

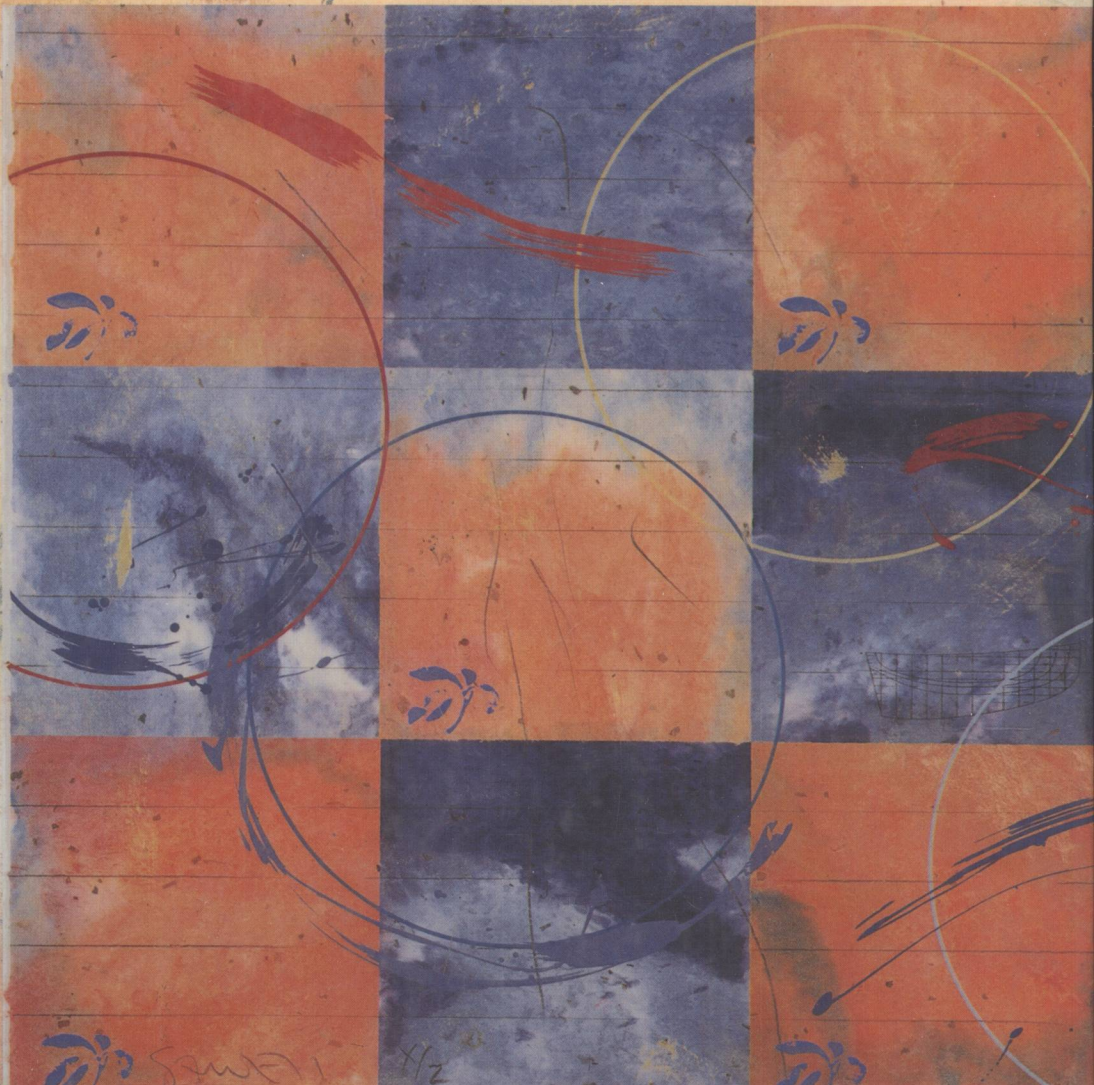
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# Management Information Systems

*Organization and  
Technology*    *Fourth Edition*

**Kenneth C. Laudon**

**Jane P. Laudon**





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*Organization and  
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**Kenneth C. Laudon**  
New York University

**Jane Price Laudon**  
Azimuth Corporation



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# About the Authors



**Kenneth C. Laudon** is a Professor of Information Systems at New York University's Stern School of Business. He holds a B.A. in Economics from Stanford and a Ph.D. from Columbia University. He has authored eleven books dealing with information systems, organizations, and society. Professor Laudon has also written over forty articles concerned with the social, organizational, and management impacts of information systems, privacy, ethics, and multimedia technology.

