a company is deciding to create a social networking site for the sole reason that "every other business has one." This company is not asking questions such as:

- "What is the purpose of our Facebook page?"
- "What is it going to do for us?"
- "What is our policy for employees' contributions to the page?"
- "What should we do about critical customer reviews?"
- "Are the costs of maintaining the page sufficiently offset by the benefits?"

Even more serious, somewhere right now an IS manager has been convinced by some vendor's sales team or by an article in a business magazine that his or her company must upgrade to the latest, greatest high-tech gizmo. This IS manager is attempting to convince his or her manager that this expensive upgrade is a good idea. We hope that someone somewhere in the company is asking questions like "What strategic goal or objective will be served by the investment in the gizmo?"

As a future business professional, you need to learn to look at information systems and technologies only through the lens of *business need*. Learn to ask, "All of this technology may be great, in and of itself, but what will it do for us? What will it do for our business and our particular strategy?"

Because strategy is so important to MIS, we will discuss the relationship between MIS and strategy in the next question and then, in the balance of this chapter, explore the relationship of MIS to value chains and related concepts.

## Q1-3 How Does MIS Relate to Organizational Strategy?

According to the definition of MIS, information systems exist to help organizations achieve their strategies. As you will learn in your business strategy class, an organization's goals and objectives are determined by its *competitive strategy*. Thus, ultimately, competitive strategy

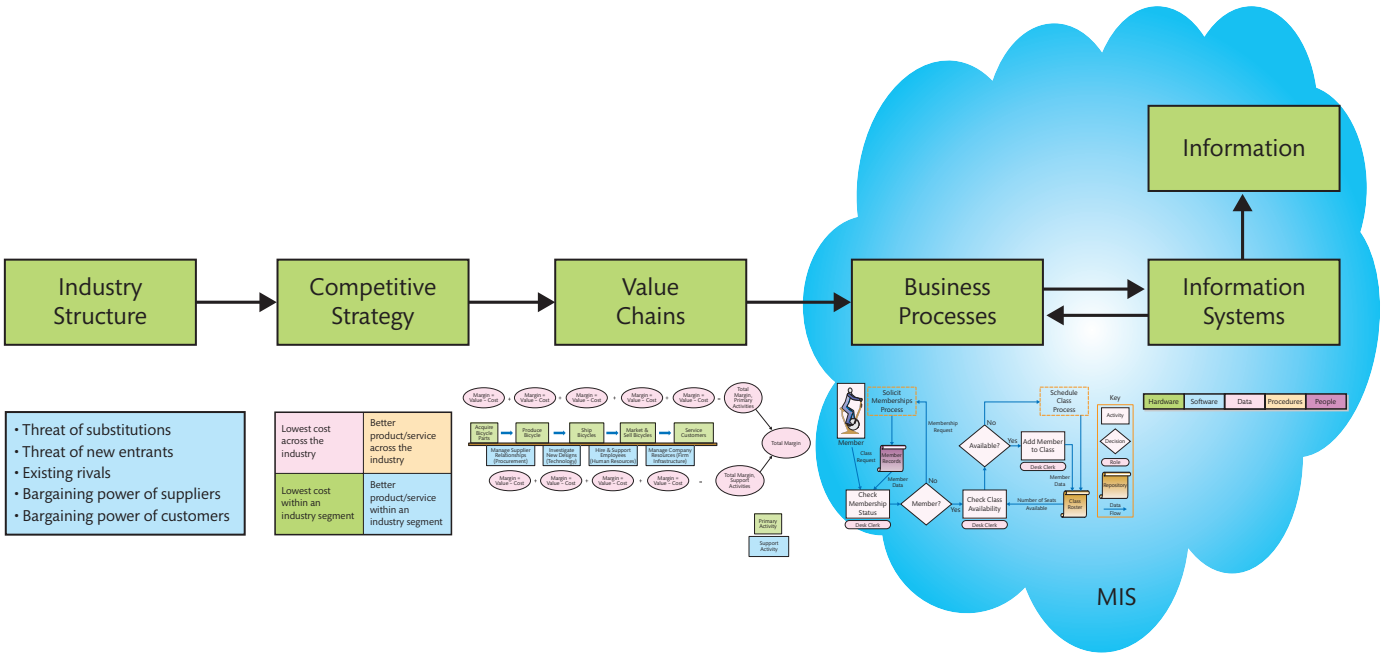



**FIGURE 1-6**
Organizational Strategy Determines MIS

determines the structure, features, and functions of every information system. Business processes can also influence the design of information systems. However, as you will learn in Chapter 2, the relationship between business processes and information systems is complex; in some cases, the information system's capabilities will be constrained. If so, the information system's features and functions may determine the structure of business processes as well. Finally, as shown in Figure 1-6, information systems produce information.

Michael Porter, one of the key researchers and thinkers in competitive analysis, developed three different models that can help you understand the elements in Figure 1-6. To understand this figure, we begin with Porter's five forces model.

## Q1-4 What Five Forces Determine Industry Structure?

Organizational strategy begins with an assessment of the fundamental characteristics and structure of an industry. One model used to assess an industry structure is Porter's **five forces model**,[6] summarized in Figure 1-7. According to this model, five competitive forces determine industry profitability: threat of substitutes, threat of new entrants, existing rivals, bargaining power of suppliers, and bargaining power of customers. The intensity of each of the five forces determines the characteristics of the industry, how profitable it is, and how sustainable that profitability will be. Industries vary in profitability and business leaders must understand the forces that drive profitability.

| Force | Example of Strong Force | Example of Weak Force |
|---|---|---|
| **Threat of substitutions** | Toyota's purchase of auto paint | Your power over the procedures and policies of your university |
| **Threat of new entrants** | Frequent traveler's choice of auto rental | Patients using the only drug effective for their type of cancer |
| **Existing rivals** | Students purchasing gasoline | Grain farmers in a surplus year |
| **Bargaining power of suppliers** | Corner latté stand | Professional football team |
| **Bargaining power of customers** | Used car dealers | Internal Revenue Service |

**FIGURE 1-7**
Examples of Five Forces

**FIGURE 1-8**
Five Forces at Walmart

| Force | Examples | Strength of Force |
|---|---|---|
| **Threat of substitutes** | e-commerce | Strong |
| **Threat of new entrants** | Regional chains that grow | Strong |
| **Existing rivals** | Target, Kmart, Sears | Medium |
| **Bargaining power of suppliers** | Procter & Gamble, Microsoft | Weak |
| **Bargaining power of customers** | You and I | Weak |

To understand this model, consider the strong and weak examples for each of the forces in Figure 1-7. A good check on your understanding is to see if you can think of different examples for each category. Also, take a particular industry—say, auto repair—and consider how these five forces determine the competitive landscape of that industry.

