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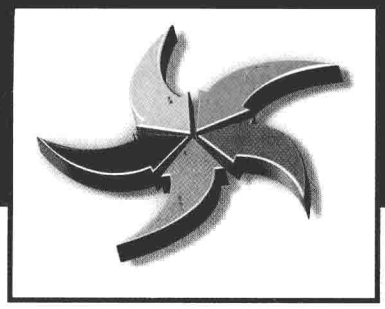
INFORMATION TECHNOLOGY FOR MANAGEMENT

Transforming Organizations in the Digital Economy

4TH EDITION



4TH EDITION

Information Technology for Management

TRANSFORMING ORGANIZATIONS IN THE DIGITAL ECONOMY

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Preface

In the last few years we have been witnessing one of the most important events in human history thus far—the digital and Web revolution. The Web is not only changing the way that we work, study, play, and conduct our lives, but it is doing so much more quickly than any other revolution (such as the Industrial Revolution), with impacts that are more far-reaching. Furthermore, all we have seen is the tip of the iceberg. It is difficult to predict all the implications. The Web revolution is facilitated by ever-changing information technologies.

Computerized systems in general and Web-based systems in particular can be found today in even the smallest businesses. It is almost 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, knowledge management, customer relationship management, enterprise resource planning, supply chain management,* and *mobile computing* into an organization, frequently under the umbrella of e-business. Furthermore, it must be done wisely, eliminating failures and unnecessary expense.

Information Technology for Management, 4th Edition, addresses the basic principles of MIS in light of these new developments. For example, one of the major changes occurring in IT is the ability to deliver systems over the Web, rather than build them. This option, which is delivered by application server providers, is a strategic option for the prudent managers of the digital economy. It is the beginning of the move toward utility computing, or "on-demand" computing, which may change the need for software and hardware. But does it fit all organizations? Such issues resulting from the Web revolution are discussed in this textbook. Its major objective is to prepare managers and staff in the modern enterprise to understand the role of information technology in the digital economy.

Transforming Organizations to the Digital Economy

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, increasing speed, improving customer service, enhancing communication and collaboration,* and *enabling business process restructuring.* By taking a practical, managerial-oriented approach, the book demonstrates that IT can be provided not only by information systems department but also 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 organizations, private and public, and will be essential to the survival of organizations in the digital economy.

Many introductory textbooks 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 throughout the enterprise. The rapidly increased use of the Web, the Internet, intranets, extranets, e-business and e-commerce, and mobile computing changes the manner in which business is done in almost all organizations. This fact is reflected in our book: 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 second-generation e-commerce applications such as m-commerce, c-commerce, e-learning, and e-government. Also, the integration of ERP, CRM, and knowledge management with e-commerce is of great importance.

FEATURES OF THIS TEXT

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

• ***Digital Economy Focus.*** This book was written with the recognition that organizations desire to transform themselves successfully to the digital economy. To do so companies need not only to use Web-based systems, but also to have an appropriate e-strategy and ability to plan click-and-mortar systems as well as new business models. Furthermore, they need to plan the transformation process, which is dependent on information technology and enabled by it.

• ***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 implement this orientation, we assembled all of the major technological topics in five Technology Guides, located on the book's Web site. 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, organizational restructuring, and CRM as they relate to information technology.

• ***New Computing Environments.*** Most textbooks ignore some of the major developments that will completely change both IT and its enabling role. Most notable are mobile and wireless computing, utility computing, pervasive computing, Web services, semantic Web, and grid computing. We introduce these topics as well as explain their impact on IT vendors, IS departments, and end users.

• ***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. We show, through the use of icons, the relevance of topics to accounting, finance, marketing, production/operations management, human resources management, and government. Finally, our examples also cover small service industries as well as the international setting.

• ***E-Business, E-Commerce, and the Use of the Web.*** We strongly believe that e-business, e-commerce, and the use of the Internet, intranets, and extranets are changing the world of business. Not only is an entire extended chapter (Chapter 5) dedicated to e-commerce, but we also demonstrate the significance of e-business in every chapter and major topic. The world of business is changing, and it is important that students understand these changes and their implications. For example, world-class companies such as General Electric, IBM, FedEx, Dell Computer and Wal-Mart are introducing extremely innovative supply chain and logistics systems supported by information technologies. This text tells you about all these innovations.

