Business Information Systems

A PROBLEM-SOLVING APPROACH

Second Edition

Kenneth C. Laudon   ○   Jane Price Laudon

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About the Authors

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Ken has written six books and numerous articles in academic journals about the organizational and societal impacts of information technology. He has testified before Congress on many occasions and has worked as a consultant to the Office of Technology Assessment (United States Congress), the Office of the President, several executive branch agencies, and congressional committees.

Ken's current research deals with the planning and management of very large-scale systems for the 1990s. This research is funded by the National Science Foundation and private corporations.

JANE PRICE LAUDON is a management consultant in the information systems area and a professional writer. She has written six books. Her special interests include systems analysis and design, software evaluation, and teaching business professionals how to design and use information systems. She has taught at the New York University Graduate School of Business and at Columbia University. She received her B.A. from Barnard College, her M.A. from Harvard University, and her Ph.D. from Columbia University. For the past eight years, Jane has been an information systems consultant for leading *Fortune* 500 companies. She and her husband, Ken, have two daughters, Erica and Elisabeth.

Business Information Systems: A Problem-Solving Approach is the second book the Laudons have written together. It reflects the Laudons' personal belief that undergraduate information systems textbooks must include a multidimensional perspective involving people, technology, and organizations, and that such books must be, above all, readable, enjoyable, and informative.

Preface

The second edition of *Business Information Systems,* as was the first edition, is based on the premise that virtually all college graduates in the 1990s will be employed in computerized organizations. Regardless of their occupations, college graduates will be expected by employers to understand, use, and possibly design computer-based information systems.

Accordingly, we wrote this book for nontechnical undergraduate students in finance, accounting, management, information systems, and the liberal arts who will find a knowledge of information systems and technology vital for professional success. This book also provides a broad foundation and understanding for students who will become MIS majors.

This textbook presents the introductory information systems course from a business and problem-solving perspective. Traditionally, the introductory information systems course has had a technology or computer hardware orientation. Much of the course was devoted to the computer input, output, and processing equipment, with a secondary focus on introductory programming concepts.

Increasingly, many colleges, universities, and business employers are finding that students cannot apply computer technology effectively unless they understand more about business—the important features of business organizations, business processes, and how businesses use information and information systems. They realize that students cannot appreciate the full potential of information technology unless they can see how it is used in real-world business settings. Moreover, information technology has changed so rapidly that using computer hardware and software effectively requires considerably less technical knowledge than in the past. Both businesses and educators are finding that the major stumbling block to using computers effectively is not insufficient knowledge of the nuts and bolts of computers but the need for greater understanding of the role of information technology in business and how it can be applied to solve business problems.

Equally important, the educational and business worlds are both calling for students to hone their critical-thinking and problem-solving skills. To remain competitive, productive, and prosperous, we need to educate people not only with the specialized skills but also with the broader knowledge required to solve new problems they will encounter in the future. Our responsibility does not end with teaching students about business information systems. We must teach students how to apply what they have learned. This is essential for leaders and problem solvers in a world where the knowledge base and business environment are constantly changing. The second

edition of *Business Information Systems* reinforces the problem-solving emphasis that was so well-received in the first edition.

Unique Thrusts of the Book

Our textbook departs from other textbooks in several ways. It treats information systems as more than just computers. Instead, we view information systems as composed of information technologies, business organizations, and people. We emphasize the broader concepts of information systems rather than computer systems, and information systems literacy rather than computer literacy. By information systems literacy, we mean a full understanding of business organizations and individuals from a behavioral perspective combined with knowledge of information technology. From this point of view, a firm's procedures, values, and plans, as well as the training it provides its employees, are just as important as its technologies.

One solid discovery of the last five years is that information technology alone is not sufficient to bring about changes in business productivity or personal effectiveness. We need to redesign business organizations, create new roles for people, and develop new ideas about how to use information technology wisely in order to achieve higher levels of productivity.