Figure 1-8 illustrates how the five forces model can be applied to the retail industry and to Walmart in particular. A **substitute** performs the same or similar function as an industry's product by another means. Examples include email as a substitute for post office mail, ebooks as substitutes for traditional books, Uber for a taxi, or Airbnb for a hotel room. Substitutes can also be doing without, buying used, or doing it yourself. The threat of a substitute is stronger if the substitute's price is lower, if the benefits of the substitute are similar, and if it is easy for the buyer to switch products. For example, Walmart views e-commerce and used products as substitution threats. Walmart judges the threat from e-commerce to be high because switching costs are low and prices can be low.

The threat from new entrants is based on industry barriers to entry and the reaction new entrants can expect from established companies in the industry. **Barriers to entry** are factors that make it difficult for a new business to begin operating in an industry. Examples include high customer switching costs, large financial investments to get started, sales and distribution channels that are not accessible to new entrants, and government policies. Walmart views existing regional retailers that grow to become national retailers as a high new entrant threat because they face few barriers to entry.

The competition from industry rivals, also called copycats, is high when rivals compete with each other using price discounting, new products, and service improvements. Competition from rivals is particularly high when competitors are numerous, when industry growth is slow, and when exit barriers are high. Walmart considers Target, Kmart, and Sears to be rivals and the rivalry force medium.

The last two forces concern bargaining power forces from suppliers or from customers. The strength of these forces depends on the number of available suppliers and buyers, switching costs, the differentiation of the product, and the relative size of the firm (here Walmart) compared to the size of suppliers or customers. Walmart's suppliers include Procter & Gamble, Microsoft, and thousands of smaller players. Because there are many suppliers for Walmart to choose from, low switching costs for Walmart to switch from one to another, limited product differentiation by the suppliers, and the tremendous relative size advantage for Walmart, the bargaining power of suppliers is weak. People like you and me are Walmart's buyers, and because you have many suppliers and low switching costs and Walmart's products are not differentiated from other suppliers' products, you have some buyer power. However, that power is completely overcome by Walmart's size advantage. As a result, Walmart sees the bargaining power of its buyers as weak.

To summarize, Walmart concludes that its competitive strategy, and the IS that supports that strategy, should address e-commerce, regional threats, and industry rivals. An IS that addresses weak forces and attempts to lock in customers or prevent buyers from switching, while useful, will not be strategically aligned.

## Q1-5 What Is Competitive Strategy?

An organization responds to the structure of its industry by choosing a **competitive strategy**. Porter followed his five forces model with the model of four competitive strategies shown in Figure 1-9.[7] According to Porter, a firm can engage in one of four fundamental competitive

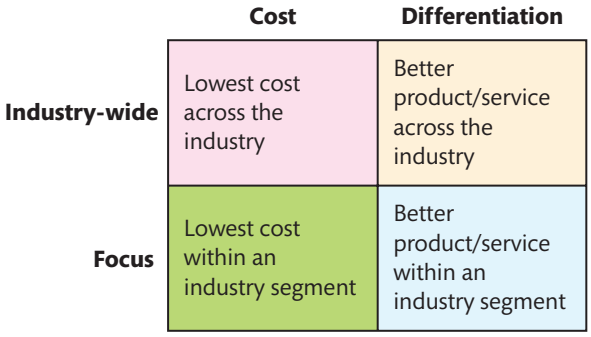



**FIGURE 1-9**
Porter's Four Competitive Strategies

strategies. An organization can be the cost leader and provide products at the lowest prices in the industry, or it can focus on adding value to its products to differentiate them from those of the competition. Further, the organization can employ the cost or differentiation strategy across an industry, or it can focus its strategy on a particular industry segment.

The key is for companies to commit to one of the four competitive strategies. It is always wrong to try to do more than one competitive strategy at a time. Too often a company will state a strategy of low cost leadership *and* a differentiation on customer service. The result is typically accomplishing neither, as these goals are often at odds and pursuing both sends mixed messages within the firm about which is most important. A second principle of strategy is that a competitive strategy must be distinctive and maintainable. If competitors are pursuing a similar strategy and do it better, the impact of this strategy on your company may be fatal.

Consider the car rental industry, for example. According to the first column of Figure 1-9, a car rental company can strive to provide the lowest-cost car rentals across the industry, or it can seek to provide the lowest-cost car rentals to a "focused" industry segment—say, U.S. domestic business travelers.

As shown in the second column, a car rental company can instead seek to differentiate its products from the competition. It can do so in various ways—for example, by providing a wide range of high-quality cars, by providing the best reservation system, by having the cleanest cars or the fastest check-in, or by some other means. The company can strive to provide product differentiation across the industry or within particular segments of the industry, such as U.S. domestic business travelers.

According to Porter, to be effective, the organization's goals, objectives, culture, and activities must be consistent with the organization's strategy. To those in the MIS field, this means that all processes, information systems, and information must be constructed to facilitate the organization's competitive strategy.

Consider the competitive strategy at Walmart. Walmart has chosen a low-cost strategy industry-wide. Walmart seeks to fight off threats from e-commerce, regional chains, and industry rivals by having the lowest cost structure in the industry. Keep in mind that cost is not price. Cost is what it takes to produce a product or service, while price is what people are willing to pay for it. You might also be thinking that cost leadership does not sound distinctive—couldn't several firms have this same strategy? Porter tells us that only one company in an industry can actually be the leader. If you attempt this strategy and your costs are actually higher than another firm, this may be your last strategy.

## Q1-6 How Does Competitive Strategy Determine Value Chain Structure?

Organizations analyze the structure of their industry, and using that analysis, they formulate a competitive strategy. They then need to organize and structure the organization to implement that strategy. If, for example, the competitive strategy is to be the *cost leader*, then business activities should be developed to provide essential functions at the lowest possible cost.

