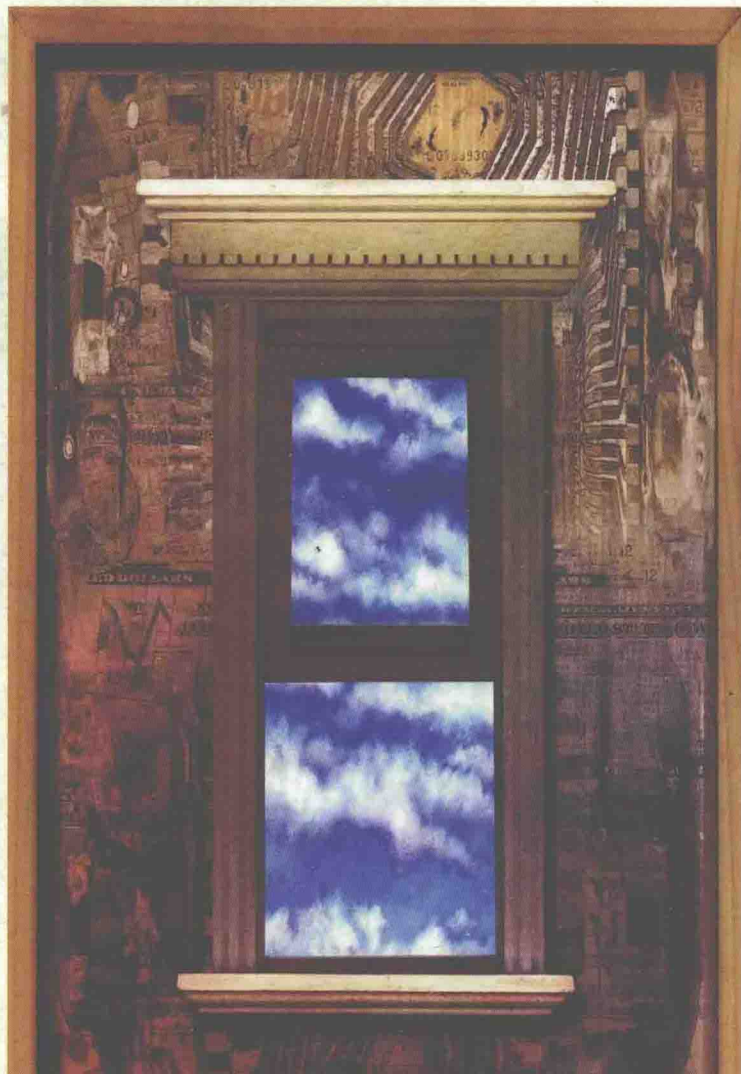




# Principles of Information Systems

Ralph M. Stair ♦ George W. Reynolds

*Fourth Edition*



**Principles of**



# **INFORMATION SYSTEMS**

**A Managerial Approach**

Fourth Edition

**Ralph M. Stair**

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*The University of Cincinnati*



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# Preface

*Principles of Information Systems: A Managerial Approach*, fourth edition, continues the tradition, principles, and approach of the previous editions. Our primary objective is to develop the best information systems text and accompanying materials for the first computer course required of all business students. Through surveys, questionnaires, focus groups, and feedback that we have received from current and past adopters, as well as others who teach in the field, we have been able to develop the highest quality set of teaching materials available.

Because information systems are key to business functions today, the information systems (IS) discipline deserves its own course on a par with those of other academic lines. This is even truer now than it was with the first edition's publication. This book stands proudly at the beginning of the IS curriculum and remains unchallenged in its position as the only IS principles text offering the basic IS ideas and concepts that every business student must learn to be successful. In the past, instructors of the introductory course faced a dilemma. On one hand, experience in business organizations allows students to grasp the complexities underlying important IS concepts. For this reason, many delayed presenting these concepts until students completed a large portion of the core business requirements. On the other hand, delaying the presentation of IS concepts until students have matured within the business curriculum often forces the one or two required introductory IS courses to focus only on microcomputer software tools and, at best, merely to introduce computer concepts.