Professor Laudon's current research is on the planning and management of large-scale information systems for the 1990s and multimedia information technology. He has received grants from the National Science Foundation to study the evolution of national information systems at the Social Security Administration, the IRS, and the FBI. A part of this research is concerned with computer-related organizational and occupational changes in large organizations, changes in management ideology, changes in public policy, and understanding productivity change in the knowledge sector.

Ken Laudon has testified as an expert before the United States Congress. He has been a researcher and consultant to the Office of Technology Assessment (United States Congress) and to the Office of the President, several executive branch agencies, and Congressional Committees. Professor Laudon also acts as a consultant on systems planning and strategy to several Fortune 500 firms.

Ken Laudon's hobby is sailing

**Jane Price Laudon** is a management consultant in the information systems area and the author of seven books. Her special interests include systems analysis, data management, MIS auditing, software evaluation, and teaching business professionals how to design and use information systems.

Jane received her Ph.D. from Columbia University, her M.A. from Harvard University, and her B.A. from Barnard College. She has taught at Columbia University and the New York University Graduate School of Business. She maintains a lifelong interest in Oriental languages and civilizations.

The Laudons have two daughters, Erica and Elisabeth.

*Management Information Systems: Organization and Technology* reflects a deep understanding of MIS research and teaching as well as practical experience designing and building real world systems.



*for*  
**Erica**  
*and*  
**Elisabeth**

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# Preface

*Management Information Systems: Organization and Technology (Fourth Edition)* is based on the premise that professional managers, in both the private and public sectors, cannot afford to ignore information systems. In today's business environment, professional managers must learn how to use information technology to create competitive firms, manage global corporations, and provide useful products and services to customers. Information systems have become so vital to the management, organization, operation, and products of large organizations that they are too important to be left only to technicians. A few years ago, this statement was not true. Briefly, it is difficult—if not impossible—to manage a modern organization without at least some grounding in the fundamentals of what information systems are, how they affect the organization and its employees, and how they can make businesses more competitive and efficient.

Accordingly, this book has been written for nontechnical undergraduate and MBA students in finance, accounting, management, and the liberal arts who will find a knowledge of information systems vital for their professional success. This book may also serve as a first course for students who subsequently major in information systems at either the undergraduate or graduate level. We have made every effort to provide a comprehensive and current survey of research and literature on organizations and systems and to present it in a highly readable style.

## THE CONTEMPORARY ENVIRONMENT

This book reflects three related trends in the contemporary business environment. First, globalization of markets puts new emphasis on organizational design and management control. When your parts originate in Korea, your assembly occurs in Mexico, and your finance, marketing and general counsel are in New York, then you know you face tough challenges in designing the proper organization and in managing the work.

Second, the transformation of the American and other advanced industrial economies into full-fledged knowledge and information economies puts new emphasis on time-based competition, productivity of knowledge workers, short product life cycles, and employee training. When 70% of the gross national product is an output of the information sector, then the productivity of information workers is a central societal concern. When your firm's future depends on having a new product in the marketplace in nine months, then you face a difficult challenge as a manager in speeding up the work of engineers and other knowledge workers. The demand for information, for communications, has never been so great.

Third, the development of powerful microprocessors and telecommunications networks has brought forth a new information architecture based on powerful desktop computers and communications networks. We can now put what used to be called a mainframe computer on every desktop, and we can now design organizations with powerful information networks to instantly link factories, offices, and desktops within the company and with other companies around the world. A few years ago this was a dream.



The work of an organization—and its employees—depends increasingly on what its information systems are capable of doing. Increasing market share, becoming the high-quality or low-cost producer, developing new products, and increasing employee productivity, depend more and more on the kinds and quality of information systems in the organization. Information systems can lead to more efficient and effective organizations, new styles and procedures of management, new strategies, and new organizational roles. Organizations innovating with information systems have transformed the way they operate and even changed the face of an entire industry.

Today's managers are not only expected to use systems but are also expected to:

- Know how to use information technology to design competitive and efficient organizations.
- Understand the business and system requirements of a global environment.
- Use information systems to ensure quality throughout the firm.
- Make choices about technology platforms—hardware, software, and communications technologies—to enhance their firm's productivity and overall performance.
- Manage and control the influence of systems on employees and customers.
- Understand the ethical dilemmas and controversies which surround the use of advanced information systems.

