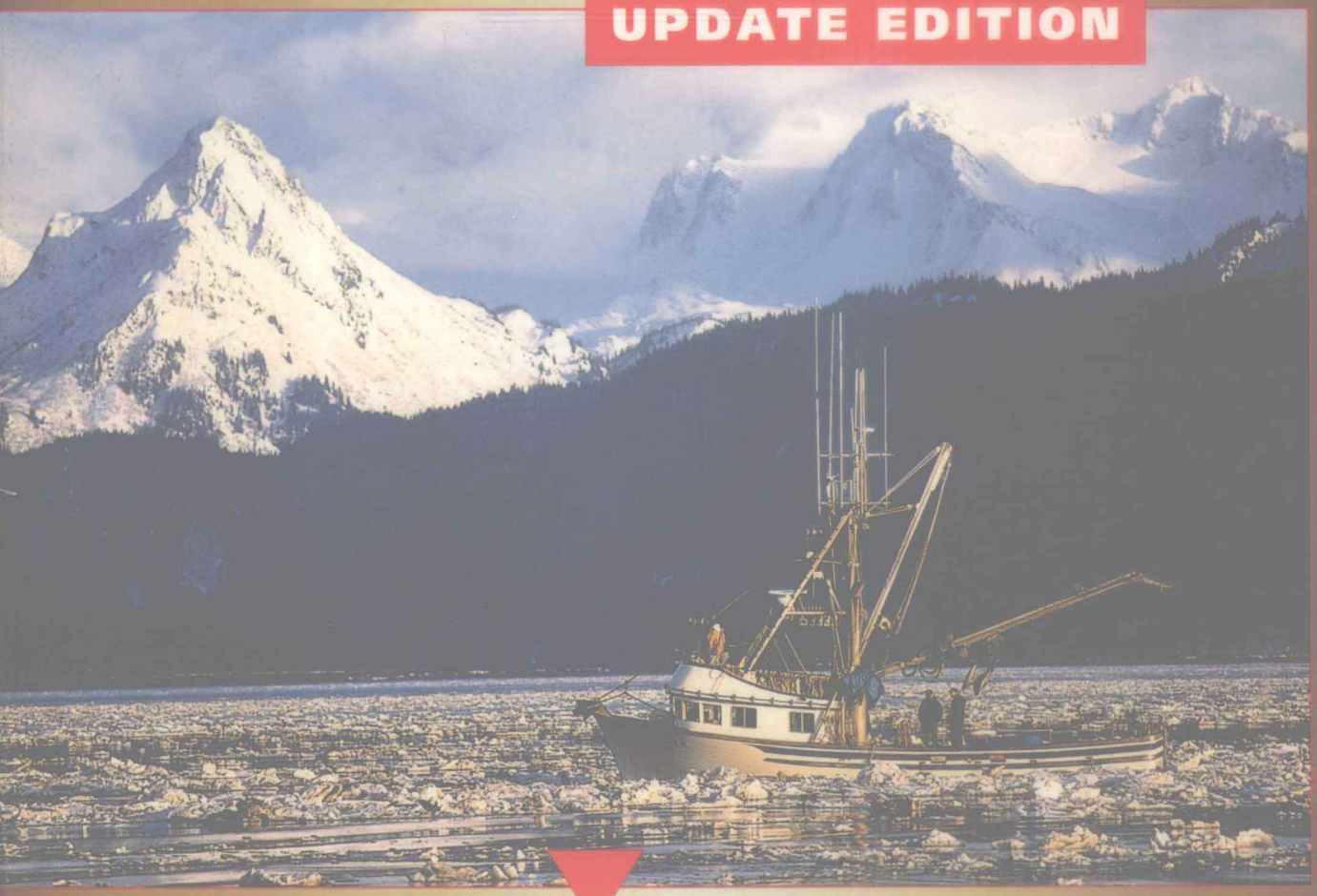
Turban · McLean · Wetherbe

UPDATE EDITION



INFORMATION TECHNOLOGY for MANAGEMENT

Making Connections for Strategic Advantage

SECOND EDITION

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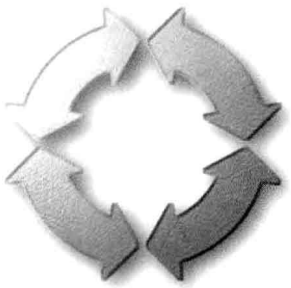