This text has been written specifically for the principles course in the IS curriculum. It represents an exciting alternative to texts used in the introductory IS course in the past. *Principles of Information Systems: A Managerial Approach*, fourth edition, treats the appropriate computer and IS concepts together with a strong managerial emphasis.

## APPROACH OF THE TEXT

*Principles of Information Systems: A Managerial Approach*, fourth edition, offers the traditional coverage of computer concepts material, but it places the material within a highly structured framework of overall IS functionality. The text stresses principles of IS, which are brought together and presented in a way that is directly accessible. These fundamental ideas are not buried within historical detail or technical jargon. In addition, this book offers an overview of the entire IS discipline as well as a solid preparation for further study in advanced IS courses. It will serve both general business students and those who will become IS professionals. In particular, this book provides a solid groundwork from which to build advanced courses in such areas as systems development, programming, database management, Internet deployment, and decision support.

The overall vision, framework, and pedagogy that made the previous editions so popular have been retained in the fourth edition, offering a number of benefits to students. We continue to present IS concepts with a managerial emphasis. While much of the fundamental vision of this market-leading text remains unchanged, the fourth edition more clearly highlights established principles and draws out new ones that have emerged as a result of corporate and technological change. This text:

- Begins with a solid grounding in the principles of systems theory.
- Utilizes a problem-solving framework throughout and expands the scope of IS problem identification to include all activities, especially those at the strategic level of the organization.
- Covers the latest technologies, including connectivity and electronic commerce, in a business setting. Boxes, vignettes, examples, and cases are current, exciting, and relevant to today's businesses.
- Includes appropriate coverage of computer concepts, stressing characteristics of information systems relevant to aspiring decision makers.
- Presents the tenets, rules, guidelines—the principles—of information systems with which every business student must be knowledgeable.
- Stresses a single, all-encompassing concept: The right information, if it is delivered to the right person, in the right fashion, and at the right time, can improve and ensure organizational effectiveness and efficiency.
- Shows the value of the discipline as an attractive field of specialization and emphasizes the role of the IS professional as a change agent and manager who exercises special skills from a generalist perspective.
- Emphasizes the promise of integrated information systems in providing vastly superior organizational efficiencies.
- Shows that information systems are often intimately intertwined with value-added business processes.
- Presents IS objectives as supportive of, yet subordinate to, broader organizational goals.

## **IS Principles First, Where They Belong**

Exposing students to fundamental IS concepts provides a service to students who do not later return to the discipline for advanced courses. Since most functional areas in business rely on information systems, an understanding of IS principles helps students in other course work. In addition, introducing students to the principles of information systems helps future functional area managers avoid mishaps that often result in unfortunate consequences. Furthermore, presenting IS concepts at the introductory level creates interest among general business students who will later choose information systems as a field of concentration.

## **Current Examples, Boxes, Cases, and References**

We take great pride in including the most recent examples, boxes, cases, and references throughout the text. Some were developed at the last possible moment, just a few months before the publication of the book. Our adopters have come to expect the best and most recent material. We have done everything we can to meet or exceed these expectations. Every effort was made to include the newest, freshest, and most relevant examples, boxes, cases, and references possible.

## Author Team

Ralph Stair and George Reynolds team up again for the fourth edition. Together, they have over fifty years of academic and industrial experience. Ralph Stair brings years of writing, teaching, and academic experience. He has written over twenty books and a large number of articles while at Florida State University. George Reynolds brings a wealth of computer and industrial experience to the project, with over thirty years experience working in government, institutional, and commercial IS organizations. He has also authored eight texts and has been an adjunct professor at the University of Cincinnati, teaching the introductory IS course. The Stair and Reynolds team brings a solid conceptual foundation along with practical IS experience to students.