A business that selects a *differentiation* strategy would not necessarily structure itself around least-cost activities. Instead, such a business might choose to develop more costly processes, but it would do so only if those processes provided benefits that outweighed their risks.

**FIGURE 1-10**
Primary Activities in the Value Chain

| Primary Activity | Description |
|---|---|
| Inbound logistics | Receiving, storing, and disseminating inputs to products |
| Operations/manufacturing | Transforming inputs into final products |
| Outbound logistics | Collecting, storing, and physically distributing products to buyers |
| Sales and marketing | Inducing buyers to purchase products and providing a means for them to do so |
| Customer service | Assisting customers' use of products and thus maintaining and enhancing the products' value |

Porter defined **value** as the amount of money that a customer is willing to pay for a resource, product, or service. The difference between the value that an activity generates and the cost of the activity is called the **margin**. A business with a differentiation strategy will add cost to an activity only as long as the activity has a positive margin.

A **value chain** is a network of value-creating activities. According to Porter, that generic chain consists of five primary activities and four support activities.

## Primary Activities in the Value Chain

Figure 1-10 summarizes the primary activities of the value chain. **Primary activities** drive competitive advantage. Raw materials are obtained using inbound logistics activity, products and goods are produced in operations/manufacturing activity, and those products and goods are shipped to customers using outbound logistics activity. Additionally, organizations have sales and marketing as well as customer service activities.

To understand the essence of these activities, consider the bicycle wholesaler CBI (see Figure 1-11). First, CBI acquires bicycle parts (inbound logistics). This activity concerns the

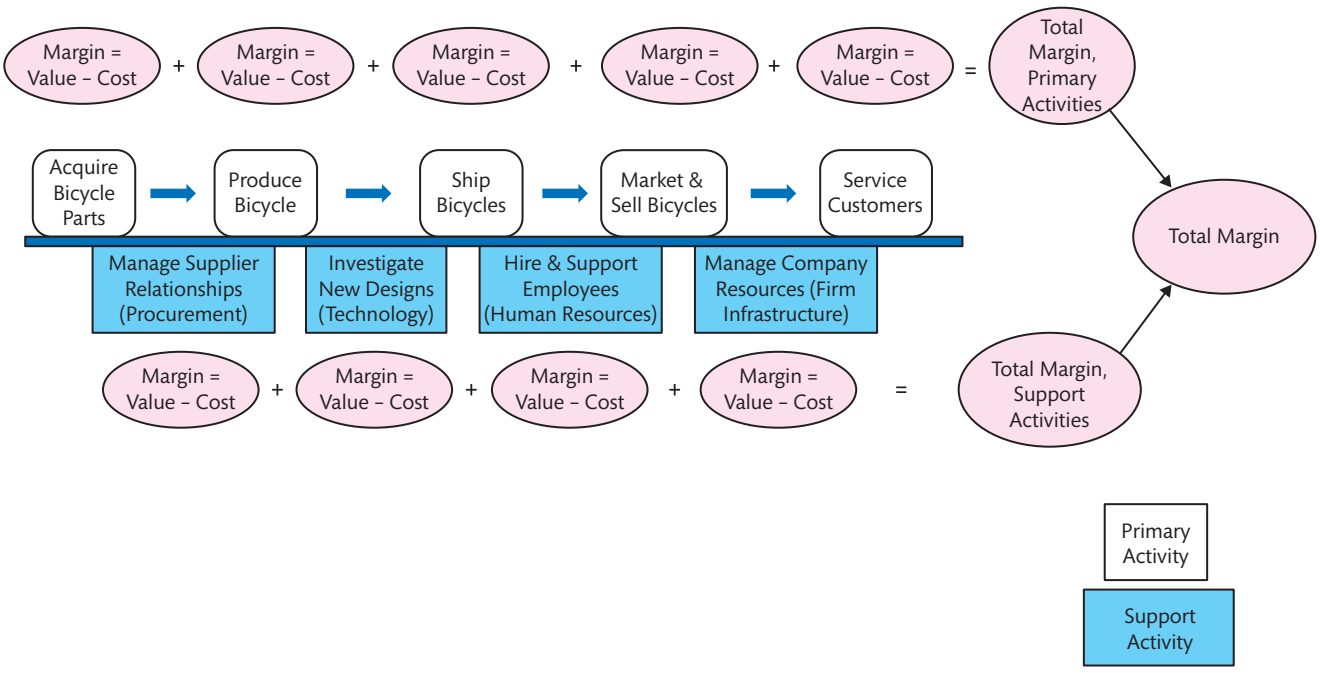



**FIGURE 1-11**
Bicycle Company's Value Chain

# MIS InClass

## Work Skills Exercise

In this chapter, we have asked you to think about work skills that are in demand in business today. For example, one might be good collaboration, another the ability to use software effectively. If you can do these skills well, you will have a better chance at finding and keeping a great job.

**Step 1:** In collaboration with teammates, write down six skills that you think are most in demand in business today. Each team member writes down the same list.

**Step 2:** In discussion with teammates, identify and circle four of these skills that your team believes are most often lacking in students.

**Step 3:** Evaluate yourself: On which of these four are you capable, and on which of these are you weakest?

**Step 4:** In discussion with teammates, decide which of these four are taught well by other classes at your school and which are not.

**Step 5:** Based on what you know about this class, which of the four skills can you practice in this class? How will you know that you are better at them?

*Source:* monticello/Shutterstock; Eric Isselée/Shutterstock; Denis Pepin/Shutterstock; gresei/Shutterstock.

receiving and handling of raw materials and other inputs. The accumulation of those materials adds value in the sense that even a pile of unassembled parts is worth something to some customer. A collection of the parts needed to build a bicycle is worth more than an empty space on a shelf. The value is not only the parts themselves, but also the time required to contact vendors for those parts, to maintain business relationships with those vendors, to order the parts, to receive the shipment, and so forth.

In the operations activity labeled Produce Bicycle, the bicycle maker transforms raw materials into a finished bicycle, a process that adds more value. Next, the company ships bicycles (outbound logistics) to customers. Of course, there is no customer to send the bicycle to without the marketing and sales activity. Finally, the customer service activity provides support to the bicycle users.