• ***Real-World Orientation.*** Extensive, vivid examples from large corporations, small businesses, government, and not-for-profit agencies 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.

• ***Failures and Lessons Learned.*** Whereas most IT and MIS books introduce only the success of information systems, we acknowledge the fact that many systems do fail. Many chapters include discussion or examples of failures, and the lessons learned from them. For example, Chapter 8 cites some ERP failures, and Chapter 13 discusses economic aspects of failures and runaway projects.

• ***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, including his latest e-strategy adaptation. Furthermore, we provide extensive references and many exercises and Web resources to supplement the theoretical presentations.

• ***Very Current.*** The book presents the most current topics of information technology, as evidenced by the many new cases and examples throughout

the book and by 2002 and 2003 citations. Every topic in the book has been researched to find the most up-to-date information and features.

• ***Economic Justification.*** Information technology is mature enough to stand the difficult test of economic justification, a topic 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 (Chapter 13, "IT Economics") to this subject.

• ***Integrated Systems.*** In contrast to 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 e-exchanges. Also integration efforts by the major vendors such as Websphere from IBM, .Net from Microsoft, and 9i, from Oracle, are presented.

• ***Global Perspective.*** The importance of global competition, partnerships, and trading is rapidly increasing. IT facilitates export and import, management of multinational companies, and electronic trading around the globe. International examples are highlighted with a special globe icon, 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 readers' interest at a very high level.

• ***Ethics.*** The importance of ethics is growing rapidly in the digital economy. Therefore we introduce the essentials of ethics as an appendix to Chapter 1. Topics relating to ethics are introduced in every chapter, and are highlighted by icons in the margin. Finally, a primer on ethics is provided on the Web site; this resource poses 14 ethics scenarios and asks students to think about responses to these situations. The ethics primer also contains a detailed list of references for further reading and research.

What's New in this Edition?

In preparing the new, fourth edition we made the following large-scale changes:

- Added a new chapter, Chapter 6, on mobile and wireless computing, and m-commerce.
- Combined into one chapter, Chapter 12, the coverage on supporting management and decision making with the material on intelligent support systems.
- Created extensive Web resources for most of the chapters (over 100 online files). Specific pointers to the online files tie the text narrative to the online material; marginal icons highlight these cross-references.
- Changed the emphasis from e-commerce to the broader concept of e-business.
- Increased emphasis on trends toward utility computing and outsourcing.
- Increased coverage of information security.
- Emphasized information integration and the role of Web Services in such integration.
- Added a Virtual Company assignment near the end of each chapter (see description in the "Pedagogical Features" section, below).
- Completely revised most of the chapters, to introduce new research, current examples and case studies, and updated reference materials.
- Streamlined and smoothed the logical flow throughout the text.
- Added 14 specially crafted ethical scenarios (in the online Ethics Primer).

Organization of the Book

The book is divided into five major parts, composed of 16 regular chapters supplemented by five Technology Guides. Parts and chapters break down as follows.

• ***Part I: IT in the Organization.*** Part I gives an overview of IT in the organization. The three chapters in Part I introduce the drivers of the use of information technology in the digital economy. It also presents the foundations of information systems and their strategic use. Special attention is given to the role information systems play in

facilitating Web-based business models and strategic information systems.

• ***Part II: The Web Revolution.*** The three chapters in Part II introduce the Web-based technologies and applications, starting with telecommunications networks and the role of the Internet, intranets, and extranets in contributing to communication, collaboration, and information discovery (Chapter 4). Electronic commerce is presented in a comprehensive way (Chapter 5), followed by mobile and wireless computing in new Chapter 6.

• ***Part III: Organizational Applications.*** Part III begins with the basics: IT applications in transaction processing, functional applications, and customer relationship management (Chapter 7). We then cover supply chain management and Web-based enterprise systems (Chapter 8). Planning for technology and the necessary organizational restructuring is discussed next (Chapter 9).

