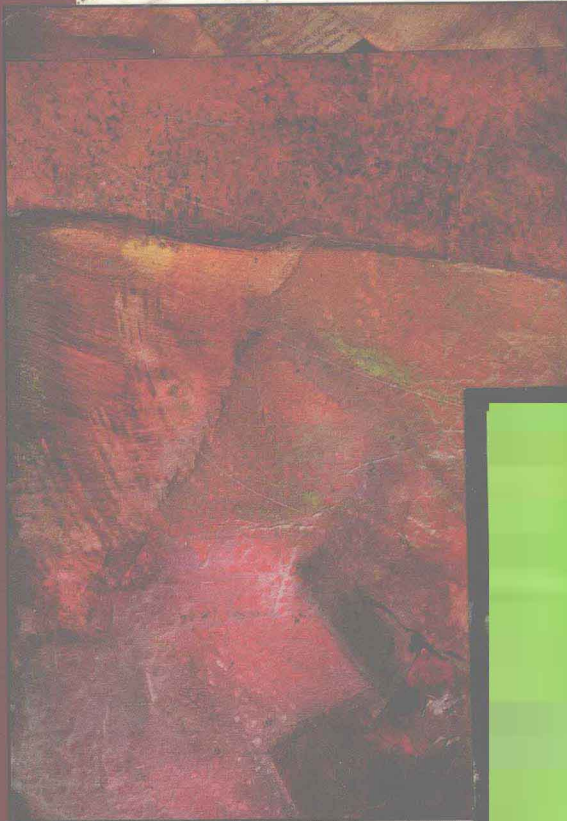# Principles of

Information Systems

A Managerial Approach

THIRD EDITION

RALPH M. STAIR • GEORGE W. REYNOLDS

Principles of

Information Systems

A Managerial Approach

THIRD EDITION

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Principles of

Information Systems

A Managerial Approach

THIRD EDITION

For Lila and Leslie
• **RMS**

To Ginnie, Tammy, Kim, Kelly, and Kristy
• **GWR**

Principles of Information Systems: A Managerial Approach, Third Edition, continues the tradition, principles, and approach of the previous editions. Our primary objective is to develop the best information systems text and accompanying materials for the first computer course required of all business students. Through surveys, questionnaires, focus groups, and feedback that we have received from current and past adopters, as well as others who teach in the field, we have been able to develop the highest quality set of teaching materials available.

Because information systems are key to business functions today, the information systems (IS) discipline deserves its own course on par with those of other academic lines. This is even truer now than it was with the first edition's publication. This book stands proudly at the beginning of the IS curriculum and remains unchallenged in its position as the only IS principles text offering the basic IS ideas and concepts that every business student must learn to be successful. In the past, instructors of the introductory course faced a dilemma. On one hand, experience in business organizations allows students to grasp the complexities underlying important IS concepts. For this reason, many delayed presenting these concepts until students completed a large portion of the core business requirements. On the other hand, delaying the presentation of these concepts until students have matured within the business curriculum often forces the one or two required introductory IS courses to focus only on microcomputer software tools and, at best, merely to introduce computer concepts.

This text has been written specifically for the principles course in the IS curriculum. It represents an exciting alternative to texts used in the introductory IS course in the past. *Principles of Information Systems: A Managerial Approach,* Third Edition, treats the appropriate computer and IS concepts together with a strong managerial emphasis.

● APPROACH OF THE TEXT

The overall vision, framework, and pedagogy that made the first two editions so popular have been retained in the third edition, offering a number of benefits to students. We continue to present IS concepts with a managerial emphasis. While much of the fundamental vision of this market-leading text remains unchanged, the third edition more clearly highlights established

principles and draws out new ones that have emerged as a result of corporate and technological change. This text:

- Begins with a solid grounding in the principles of systems theory
- Utilizes a problem-solving framework throughout and expands the scope of IS problem identification to include all activities, especially those at the strategic level of the organization
- Includes appropriate coverage of computer concepts, stressing characteristics of information systems relevant to aspiring decision makers
- Presents the tenets, rules, guidelines—the principles—of information systems with which every business student must be knowledgeable
- Stresses a single, all-encompassing concept: The right information, if it is delivered to the right person, in the right fashion, and at the right time, can improve and ensure organizational effectiveness and efficiency
- Shows the value of the discipline as an attractive field of specialization and emphasizes the role of the IS professional as a change agent and manager who exercises special skills from a generalist perspective
- Emphasizes the promise of integrated information systems in providing vastly superior organizational efficiencies
- Positions telecommunications technologies as enablers of change
- Shows that information systems are often intimately intertwined with value-added business processes
- Presents IS objectives as supportive of, yet subordinate to, broader organizational goals