Making Connections for Strategic Advantage

Second Edition
UPDATE

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PREFACE

As we begin a new millennium, we witness the tremendous importance of computerized information systems and their applications in business, education, government, the military, medicine, and at home. Computerized systems can be found today in even the smallest businesses. It is impossible to run a competitive business without a computerized information system. Indeed, global competitive pressures and continuous innovations are forcing many organizations to *rethink* how they do business. To do so requires the ability to successfully incorporate *electronic commerce, enterprise resource planning,* and *supply chain management* into an organization.

Much has changed since the Second Edition of this text was published in 1999. To help keep students up-to-date in this fast-moving field, we felt it necessary to update key sections of the text including electronic commerce, supply chain management, and enterprise resource planning. Consequently we have updated and revised the following: Chapter 4 on business process reengineering now includes extensive coverage of supply chain management and more on enterprise resource planning. Chapter 6 on electronic commerce is completely rewritten and updated to reflect the great expansion of e-commerce over the past couple of years; we've included up-to-the-minute coverage of the Internet, intranets, and extranets to conduct business. Chapter 8 has more coverage on integration of innovative functional systems to keep pace with what is happening in business today. (A special appendix presenting the basic concepts of BPR is also available on our Web site.) Finally the Technology Guides are fully updated with technological advances of the last two years.

MAKING CONNECTIONS FOR STRATEGIC ADVANTAGE

This book is based on the fundamental premise that the major role of information technology is to provide organizations with *strategic advantage by facilitating problem solving, increasing productivity and quality, improving customer service, and enabling business process reengineering.* By taking a practical, managerial-oriented approach, the book demonstrates that IT can be provided not only by information systems departments, but by end users and vendors as well. Managing information resources, new technologies, and communications networks is becoming a—or even *the*—critical success factor in the operations of many companies, and will be essential to the survival of businesses as we reach the year 2000.

Many introductory texts on information systems are geared toward yesterday's environment, where the important issues were the technology, the construction of information systems, and the support of traditional business functional applications. This book's approach is different. While recognizing the importance of the technology, system development, and functional transaction processing systems, we emphasize the *innovative* uses of information technology. The rapidly increased use of the Web, the Internet, intranets, extranets, and electronic commerce change the manner in which business is done in almost all organizations. This fact is reflected in our book where every chapter and major topic points to the role of the Web in facilitating competitiveness, effectiveness, and profitability. Of special importance is the emergence of the Enterprise Resource Planning (ERP) concept and the integrated information systems (such as those provided by SAP AG) that support it.

FEATURES OF THIS TEXT

In developing the second edition of *Information Technology for Management,* we have tried to craft a book that will serve the needs of tomorrow's managers. During the process of revising and reorganizing this edition, we have been guided by certain recurring themes that are important to succeed in business as we move into the twenty-first century.

This book reflects our vision of where information systems are going and the direction of IS education in business programs. This vision is represented by the following features that we have integrated throughout the book.