• ***Part IV: Managerial and Decision Support Systems.*** Part IV 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 three chapters in this part address some of the ways businesses are using information technology to solve specific problems and to build strategic, innovative systems that enhance quality and productivity. Special attention is given to innovative applications of knowledge management (Chapter 10), data analysis and data management (Chapter 11), and decision support and intelligent support systems (Chapter 12).

• ***Part V: Implementing and Managing IT.*** Part V explores several topics related to the implementation, evaluation, construction, and maintenance of information systems. We consider several issues ranging from the economics of information technology (Chapter 13) to building or outsourcing information systems (Chapter 14) to the management of IT resources and IT security (Chapter 15). Finally, Chapter 16, which is available online at the book's Web site, assess the impact of IT on individuals, organizations, and society.

The five **Technology Guides,** which are available online at the book's Web site, cover hardware, software, databases, telecommunications, and 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 online by a glossary for the terms in the Tech Guides, questions for review and discussion, and case studies, all of which are available on our Web site (*www.wiley.com/college/turban*).

PEDAGOGICAL FEATURES

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

• ***Chapter Outline.*** The chapter outline provides a quick indication of the major topics covered in the chapter.

• ***Learning Objectives.*** Learning objectives listed at the beginning of each chapter help students focus their efforts and alert them to the important concepts that will be discussed.

• ***Opening Cases.*** Each chapter opens with a *real-world* example that illustrates the use of information technology in modern corporations. These cases have been carefully chosen to demonstrate the relevance, for business students, of the topics introduced in the chapter. They are presented in a standard format (problem or opportunity, IT solution, and results) that helps model a way to think about business problems. The Opening Case is followed by a brief section (called Lessons Learned from this Case) that ties the key points of the opening case to the topic of the chapter.

• ***"A Closer Look" Boxes.*** These boxes 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. Some of these boxes are included in the online materials.

• ***"IT at Work" Boxes.*** The IT at Work boxes spotlight some real-world innovations and new technologies that companies are using to solve organizational dilemmas or create new business opportunities. Each box concludes with "for further exploration" questions and issues. Some of these boxes are online.

• ***Highlighted Icons.*** As indicated earlier, icons appear throughout the text to relate the topics covered within each chapter to some major themes of the book. The icons alert students to the related

functional areas, to IT failures, and to global and ethical issues. Icons also indicate where related enrichment resources can be found on the book's companion Web site. The following list summarizes these icons.

Ethics-related topic

Global organization

Lessons to be learned from IT failures

Accounting example

Finance example

Government example

Human resources management example

Marketing example

Production/operations management example

Service-company example


Material at the book's Web site: *www.wiley/com/college.turban*

• ***Managerial Issues.*** The final text section of every chapter explores some of the special concerns managers face as they adapt to an increasingly technological environment. The issues highlighted in this section 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.*** The key terms and concepts are typeset in boldface blue when first introduced in a chapter, and are listed at the end of the chapter. All key terms are defined in the end-of-book glossary.

• ***Chapter Highlights.*** All the important concepts covered in the chapter are listed at the end of the chapter and are linked by number to the learning objectives introduced at the beginning of each chapter, to reinforce the important ideas discussed.

• ***End-of-Chapter Questions and 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 more challenging assignments that require students to apply what they have learned.

• ***Group Assignments.*** Comprehensive group assignments, including Internet research, oral presentations to the class, and debates are available in each chapter.

• ***Internet Exercises.*** Close to 200 hands-on exercises send the students to interesting Web sites to explore those sites, find resources, investigate an application, compare, analyze, and summarize information, or learn about the state of the art of a topic.

• ***Minicases.*** Two real-world cases at the end of each chapter highlight some of the problems encountered by corporations as they develop and implement information systems. Discussion questions and assignments are included. A number of additional minicases are available online at the book's Web site.

• ***Virtual Company Assignment.*** The Virtual Company Assignment centers around the ongoing situation at a simulated company, The Wireless Café (TWC), a technology-savvy 1950s–style diner. Students are "hired" by the diner as consultants and in each chapter are given assignments that require them to use the information presented in the chapter to develop solutions and produce deliverables to present to the owners of The Wireless Café. These assignments get the student into active,

hands-on learning to complement the conceptual coverage of the text.