IS Principles First, Where They Belong

Exposing students to fundamental IS concepts provides a service to students who do not later return to the discipline for advanced courses. Since most functional areas in business rely on information systems, an understanding of IS principles will help students in other course work. In addition, introducing students to the introductory principles of information systems will help future functional area managers avoid mishaps that often result in unfortunate consequences. Furthermore, presenting IS concepts at the introductory level may create interest among general business students who will later choose information systems as a field of concentration.

Current Examples, Boxes, Cases, and References

We take great pride in including the most recent examples, boxes, cases, and references throughout the text. Some were developed at the last possible moment, just a few months before the publication of the book. Our adopters have come to expect the best and most recent material. We have done everything we can to meet or exceed these expectations.

New Author Team

Ralph Stair has combined forces with George Reynolds in the third edition. Ralph Stair brings years of writing, teaching, and academic experience. He has written over 20 books and a large number of articles while at Florida State University. George Reynolds brings a wealth of experience to the project with over 30 years experience working in government, institutional, and commercial IS organizations. He has also authored eight texts and been an adjunct

professor at the University of Cincinnati, teaching the introductory IS course for more than 17 years. The Stair/Reynolds team brings a solid conceptual foundation along with practical IS experience to students.

GOALS OF THIS TEXT

This text has three main goals:

1. To present a core of IS principles with which every business student should be familiar and to offer a survey of the IS discipline that will enable all business students to understand the relationship of advanced courses to the curriculum as a whole
2. To present the changing role of the IS professional
3. To show the value of the discipline as an attractive field of specialization

These goals will help students, regardless of major, understand and be able to use fundamental information systems principles so that they will efficiently and effectively function as future business employees and managers. Because *Principles of Information Systems: A Managerial Approach*, Third Edition, is written for all business majors, we feel it is important to present not only a realistic perspective on IS in business but also to provide students with the skills they can use to be effective leaders in their companies.

IS Principles

Information systems are critical to the success of every business. In the past, advances in IS technology and applications have moved faster than the business curriculum. Books and courses dealing with important IS concepts have fallen too late in the curriculum. Introductory texts have tended to focus more on the descriptive (What have business managers been doing with information systems?) rather than on the prescriptive (What should business managers do with information systems to succeed?).

This text offers the traditional coverage of computer concepts material but places it within a structured framework of overall IS functionality. It stresses principles of information systems, which are brought together and presented in a way that is directly accessible. These fundamental ideas are not buried within historical detail or technical jargon. The book, although comprehensive, does not pretend to cover every aspect of the IS discipline. Instead, it offers an essential core of guiding IS principles for students to use as they face the career challenges ahead. From the opening vignettes to the end-of-chapter material, each chapter emphasizes these fundamental IS principles. New IS principles sections at the end of each chapter further help reinforce important concepts and principles.

Information systems technology has outpaced academic guidelines directing how information technology should best be employed. The driving force of the technology has captured the attention of most authors of introductory IS textbooks. The first course in information systems has historically concentrated on discussing the components of an information system (primarily the technological components), and perhaps to some degree how information systems are developed. Yet, the first course has often neglected the important aspects of *why* and *how* information systems should be used to meet organizational goals. As a result, general business graduates have

been thrust into work environments in which information systems were critical to their success, but the graduates were unprepared to interact with these systems. Even those with some understanding of IS technology have floundered; an understanding of the technology alone does not enable one to apply it successfully.

The material presented in this book offers an overview of the entire IS discipline and gives a solid preparation for further study in advanced IS courses. It serves both general business students and those who will become IS professionals. In particular, this book provides a solid groundwork from which to build advanced courses in such areas as systems development, database management, decision support, and expert systems.

Changing Role of the IS Professional

As business and the IS discipline have changed, so too has the role of the IS professional. Once considered a dedicated specialist, the IS professional now is often an internal consultant to all functional areas, knowledgeable about their needs and competent in bringing the power of information systems to bear throughout the business. The IS professional must exercise a broad perspective, encompassing the entire organization and often going beyond it.