In the systems environment of the 1990s, the computer is just one of many technical elements in a network of devices that may include "smart" printers, facsimile machines, plotters, modems, and a host of other devices. Data processing is just one of many functions that such networks perform. A host of new functions have appeared: image processing, graphics, desktop publishing, communications, and group support, to name only a few. Therefore, this book will shift from a singular focus on the "computer in the box" toward an understanding of the many information technologies used in computer-based networks.

Our textbook further departs from textbooks of the past by employing an explicit problem-solving and critical-thinking perspective. It shows how businesses and individuals can design and use information systems to solve business problems, and it emphasizes the teaching of critical-thinking and problem-solving skills. Students will learn how to analyze and define a business problem and how to design an appropriate solution. In many cases the solution requires students to visualize a new information system application.

Avoiding a simple "hands-on" approach, our book seeks a broader understanding of the business and organizational setting of systems. Mere computer literacy, or hands-on training, will not suffice as the basis of an enduring professional education; knowing how to strike keys on a keyboard is insufficient preparation for the 1990s. It is more important for students to know why and how an information system might solve a business problem, how to evaluate software and hardware, and what organizational changes are required to make systems work for a business. Knowing the difference between an organizational problem, a people problem, and a technology problem is central to this understanding.

How This Book Prepares You for the 1990s

Now and in the foreseeable future the success of a business—whether it becomes the market leader in design and quality, the low-cost producer, or the successful innovator—will increasingly depend on the quality of its information systems and technologies. In turn, the quality of a business's systems and technologies will depend largely on you—the professional who works in the firm. You will be expected to perform the following functions: suggest new uses for information systems; participate in the design of systems; purchase information systems equipment; solve business problems using information technology; and understand the limitations of information technology. These new roles and expectations for business professionals require a much deeper understanding of information and information systems than ever before.

As a business owner or employee, you will be expected to assimilate information about a dizzying array of new hardware, software, and telecommunications developments. To keep up with the rapid pace of change tomorrow, you will need a firm foundation today. All of your reading, analysis, writing, and problem-solving skills will be required.

To prepare you for the world of the mid-to-late 1990s, this book aims to accomplish three goals:

- Show you how to envision, design, and evaluate computer-based solutions to typical business problems
- Teach you how to use contemporary and emerging hardware and software tools
- Provide enduring concepts for understanding information systems that you can apply in your future careers or information systems courses

The features of the book accomplish these objectives in a variety of ways.

Providing Critical-Thinking and Problem-Solving Skills

Computers cannot solve problems unless people can first understand the problem, describe it, and then design a solution. Accordingly, Part 3 of this book (Problem Solving with Information Systems) is devoted to this topic. Earlier chapters introduce problem solving by providing a framework for analyzing business problems in terms of people, organizations, and technologies.

How we define a problem fundamentally shapes the solutions we devise. Some problems can be solved by changing organizational structure, management, or procedures. Others require a solution that changes the way an existing information system works or that provides an entirely new one. Thus, problem solving in the information systems world requires a methodology that considers technology, people, and organizations. This methodology, accompanied by real-world case studies depicting alternative solutions, is presented in two core chapters of the text. It appears in many of the other chapters as well.

This edition of the textbook puts even more emphasis on critical thinking and problem solving than the first edition. It encourages students to learn more actively by providing them with numerous cases, problems, and projects, where they can synthesize the material provided in each chapter and apply the concepts they learn to new situations. Each chapter includes at least one project or exercise that is suitable for group work and presentation, and each is replete with opportunities for students to sharpen and integrate their analytical, writing, and oral-presentation skills.

Using Business Information Technologies

Business Information Systems offers an unparalleled package of both internal and supplementary hands-on materials that makes it relatively easy to learn how to use contemporary technology to solve business problems.

