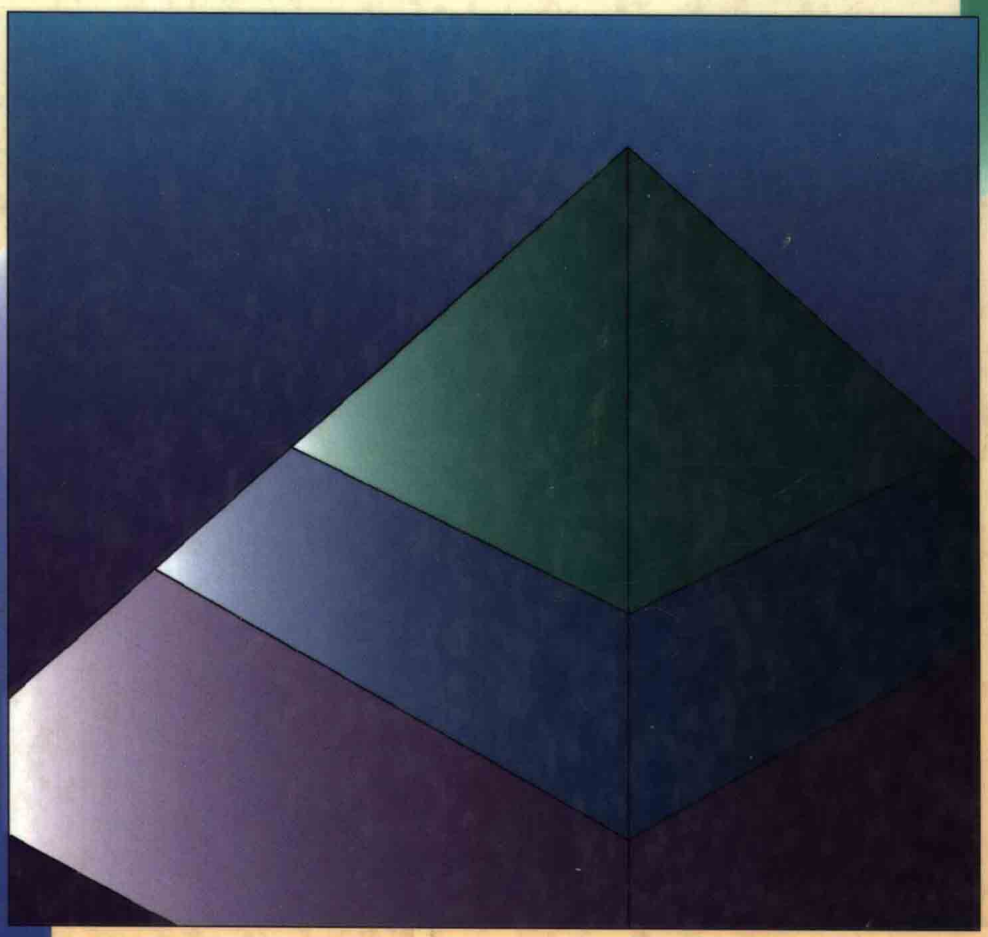
SECOND EDITION

Management Information Systems

A Managerial End User Perspective



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Management Information Systems

A Managerial End User Perspective

James A. O'Brien
Northern Arizona University

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About the Author

James A. O'Brien is a professor of Computer Information Systems in the College of Business Administration at Northern Arizona University. He did his undergraduate studies at the University of Hawaii and Gonzaga University and earned an M.S. and Ph.D. in Business Administration from the University of Oregon. He has been coordinator of the CIS area at Northern Arizona University, professor of Finance and Management Information Systems and chairman of the Department of Management at Eastern Washington University, and a visiting professor at the University of Alberta and the University of Hawaii.

Jim's business experience includes the Marketing Management Program of the IBM Corporation, as well as serving as a financial analyst for the General Electric Company. He is a graduate of General Electric's Financial Management Program. He has also served as an information systems consultant to several banks and computer services firms.

Jim's research interests lie in developing and testing basic conceptual frameworks used in information systems development and management. He has written eight books, including several that have been published in Dutch, French, or Japanese translations. He has also contributed to the field of information systems through the publication of numerous articles in business and academic journals, as well as through his active participation in academic and industry associations in the field of information systems.