The scope of responsibilities of an IS professional today ranges not only throughout the organization but also throughout the entire interconnected network of suppliers, customers, competitors, and other entities, no matter where they may be located. This broad scope offers IS professionals a new challenge: how to help the organization survive in a highly interconnected, highly competitive, international environment. In accepting that challenge, the IS professional plays a pivotal role in shaping the business itself and ensuring its success. To survive, businesses must now strive for ultimate customer satisfaction and loyalty through ever-improving product and service quality. The IS professional assumes critical responsibility in determining the organization's approach to quality performance and therefore plays an important role in the ongoing survival of the organization. This new duality in the role of the IS employee—a professional who exercises specialist's skills with a generalist's perspective—is reflected throughout the book.

IS as a Field for Further Study

The IS field is exciting, challenging, and rewarding. It is important to show the value of the IS discipline as an attractive field of study for the average business student. The need to draw bright and interested students into the IS discipline is part of our ongoing responsibility. The IS graduate is no longer a technical recluse. Increasingly, we are seeing the brightest and most talented students enter the IS field. IS graduates at many schools, including Florida State University and the University of Cincinnati, are among the highest paid of all business graduates. Throughout this text, the many challenges and opportunities available to IS professionals are highlighted and emphasized. The "Who's Who" supplemental interest boxes strengthen this theme by showing how IS professionals have helped organizations achieve their goals using information systems and technology. Students are shown that the IS discipline is not only rewarding but fun!

• CHANGES IN THE THIRD EDITION

Like the previous editions, the third edition retains the focus on IS principles and strives to be the most current text on the market. We are excited about a number of changes to the text, particularly those that were made in response to feedback on how the course is now being taught. Some of the highlights follow:

- *Fewer Chapters.* To respond to the changing needs in the introductory IS course, we have reduced the number of chapters from 16 to 14 to give instructors more flexibility in using tools in the course. Material from the second edition's Chapter 16 on information resource management has been integrated into other chapters to show how important these issues are to businesses. In addition, the three systems development chapters in the second edition have been combined into two chapters for this edition.
- *New Internet Chapter.* A new Internet chapter, Chapter 7, shows the vast potential of this technology. Students will see how real companies use the Internet, intranets, and extranets to help them satisfy customer needs and achieve organizational goals.
- *Revised Telecommunications Chapter.* Chapter 6 on telecommunications has been completely revised. This chapter contains a core of important technical material but stresses the applications of telecommunications in a business setting. It also discusses new developments in the telecommunications industry, such as the Telecommunications Act of 1996 and the World Trade Agreement of 1997.
- *Revised Systems Development Material.* The systems development material has been combined into two chapters and completely revised. Systems development methodologies; the role of stakeholders, users, and IS personnel; and the importance of systems development as a tool to achieve organizational goals are stressed.
- *Greater Coverage of Ethical Issues.* With each chapter, important ethical issues and concerns are discussed in relation to the specific topics covered in the chapter. This increased coverage can be seen in the "Ethical and Societal Issues" boxes included with each chapter and woven into text discussion and end-of-chapter materials. Ethical issues are also covered in detail in Chapter 14.
- *More Real-World Examples.* Our adopters and reviewers told us they wanted more real-world examples. Most of the opening vignettes, supplemental interest boxes, and examples in the text have been updated to include more real-world examples that are current and interesting. We have also at least doubled the cases at the end of each chapter—at least four cases and sometimes as many as six provide the practical focus that instructors want. Instructors who teach using the case approach will find this text's cases sufficient and varied for their needs.
- *New Pedagogy.* Each chapter starts with a provocative opening quotation that provides an interesting insight into information systems. All supplemental interest boxes and cases have been updated or revised.

A new IS principles section is included to summarize important concepts and key principles that every student should know. Each learning objective is tied to a major section in the chapter summaries to allow students to see whether they have achieved mastery of the subject matter. The material at the end of each chapter has been thoroughly updated to provide new learning experiences and more variety. Changes to the pedagogy are detailed in the next section.

- *Currency.* Every effort was made to make the third edition the most up-to-date text on the market. New hardware and software concepts, the Internet and telecommunications, and many other current developments can be found on most pages of the text. The third edition, however, goes beyond headline-making technologies to focus on how new technology can be used to solve business problems and further business goals. New technology is not the question. The question is: How can new technology be used to help organizations achieve their goals?