Parts 2 and 4—Foundations of Information Technologies and Overview of Business Information Systems—provide an overview and in-depth understanding of business information technologies using real-world business examples. Because personal computers are important tools of individual workers, entrepreneurs, and large corporations, many examples relating to personal computer hardware, software, and applications are included. Yet mainframes, minicomputers, long-distance telecommunications networks, and large corporate information systems also receive full discussion. The focus of the text is the entire array of contemporary information technologies.

Internal software case studies in key chapters provide the opportunity to use spreadsheet and database software to solve real business problems. These cases are generic in the sense that they can be used with any available software on your campus or in your home.

Hands-on software exercises have played an important role in introductory information systems courses, because they have enormous potential for teaching information systems concepts. In competing books, the primary emphasis has been on learning commands and keystrokes to gain facility with various software packages. In this book, software exercises are problem driven. Emphasis is placed on developing concepts and skills for applying software to problem solving. In both the text and the supplemental software package, students are first presented with problems and are then taught how to use software to solve them.

Providing an Enduring Sense of Understanding

Most of the hardware and software you use now is at least five years old. Much of it will be gone in five to ten years, replaced by better hardware and software. Hence, some of what you learn today will no longer be relevant five years after your graduation. What will be relevant?

We believe critical-thinking and problem-solving skills will last a lifetime. In addition, many underlying principles of business information systems—the structure of computer hardware and software and ways of using this technology intelligently—will not change.

For instance, the basic principles of how computer hardware and software work will not have changed a great deal by the year 2000. Some radically new principles of computing may, indeed, be discovered, but full implementation of totally new computing concepts usually takes a long time. Similarly, the basic professional, financial, accounting, and management knowledge base will change slowly over the years. The basic skills that enable you first to understand a problem and then to solve it will not change.

In addition to enhancing your knowledge of contemporary information systems, this textbook develops a more fundamental understanding of technology, business organizations, and human beings. We believe this understanding is necessary to cope with a rapidly changing technological base.

We hope *Business Information Systems* will help you become effective leaders and analysts who can innovate and use information systems to help businesses manage change.

Overview of the Book

Part 1 describes the major themes of the book and explores the role of information systems in contemporary businesses. These chapters are especially important for describing the major challenges that we all face in applying information technology effectively. Part 1 raises several major questions: What is an information system? What is a business? How much do I need to know about information systems and why?

Part 2 provides the technical foundation for understanding information and telecommunications technologies. It answers two questions: How do information technologies work? How are they likely to change in the near future? Students with no prior background in computing will find Part 2 very helpful because it provides a basic foundation for computing and systems literacy. More advanced students will find that these chapters considerably extend and update their knowledge of contemporary systems. Chapter 7 is entirely devoted to new telecommunications technologies, and Chapter 8 describes current leading-edge business uses of expert systems.

Part 3 describes how to use the knowledge gained in Parts 1 and 2 to analyze and design solutions to business problems. This part focuses on the question: How can information systems be used to solve a business problem? Two entire chapters in Part 3 are devoted to critical thinking and problem solving. Chapter 9 describes an overall methodology for analyzing business problems. Chapter 10 puts this methodology to work. The emphasis throughout is on a broad understanding of how organizations, technologies, and people must work together. Chapter 11 examines various ways of building systems using basic problem-solving methods and alternative systems development methodologies.

Part 4 provides a more extensive introduction to real-world information systems in business. It answers two major questions: How do contemporary businesses use information systems? What broader social and organizational concerns are raised by information systems in business? The

emphasis here is on real-life examples and how these systems fit into the larger world of business organizations. Chapters 13 and 14 are noteworthy for their description of an entirely new class of systems—knowledge-based systems for office automation and professional work.

Some of the new themes covered in this book are given complete chapter-length treatment. Among these unique chapters are Knowledge and Information Work: Office Automation; Business Problem Analysis: Critical Thinking Skills; and Designing Information System Solutions.

Book Design Features

This book makes several large, stylistic departures from previous works. The following design features reflect the authors' concern for providing a comprehensive understanding of issues and a highly readable text that students and professors will appreciate.