- ***Managerial Orientation.*** Most IS textbooks identify themselves as either technology or socio-behavioral oriented. While we recognize the importance of both, our emphasis is on managerial orientation. To do so *we assembled all the major technological topics in the four technology guides at the end of the book.* Furthermore, we attempted not to duplicate detailed presentations of behavioral sciences topics, such as dealing with resistance to change, or motivating employees. Instead, we concentrate on managerial decision making, cost-benefit justification, supply chain management, and business process reengineering as they relate to information technology.
- ***Functional Relevance.*** Frequently, non–IS major students wonder why they must learn technical details. In this text the relevance of information technology to the major functional areas is an important theme. Also, we show, through the use of icons, the relevance of topics to accounting, finance, marketing, production/operations management, and human resource education. Furthermore, we show the relevance to public services and health care management, using additional icons. Finally, our examples cover small businesses as well.
- ***Real-World Orientation.*** Extensive, vivid examples from large corporations, small businesses, and government and not-for-profit agencies will make concepts come alive by showing students the capabilities of information technology, its cost and justification, and some of the innovative ways real corporations are using IT in their operations.
- ***Solid Theoretical Backing.*** Throughout the book we present the theoretical foundation necessary for understanding information technology, ranging from Moore's Law to Porter's competitiveness models. Furthermore, we provide extensive references and many exercises to supplement the theoretical presentations.
- ***Most Current.*** The book presents the most current topics of information technology as evidenced by the many 1998 and 1999 citations. Topics such as electronic commerce, extranets, chief knowledge officers and knowledge bases, Web-based supply chain systems, data warehousing, knowledge discovery, and information economics are presented both from the theoretical point of view and from the application side.
- ***Electronic Commerce and the Use of the Web.*** We strongly believe that electronic commerce and the use of the Internet, intranets, and extranets are changing the world of business. Not only is an entire extended chapter (6) dedicated to electronic commerce, but we demonstrate our belief in every chapter and major topic. The world of commerce is changing and it is important that students understand these changes and their implications. For example, world-class companies such as FedEx, Dell computers, and Wal-Mart are introducing extremely innovative logistics systems supported by information technologies. This text tells you about all these innovations.
- ***Economic Justification.*** Information technology is mature enough to stand the difficult test of economic justification, a topic which is ignored by most textbooks. It is our position that investment in information technology must be scrutinized like any other investment, despite the difficulties of measuring technology benefits. In addition to discussion throughout the text, we are unique in devoting a complete Chapter (13, "Information Technology Economics") to this subject.
- ***Integrated Systems.*** In contrast with many books that highlight isolated functional information systems, we emphasize those systems that support Enterprise Resources Planning (ERP) and supply chain management. Interorganizational systems are particularly highlighted, including the latest innovations in global commerce.
- ***Global Perspective.*** The importance of global competition, partnerships, and trading is rapidly increasing. IT facilitates export and import, managing multinational companies, and trading electronically around the globe. International examples are highlighted in a Special Global Index in the back of the book, and the book's Web site includes several international cases.
- ***Comprehensiveness and Ease of Reading.*** All major topics of information technology are covered, many with more details than you will find elsewhere. Furthermore, the book is very user friendly, easy to understand and follow, and it is full of interesting real-world examples and "war stories" that keep the reader's interest at a very high level.

ORGANIZATION OF THE BOOK

The book is divided into four major parts composed of 15 regular chapters with four technology guides supplementing them.

Part I introduces the drivers of the use of information technology in the new world of business.

It also introduces the foundations of information systems and their strategic use. Special attention is given to the role information systems play in facilitating business process reengineering.

Part II introduces network computing, the various applications of telecommunication networks and the role of the Internet, intranets, and extranets in contributing to communication, collaboration, and information discovery. Electronic commerce is presented in a most comprehensive way, followed by an analysis of information technology impacts on individuals, groups, organizations, and society.

Part III discusses the many ways information systems can be used to support the day-to-day operations of a company, with a strong emphasis on the use of IT in managerial decision making. The four chapters in this part address some of the ways businesses are using information technology to solve specific problems and build strategic, innovative systems that enhance quality and productivity. Special attention is given to innovative applications of intelligent systems and to integrated systems, not only within organizations but also between and among business partners and customers. Also highlighted are the new approaches to marketing databases and knowledge management.

Part IV explores many topics, related to the planning, evaluation, construction, operation, security, and maintenance of information systems. We consider several issues ranging from the economics of information to outsourcing.

The four **technology guides** cover hardware, software, databases, and telecommunications, including the essentials of the Internet. They contain condensed up-to-date presentations of all the material necessary for the understanding of these technologies. They can be used as a self-study refresher or as a basis for a class presentation. The technology guides are supplemented by a glossary, questions for review and discussion, and case studies, all of which are available on our Web site.

PEDAGOGICAL STRUCTURE

We developed a number of pedagogical features to aid student learning and tie together the themes of the book.