Preface

An Opening Word

My heartfelt thanks goes to all the faculty and students who made the first edition of this text such a success. Thanks especially to the many instructors who took a chance on a new MIS text in a field crowded with "new" MIS textbooks. A special thanks also to those students who told their instructors how much they liked the approach and content of a text with these unique features:

- Loading the text with real world cases and problems about real people and companies in the business world.
- Organizing the text around a simple five level framework that emphasizes the IS knowledge a managerial end user needs to know.
- Distributing and integrating IS foundation theory throughout the text instead of concentrating it in several early chapters.
- Early emphasis on the strategic role of information systems in providing competitive advantage, as well as on the operational and decision support roles of information technology.
- Early coverage of how the systems development process can provide information system solutions to business problems.

This new second edition is a major revision that retains these important features, while significantly updating coverage of IS technology and theory. In addition, it adds a new chapter on international and ethical issues in information systems and provides all new Real World Cases and Problems. Major revisions have been made to the organization of topics in many chapters, and several new pedagogical components have been added to the end-of-chapter materials. And of course, the second edition now features full color art and photos to increase its attractiveness and visual appeal to students.

A Text for Managerial End Users

This text is written for students who are potential managerial end users. That is, it is written for business students, most of whom will become managers, entrepreneurs, or managerial-level professionals who will use and manage information systems. Achieving this goal will be difficult without a knowledge of the indispensable role of information systems in business operations, managerial decision making, and the strategic success of organizations. This text is designed to help students become managerial end users who can propose and participate in developing information system solutions to business problems.

This text is designed for use in undergraduate or introductory MBA courses in

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Management Information Systems, which are required in many Business Administration or Management programs as part of the *common body of knowledge* required of all business majors. Thus, this text treats the subject area known as Information Systems (IS), Management Information Systems (MIS), or Computer Information Systems (CIS) as a major functional area of business that is as important to management education as are the areas of accounting, finance, operations management, marketing, and human resource management.

This text is designed to support the attainment of **information system literacy** by students. That is, its objective is to build a basic understanding of the value and uses of information systems for business operations, managerial decision making, and strategic advantage. Although this text is not designed for courses in *computer literacy*, it does include a module entitled "Information Technology: A Managerial Overview." The four chapters of this module emphasize managerial implications of information technology. However, they do contain overviews of computer hardware, software, telecommunications, and database management that can be used as a refresher on such topics or to help remedy deficiencies in student computer literacy.

A Framework for Managerial End Users

This text reduces the complexity of a course in management information systems by using a framework that organizes the knowledge needed by a managerial end user into five major areas:

- **Foundation Concepts.** Basic information systems concepts and the operational, decision making, and strategic roles of information systems (Chapters 1 and 2). Other behavioral, managerial, and technical concepts are presented where appropriate in other chapters.
- **Development.** Developing information system solutions to business problems using systematic problem solving and systems development methodologies (presented in Chapter 3 and Appendix A, and in other chapters when discussing the development of major types of information systems).
- **Technology.** Major concepts, developments, and managerial implications involved in computer hardware, software, telecommunications, and database management technologies (Chapters 4, 5, 6 and 7). Other technologies used in computer-based information systems are discussed where appropriate in selected chapters.
- **Applications.** How information systems support end user activities, business operations, managerial decision making, and strategic advantage (introduced in Chapter 2 and discussed in detail in Chapters 8, 9, 10, 11 and 12.)
- **Management.** The challenges and methods of managing information technology (emphasized in every chapter, but discussed specifically in Chapters 13, 14 and 15).

Real World Cases and Problems

This text makes extensive use of up-to-date "real world" case studies and problems. These are not fictional stories, but actual situations faced by business firms and other organizations as reported in current business and IS periodicals. This includes three real world case studies in each chapter that apply specifically to that chapter's

contents, six real work problems provided at the end of every chapter and 10 major case studies found in Appendix C. In addition, each chapter contains several Application Exercises, including some hands-on computer assignments. The purpose of this variety of assignment options is to give instructors and students many opportunities to apply each chapter's material to real world situations.

Developing Information System Solutions to Business Problems

This text introduces students to (1) basic information system concepts, (2) the generic systems approach to problem solving, and (3) information systems development early in the text. This approach emphasizes that general systems theory, information system concepts, the systems approach, and the systems development process are fundamental interrelated concepts used by both end users and IS specialists to solve business problems.

Students are better motivated if they can be shown how to apply information systems concepts (including systems development concepts) to business problem solving early in the course. Then they can learn how to identify, analyze, and propose possible information system solutions to a variety of simple organizational problems early in the course. So this text introduces students to the systems approach in the first section of Chapter 3, while the second section introduces the systems development process as a way for end users to develop IS solutions to business problems. At the option of the instructor, Appendix A can be assigned to provide coverage of systems development tools, while Appendix B demonstrates applying IS solutions to a business case study. This makes it possible for students to begin analyzing chapter cases and problems early in the course, as well as some of the shorter case studies in Appendix C, and any actual business situations that instructors may assign as class projects.