Each stage of this generic chain accumulates costs and adds value to the product. The net result is the total margin of the chain, which is the difference between the total value added and the total costs incurred.

## Support Activities in the Value Chain

The **support activities** in the generic value chain contribute or facilitate the primary value chain activities. They include procurement, technology, human resources, and firm infrastructure.

Porter defined *procurement* as the processes of finding vendors, setting up contractual arrangements, and negotiating prices. He defined *technology* broadly. It includes research and development, but it also includes other activities within the firm for developing new techniques, methods, and procedures. He defined *human resources* as recruiting, compensation, evaluation, and training of full- and part-time employees. Finally, *firm infrastructure* includes general management, finance, accounting, legal, and government affairs.

Supporting functions add value, albeit indirectly, and they also have costs. Hence, as shown in Figure 1-11, supporting activities contribute to a margin. In the case of supporting activities, it would be difficult to calculate the margin because the specific value added of, say, the manufacturer's lobbyists in Washington, D.C., is difficult to know. But there is a value added, there are costs, and there is a margin, even if it is only in concept.

### Value Chain Linkages

Porter's model of business activities includes **linkages**, which are interactions across value activities. For example, manufacturing systems use linkages to reduce inventory costs. Such a system uses sales forecasts to plan production; it then uses the production plan to determine raw material needs and then uses the material needs to schedule purchases. The end result is just-in-time inventory, which reduces inventory sizes and costs.

By describing value chains and their linkages, Porter started a movement to create integrated, cross-departmental business systems. Over time, Porter's work led to the creation of a new discipline called business process design. The central idea is that organizations should not automate or improve existing functional systems. Rather, they should create new, more efficient business processes that integrate the activities of all departments involved in a value chain. We will revisit this idea of activity integration throughout this book when we examine process improvement.

## Q1-7 How Does Competitive Strategy Determine Business Processes and Information Systems?

Figure 1-12 shows a business process for renting bicycles. The value-generating activities are shown in the top of the table, and the implementation of those activities for two companies with different competitive strategies is shown in the rows that follow.

The first company has chosen a competitive strategy of low-cost rentals to students. Accordingly, this business implements business processes to minimize costs. The second company has chosen a differentiation strategy. It provides "best-of-breed" rentals to executives at a high-end conference resort. Notice that this business has designed its business processes to ensure superb service. To achieve a positive margin, it must ensure that the value added will exceed the costs of providing the service.

Now, consider the information systems required for these business processes. The processes used by the student rental business require minimal information systems support. The only computer/-software/data component in its business is the machine provided by its bank for processing credit card transactions.

| | | | | | |
|---|---|---|---|---|---|
| **Low Cost Rentals to Students** | Message implementing competitive strategy | "You wanna bike?" | "Bikes are over there help yourself" | "Fill out this form, bring it to me when you're done" | "Show me the bike. You owe $23.50" |
| | Supporting Business Process | None. | Physical Controls to prevent theft | Printed forms in shoebox | Shoebox with receipts |

| Value Chain Activity | Greet Customer | Determine Needs | Rent Bike | Return Bike & Pay |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Hi Service Rentals to Executives** | Message implementing competitive strategy | "Hello, wonderful to see you again Mrs Henry, would you like the Trek you used last time?" | "I think the newer Trek would be a better choice this time." | "I'll scan the bar code on the bike and adjust the seat for you." | "How was your ride, would you like a beverage. Can I put this bill on your room or would you like to pay now?" |
| | Supporting Business Process | Customer tracking and past sales system | Employee training and IS to match customer and bike | Automated inventory system | Automated inventory system, payment process integrated with resort |

**FIGURE 1-12**
Operations Value Chain and Business Processes for Bicycle Rental Companies

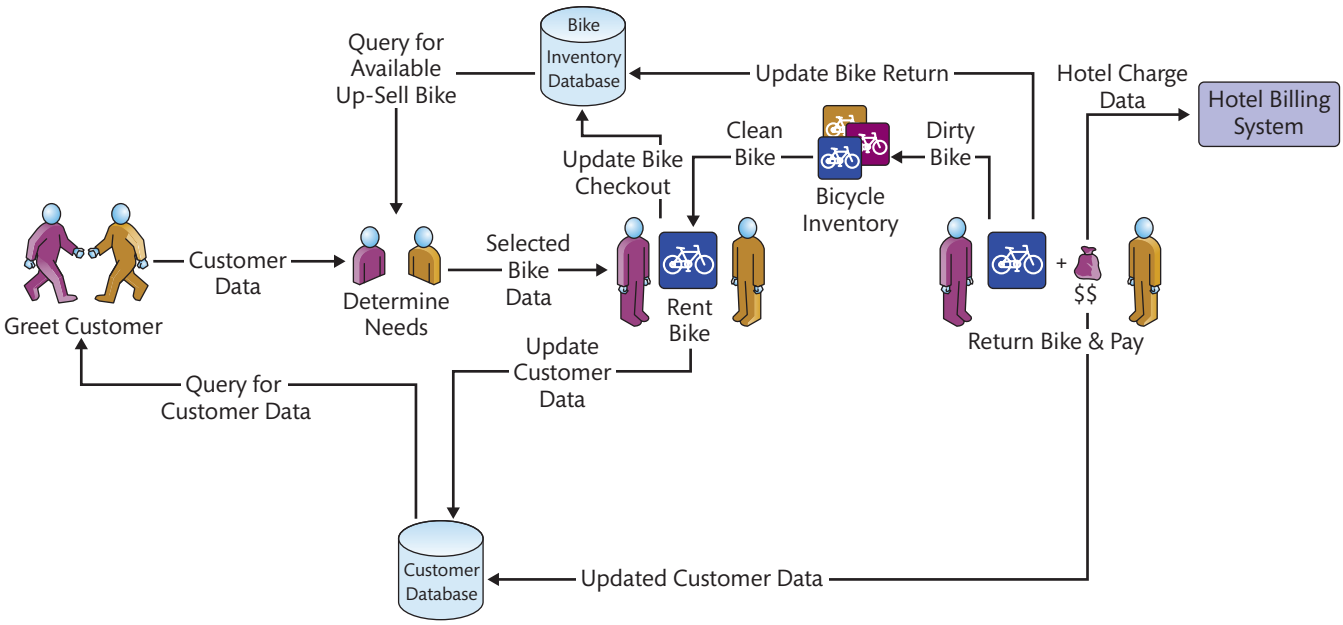



**FIGURE 1-13**

**Business Process and Information Systems for High-Service Bike Rental**

The high-service business uses processes that require more sophisticated information systems, as shown in Figure 1-13. It has a sales tracking database that tracks past customer rental activity and an inventory database that is used to select and up-sell bicycle rentals as well as control bicycle inventory with a minimum of fuss to its high-end customers.