## GOALS OF THIS TEXT

This text has three main goals:

1. To present a core of IS principles with which every business student should be familiar and to offer a survey of the IS discipline that will enable all business students to understand the relationship of advanced courses to the curriculum as a whole
2. To present the changing role of the IS professional
3. To show the value of the discipline as an attractive field of specialization

These goals help students, regardless of major, understand and use fundamental information systems principles so that they will efficiently and effectively function as future business employees and managers. Because *Principles of Information Systems: A Managerial Approach*, fourth edition, is written for all business majors, we believe it is important to present not only a realistic perspective on IS in business but also to provide students with the skills they can use to be effective leaders in their companies.

## IS Principles

Information systems are critical to the success of every business. In the past, advances in IS technology and applications have moved faster than the business curriculum. Books and courses dealing with important IS concepts have fallen too late in the curriculum. Introductory texts have tended to focus more on the descriptive (What have business managers been doing with information systems?) rather than on the prescriptive (What should business managers do with information systems to succeed?).

This text offers the traditional coverage of computer concepts but stresses the broad framework to provide students solid grounding in business uses of technology. The book, although comprehensive, does not attempt to cover every aspect of the IS discipline. Instead, it offers an essential core of guiding IS principles for students to use as they face the career challenges ahead. From the opening vignettes to the end-of-chapter material, each chapter emphasizes these fundamental IS principles. IS principles sections at the end of each chapter further reinforce important concepts and principles.



Information systems technology has outpaced academic guidelines directing how information technology should best be employed. The driving force of the technology has captured the attention of most authors of introductory IS textbooks. The first course in information systems has historically concentrated on discussing the components of an information system (primarily the technological components) and perhaps to some degree how information systems are developed. Yet, the first course has often neglected the important aspects of *why* and *how* information systems should be used to meet organizational goals. As a result, general business graduates have been thrust into work environments in which information systems were critical to their success, but the graduates were unprepared to interact with these systems. Even those with some understanding of IS technology have floundered; an understanding of the technology alone does not enable one to apply it successfully.

In addition to serving general business students, this book offers an overview of the entire IS discipline and gives a solid preparation for further study in advanced IS courses. It gives students who will become IS professionals a solid foundation to face the rapidly changing role of the profession and the IS discipline.

### Changing Role of the IS Professional

As business and the IS discipline have changed, so too has the role of the IS professional. Once considered a dedicated specialist, the IS professional now is often an internal consultant to all functional areas, knowledgeable about their needs, and competent in bringing the power of information systems to bear throughout the business. The IS professional must exercise a broad perspective, encompassing the entire organization and often going beyond it.

The scope of responsibilities of an IS professional today ranges not only throughout the organization but also throughout the entire interconnected network of suppliers, customers, competitors, and other entities, no matter where they may be located. This broad scope offers IS professionals a new challenge: how to help the organization survive in a highly interconnected, highly competitive international environment. In accepting that challenge, the IS professional plays a pivotal role in shaping the business itself and ensuring its success. To survive, businesses must now strive for ultimate customer satisfaction and loyalty through ever-improving product and service quality. The IS professional assumes critical responsibility in determining the organization's approach to quality performance and therefore plays an important role in the ongoing survival of the organization. This new duality in the role of the IS employee—a professional who exercises specialist's skills with a generalist's perspective—is reflected throughout the book.

### IS as a Field for Further Study

The IS field is exciting, challenging, and rewarding. It is important to show the value of the IS discipline as an attractive field of study for the average business student. The need to draw bright and interested students into the IS discipline is part of our ongoing responsibility. The IS graduate is no longer a technical recluse. Increasingly, we are seeing the brightest and most talented students enter the IS field. IS graduates at many schools are

among the highest paid of all business graduates. Throughout this text, the many challenges and opportunities available to IS professionals are highlighted and emphasized. The “Making a Difference” supplemental interest boxes strengthen this theme by showing how IS professionals and organizations have used information systems to achieve their goals. Students are shown that the IS discipline is not only rewarding but fun!