Distributing and Integrating IS Theory

MIS texts have traditionally lumped coverage of systems theory, information theory, decision theory, management theory, and organization theory into their first three or four chapters. Although this placement is conceptually natural and defensible, it devastates many students and frustrates their instructors. It's just too much theory, too early, for most students. Much of it is forgotten by the time they finally get to chapters that apply such theories to various information system applications.

That's why this text distributes and integrates theory throughout the text, especially in chapters covering major information system applications. For example, important concepts from management and decision theory are discussed in the first section of Chapter 10, followed by coverage of decision support and executive information systems in the second section of that chapter. This method of organizing the text ties theoretical concepts more directly and naturally to their application to major types of information systems. It thus makes it easier for students to understand and remember such concepts, while providing a rationale for the importance of specific information systems applications and issues.

Strategic, International, and Ethical Dimensions

This edition contains substantial text material and cases reflecting the strategic, international, and ethical dimensions of information systems. This can be found not only in Chapter 2: *Information Systems for Operations, Management, and Strategic Advantage*, and Chapter 15: *Managing IT: International and Ethical Dimensions*, but in

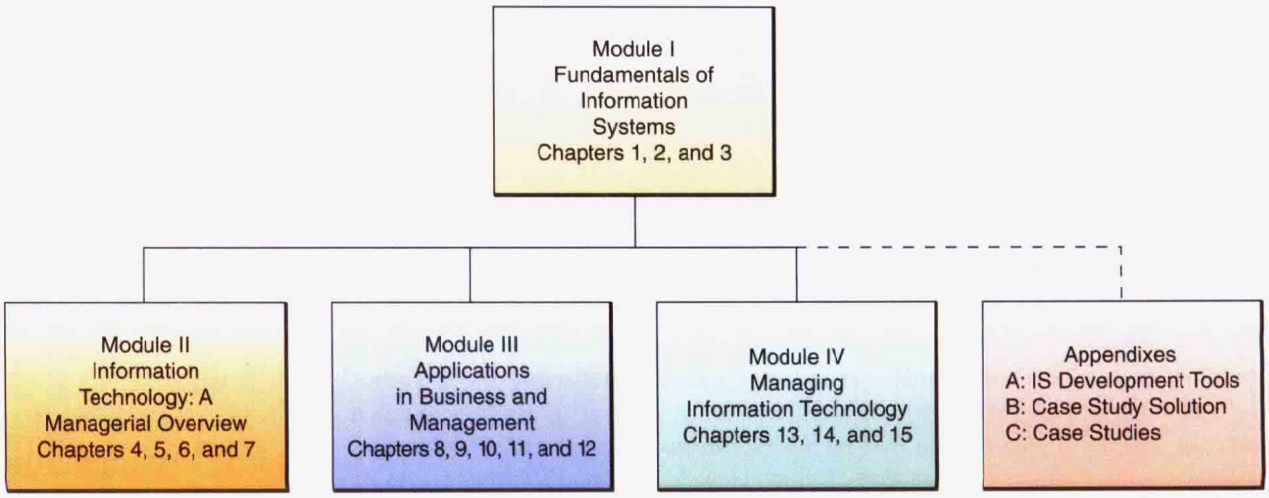
all other chapters of the text. This is especially evident in many Real World Cases and Problems, such as United Parcel Service (Eastern Europe), Port of Singapore, Nissan Motor Company, Royal Bank of Canada, The Government of Israel, The Egyptian Cabinet, The Legion of Doom, Epson America versus Alana Shoars, and many, many others. These examples repeatedly demonstrate the strategic and ethical challenges of managing information technology for competitive advantage in global business markets and in the global information society in which we all live and work.

Modular Structure of the Text

The text is organized according to the five major areas of the framework for information systems knowledge mentioned earlier. Figure 1 illustrates how the text is organized into four **modules** and three appendices. Also, each chapter is organized into two distinct **sections**. This is done to avoid proliferation of chapters, as well as to provide better conceptual organization of the text and each chapter. This organization increases instructor flexibility in assigning course material since it structures the text into modular levels, i.e., modules, chapters, and sections, while reducing the number of chapters that need to be covered.