In essence, contemporary managers are expected to know enough about information technology to use it in the design and management of their organizations. These new management responsibilities require a deeper understanding of information technology and systems than ever before. Although this book primarily deals with private organizations, public sector managers are no less susceptible to these trends and changes in management and organization.

## UNIQUE FEATURES OF THIS TEXT

*Management Information Systems: Organization and Technology (Fourth Edition)* has many unique features designed to create an active, dynamic learning environment.

- **Interactive Multimedia Edition:** The textbook is available in a new multimedia interactive format on CD-ROM. The Multimedia Edition features the full 19 chapters of the printed text plus 19 additional videos explaining key concepts, audio clips, line art, research articles, simulations, and interactive exercises. With specially prepared “BulletText” summaries, hyperlinked graphics, and complete hypertext linking of concepts, definitions, and applications, the multimedia version can be used independently of the hard cover version or in conjunction with the hard cover text as an interactive study guide. All supplements for the printed version may be used with the Multimedia Edition.
- **An integrated framework for describing and analyzing information systems.** An integrated framework portrays information systems as being composed of management, organization, and technology elements. This framework is used throughout the text to describe and analyze information systems and information system problems. A special diagram accompanying each chapter-opening vignette graphically illustrates how management, organization, and technology elements work together to create an information system solution to the business challenges discussed in the vignette. The diagram can be used as a starting point to analyze any information system problem.
- **Real-World Examples:** Real-world examples drawn from business and public organizations are used throughout to illustrate text concepts. Each chapter opens with a vignette illustrating the themes of the chapter by showing how a



real-world organization meets a business challenge using information systems. More than 100 companies in the United States and over 100 organizations in Canada, Europe, Australia, Asia, and Africa are discussed (see the Organization and International Organization indexes.)

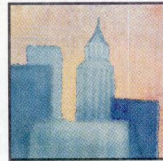
Each chapter contains three WINDOW ON boxes (WINDOW ON MANAGEMENT, WINDOW ON ORGANIZATIONS, WINDOW ON TECHNOLOGY) that present real-world examples illustrating the management, organization, and technology issues in the chapter. Each WINDOW ON box includes a section called *To Think About* containing questions for students to apply chapter concepts to management problem solving. The themes for each box are:



**WINDOW ON MANAGEMENT:** Management problems raised by systems and their solution; management strategies and plans; careers and experiences of managers using systems.



**WINDOW ON TECHNOLOGY:** Hardware, software, telecommunications, data storage, standards, and systems-building methodologies.



**WINDOW ON ORGANIZATIONS:** Activities of private and public organizations using information systems; experiences of people working with systems.

- **Coverage of new leading-edge topics.** Full chapters address the challenges posed by today's competitive global business environment. Enterprise-Wide Computing and Networking (Chapter 10); Managing International Information Systems (Chapter 19); Ensuring Quality with Information Systems (Chapter 13); and Ethical and Social Impact of Information Systems (Chapter 5) address these themes. The text includes up-to-date coverage of topics such as:
  - The Internet and the information superhighway
  - Electronic commerce
  - Business re-engineering
  - Intelligent agents
  - Wireless networks
  - Case-based reasoning
  - Fuzzy logic
  - Genetic algorithms
  - Client/server computing
  - Multimedia
- **A truly international perspective:** In addition to a full chapter on Managing International Information Systems, all chapters of the text are illustrated with real-world examples from one hundred corporations in Canada, Europe, Asia, Latin America, Africa, Australia, and the Middle East. Each chapter contains at least one, and often more, WINDOW ON box, case study, or opening vignette drawn from a non-U.S. firm. The text concludes with five major international case studies contributed by leading MIS experts in Canada, Europe, and Australia—Andrew Boynton, University of North Carolina at Chapel Hill and the



International Institute for Management Development (Switzerland) and Michael E. Shank, Renaissance Vision; Len Fertuck, University of Toronto (Canada); Helmut Krcmar and Bettina Schwarzer, Hohenheim University (Germany); Tapio Reponen, Turku School of Economics and Business Administration (Finland); and Peter Weill and Joel B. Barolsky, University of Melbourne (Australia).