Focus Boxes • In each chapter you will find examples of the four highlighted Focus boxes. The purpose of these boxes is to present contemporary examples of the conceptual foundation, design, use, and management of information technology and systems. Focus box themes are:

- **Technology:**   Hardware, software, telecommunications, and data and information storage.
- **Organizations:**   Histories, activities, and plans of business organizations using information systems.
- **People:**   Careers and experiences of individuals working with systems.
- **Problem solving:** Examples of successful and unsuccessful business solutions and their consequences.

Each Focus box features a question or series of questions that challenges students to reconceptualize a problem and apply what they have learned in the chapter to the real-world scenario in the box.

Real-World Examples • Only real-world examples are used throughout the text for cases and Focus boxes. More than 200 American and foreign corporations are discussed (see the Organization Index).

Problem-Solving Exercises • Each chapter concludes with exercises or projects based on the material covered in the chapter. All of these exercises are designed to sharpen problem-solving skills and can be used with any available software or paper and pencil. The problem-solving exercises encourage students to answer a question, think about a problem, work with a group of students to define an answer to a problem, or outline the pros and cons of an issue. At least one problem-solving exercise per chapter is designed for group work and presentation.

Chapter Cases • Thirty-two, real-world business cases are included in the text—one at the beginning and one at the end of each chapter. The

chapter-opening cases introduce or illustrate the major theme of each chapter. Typically, they focus on how a real-world business organization uses a technology (or fails to use it) to solve a problem. The chapter-ending cases, called Problem-Solving Cases, help students review the material covered in each chapter and apply this new knowledge to specific problems.

Leading-Edge Application Section • Many chapters conclude with an illustration of an information systems application related to chapter topics that uses leading-edge information technology.

Chapter Format

We have made every effort to ensure that each chapter is lively, informative, and often provocative of further debate, discussion, and thought. Each chapter employs the following format:

- A detailed outline at the beginning to provide an overview of chapter contents
- A list of chapter learning objectives
- A chapter-opening case
- A summary that identifies key themes, terms, and topics introduced in the chapter
- A list of key terms for students to review
- A set of review questions for student use in reading
- A set of discussion questions for the instructor and students to use in class discussion or individual study
- Problem-solving exercises at the end, consisting of both group and individual projects
- A problem-solving case at the end
- A list of references to provide students with guidance for additional research or term papers

Changes to the Second Edition

More Activist Pedagogy to Promote Critical-Thinking, Writing, and Presentation Skills • The first edition of *Business Information Systems* was a leader in the field because of its business emphasis, use of real-world examples, coverage of leading-edge technology, and treatment of critical thinking and problem solving. The second edition maintains these strengths, while putting even more emphasis on showing students how to analyze problems and actively learn. Group exercises to develop teamwork and oral- and written-presentation skills have been added to the Problem-Solving Exercises at the end of each chapter. Focus questions at the end of each Focus box challenge students to think creatively and apply chapter concepts to the real-world material in the boxes.

More Attention to the Human and Ethical Dimensions of Information Systems • Chapter 16 contains an entirely new section on information system ethics. Focus boxes in other chapters highlight important human and ethical issues, such as privacy, software copying, employee monitoring, and employee health and safety.

Leading-Edge Coverage of New Technical and Business Developments • All Focus boxes have been updated with contemporary material. The text features more extensive treatment of such leading-edge technical developments as multimedia, object-oriented programming, fuzzy logic, imaging, and groupware.

Broader International Coverage • More examples emphasizing the global nature of business and information systems are drawn from businesses in Canada, Europe, and Asia.

More Attention to the Role of Intrapreneurship, Creativity, and Change Management in the Overall Problem-Solving Process • Chapter and Focus box coverage of these topics has been expanded.

More In-depth Treatment of the Issues of Productivity and Competitive Advantage • Chapter 2 contains more material on the strategic value of information systems and competitive advantage. Technological, human, and organizational factors in business productivity are discussed throughout the text and in Focus boxes.