- ***Chapter outline.*** The outlines provide a quick indication of the major topics covered. Detailed outlines are provided at the beginning of the book.
- ***Learning objectives.*** Learning objectives are provided at the beginning of each chapter to help students focus their efforts and alert them to the important concepts discussed.
- ***Opening cases (Connections).*** Each chapter opens with a *real-world* example that illustrates the importance of information technology to modern corporations. These cases were carefully chosen to demonstrate the relevance, for business students, of the topics introduced in the chapter.
- ***"A Closer Look" boxes.*** These contain detailed, in-depth discussions of specific concepts or procedures, often using real-world examples. Some boxes enhance the in-text discussion by offering an alternative approach to information technology.
- ***"IT at Work" boxes.*** These spotlight some real-world innovations and new technologies that companies are relying on to solve organizational dilemmas or create new business opportunities. Each box concludes with "for further exploration" issues.
- ***Highlighted icons.*** Icons appear throughout the text to relate the topics covered within each chapter back to some major themes of the book. The icons alert students to the related functional areas, and to human resource management and health care applications.
- ***Student Annotations.*** To help business students understand the relevance of the topics in this book, we asked students who also hold jobs to add their comments about how the concepts are applied in the business world. Their remarks appear in the margins throughout the book.
- ***Managerial Issues.*** The final section of every chapter explores some of the special concerns managers face as they adapt to an increasingly technological environment. Thought-provoking questions can serve as a springboard for class discussion and challenge business students to consider some of the actions they might take if placed in similar circumstances.
- ***Key Terms.*** All boldfaced, new terms introduced within the chapter appear in a list at the end of the chapter and are defined in the end-of-book glossary.
- ***Chapter Highlights.*** A list of all the important concepts covered, the chapter highlights are linked to the learning objectives introduced at the beginning of each chapter to reinforce the important ideas discussed.
- ***End-of-Chapter Exercises.*** Different types of questions measure student comprehension and their ability to apply knowledge. Questions for

Review ask students to summarize the concepts introduced. Discussion Questions are intended to promote class discussion and develop critical thinking skills. Exercises are challenging assignments that require students to apply what they have learned. The Group Assignments are class projects designed to foster teamwork.

- ***Internet Exercises.*** Over 100 hands-on exercises send the students to the most interesting Web sites to conduct research, investigate an application, or learn about the state of the art of a topic.
- ***Minicases.*** Real-world cases highlight some of the problems encountered by corporations as they develop and implement information systems. Discussion questions and group assignments are included.
- ***Part Ending Cases.*** Longer real-world cases were chosen specifically for their ability to bring together many of the overriding concepts from each part of the text. These can be found on our Web site.
- ***International cases.*** Several cases from countries around the globe (including multinational corporations) are available on our Web site.

SUPPLEMENTARY MATERIALS

An extensive package of instructional materials is available to support this edition:

- ***Instructor's Manual*** (0471-28333-9). Written by Tushar Hazra (University of Baltimore), this manual presents objectives from the text with additional information to make them more appropriate and useful for the instructor. Chapter overviews provide an explanation of how each chapter fits in with previous chapters and the entire course. The manual also includes practical applications of concepts, case study elaboration, answers to end-of-chapter questions, questions for review, questions for discussion, and Internet exercises.
- ***Test Bank*** (0471-29933-2). Written by Lisa Friedrichsen (instructor at the Keller Graduate School of Management), the test bank contains approximately 1,000 questions and problems (about 50 per chapter) consisting of multiple-choice, short answer, fill-ins, and critical thinking/essay questions.
- ***Computerized Test Bank*** (0471-29927-8). This electronic version of the Test Bank allows instructors to customize tests and quizzes for their students.
- ***PowerPoint Presentation*** (0471-29928-6). A series of slides designed around the content of the text incorporates key points from the text and illustrations where appropriate. These were prepared by Wade Jackson of University of Memphis.
- ***Video Series*** (0471-29929-4). A collection of videos which provide the students and instructors with dynamic and interesting business examples directly related to the concepts introduced in the text. The video clips illustrate the ways in which computer information systems are utilized in various companies and industries.
- ***Business Extra Website: Wall Street Journal Interactive and the On-Line Business Survival Guide.*** Wiley has teamed up with the Wall Street Journal to bring you instant access to a wealth of current articles dealing with all aspects of today's volatile business world. Use this resource to get up-to-date articles dealing with issues in information systems. The *On-Line Business Survival Guide* (0-471-25503-3) covers everything your students need to know to become master sleuths at finding critical information on the Internet. Each copy of the Survival Guide includes a special password for Wiley's *Business Extra Website* that allows students access to a series of relevant clippings from news wires and Dow Jones publications. For more information, go to www.wiley.com/college/businessextra
- ***The Turban Web Site*** (www.wiley.com/college/turban2e). The Web site extends the content and theme of the text to provide extensive support for instructors and students. Organized by chapter, it includes cases, questions and exercises for the technology guides, and downloadable PowerPoint slides, self-testing material for students, working student's experiences with using IT, links to many of the companies discussed in the text, and a link to a unique supplement called "The Virtual Company" described below.
- ***The Virtual Company.*** A Web-based case, The Virtual Company features Internet and intranet sites for a simulated company that produces snowboards. Students are "hired" by the company as consultants and given assignments which require the students to use the information in the Internet and intranet sites to develop the solutions and produce deliverables to present to the company. These exercises get the student into active, hands-on learning to complement the conceptual coverage of the text.