- **Activist pedagogy to teach management problem-solving:** *Management Information Systems: Organization and Technology* contains many features that encourage students to actively learn and to engage in management problem solving.

**GROUP PROJECTS.** At the end of each chapter is a group project that encourages students to develop teamwork and oral and written presentation skills. The group project exercise asks students to work in groups of three or four to research a specific topic, analyze the pros and cons of an issue, write about it, and orally present the group's findings to the class. For instance, students might be asked to work in small groups to analyze a business and to suggest appropriate strategic information systems for that particular business or to develop a corporate ethics code on privacy that considers E-mail privacy and employers' use of information systems to monitor work sites.

**MANAGEMENT CHALLENGES SECTION.** Each chapter concludes with several challenges, relating to the chapter topic, that managers are likely to encounter. These challenges are multi-faceted and sometimes pose dilemmas. They make excellent springboards for class discussion. Some of these Management Challenges are the organizational obstacles to building a database environment and the major risks and uncertainties in systems development.

**TO THINK ABOUT QUESTIONS.** Included in every WINDOW ON box, these questions require students to apply chapter concepts to real-world scenarios. These questions frequently ask students to assume the role of managers, use multiple perspectives, consider different alternatives, and think creatively. The questions can be used for class discussion or for short written projects.

**CASE STUDIES.** Each chapter concludes with a case study based on a real-world organization. These cases help students synthesize chapter concepts and apply this new knowledge to real-world problems and scenarios. Major case studies at the end of each part of the text and international case studies concluding the text provide additional opportunities for management problem solving. Professors can assign these case studies for class discussion or for term projects.

## NEW TO THE FOURTH EDITION

This edition maintains the strengths of earlier editions, but puts even more emphasis on showing managers the opportunities for reshaping and enhancing their organizations using information technology. The Internet and other global networks have opened up exciting new avenues for expediting the flow of knowledge, organizational coordination, and electronic commerce. More and more companies are trying to use information technology to redesign their business processes and to fundamentally change the way they work. Small businesses, as well as large, can benefit from understanding the capabilities—and the limitations—of today's information technologies. The fourth edition was reworked from start to finish to more fully integrate the issues surrounding the growing use of the Internet, business re-engineering, and the system requirements of small businesses into the MIS course. These concerns are reflected in the following changes:

**THE INTERNET.** An entirely new chapter on the Internet and enterprise-wide computing (Chapter 10) describes the underlying technology, capabilities, and benefits of the Internet with numerous illustrations from real-world companies. The chapter carefully analyzes the benefits and liabilities of this world-wide network. Internet





topics such as intelligent agents, Internet security, digital commerce, and the information superhighway are integrated into other chapters of the book.

**The Internet Connection** can be found in each chapter of the text and in each of the major part-ending case studies. The Internet Connection interactively shows students how to use the Internet for research and management problem-solving and helps professors integrate the Internet into the MIS course.

The Internet Connection icon in the text directs the reader to additional materials and resources on the World Wide Web of the Internet dealing with topics and organizations discussed in the chapter or case, interactive software demonstrations, or in-depth descriptions of Internet capabilities and tools. These Web resources can be used to illustrate concepts such as multimedia, strategic information systems, telecommunications-based transaction processing, decision-support systems, or Total Quality Management. The user first links to Prentice-Hall's World Wide Web Site [<http://www.prenhall.com>] via either a university or home Internet service. Once the user is attached to the Prentice Hall Web site, he or she will be directed to a Laudon-Laudon Home Page. From the Laudon-Laudon Home Page the user can link directly to the Web resources specified for each Internet Connection session.

**ATTENTION TO SMALL BUSINESSES AND ENTREPRENEURS.** We have expanded the text to devote more attention to the specific management, organization, and technology issues relevant to small businesses and entrepreneurs using information systems. Specially designated chapter-opening vignettes, Window On boxes, and ending case studies highlight the experiences of small businesses using information systems.

**EXPANDED TREATMENT OF BUSINESS RE-ENGINEERING, ORGANIZATIONAL CHANGE, AND ORGANIZATIONAL DESIGN USING INFORMATION TECHNOLOGY.** Chapter 11 contains a detailed discussion of redesigning businesses processes using information technology. Experiences of real-world organizations performing business re-engineering are described in this chapter and integrated throughout the text. The entire text reflects a new emphasis on showing the potential for organizational change and organizational design using information technology.