To see how competitive strategy affects processes and information at a large firm, once again consider Walmart. Instead of the four simple value chain activities as shown in the top of Figure 1-12, Walmart would have hundreds of activities and hundreds of business processes. To be the low-cost leader in the industry, Walmart uses very sophisticated IS to link its activities and processes together to reduce cost and create value.

So the bottom line is this: Organizations analyze their industry and choose a competitive strategy. Given that strategy, they examine their value chain and design business processes that span value-generating activities. Those processes determine the scope and requirements of each organization's information systems. This textbook's main focus is to help you better understand business processes and the information systems that support them. In our next chapter, we examine processes and information systems in more depth and introduce the topic of information, the final element of Figure 1-6.

In general, IS can influence strategy by offering new opportunities to address the five forces. For example, IS can reduce the threat of new competitors or change bargaining power by raising switching costs for suppliers or customers. In addition to affecting the five forces, IS influences strategy when it offers new opportunities for differentiation. For example, a supplier can differentiate itself using IS to become a leader in customer responsiveness or to become the leader in ecological stewardship. Finally, IS can influence strategy when an organization uses IS to pursue a low-cost competitive strategy.

In this chapter, and in most of this textbook, we contend that IS should support strategy. However, in some cases, IS can also shape or influence strategy. For example, a firm may want to offer a new product or service that is highly dependent on an IS. A car manufacturer may decide to offer a self-driving vehicle, a university a new online curriculum, or a financial institution a new way to apply for a loan via a new technology. In these cases, new advancements in IT are influencing strategy. Without the IS, the strategy would be impossible.

Before closing, we must also point out that strategy continually evolves. Every organization periodically must assess its strategy and decide if it needs to be altered. Strategic planning should always ask what is next, which markets and products should we exit, and how is our industry changing.

# Ethics Guide

## Ethics and Professional Responsibility

Suppose you're a young marketing professional who has just taken a new promotional campaign to market. The executive committee asks you to present a summary of the sales effect of the campaign, and you produce the graph shown in Figure 1-14. As shown, your campaign was just in the nick of time; sales were starting to fall the moment your campaign kicked in. After that, sales boomed.

But note the vertical axis has no quantitative labels. If you add quantities, as shown in Figure 1-15, the performance is less impressive. It appears that the substantial growth amounts to less than 20 units. Still, the curve of the graph is impressive, and if no one does the arithmetic, your campaign will appear successful.

This impressive shape is only possible, however, because Figure 1-15 is not drawn to scale. If you draw it to scale, as shown in Figure 1-16, your campaign's success is, well, problematic, at least for you.

Which of these graphs do you present to the committee?

Each chapter of this text includes an Ethics Guide that explores ethical and responsible behavior in a variety of MIS-related contexts. In this chapter, we'll examine the ethics of data and information.

Centuries of philosophical thought have addressed the question "What is right behavior?" and we can't begin to discuss all of it here. You will learn much of it, however, in your business ethics class. For our purposes, we'll use two of the major pillars in the philosophy of ethics. We introduce the first one here and the second in Chapter 2.

The German philosopher Immanuel Kant defined the **categorical imperative** as the principle that one should behave only in a way that one would want the behavior to be a universal law. Stealing is not such a behavior because if everyone steals, nothing can be owned.

When you ask whether a behavior is consistent with this principle, a good litmus test is "Are you willing to publish your behavior to the world? If not, your behavior is not ethical, at least not in the sense of Kant's categorical imperative.

We will apply these principles in the chapters that follow. For now, use them to assess your beliefs about Figures 1-14 to 1-16 by answering the following questions.

*Source:* Dotshock/123RF

**FIGURE 1-14**

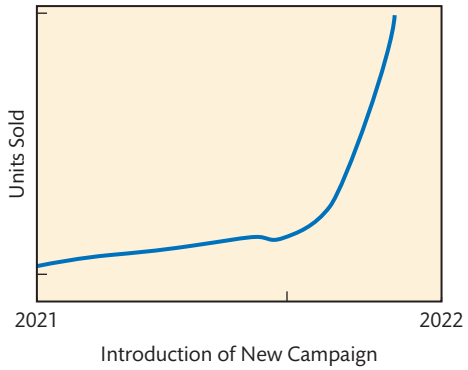



**FIGURE 1-15**

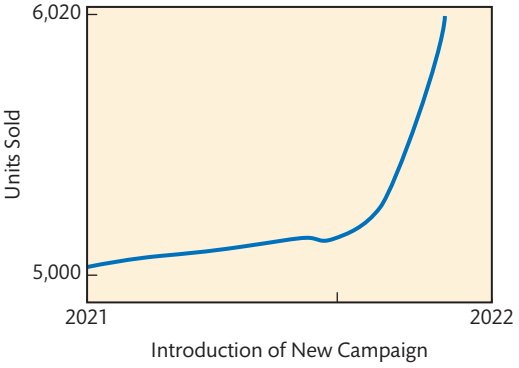
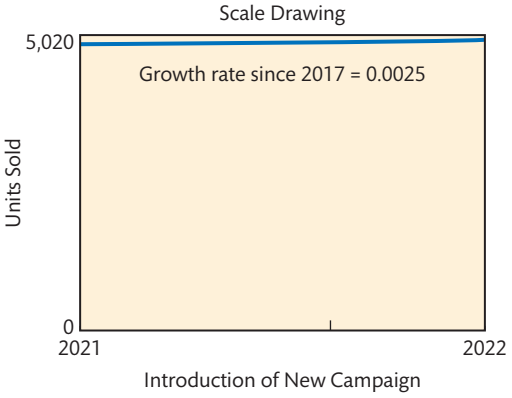