ACKNOWLEDGMENTS

Special recognition goes to Ralph Westfall (California State University Long Beach) and Kelly Rainer (Auburn University). Ralph wrote the chapter on information economics (Chapter 13) and contributed major portions to Chapters 12 and 14. Kelly created the technology guides to this book and updated the relevant technological topics. Also, we recognize the contribution of Kent Sandoe (formerly of Fordham University and now California State University at Chico), who reviewed the entire manuscript for completeness, accuracy, and consistency. And we thank Christine Bullen who helped to set up a student focus group at Fordham University.

Many other individuals provided assistance in the creation of the second edition. First, dozens of students participated in the class testing of the material and helped develop exercises and find illustrative applications, and contributed valuable suggestions and annotations for the text. It is not possible to name all of them, but they certainly deserve recognition and thanks.

Faculty feedback was essential to the development of the book. Many individuals participated in focus groups and/or acted as reviewers. Several others created portions of chapters or cases, especially international cases, some of which are in the text and others are on the Web site. We are grateful to the following faculty for their contributions to the second edition:

Christine P. Andrews, *SUNY at Fredonia;* Marzi Astanti, *Winona State University;* V. Bose, *Texas A&M University;* Marek Ejsmont, *Keyano College (Alberta, Canada);* George Fettes, *Camosun College;* David R. Fordham, *James Madison University;* Lisa Friedrichsen, *Keller Graduate School;* David Hale, *University of Alabama;* Fred G. Harold, *Florida Atlantic University;* Jeff Harper, *Athens State College;* Myron Hatcher, *California State University, Fresno;* Chin-Yuan Ho, *National Central University (Taiwan);* Change T. Hsieh, *University of Southern Mississippi;* Grace Johnson, *Marietta College;* Dorothy Leidner, *Baylor University;* James Linderman, *Bentley College;* Munir Mandviwalla, *Temple University;* Ji-Ye Mao, *University of Waterloo;* Vicki McKinney, *University of Texas, Arlington;* Derrick Neufeld, *University of Manitoba;* E. F. Peter Newson, *University of Western Ontario;* Floyd D. Ploeger, *Southwest Texas State University;* Larisa Preiser-Houy, *California State University, Pomona;* Mary Ann Robbert, *Bentley College;* Dolly Samson, *Weber State University;* Vijay Sethi, *Nanyang Technological University (Singapore);* Kathy Stewart, *Georgia State University;* Ted Strickland, *University of Louisville;* Edward Tsang, *University of Essex (United Kingdom);* and Liang Chee Wee, *Luther College.*