PEDAGOGICAL FEATURES

In addition to the text reorganization, we revamped the pedagogy and the teaching resources for the third edition. Our emphasis throughout is on applying text concepts to the most up-to-date, real-world examples possible.

Chapter-opening Material

The chapter-opening material introduces students to what is contained in each chapter. From the opening quotation to the vignette, we have developed this material to be interesting and motivational.

Opening Quotations. Each chapter starts with an opening quotation to stimulate interest in the material and set the stage for the chapter.

Chapter Outlines. Each chapter includes a chapter outline to show students and instructors the content of the chapter at a glance.

Learning Objectives. Carefully-crafted learning objectives are included with every chapter. The learning objectives reflect what students should be able to accomplish after completing a chapter. The objectives are also integrated into the chapter summaries—each item in the summary starts with a learning objective from the beginning of the chapter.

Opening Vignettes. A brief opening vignette follows the learning objectives for each chapter. This vignette describes a real company or current business situation and is related to the concepts discussed in the chapter. Each vignette ends with a few questions for students to consider as they read the chapter.

Supplemental Interest Boxes

New supplemental interest boxes are interspersed throughout the text. These boxes were designed to support the goals and themes of this text. Each box includes two discussion questions. Some questions tie the material to the text by asking students to relate chapter concepts to the topics in the supplemental boxes. Other questions challenge students to think "outside the box" to apply concepts to new situations in critical and creative ways.

Ethical and Societal Issues. Each "Ethical and Societal Issues" box presents a timely look at ethical challenges and the societal impact of information systems. Topics include classic ethical scenarios, such as software piracy, network privacy, and other issues being raised by new technology. The dramatic impact of technology on business and society is also explored.

Who's Who. These brief profiles of successful IS professionals can motivate students to consider IS as a major field of study. They show how IS professionals have made a meaningful contribution to the achievement of organizational goals and blazed new trails in business. The subjects of these interviews were selected to provide balanced, realistic views of day-to-day life at all employee levels within the information systems field, from programmer to CIO.

Technology Advantage. "Technology Advantage" boxes show the pervasive role of business information systems beneath the surface of IS applications and reveal the technological advantage of using information systems in a business setting. The boxes stress how technology is used to make a system more efficient and effective.

Principles in Action. These supplemental interest boxes reinforce the fundamental principles of the text. By showing specific examples of how real organizations apply fundamental principles and benefit from them, students are able to see how IS principles are applied and why they are so important. These boxes also show students how organizations can increase efficiency, effectiveness, and competitiveness by their application.

Net Links. The "Net Links" boxes show the impact of networks and the Internet in a business setting. This new feature stresses the importance of interconnecting companies, customers, and suppliers. Students will see how real companies apply telecommunications, networks, client/server systems, and Internet technology to help them satisfy customer needs and achieve organizational objectives.

End-of-Chapter Material

To help students retain IS principles and to expand their understanding of important IS concepts and relationships, information systems principles, summaries, key terms, review questions, discussion questions, problem-solving exercises, team activities, and cases have been included at the end of every chapter to enhance student learning and improve student performance in the course.

Information Systems Principles. New to this edition, Information Systems Principles summarize key concepts that every student should know. This important new feature is a convenient summary of key ideas.

Summary. Every chapter includes a detailed summary. Each summary is tied to a learning objective to make sure students have mastered the material in the chapter.

Key Terms. A list of key terms with page numbers follows the summary for each chapter. Each key term is placed in bold in the text and defined in the margin.

Review Questions. Directly linked to the text, these questions reinforce the key concepts and ideas within each chapter.

Discussion Questions. Picking up where the review questions leave off, discussion questions help instructors generate class discussion to move students beyond the concepts to explore the numerous aspects and principles of information systems.

Problem-Solving Exercises. Each chapter of the text contains a set of problem-solving exercises. These exercises enable students to continue to apply skills learned in application software courses to problems related to chapter material. The primary purpose of these activities is to keep software skills fresh. The exercises also help prepare students for more rigorous applications in advanced business courses.