**EXPANDED TREATMENT OF INFORMATION SYSTEMS AND QUALITY.** The text now puts more emphasis on showing the various ways that information systems can be used to promote quality throughout the business. Quality issues are addressed in Chapter 13 (Ensuring Quality with Information Systems) and integrated throughout the text.

**INTERACTIVE LEARNING.** The CD-ROM version provides an interactive, computer-managed instruction component that lets students learn at their own pace. Students apply text concepts to management problems in on-line interactive exercises. They can select and access material using powerful electronic indices for subjects, names, and organizations and they can review key terms with an electronic glossary. Each chapter of the text contains a bulletized summary of the key points for immediate on-line access and review through hot buttons and on-line glossaries and indexes. Videos and audio clips for each chapter illustrate real-world applications of key concepts. An interactive study guide provides helpful question-and-answer sessions, which can be automatically graded and handed to the professor.

## BOOK OVERVIEW

The five parts of the book are designed to be relatively independent of each other. Each instructor may choose to emphasize different parts.

Part One is concerned with the organizational foundations of systems and their emerging strategic role. It provides an extensive introduction to real-world systems, focusing on their relationship to organizations, management, and important ethical and social issues. This section is important for understanding the larger environment in which systems operate and for showing students how they relate to organizational design, strategy, operations, and accountability.



Part Two provides the technical foundation for understanding information systems, describing hardware, software, storage, and telecommunications technologies. The section concludes by describing the challenge of making all of the information technologies work together in a new information architecture based on enterprise-wide networking and internetworking with other organizations.

Part Three focuses on the process of redesigning organizations using information systems, showing how new information systems can be used to engineer varying degrees of organizational change, including re-engineering of critical business processes. Because information systems and organizations are so closely intertwined, we see systems analysis and design as an exercise in organizational design, one that requires great sensitivity to the right tools and techniques, quality assurance, and change management.

Part Four describes the role of information systems in capturing and distributing organizational knowledge and intelligence and in enhancing management decision-making. It shows how knowledge creation and distribution, work group collaboration, and individual and group decision making can be supported by the use of knowledge work systems, decision support systems, and executive support systems. Organizational performance can also be enhanced by the use of carefully chosen artificial intelligence applications.

Part Five concludes the text by examining the special management challenges and opportunities created by the pervasiveness and power of contemporary information systems: ensuring security and control and developing global systems. Throughout the text, emphasis is placed on using information technology to redesign the organization's products, services, procedures, jobs and management structures. Numerous examples, drawn from multinational systems and global business environments, are presented.

## Chapter Outline

Each chapter contains the following:

- A detailed outline at the beginning to provide an overview.
- An opening vignette, describing a real-world organization, to establish the theme and importance of the chapter.
- A diagram analyzing the opening vignette in terms of the management, organization, and technology model used throughout the text.
- A list of learning objectives.
- Marginal glosses of key terms in the text.
- Management challenges.
- An Internet Connection icon directing students to related material on the Internet.
- A chapter summary keyed to the learning objectives.
- A list of key terms that the students can use to review concepts.
- Review questions for students to test their comprehension of chapter material.
- A set of discussion questions that can be used for class discussion or for research topics.
- A group project to develop teamwork and presentation skills.
- A chapter-ending case study that illustrates important themes.
- A list of references for further research on topics.

## INSTRUCTIONAL SUPPORT MATERIALS:

### Software

A series of optional management software cases called *Solve it! Management Problem Solving with PC Software* has been developed to support the text. *Solve it!*



consists of 10 spreadsheet and 10 database cases drawn from real-world businesses, plus a data diskette with the files required by the cases. The cases are graduated in difficulty. The case book contains complete tutorial documentation showing how to use spreadsheet and database software to solve the problems. There are separate *Solve it!* case books for Windows and DOS software tools. A new version of *Solve it!* with all new cases is published every year. *Solve it!* must be adopted for an entire class. It can be purchased directly from the supplier, Azimuth Corporation, 124 Penfield Ave., Croton-on-Hudson, New York 10520 (Telephone 914-271-6321).

### **Instructor's Manual/Test Bank and Videocases**

The *Instructor's Resource Manual*, written by Ken and Jane Laudon and Marshall R. Kaplan, includes lecture outlines as well as answers to review questions, discussion questions, group project exercises, case study questions, video cases, and To Think About questions. The Test Bank has been expanded to include 25 true-false questions, 25 multiple choice questions, and 25 fill in the blank questions for each chapter.