• ***Additional Online 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 (*www.wiley.com/college/turban*). Also at the Web site are several cases from countries around the globe (including multinational corporations).

SUPPLEMENTARY MATERIALS

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

• ***Instructor's Manual.*** The Instructor's 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.*** 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.*** This electronic version of the test bank allows instructors to customize tests and quizzes for their students.

• ***PowerPoint Presentation.*** A series of slides designed around the content of the text incorporates key points from the text and illustrations where appropriate.

• ***Video Series.*** A collection of videos provides 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 Select.*** (*www.wiley.com/college/bxs*) Business Extra Select enables you to add copyright-cleared articles, cases, and readings from such leading business resources as *INSEAD*, *Ivey* and *Harvard Business School Cases*, *Fortune*, *The Economist*, *The Wall Street Journal*, and more. You can create your own custom CoursePack, combining these resources along with content from Wiley's Business Textbooks, your own content such as lecture notes, and any other third-party content. Or you can use a ready-made CoursePack for Turban's *IT for Management 4th edition*.

• ***The Turban Web Site.*** (*www.wiley.com/college/turban*) The book's Web site greatly extends the content and theme of the text to provide extensive support for instructors and students. Organized by chapter, it includes additional text, tables, figures, cases, questions, exercises, and downloadable PowerPoint slides, self-testing material for students, working students' experiences with using IT, links to resources on the Web, and links to many of the companies discussed in the text and to the "The Virtual Company" Web site.

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About the Authors

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Dr. Efraim Turban obtained his MBA and Ph.D. degrees 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 in Oakland, California. He also has extensive consulting experience to small and large corporations as well as to governments. In his over thirty years of teaching, Professor Turban has served as Chaired Professor at Eastern Illinois University, and as Visiting Professor at Nanyang Technological University in Singapore, and University of Science and Technology in Hong Kong. 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 110 leading journals, including the following: *Management Science, MIS Quarterly, Operations Research, Journal of MIS, Communications of the ACM, International Journal of Electronic Commerce, Information Systems Frontiers, Decision Support Systems, International Journal of Information Management, Heuristics, Expert Systems with Applications, International Journal of Applied Expert Systems, Journal of Investing, Accounting, Management and Information Systems, Computers and Operations Research, Computers and Industrial Engineering, IEEE Transactions on Engineering Management, Omega, International Journal of Electronic Commerce, Organizational Computing and Electronic Commerce,* and *Electronic Markets.* He has also published 21 books, including best sellers such as *Neural Networks: Applications in Investment and Financial Services* (2nd edition) (co-editor with R. Trippi), Richard D. Irwin, 1996; *Decision Support Systems and Intelligent Systems* (Prentice Hall, 7th edition, 2004); *Expert Systems and Applied Artificial Intelligence,* (MacMillan Publishing Co., 1992), *Electronic Commerce: A Managerial Approach, 3rd edition,* (Prentice Hall, 2004), *Introduction to Information Technology 2nd edition* (Wiley, 2003), and *Introduction to Electronic Commerce* (Prentice Hall, 2003).

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

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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 MIT, 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 MIT 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 MIT 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 fall 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 Cochairman in 1981 in Cambridge, Massachusetts; Conference Chairman in 1986 in San Diego, California; and Conference Cochairman in 1997 in Atlanta, Georgia. He is currently Vice President for Affiliated Organizations of the 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 C. WETHERBE

Dr. James C. Wetherbe is Stevenson Chair of Information Technology at Texas Tech University as well as Professor of MIS at the University of Minnesota where he directed the MIS Research Center for 20 years. 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.

Dr. Wetherbe is the author of 18 highly regarded books and is quoted often in leading business and information systems journals. He has also authored over 200 articles, was ranked by *InformationWEEK* as one of the top dozen information technology consultants, and is the first recipient of the MIS Quarterly Distinguished Scholar Award. He has also served on the faculties of the University of Memphis, where he was FedEx Professor and Director of the Center for Cycle Time Research, and the University of Houston.

Dr. Wetherbe received his Ph.D. from Texas Tech University.

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