## CHANGES IN THE FOURTH EDITION

Like the previous editions, the fourth edition retains the focus on IS principles and strives to be the most current text on the market. We are excited about a number of changes to the text, particularly those that were made in response to feedback on how the course is now being taught. Some of the highlights follow:

- *Themes for the Fourth Edition.* This text looks to the future with the latest content and pedagogy. We stress *commerce* and *connectivity* as major themes for the fourth edition. Placing IS concepts in a business context has always set us apart from general computer books. As businesses of all sizes and types embrace connectivity, we are witnessing history in the making. This revolution of conducting business electronically will profoundly change businesses, markets, and society for decades. With years of service to the information systems discipline, this edition builds on the traditions and strengths of past successes, while keeping an eye on the needs of future managers and decision makers.
- *More Real-World Examples.* Our adopters and reviewers told us they wanted more real-world examples. The opening vignettes, supplemental interest boxes, and examples in the text have been updated to include more real-world examples that are current and interesting. We have also updated the cases at the end of each chapter.
- *New Supplemental Interest Boxes.* All supplemental interest boxes have been upgraded to include current issues and events. In addition, the “Making a Difference,” “FYI,” and “E-Commerce” boxes are new types for the fourth edition.
- *Current.* Every effort was made to make this edition the most up-to-date text on the market. New hardware and software concepts, the Internet and telecommunications, and many other current developments can be found throughout the text. This edition, however, goes beyond headline-making technologies to focus on how new technology can be used to solve business problems and further business goals. The newest, freshest, and most relevant examples, boxes, cases, and references possible have been included. Many were obtained just prior to the publication of this text.
- *Revised End-of-Chapter Material.* The material at the end of each chapter has been thoroughly updated. Information systems principles sections, summaries keyed to the learning objectives, key terms, review questions, discussion questions, problem-solving activities, team activities, and cases have been replaced and revised to reflect the themes of the fourth edition and to give students the opportunity to explore the latest technology in a business setting. Chapter references, found at the end of the book, are new and explore the latest developments in information systems. New to this edition, Web exercises further reinforce the



themes of this text and help students explore organizations' use of this expanding technology.

- *Increased Emphasis on Performance-Based Management.* In many companies, we are seeing a trend toward performance-based management. There are at least three major stages in the business use of IS. The first stage started in the 1960s and was oriented toward cost reduction and efficiency. This stage generally ignored the revenue side. The second stage started in the 1980s and was oriented toward strategic advantage. In many cases, companies spent large amounts on IS and ignored the costs. The third stage is performance based, which carefully considers both strategic advantage and total IS costs.
- *Internet, Intranet, and Extranet Coverage.* In addition to the Internet chapter, Chapter 7, most chapters fully explore the use of Internet technology. The chapters on transaction processing, management information, and decision support systems have been revised to show the vast potential of this technology. Students see how real companies use the Internet, intranets, and extranets to help them satisfy customer needs and achieve organizational goals.
- *New Emphasis on Electronic Commerce.* The importance of electronic commerce is stressed throughout the book. The latest developments in conducting business electronically are covered, including electronic markets, product identification, product selection, and electronic product distribution. Current examples are included throughout the book, and the use of the Internet for electronic commerce is fully explored. In addition, a new box on electronic commerce has been included in every chapter.
- *New Coverage of Enterprise Resource Planning.* Chapter 8 covers the importance of enterprise resource planning (ERP). Platforms developed by SAP and others are explored. Corporations are investing millions of dollars in ERP to link their systems and provide crucial information to employees and managers. The costs and potential benefits are covered, as well as the disadvantages.
- *Greater Coverage of Ethical Issues.* In each chapter, important ethical issues and concerns are discussed in relation to the specific topics covered in the chapter. This increased coverage can be seen in the "Ethical and Societal Issues" boxes included in each chapter and woven into text discussion and end-of-chapter materials. Ethical issues are also covered in detail in Chapter 14.

## PEDAGOGICAL FEATURES

In addition to the text, we revamped the pedagogy and the teaching resources for the fourth edition. Our emphasis throughout is on applying text concepts to the most up-to-date, real-world examples possible.