Team Activities. These activities require students to work in small groups on a shared assignment. These activities foster teamwork, communication, and mutual accountability. Students work to create a joint work product, such as a report, a database, or a group presentation. Some activities involve semistructured activities like visiting a local business, while others demand creative thinking, such as designing the perfect PC with a given set of system constraints and price parameters.

Cases. We listened to our past adopters and reviewers and responded with four or more cases at the end of each chapter. This doubles and sometimes triples the scenarios that instructors may use. These cases further reinforce important IS concepts and principles and further show how real companies have applied information systems to achieve their goals.

TEACHING RESOURCE PACKAGE

This text has many exciting supplements that will benefit students and help enhance the course. We are pleased to present these supplements to you for your use. Here are your options.

Instructor's Manual (and Solutions Manual)

The *Instructor's Manual* is available in both electronic and printed formats. This all-new enhanced *Instructor's Manual* provides valuable chapter overviews; highlights key principles and critical concepts; offers sample syllabi, learning objectives, and discussion topics; possible essay topics, further readings or cases, and solutions to all of the end-of-chapter questions and problems as well as suggestions for conducting team activities. Additional end-of-chapter questions are also included, as well as the rationale, methodology, and solutions for each.

Course Test Manager and Test Bank

This cutting-edge Windows-based testing software helps design and administer pretests, practice tests, and actual examinations. With *Course Test Manager* students can randomly generate practice tests that provide immediate on-screen feedback and enable them to create detailed study guides for questions incorrectly answered. On-screen pretests help assess students' skills and plan instruction. *Course Test Manager* can also produce printed tests. In addition, students can take tests at the computer that can be automatically graded and can generate statistical information on students' individual and group performance.

Course Presenter

A CD-ROM–based presentation tool developed in Microsoft PowerPoint, *Course Presenter* offers a wealth of resources for use in the classroom. Instead of using traditional overhead transparencies, *Course Presenter* puts together impressive computer-generated screen shows including graphics and videos. All of the graphics from the book (not including photos) have been included.

Web Site

A dynamic site helps keep materials current. Visit us at http://www.course.com for additional and updated cases, and information about what is changing in the IS field. We provide information about the book, chapter-by-chapter updates, additional resources for instructors and students, and links to real-world companies showcased in the case studies throughout the book. We also link with Mainspring Communications, a provider of on-line Internet and intranet resources. This Web-based Internet business solution service provides detailed business and technical information on planning, justifying, designing, implementing, and maintaining a Web site; weekly articles from leading Internet thinkers such as Mary Cronin and Lincoln Stein; case studies and hot articles from leading technology publishers, nationwide directories of Internet service providers, and much more. Adopters will find it easy to remain current.

Student Study Guide

This optional item serves as a convenient place for students to take structured lecture notes and is also a source of much useful review and self-testing material. It includes activities, projects, self-administered true/false tests, vocabulary, matching, activity test questions, and additional resources. Students are provided an opportunity to review material and test their knowledge to reinforce the concepts presented in each chapter of the text.

Supplemental Video Program

A number of high-quality videos are available to qualifying adopters of this text. These videos cover topics ranging from computer applications to the ways computers have changed how we live and run businesses. Videos range in length from 4 to 58 minutes. For more details, contact your sales representative.

● ACKNOWLEDGMENTS

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Many thanks to the sales force at Course Technology. You make this all possible. You helped to get important feedback from current and future adopters. As Course Technology product users, we know how important you are.

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We are also indebted to a number of other individuals for their outstanding contributions to this project. We can only hope the finished book meets their high expectations. In particular, we would like to thank the reviewers of the third edition, focus group members, and reviewers of previous editions.

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▪ OUR COMMITMENT

We are sincerely committed to serving the needs of our adopters and readers. Like the field of IS itself, the writing and publishing process is an evolutionary and participatory one. We encourage participation in our endeavor to bring the freshest, most relevant information possible. We pride ourselves on listening to instructors and developing creative solutions to problems and needs. Numerous individuals in the IS discipline have given us their time and insight during the process of this revision. They have offered valuable feedback on outstanding features of the previous editions and potential improvements in the third edition. We have listened to their comments and thank them for their time.

As always, we welcome input and feedback. If you have any questions or comments regarding *Principles of Information Systems: A Managerial Approach,* Third Edition, please contact us through Course Technology or your local representative, via e-mail at **mis@course.com**, via the Internet at **www.course.com**, or address your comments, criticisms, suggestions, and ideas to:

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