### **Video Cases**

Ten video cases based on the real-world corporations and organizations used in the text are available to adopters. The video cases illustrate the concepts in each section and can be used for class discussion or written projects. The video cases are analyzed in the *Instructor's Resource Manual*.

### **Computerized Test Bank**

All test bank questions are available in computerized form.

### **Transparency Acetates**

A set of approximately 100 full-color transparency acetates is available to illuminate key concepts.

### **The New York Times "Themes of the Times"**

Information systems is a constant theme in the news, both because of developments in the IT industry itself and because of the ways business uses it on a day-to-day basis. To enhance access to important news items, the *New York Times* and Prentice Hall are sponsoring "Themes of the Times." Twice a year, Prentice Hall will deliver complimentary copies of a "mini newspaper" containing reprints of selected *Times* articles to instructors who use this book for their classes. "Themes of the Times" is an excellent way of keeping students abreast of the ever-changing world of MIS.

### **Prentice Hall Video Library**

Prentice Hall is fortunate to have an exclusive contract with Computer Chronicles, a premier TV program in its 12th season. It airs each week on 289 public television stations and in over 200 foreign cities. Stewart Cheifet, the host, takes an in-depth look each week at cutting-edge topics in new technology. Prentice Hall has selected clips from the most innovative programs and included them in our MIS Video Library for adopters of Laudon/Laudon's MIS 4E. In addition, Prentice Hall provides company footage from case studies highlighted in the text.

### **Powerpoint Transparencies**

Prentice Hall provides you with PowerPoint electronic transparencies, for all of the figures and tables in the text, to support lectures. Instructors can customize these 4-color images adding information to suit their presentation style and to personalize their lectures.



## ACKNOWLEDGMENTS

The production of any book involves many valuable contributions from a number of persons. We would like to thank all of our editors for encouragement, insight, and strong support for many years. We are grateful to P. J. Boardman for her energy and enthusiasm in guiding the development of this edition and to Charles Stewart for his vision and encouragement in the preparation of earlier editions of this text. We thank Amy Cohen for directing the preparation of ancillary materials and commend Elaine Lynch of Prentice Hall's Production Department for guiding production of this text under a very ambitious schedule.

We are deeply indebted to Marshall R. Kaplan for his invaluable assistance in the preparation of this edition and for his work on the *Instructor's Resource Manual*.

The Stern School of Business at New York University and the Information Systems Department provided a very special learning environment, one in which we and others could rethink the MIS field. Special thanks to Vasant Dhar, Ajit Kambil, Robert Kauffman, and Stephen Slade for providing critical feedback and support where deserved. Professor Norm White was especially helpful in commenting on the technical chapters in Part II and we thank him. Professor William H. Starbuck of the Management Department at NYU provided valuable comments and insights.

The late Professor James Clifford of Stern's Information Systems Department made valuable recommendations for improving our discussion of files and databases. Jim was a wonderful friend and colleague, and we will miss him deeply.

Professors Al Croker and Michael Palley of Baruch College and NYU, Professor Kenneth Marr of Hofstra University, Professor Edward Roche of Seton Hall University, Professor Sassan Rahmatian of California State University, Fresno, Ashok Malhotra and Emilio Collar of IBM, Jiri Rodovsky, and Russell Polo provided additional suggestions for improvement.

We are truly grateful to our colleagues in the MIS field who shared their expertise and comments with us. We want to thank Len Fertuck, Andrew Boynton, Michael E. Shank, Helmut Krcmar, Tapio Reponen, Bettina Schwarzer, Joel B. Barolski, and Peter Weill for contributing case studies. They deeply enrich the text.

One of our goals for *Management Information Systems*, 4E was to write a book which was authoritative, synthesized diverse views in the MIS literature, and helped define a common academic field. A large number of leading scholars in the field were contacted and assisted us in this effort. Reviewers and consultants for *Management Information Systems: Organization and Technology* took considerable time and care to examine individual chapters as specialists and the entire manuscript as instructors in the MIS course. Insofar as time and space allowed, we tried to incorporate their ideas in the text. We deeply appreciate their work and their suggestions for improving the text. These consultants are listed in the front end papers of the book. It is our hope that this group endeavor contributes to a shared vision and understanding of the MIS field.



# Management Information Systems



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