**FIGURE 1-16**




### DISCUSSION QUESTIONS

1. Restate Kant's categorical imperative using your own words. Explain why cheating on exams is not consistent with the categorical imperative.
2. While there is some difference of opinion, most scholars believe that the Golden Rule ("Do unto others as you would have them do unto you.") is not as limiting to behavior as Kant's categorical imperative. Justify this belief.
3. Change roles. Assume now you are a member of the executive committee. A junior marketing professional presents Figure 1-14 to the committee and you object to the lack of labels and the scale. In response, the junior marketing professional says, "Sorry, I didn't know. I just put the data into Excel and copied the resulting graph." What conclusions do you, as an executive, make about the junior marketing professional in response to this statement?
4. As the junior marketing professional, which graph do you present to the committee?
5. According to Kant, lying is not consistent with the categorical imperative. Suppose you are invited to a seasonal BBQ at the department chair's house. You are served a steak that is tough, over-cooked, and so barely edible that you secretly feed it to the department chair's dog (who appears to enjoy it). The chairperson asks you, "How is your steak?" and you respond, "Excellent, thank you."
   a. Is your behavior consistent with Kant's categorical imperative?
   b. The steak seemed to be excellent to the dog. Does that fact change your answer to a?
   c. What conclusions do you draw from this example?

# ACTIVE REVIEW

Use this Active Review to verify that you understand the material in the chapter. You can read the entire chapter and then perform the tasks in this review, or you can read the text material for just one question and perform the tasks in this review for that question before moving on to the next one.

## Q1-1 Why is Introduction to MIS the most important class in the business school?

Define *Moore's Law* and explain why its consequences are important to business professionals today. Explain the trends in IT being driven by Moore's Law. Describe the key aspects of the Information Age. Give the text's definition of *job security*, and use Reich's enumeration of four key skills to explain how this course will help you attain that security. Summarize IS-related job opportunities.

## Q1-2 What is MIS?

Define *MIS*. Describe, in the intuitive manner used in this chapter, the meaning of processes, information systems, and information. Explain the meaning of creating, monitoring, and adapting, and summarize the reasons why this text claims it is important to all businesspeople, not just MIS professionals. Explain the confusion in the statement "organizations achieve their strategies." Summarize why it can be difficult for organizations to focus their MIS on organizational strategy.

## Q1-3 How does MIS relate to organizational strategy?

Summarize the reasons that the Porter models are relevant to MIS. Diagram and explain the relationship among industry structure, competitive strategy, value chains, business processes, information systems, and information.

## Q1-4 What five forces determine industry structure?

Name and briefly describe the five forces. Give your own examples of both strong and weak forces of each type, similar to Figure 1-7. Define *substitute, barrier to entry,* and *switching cost*. Explain how they are used by the five forces.

## Q1-5 What is competitive strategy?

Describe four different competitive strategies, as defined by Porter. Give an example of four different companies that have implemented each of the strategies.

## Q1-6 How does competitive strategy determine value chain structure?

Define the terms *value, margin*, and *value chain*. Explain why organizations that choose a differentiation strategy can use value to determine a limit on the amount of extra cost to pay for differentiation. Name the primary and support activities in the value chain and explain the purpose of each. Explain the concept of linkages.

## Q1-7 How does competitive strategy determine business processes and information systems?

Describe the relationship between a value chain and a business process. Explain how business processes relate to competitive strategy. Explain how information systems relate to competitive strategy. Justify the comments in the two rows labeled "Supporting business process" in Figure 1-12.

# KEY TERMS AND CONCEPTS

Abstract reasoning 6
Barriers to entry 12
Categorical imperative 18
Competitive strategy 12
Experimentation 7
Five forces model 11
Information Age 5
Linkages 16
Management information systems (MIS) 9
Margin 14
Moore's Law 4
Primary activities 14
Substitute 12
Support activities 15
Systems thinking 7
Value 14
Value chain 14

## USING YOUR KNOWLEDGE

**1-1.** MyLab MIS One of life's greatest gifts is to be employed doing work that you love. Reflect for a moment on a job that you would find so exciting that you could hardly wait to get to sleep on Sunday night so that you could wake up and go to work on Monday.

a. Describe that job. Name the industry, the type of company or organization for whom you'd like to work, the products and services it produces, and your specific job duties.
b. Explain what it is about that job that you find so compelling.
c. In what ways will the skills of abstract reasoning, systems thinking, collaboration, and experimentation facilitate your success in that job?
d. Given your answers to parts a–c, define three to five personal goals for this class. None of these goals should include anything about your GPA. Be as specific as possible. Assume that you are going to evaluate yourself on these goals at the end of the quarter or semester. The more specific you make these goals, the easier it will be to perform the evaluation. Use Figure 1-3 for guidance.

**1-2.** MyLab MIS Suppose you decide to start a business that recruits students for summer jobs. You will match available students with available jobs. You need to learn what positions are available and what students are available for filling those positions. In starting your business, you know you will be competing with local newspapers, Craigslist (*www.craigslist.org*), and your college. You will probably have other local competitors as well.

a. Analyze the structure of this industry according to Porter's five forces model.
b. Given your analysis in part a, recommend a competitive strategy.
c. Describe the primary value chain activities as they apply to this business.
d. Describe a business process for recruiting students.
e. Describe information systems that could be used to support the business process in part d.
f. Explain how the process you described in part d and the system you described in part e reflect your competitive strategy.

**1-3.** MyLab MIS Consider the two different bike rental companies in Figure 1-12. Think about the bikes they rent. Clearly, the student bikes will be just about anything that can be ridden out of the shop. The bikes for the business executives, however, must be new, shiny, clean, and in tip-top shape.

a. Compare and contrast the operations value chains of these two businesses as they pertain to the management of bicycles.
b. Describe a business process for maintaining bicycles for both businesses.
c. Describe a business process for acquiring bicycles for both businesses.
d. Describe a business process for disposing of bicycles for both businesses.
e. What roles do you see for information systems in your answers to the earlier questions? The information systems can be those you develop within your company, or they can be those developed by others, such as Craigslist.