Instructional Support Materials

Many additional resources available with this text will assist students in learning more about information systems.

Software

In our experience teaching this course, we have found that a strong computer-based learning package is vital to strengthening student understanding. The support package for this text includes a software problem-solving package called *The Integrated Solution*. *The Integrated Solution* consists of 21 business cases. These cases provide students with a truly unique opportunity to learn how software is actually used in business settings. They are based on real-world problems and solutions from American businesses, and are solved using spreadsheet, database, and word processing software. *The Integrated Solution* includes documentation on how to use WordPerfect, Lotus 1-2-3, and dBASE III PLUS (and most of their clone products). Additional cases involving business problem solving with spreadsheet and database software can be found in *Solve It!*, a supplement prepared by Ken and Jane Laudon. *Solve It!* can be obtained by writing: Azimuth Corporation, 124 Penfield Avenue, Croton-on-Hudson, NY, 10520.

A tutorial lab manual, *Productivity Software Guide* by Charles S. Parker at the College of Santa Fe, provides complete proficiency-based software instructions and abundant exercises. The *Productivity Software Guide* introduces students to MS DOS, WordPerfect, dBASE III PLUS, and dBASE IV, as well as Lotus 1-2-3. The *Productivity Software Guide* is also available in individual modules, allowing you to select the ones that best fit your course. For schools planning to run software under Windows, The Dryden Press offers a selection of modules providing various popular software options.

Instructor's Resource Manual

The *Instructor's Resource Manual,* written by Jane and Ken Laudon, and Beverly Amer of the University of Florida, provides additional material to support your classroom preparation and lecture presentation. For each chapter of the text, the *Instructor's Resource Manual* includes a chapter summary, learning objectives, key terms, lecture outline, answers to review questions, answers to discussion questions, answers to case questions, and transparency masters.

Student Study Guide

The *Student Study Guide,* written by Marilyn Moore of Purdue University— Calumet and Diane Larson, offers students an innovative and active approach to the study of information systems. The guide begins by having students assess their understanding of textual concepts, and then initiates further exploration of Focus topics and problem-solving techniques. The guide features a tutorial walk-through summary keyed to the learning objectives; chapter terminology review; questions on the Focus boxes and vignettes; short-answer questions; additional resources section; and assignments with software applications.

Test Bank

The *Test Bank,* written by Milan Kaldenberg of Northwest Nazarene College and Laurette Simmons of Loyola College, contains more than 2,100 test items, including multiple choice, true/false, matching, vocabulary application, and short-answer questions, as well as problem-solving applications. Questions are keyed to the chapter learning objectives and include an answer key noting the question level and cognitive type.

The *Test Bank* is also available on the ExaMaster Computerized Test Bank in IBM 5¼″, 3½″, and Macintosh versions. The electronic versions allow instructors to easily preview, edit, or delete questions as well as to add their own questions, print scrambled forms of tests, and print answer keys.

Transparency Acetates

A set of approximately 100 full-color transparency acetates is available to illustrate and explain key concepts. The acetates feature both selected text diagrams and new pieces of art. Teaching notes for each transparency are included.

Videotapes

The new video series *The Machine That Changed the World* is currently available to adopters. This exciting series contains segments depicting real-world examples of computer use in society; leading-edge coverage of future trends in information technologies, such as artificial intelligence, virtual reality, and imaging; and information on the ever-emerging ethical issues confronting users in the computer age. The series offers clear, concise portrayals of past and present developments in hardware and software. Ask your Dryden sales representative for details on adoption criteria.

In addition, a growing collection of videotapes from Dryden's new Information Processing Video Library is available to adopters of *Business Information Systems*. Adopters will have immediate access to professional quality videotapes that explore such technological landmarks as the advent of the electrical digital computer, the laser, and the communication satellite. Other topics include information theory, the role of computers at Florida's Sea World theme park, and a demonstration of active problem-solving techniques.

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