The following individuals participated in focus groups and/or acted as reviewers of the first edition: Mary Anne Atkinson, *University of Delaware,* Benedict Arogyaswamy, *University of South Dakota,* James Carroll, *Georgian Court College,* Paul Cheney, *University of South Florida,* Candace Deans, *Thunderbird School, AGIM,* Bill DeLone, *American University,* Phillip Ein-Dor, *Tel Aviv University (Israel),* Michael Eirman, *University of Wisconsin-Oshkosh,* Paul Evans, *George Mason University,* Deb Ghosh, *Louisiana State University,* Oscar Gutierrez, *University of Massachusetts-Boston,* Rassule Hadidi, *Sangamon State University,* Fred Harold, *Florida Atlantic University,* Jaak Jurison, *Fordham University,* Eugene Kaluzniacky, *University ofWinnipeg,* Astrid Lipp, *Clemson University,* Jo Mae Maris, *Northern Arizona University,* E. F. Peter Newson, *University of Western Ontario,* Michael Palley, *CUNY-Baruch College,* Keri Pearlson, *University of Texas,* Bill Richmond, *George Mason University,* Larry Sanders, *University of Buffalo,* A. B. Schwarzkopf, *University of Oklahoma,* Henk Sol, *Delft Institute of Technology (The Netherlands),* Timothy Smith, *DePaul University,* Timothy Staley, *DeVry Institute of Technology,* Shannon Taylor, *Montana State University,* Robert Van Cleave, *University of Minnesota,* Kuang-Wei Wen, *University of Connecticut,* Anthony Wensley, *University of Toronto (Canada),* Jennifer Williams, *University of Southern Indiana,* G. W. Willis, *Baylor University,* Gayle Yaverbaum, *Pennsylvania State University*

Also, we recognize those faculty who contributed cases to the first edition of the text.

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We would like to thank Tushar Hazra of the University of Baltimore for creating the Instructor's Manual and Lisa Friedrichsen of the Keller Graduate School of Management for generating the Test Bank that accompanies this edition.

Many individuals helped us with the administrative work; of special mention are Judy Lang, who devoted considerable time to typing and editing. Hugh Watson of the University of Georgia, the Information Systems Advisor to Wiley, guided us through various stages of the project. Finally, we would like to thank the dedicated staff of John Wiley & Sons, Cindy Rhoads, Carlise Paulson, Kim Khatchatourian, Jeanine Furino, and Trisha McFadden. A special thank you to Matthew Van Hattem, Johnna Barto, Beth Lang Golub, Shelley Flannery, and Suzanne Ingrao of Ingrao Associates, who contributed their considerable energy, time, and devotion to the success of this project.

Finally, we recognize the various organizations and corporations that provided us with material and permissions to use it.

Efraim Turban
Ephraim McLean
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ABOUT THE AUTHORS

DR. EFRAIM TURBAN

Dr. Efraim Turban obtained his MBA and Ph.D from the University of California, Berkeley. His industry experience includes eight years as an Industrial Engineer, three of which were spent at General Electric Transformers Plant. He also has extensive consulting experience to small and large corporations as well as to foreign governments.

In his thirty years of teaching, Professor Turban has served as Distinguished Professor at Eastern Illinois University, and as Visiting Professor at Nanyang Technological University in Singapore. He has also taught at UCLA, USC, Simon Fraser University, Lehigh University, California State University, Long Beach, and Florida International University.

Dr. Turban was a Co-Recipient of the 1984/85 National Management Science Award (Artificial Intelligence in Management). In 1997 he received the Distinguished Faculty Scholarly and Creative Achievement Award at California State University, Long Beach.

Dr. Turban has published articles in over 100 leading journals, including the following: *Management Science, MIS Quarterly, Expert Systems,Operations Research, Expert Systems With Applications, Journal of MIS, Communications of the ACM, Decision Support Systems, International Journal of Information Management, Heuristics, International Journal of Applied Expert Systems, The Journal of Investing, Accounting, Management and Information Systems, Computers and Operations Research, Computers and Industrial Engineering, IEEE Transactions on Engineering Management, Omega, Human Systems Management and Information Resources Management*. He has also published eighteen books, including bestsellers such as *Electronic Commerce: A Managerial Perspective* (Prentice Hall, 2000); *Neural Networks: Applications in Investment and Financial Services*, 2nd edition (co-editor with R. Trippi) (Richard D. Irwin, 1996); *Decision Support Systems and Expert Systems*, 6th edition (Prentice Hall, 2001); and *Expert Systems and Applied Artificial Intelligence* (MacMillan, 1992). Books in progress include *Essentials of Managing Information Systems* (Wiley, 2001).