Each chapter starts with a Chapter Outline and Learning Objectives and ends with a Summary, Key Terms and Concepts, a Review Quiz tied directly to the Key Terms and Concepts, Discussion Questions, Real World Problems, Application Exercises, and Selected References. Real World Cases are also provided at the end of each section and chapter. The Discussion Questions and Application Exercises are new to this edition and provide other ways for students to apply chapter material. This includes hands-on application exercises in Chapters 5, 7, 8, 9, 10, 13, and 14 and Appendix A that give students an opportunity to use spreadsheet and database management packages to solve business problems. These exercises are identified by a disk icon in the margin of the page. The Data/Solutions disk for these exercises is located in the Instructor's Resource Manual.

FIGURE 1
The modular organization of the text.



Module I: Fundamentals of Information Systems

The first module of this text is designed as a **core module** of foundation concepts. Once instructors have covered this module, they can assign any other module depending on their pedagogical preferences. Chapter 1 introduces students to the importance of information systems, the framework of information systems knowledge needed by managerial end users, and the generic components and properties of information systems. Chapter 2 introduces the major roles and types of information systems, emphasizing the strategic role that information systems can play in gaining competitive advantages for an organization. Chapter 3 introduces the generic systems approach to problem solving and then applies these concepts to the traditional and prototyping process of information systems development from the viewpoint of a managerial end user.

Module II: Information Technology: A Managerial Overview

Module II contains chapters on computer hardware (Chapter 4), software (Chapter 5), telecommunications (Chapter 6), and database management (Chapter 7). Its purpose is to give students an overview of the technology used in modern computer-based information systems and its implications for end user management. This material is consolidated in an independent module since students may have already covered some of these topics in an earlier course. Thus, instructors can selectively use the chapters and sections of this module, depending on the preparation of their students. This is especialy useful in the case of the important topics of telecommunications and database management, in which many students have typically had only a brief exposure. Students need an adequate background in such topics in order to propose realistic information system solutions to business problems.

Module III: Applications in Business and Management

Module III contains five chapters that discuss the basic concepts and major applications of computer-based information systems. It emphasizes how information systems support end user activities and the operations and management of business firms and other organizations. Thus it includes coverage of concepts and applications in end user computing and office automation (Chapter 8), transaction processing and information reporting (Chapter 9), managerial decision making and decision support and executive information systems (Chapter 10), artificial intelligence, human information processing, and expert systems (Chapter 11), and information systems for the functional areas of business (Chapter 12).

Module IV: Managing Information Technology

It is important that prospective managerial end users learn that although information technology can help them solve business problems, it also poses major managerial challenges. That is the focus of the three chapters of Module IV. The impact of information technology, the importance of information resource management, and strategic, tactical, and operational information systems planning are covered in Chapter 13. Chapter 14 discusses management issues in the implementation of information systems, and the controls needed for information system performance and security. Chapter 15 is a new chapter that explores the key managerial issues in global IT management and the ethical and societal dimensions of information technology.

Appendixes

As mentioned earlier, Appendix A offers optional coverage of systems development tools such as system flowcharts and data flow diagrams, while Appendix B demonstrates an IS solution to a business case study. Appendix C is a 63-page appendix

containing 10 major case studies which can be used at the option of the instructor. They describe problems and opportunities in business operations, managerial decision making, or information systems management faced by actual computer-using firms and organizations. These cases can thus be used to integrate many of the concepts and applications discussed in the text. They are an additional method of giving students an opportunity to apply knowledge gained throughout the course to the development of information system solutions for business problems. Thus, these cases can be used as the basis for class discussion or for term project assignments.

Summary of Changes

Besides providing all new Real World Cases and Problems, the 2nd edition represents a major revision of chapter contents. Highlights of the changes made to the 1st edition material are found in the following 2nd edition chapters:

Chapter 1: Two Real World Cases are analyzed in Section I to demonstrate the importance of information systems, while the model of information system components in Section I has been revised to stress the vital role of data resources.

Chapter 2: The coverage of information systems for operations and management in Section I has been simplified, while increased coverage is given in Section II to the use of information technology for competitive advantage.

Chapter 3: The coverage of the systems approach to business problem solving in Section I has been combined with simplified coverage of information systems development in Section II. This has been made possible by moving the second sections of 1st edition Chapters 3 and 4 to the back of the text as optional Appendixes A and B.

Chapters 4, 5: Updated and reorganized coverage of computer hardware and software formerly in Chapters 5 and 6.

Chapter 6: Updated coverage of the operational and strategic impact and managerial issues of telecommunications in Section I, and technical telecommunications network developments in Section II (formerly in Chapter 7).