**1-4.** Using LinkedIn or Monster.com, read about a job you are interested in pursuing after graduation. Specify:

a. What is the job title and description?
b. What skills are required?
c. What education level is required?
d. What is the entry-level pay range?
e. Using search on LinkedIn or Monster.com, find professionals who are working at the job you specified. Write down their career path, that is, the jobs they did prior to their current job, and the certifications if any that they achieved.

## COLLABORATION EXERCISE 1

Collaborate with a group of fellow students to answer the following questions. For this exercise, do not meet face to face. Your task will be easier if you coordinate your work with SharePoint, Office, Google Docs or equivalent collaboration tools. (See Chapter 11 for a discussion of collaboration tools and processes.) Your answers should reflect the thinking of the entire group, not just that of one or two individuals.

**1.** Abstract reasoning.

a. Define *abstract reasoning,* and explain why it is an important skill for business professionals.
b. Explain how a list of items in inventory and their quantity on hand is an abstraction of a physical inventory.
c. Give three other examples of abstractions commonly used in business.
d. Explain how Jennifer failed to demonstrate effective abstract reasoning skills.
e. Can people increase their abstract reasoning skills? If so, how? If not, why not?

**2.** Systems thinking.

a. Define *systems thinking,* and explain why it is an important skill for business professionals.
b. Explain how you would use systems thinking to explain why Moore's Law caused a farmer to dig up a field of pulpwood trees. Name each of the elements in the system, and explain their relationships to each other.
c. Give three other examples of the use of systems thinking with regard to consequences of Moore's Law.

d. Explain how Jennifer failed to demonstrate effective systems-thinking skills.
e. Can people improve their systems-thinking skills? If so, how? If not, why not?

**3.** Collaboration.
a. Define *collaboration,* and explain why it is an important skill for business professionals.
b. Explain how you are using collaboration to answer these questions. Describe what is working with regard to your group's process and what is not working.
c. Is the work product of your team better than the product any one of you could have produced separately? If not, your collaboration is ineffective. If that is the case, explain why.
d. Have each team member answer these two questions: Are you a good collaborator? How do you know if you are?
e. Explain how Jennifer failed to demonstrate effective collaboration skills.
f. Can people increase their collaboration skills? If so, how? If not, why not?

**4.** Experimentation.
a. Define *experimentation,* and explain why it is an important skill for business professionals.
b. Explain several creative ways you could use experimentation to answer this question.
c. How does the fear of failure influence your willingness to engage in any of the ideas you identified in part b?
d. Explain how Jennifer failed to demonstrate effective experimentation skills.
e. Can people increase their willingness to take risks? If so, how? If not, why not?
f. Do you think IS make experimentation easier or harder?

**5.** Job security.
a. State the text's definition of *job security*.
b. Evaluate the text's definition of job security. Is it effective? If you think not, offer a better definition of job security.
c. As a team, do you agree that improving your skills on the four dimensions in Collaboration Exercise 1 will increase your job security?
d. Do you think technical skills or soft, people skills, provide more job security? Why or why not? Do you think you would have answered this question differently in 2000? Why or why not?

**6.** Apply the models in Figure 1-6 to a company of your choosing. Specify the strength of each of the five forces, select a competitive strategy, identify value-adding activities, diagram a process, and describe the information system that will support your analysis.

**7.** Using Google, find out how to follow experts on Twitter. Discuss as a team one potential job area that some of you are interested in working in after graduation. Have one person on your team log into Twitter. Find an expert on Twitter in that job area. Record the Twitter handle and an interesting tweet from this account.

# CASE STUDY 1

## How Do You Like These Apples?

A quick glance at Apple's stock history in Figure 1-17 will tell you that Apple, Inc. has been an incredibly successful company, but there may be new dark clouds on its horizon. As you can see, its stock price took off in 2008 and peaked in 2020, increasing 2,000% over that time. Where it goes from there, however, is open to question. To assess what might be next, consider Apple's history.

At the dawn of the personal computer age, in the early 1980s, Apple pioneered well-engineered home computers and innovative interfaces with its Apple II PC for the home and its Macintosh computer for students and knowledge workers. At one point, Apple owned more than 20 percent of the PC market, competing against many other PC vendors, most of which are no longer in business. However, Apple lost its way. In 1985, Steve Jobs, Apple's chief innovator, lost a fight with the Apple board and was forced out. He founded another PC company, NeXT, which developed and sold a pioneering PC product that was too groundbreaking to sell well in that era.

During this period, Apple made numerous mistakes, among them not rewarding innovative engineering, creating too many products for too many market segments, and losing the respect of the retail computer stores. Apple's PC market share plummeted.

In 1996, Apple bought Jobs' NeXT Computing and gained technology that became the foundation of today's Mac operating system. The true asset it acquired, however, was Steve Jobs. Even he, however, couldn't create an overnight miracle. By 2011, Apple's PC market share was in the range of 10 to 12 percent.

In response to these problems, Apple broke away from its strategy of competing in the PC market and created new markets with its iPod, iPhone, and iPad. It also countered retailer problems by opening its own stores. In the process, it pioneered the sale of music and applications over the Internet. iPod, iPhone, and iPad devices have been a marvel of creativity and engineering. They exude not only ease of use, but also fun. By selling hot music for the iPod, Apple established a connection with a dynamic segment of the market that was willing to spend a lot of money on bright, shiny objects.

The iPhone has been called the single greatest piece of technology ever used by the public. It allowed Apple to seize 44 percent share of the mobile market by 2011. To encourage

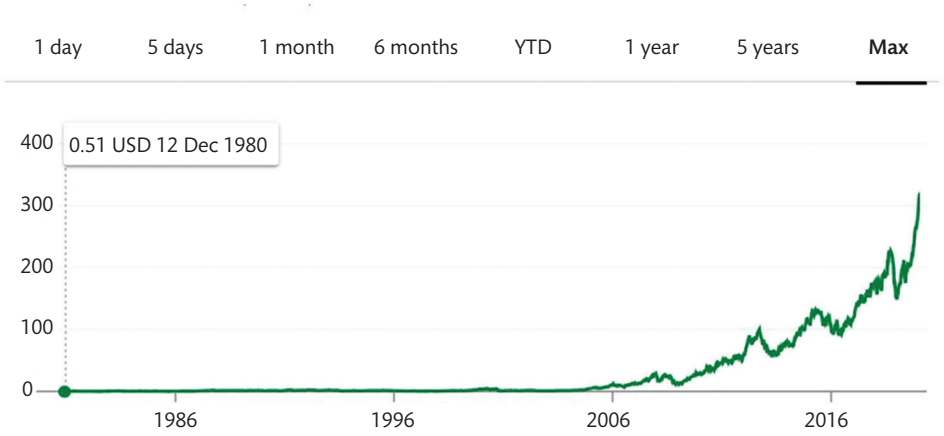



**FIGURE 1-17**
**Apple Stock Price**

the development of iPhone apps, Apple shares its revenue with application developers. That would be $2.5 billion paid to developers in the first 3 years!