### Chapter-Opening Material

The chapter-opening material introduces students to what is contained in each chapter. From the opening quotation to the vignette, we have developed this material to be interesting and motivational.

**Opening Quotations.** Each chapter starts with an opening quotation to stimulate interest in the material and set the stage for the chapter.

**Chapter Outlines.** Each chapter includes a chapter outline to show students and instructors the content of the chapter at a glance.

**Learning Objectives.** Carefully crafted learning objectives are included with every chapter. The learning objectives reflect what students should be able to accomplish after completing a chapter. The objectives are also integrated into the chapter summaries—each item in the summary starts with a learning objective from the beginning of the chapter.

**Opening Vignettes.** A brief opening vignette follows the learning objectives for each chapter. This vignette describes a real company or current business situation and is related to the concepts discussed in the chapter. Each vignette ends with a few questions for students to consider as they read the chapter.

## Supplemental Interest Boxes

New supplemental interest boxes are interspersed throughout the text. Each chapter includes the following boxes: “E-Commerce,” “Making a Difference,” “Ethical and Societal Issues,” “Technology Advantage,” and “FYI.” Like the previous editions, all boxes are designed to support the goals and themes of the fourth edition and the content of the specific chapter. Each box includes two discussion questions. Some questions tie the material to the text by asking students to relate chapter concepts to the topics in the supplemental boxes. Other questions challenge students to think “outside the box” to apply concepts to new situations in critical and creative ways.

**E-Commerce.** These new boxes contain a case study of a firm using the Internet, electronic data interchange, or other means of electronically conducting business. These boxes capture the many uses, benefits, and potential problems associated with the Internet and the World Wide Web. Each box reinforces the themes of connectivity and commerce.

**Making a Difference.** These new boxes show the role of business information systems to reduce costs, achieve a strategic advantage, or to improve overall performance. Each is current and reveals how a real company benefited from the use of information systems. Some boxes contain brief profiles of successful IS professionals to motivate students to consider IS as a major field of study.

**Ethical and Societal Issues.** Each “Ethical and Societal Issues” box presents a timely look at ethical challenges and the societal impact of information systems. Topics include classic ethical scenarios such as software piracy, data privacy, and other issues being raised by new technology. The dramatic impact of technology on business and society is also explored.

**Technology Advantage.** These boxes cover how technology is able to give a company an advantage in a competitive marketplace. New technologies and their use in a business setting are stressed. In addition, these boxes explore international aspects of information systems by highlighting companies that do business around the world.

**FYI.** These new boxes contain interesting and important developments in information systems to keep students informed. How these developments have affected individuals and corporations are stressed.

## End-of-Chapter Material

To help students retain IS principles and to expand their understanding of important IS concepts and relationships, information systems principles, summaries, key terms, review questions, discussion questions, problem-solving exercises, team activities, Web exercises, and cases are included at the end of every chapter.

**Information Systems Principles.** “Information Systems Principles” summarize key concepts that every student should know. This important feature is a convenient summary of key ideas.

**Summary.** Every chapter includes a detailed summary. Each summary is tied to a learning objective to make sure students have mastered the material in the chapter.

**Key Terms.** A list of key terms with page numbers indicating where the term is defined follows the summary for each chapter. Each key term is also placed in bold in the text and defined in the margin. All key terms are also included in the glossary at the end of the book.

**Review Questions.** Directly linked to the text, these questions reinforce the key concepts and ideas within each chapter.

**Discussion Questions.** Picking up where the review questions leave off, discussion questions help instructors generate class discussion to move students beyond the concepts to explore the numerous aspects and principles of information systems.

**Problem-Solving Exercises.** Each chapter of the text contains a set of problem-solving exercises. These exercises enable students to continue to apply skills learned in application software courses to problems related to chapter material. Icons are provided to show students and instructors which applications are being tested. The primary purpose of these activities is to keep software skills fresh. The exercises also help prepare students for more rigorous applications in advanced business courses.