Professor Turban is currently on the faculty at City University of Hong Kong, Department of Information Systems, College of Business Administration. Professor Turban's current major interest is electronic commerce.

DR. EPHRAIM McCLEAN

Dr. Ephraim McLean obtained his Bachelor of Mechanical Engineering degree from Cornell University in 1958. After brief service in the U.S. Army Ordnance Corps, he worked for Procter & Gamble Co. for seven years, first in manufacturing management and later as a computer systems analyst. In 1965, he left P&G and entered the Sloan School of Management at the Massachusetts Institute of Technology, obtaining his master's degree in 1967 and his doctorate in 1970.

While at M.I.T., he began an interest in the application of computer technology to medicine, working on his dissertation at the Lahey Clinic in Boston. While there, he was instrumental in developing the Lahey Clinic Automated Medical History System. During the same period, he served as an instructor at M.I.T. and also assisted in the preparation of the books *The Impact of Computers on Management* (MIT Press, 1967); *The Impact of Computers on Collective Bargaining* (MIT Press,1969); and *Computers in Knowledge-Based Fields* (MIT Press, 1970).

Dr. McLean left M.I.T. and joined the faculty of the Anderson Graduate School of Management at the University of California, Los Angeles (UCLA) in the winter of 1970.

He was the founding Director of the Information Systems Research Program and the first Chairman of the Information Systems area, both within the Anderson Graduate School of Management. In the Fall of 1987, he was named to the George E. Smith Eminent Scholar's Chair at the College of Business Administration at Georgia State University in Atlanta, Georgia.

Dr. McLean has published over 80 articles in such publications as the *Harvard Business Review; Sloan Management Review; California Management Review; Communications of the ACM; MIS Quarterly; Information Systems Research, Information & Management; Journal of MIS; Journal of Risk and Insurance; DATA BASE; InformationWEEK; Datamation; ComputerWorld;* and the *Journal of the American Hospital Association*. He is the co-author of *Strategic Planning for MIS* (Wiley Interscience, 1977) and co-editor of a book of programs entitled *APL Application in Management*. He was a founding Associate Editor for Research of the *MIS Quarterly* and is currently senior co-editor of the *DATA BASE for Advances in Information Systems*. He was twice on the national Executive Council of the Society for Information Management (SIM). In 1980, he helped organize the International Conference on Information Systems (ICIS) and was Conference Co-chairman in 1981 in Cambridge, Massachusetts; Conference Chairman in 1986 in San Diego, California; and Conference Co-chairman in 1997 in Atlanta, Georgia. He is currently Vice President for Affiliated Organizations of the new Association for Information Systems (AIS).

In addition to university work, he has served as a consultant to such firms as the IBM Corporation, General Electric Company, Atlantic Richfield Company, Digital Equipment Corporation, BellSouth Corporation, the National Science Foundation, American Hospital Supply Corporation, McCormick & Company, Security Pacific National Bank, Pennsylvania Financial Corporation (now Primerica), and Citibank, N.A. of New York. He has also made executive presentations and conducted management workshops in Asia, Australia, Europe, South Africa, and throughout North America.

DR. JAMES WETHERBE

Dr. James Wetherbe is FedEx Professor of Excellence and the Executive Director of the FedEx Center for Cycle Time Research at the University of Memphis, as well as Professor of MIS and the Director of the MIS Research Center at the University of Minnesota. He is internationally known as a dynamic and entertaining speaker, author, and leading authority on the use of computers and information systems to improve organizational performance and competitiveness. He is particularly appreciated for his ability to explain complex technology in straightforward, practical terms that can be strategically applied by both executives and general management.

Quoted often in leading business and information system journals, Dr. Wetherbe writes regular columns and serves as a consulting editor for publishing companies. He is the author of 17 highly regarded books and over 200 articles in the field of management and information systems.

STUDENT PANEL

Written with students in mind, this book tries to present materials as they relate to today's world of commerce. To help business students understand the importance of these concepts and applications, we asked several students to provide annotations for *Information Technology for Management* to show how the information in the text can be applied directly to their careers, whatever function they may serve in their organization. We are grateful to the following students for their thoughtful annotations, which can be found in the margins throughout the text.

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University of Texas, Arlington,
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BRIEF CONTENTS

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