The bottom line? Every sales success feeds every other sales success. Hot music fed the iPod. The iPod fed iTunes and created a growing customer base that was ripe for the iPhone. Sales of the iPhone fed the stores, whose success fed the developer community, which fed more applications, which fed the iPhone and set the stage for the iPad.

The year 2011 also brought the death of Steve Jobs, which at the time led many analysts to wonder if Apple's best days were behind it. History offers little solace to Apple fans; when Jobs left before, the company floundered. But with Tim Cook, the company continued to thrive. Sales of iPhones 8, 10, 11, the Apple Watch, and Siri have helped make Apple in 2018 the first firm to ever exceed a trillion dollars in market capitalization.

After selling over 2 billion devices, Apple's sales unsurprisingly have stagnated. In response, Apple is turning to video, news, cloud, and gaming subscriptions. The goal now is to become the world's premier digital services provider. This is a significant departure for a company that mastered the art of hardware supply chains and easy-to-use devices. With the move to services, Apple must engage established players such as Netflix, Amazon, and Disney.

Will Apple lose its luster? As history reveals, many people have underestimated Apple's resilience.

**Questions**

**1-5.** Historically, which of the four competitive strategies has Apple used for its devices?

**1-6.** In the current era of digital services, which of the four competitive strategies should Apple use?

**1-7.** Describe the five forces and label each force as Hi or Low for Apple's historical device industry.

**1-8.** Describe the five forces and label each force as Hi or Low for Apple's current digital services industry.

**1-9.** Based on your answers to 1-3 and 1-4, which of the five forces is most significant to Apple's success?

## CHAPTER RESOURCES

[1] These figures represent the cost of 100,000 transistors, which can roughly be translated into a unit of a computing device. For our purposes, the details don't matter. If you doubt any of this, just look at low-end smartphones for less than $250 and cell plans for less than $50 a month.

[2] Lynn A. Karoly and Constantijn W. A. Panis, *The 21st Century at Work* (Santa Monica, CA: RAND Corporation, 2004), p. xiv.

[3] Robert B. Reich, *The Work of Nations* (New York: Alfred A. Knopf, 1991), p. 229.

[4] Daron Acemoglu and David Autor, "Skills, Tasks, and Technologies: Implications for Employment and Earnings" (working paper), National Bureau of Economic Research June 2010, www.nber.org/papers/w16082

[5] For another perspective on the importance of these skills, read www.nytimes.com/2011/07/13/opinion/13friedman.html?_r=1.

[6] Michael Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (New York: Free Press, 1980).

[7] Michael Porter, *Competitive Strategy* (New York: Free Press, 1980).

## MyLab MIS

Go to **MyLab MIS.com** for Auto-graded writing questions as well as the following Assisted-graded writing questions:

**1-10.** In the chapter we quote a business executive who said the only job security is a marketable skill and the courage to use it. We then outlined the four marketable skills on page 6. For each of the four marketable skills, rate yourself on a 5 point scale with 5 being the highest, then explain why you believe that is an accurate assessment.

**1-11.** The U.S. Department of Labor publishes descriptions of jobs, educational requirements, and the outlook for many jobs and professions. Go to its site at *www.bls.gov*. Search for the job title *systems analyst*. Describe the job and its growth projection. Use a search engine and find articles that describe the job of the systems analyst. Which aspects of this job are most attractive to you, and which aspects are least attractive to you?

Chapter 2

# Business Processes, Information Systems, and Information

The sales conference room at CBI is always a stuffy, joyless cell. Today, the sales team is particularly gloomy as they consider a rash of canceled sales. They like to call themselves a sales team, but it is just Elwood, Sally, Emma, and Jake, the intern.

"This isn't good," said Elwood Green as he stood and kicked off the meeting.

"That's an understatement," said Sally Heppard glumly.

"Did all these sales cancellations happen just today?"

Sally replied, "Four this morning, three yesterday and there were some on Monday too."

Elwood, pulling on his chin a moment, was baffled. "We've been selling to these customers for years, why now, what is different?"

Sally offered, "One of the customers called us and said they cancelled their purchase because our payment site told her, 'Incorrect billing address.'"

Turning to Jake the intern, Elwood asked, "Jake when did the IT folks start updating our customer database?"

Jake replied, "They started about a month ago. They did the first 500 a couple of weeks ago and they gave me the last 30 customer address changes, which I did at the end of last week. Didn't get any errors."

Sally mused, "I wonder why only these customers were rejected? We've made hundreds of sales since the database was updated. Did the system change the credit settings for some customers? Maybe the new system has requirements the customers don't comply with."

Elwood responded, "But if the new system changed those settings, wouldn't we get more rejections?"

"That's true. I'm just fishing."

Elwood asked Jake, "Do you recognize any of these names of customers with canceled orders? I know it's been a few days, but can you look them over?"

Jake began to read. While every name didn't ring a bell, enough did to make him die a little inside.

"I don't recognize all of them, but I do recognize some of those, like Zingerman's Sandwich and Bikes, that's hard to forget."

"Jake, can you show me how they changed the addresses of the customers?"

"Sure, they entered a code on the first screen that takes them to the Change Address screen, it's easy actually or I thought it was easy."

"Let's go look at that, maybe that's the issue."

Sally was curious, "What could go wrong Elwood, an address change is an address change, right?"

"I wonder if they mixed up billing addresses and shipping addresses. Each customer record has at least one of each. If they input the shipping address for the billing address, the system may get confused when the customer orders—it will look like the customer is using an unapproved address and deny the sale. That might explain it."