**Team Activities.** Because employees are increasingly involved in teamwork, these activities require students to work in small groups on a shared assignment. These activities foster teamwork, communication, and mutual

accountability. Students work to create a joint product, such as a report, a database, or a group presentation. Some activities involve semistructured activities like visiting a local business, while others demand creative thinking, such as designing the perfect computer system with a given set of system constraints and price parameters.

**Web Exercises.** New to this edition, Web exercises reinforce the theme of connectivity and stress the use of the Internet, intranets, and extranets in a business setting. These exciting new exercises show students how businesses are reaching out to suppliers and customers to increase quality, service, and profitability.

**Cases.** We listened to our past adopters and reviewers and responded with four new cases at the end of each chapter. This expands the scenarios that instructors may use. These cases further reinforce important IS concepts and principles and show how real companies have applied information systems to achieve their goals. Questions focus students on the key issues of the cases and ask them to consider and apply the material.

## TEACHING RESOURCE PACKAGE

The teaching tools that accompany this text offer many options for enhancing your course. In the fourth edition, we emphasize the importance of distance learning. And, as always, we are committed to providing one of the best teaching resource packages available in this market. Here are your options.

### CyberClass

Course Technology is pleased to bring you *CyberClass* from HyperGraphics Corporation. *CyberClass* is a totally new Web-based tool for distance and on-campus settings. It is available with *Principles of Information Systems*, fourth edition, in three levels:

**Level 1.** This level is free when you use *Principles of Information Systems*, fourth edition. It has two parts: (1) access to the items below as read-only for users and (2) a chance for visiting professors to demo the capabilities of Level 2. Level 1 features:

- **Electronic Flash Cards.** A self-study tool for students to test their understanding of key computer concepts and terminology for each chapter.
- **Practice Tests.** Short tests that quiz students on key concepts from *Principles of Information Systems*, fourth edition. With each test offering 20 randomly generated questions per chapter, students can take these practice tests repeatedly to check their understanding of each chapter's content.
- **Link to Course Technology's Web Site for *Principles of Information Systems*,** fourth edition. Links to additional materials, reprint corrections, and updates to keep the book as timely as possible.

**Level 2.** Students may purchase a Level 2 diskette containing *CyberClass* for *Principles of Information Systems*, fourth edition. This diskette contains a

password for the course that lasts for the duration of the term and the necessary software to access Level 2 features, which are:

- **Level 1 Features Plus Web Site.** All of Level 1 features, plus a customizable and secure Web site for instructors to use for administering their course.
- **Syllabus Posting.** A template where an instructor can type in a syllabus or copy and paste a syllabus from a word processing document. It is also possible to paste HTML into this template.
- **Hot Links.** Links that the instructor can post for students.
- **Assignment Posting.** An area where assignments can be posted for students to turn in.
- **Test Posting.** Along with practice tests from the book, an instructor can create tests online using Course Test Manager and then post them for students to take. The test is immediately graded and sent to the instructor of the class via e-mail.
- **Assignments.** A template that allows students to submit assignments to the instructor efficiently via e-mail.
- **Student Bulletin Board.** Threaded conferencing for class members, with the topics created by the instructor.
- **Messages.** Electronic messaging that allows sending and viewing messages among class members and instructor.
- **CyberChallenge.** An interactive learning game filled with multiple-choice questions where students compete to answer questions correctly in the shortest amount of time.
- **Instructor-supervised Text Chat.** Useful for such things as online real-time office hours, mini-lectures, group work, discussion groups, and so on.
- **Administration Utilities.** Accessible by instructors only, utilities allow them to view and edit the roster, edit user information, and so on.
- **Student's Administration Utilities.** Enables students to add or edit their own user information.

**Level 3.** Students may purchase a Level 3 diskette containing *CyberClass for Principles of Information Systems*, fourth edition. This diskette contains a password for the course that lasts for the duration of the term, and the necessary software to access Level 3 features, which are:

- **All Level 1 and 2 Features.**
- **Audio Classroom.** Runs off of instructors' Windows 95 Pentium computer (up to 30 students), the school's network (up to 200 students), or HyperGraphics's servers (upon sign-up with HyperGraphics).
- **Instructor Controlled and Monitored Synchronous Assessment.** Course Technology's *Course Test Manager* provides the technology backbone and bank of questions for real-time assessment during an audio session with real-time feedback to the instructor.