Chapter 7: Updated and simplified coverage of the role of database management in managing organizational and end user data resources in Section I, and technical topics in database management in Section II (formerly in Chapter 8).

Chapter 8: Formerly Chapter 12, this revised chapter emphasizes the importance of end user computing and office automation applications to managerial end users, including substantial new material on work group computing.

Chapter 9: Increased coverage of the strategic role of transaction processing systems and EDI in Section I, with substantial new material on information presentation alternatives such as hypertext and multimedia in Section II.

Chapter 10: Revision of material on the impact of management and decision theory on IS in Section I, and increased coverage of executive information systems in Section II.

Chapter 11: Revised coverage of artificial intelligence and expert systems, and new material on neural networks, fuzzy logic, and virtual reality in business.

Chapter 12: Revision of material on IS support of the functional areas of business including new coverage on sales force automation and governmental reporting (formerly Chapter 13).

Chapter 13: Section I is a major revision of managerial issues in IT formerly found in Chapter 14, while Section II contains revised material on IS planning formerly in Chapter 15. Coverage of the managerial and organizational impacts of IT and information resource management is emphasized, especially planning its use for competitive advantage.

Chapter 14: Section I of this chapter contains revised material on IS implementation topics formerly in Chapter 15, while Section II contains revised material on IS security and controls formerly in Chapter 16.

Chapter 15: This new chapter covers the international dimensions of IS management in Section I and ethical and societal IT issues in Section II. It thus serves as a *capstone chapter* whose content provides an integrating and stimulating series of topics and Real World Cases and Problems for class discussion and assignments at the end of the course.

Appendix A: An optional appendix containing revised material on systems development tools, including expanded material on data flow diagrams (formerly Section II of Chapter 4).

Appendix B: An optional appendix containing the solution of a sample case study based on the systems approach to problem solving discussed in Chapter 3 (formerly Section II of Chapter 3).

Appendix C: An optional appendix containing 10 major case studies of computer-using firms. Seven of the case studies are new to this edition

Support Materials

A new software case book, *Application Cases in MIS: Using Spreadsheet and Database Software,* by James N. Morgan of Northern Arizona University is available to supplement the hands-on exercises in this edition. This optional case book contains an extensive number of hands-on cases, many of which include a suggested approach for solving each case with a spreadsheet or database management package. This software case book should be a valuable supplement that gives students many opportunities to learn to use spreadsheet and database management software packages to develop solutions for realistic business problems.

An **Instructor's Resource Manual**, revised by H. Roland Weistroffer of Virginia Commonwealth University, is available to instructors upon adoption of the text. It contains instructional aids and suggestions, detailed annotated chapter outlines with instructional suggestions for use in lectures, answers to chapter questions, problems and case study questions, and suggested solutions to the case studies in the appendix . Transparency masters of important figures from the text and other sources are also provided. The manual also includes a Data/Solutions disk

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containing data files and solutions to the hands-on exercises in the text. A set of 100 color overhead transparencies is also available to text adopters.

A **Test Bank**, which contains over 1,500 true-false, multiple choice, and fill-in-the-blank questions, has been revised by Lynn Jensen of Virginia Commonwealth University. It is available as a separate test manual and in computerized form on floppy disk for use with the Irwin Test Generator Program.

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My thanks also go to James N. Morgan of Northern Arizona University, who authored the software casebook that can be used with this text and developed five of the hands-on Application Exercises in the text, as well as the Data/Solutions disk in the Instructor's Resource Manual. Additional acknowledgments are owed to H. Roland Weistroffer and Lynn Jensen of Virginia Commonwealth University, who revised the Instructors Resource Manual and Test Bank, respectively, and to Jerry Post of Western Kentucky University, who provided additional transparencies for use with this text. I am indebted to Bill Macmillan of Madonna University, Tom Pollack of Duquesne University, and Ed Roche of Seton Hall University for research material they provided on international or ethical issues in information systems. I also gratefully acknowledge the unique contribution of Guy Marion of the University of Quebec, who has translated and adapted this edition of the text into a French language edition in a joint publication arrangement between Irwin and Editions Du Renouveau Pedagogique of Montreal.

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Acknowledging the Real World of Business

The unique contribution of over 150 business firms and other computer-using organizations that are the subjects of the real world cases, problems, exercises, and case studies in each chapter and Appendix C is also gratefully acknowledged. The names of these organizations are listed in the **Organization Index** at the end of the text. The real-life situations faced by these firms and organizations provide the readers of this text with a valuable demonstration of the benefits and limitations of using information technology to support business operations, managerial decision making, and strategic advantage.

James A. O'Brien

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