## Instructor's Manual with Solutions

The *Instructor's Manual* is available in both electronic and printed formats. This all-new updated *Instructor's Manual* provides valuable chapter overviews; highlights key principles and critical concepts; offers sample syllabi, learning

objectives, and discussion topics; and features possible essay topics, further readings or cases, and solutions to all of the end-of-chapter questions and problems as well as suggestions for conducting team activities. Additional end-of-chapter questions are also included, as well as the rationale, methodology, and solutions for each.

### Course Test Manager and Testbank

This cutting-edge Windows-based testing software helps design and administer pretests, practice tests, and actual examinations. With *Course Test Manager*, students can randomly generate practice tests that provide immediate on-screen feedback and enable them to create detailed study guides for questions incorrectly answered. On-screen pretests help assess students' skills and plan instruction. *Course Test Manager* can also produce printed tests. In addition, students can take tests at the computer that can be automatically graded and can generate statistical information on students' individual and group performance.

### Course Presenter

A CD-ROM-based presentation tool developed in Microsoft PowerPoint, *Course Presenter* offers a wealth of resources for use in the classroom. Instead of using traditional overhead transparencies, *Course Presenter* puts together impressive computer-generated screen shows including graphics and videos. All of the graphics from the book (not including photos) have been included.

### Web Site

A dynamic site helps keep materials current. Visit us at <http://www.course.com/sites/stair> for additional and updated cases, and information about what is changing in the IS field. We provide information about the book, chapter-by-chapter updates, additional case studies, useful resources for instructors and students, and links to real-world companies showcased in the case studies throughout the book. Adopters will find it easy to remain current.

## ACKNOWLEDGMENTS

A book of this size and undertaking is always a team effort. We would like to thank every one of our fellow teammates at Course Technology for their dedication and hard work. Many thanks to our associate publisher, Kristen Duerr. We would also like to thank Cheryl Ouellette for her help. There were a number of people behind the scenes who made this book a reality; thanks to Patty Stephan and Elizabeth Martinez. For their hard work on the manuscript, we would like to acknowledge and thank the team at Elm Street Publishing Services. Karen Hill helped with all stages of this project. Martha Beyerlein, Melissa Morgan, Barb Lange, and Abby Westapher helped with production and the final stages of the book.



Many thanks to the sales force at Course Technology. You make this all possible. You helped to get important feedback from current and future adopters. As Course Technology product users, we know how important you are.

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## TO OUR PREVIOUS ADOPTERS AND POTENTIAL NEW USERS

We sincerely appreciate our loyal adopters through the previous editions and welcome new users of *Principles of Information Systems: A Managerial Approach*. As in the past, we truly value your needs and feedback. We can only hope the fourth edition continues to meet your high expectations. In particular, we would like to thank the reviewers of the fourth edition, focus group members, and reviewers of previous editions.

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We are sincerely committed to serving the needs of our adopters and readers. Like the field of IS itself, the writing and publishing process is an evolutionary and participatory one. We encourage participation in our endeavor to provide the freshest, most relevant information possible. We pride ourselves on listening to instructors and developing creative solutions to problems and needs. Numerous individuals in the IS discipline have given us their time and insight during the process of this revision. They have offered valuable feedback on outstanding features of the previous editions and potential improvements in the fourth edition. We have listened to their comments and thank them for their time.

As always, we welcome input and feedback. If you have any questions or comments regarding *Principles of Information Systems: A Managerial Approach*, fourth edition, please contact us through Course Technology or your local representative, via e-mail at [mis@course.com](mailto:mis@course.com), via the Internet at [www.course.com](http://www.course.com), or address your comments, criticisms, suggestions, and ideas to:

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