Introduction to Information Systems

Essentials for the Internetworked E-Business Enterprise

Tenth Edition

James A. O'Brien

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James A. O'Brien

College of Business Administration
Northern Arizona University

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ESSENTIALS FOR THE INTERNETWORKED E-BUSINESS ENTERPRISE

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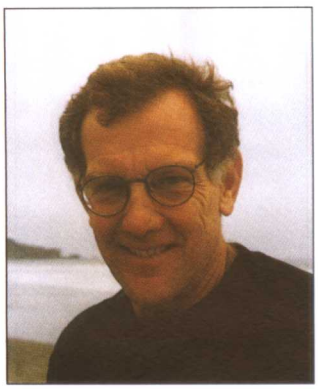
About the Author



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

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

Preface

Essentials for the Internetworked E-Business Enterprise

This new Tenth Edition is an introduction to information systems and information technology for business students who are or will be managers, entrepreneurs, and business professionals in internetworked E-business enterprises. The goal of this text is to help business students learn how to use and manage information technologies to revitalize business processes, conduct electronic commerce, improve business decision making, and gain competitive advantage. Thus, it places a major emphasis on the role of the Internet, intranets, extranets, and other Internet technologies in providing a technology platform for electronic business, commerce, and collaboration within and among internetworked enterprises and global markets.

These are the essential aspects of the internetworked E-business enterprise that this new edition brings to the study of information systems. Of course, as in all my texts, this edition:

- Loads the text with **real world cases,** examples, and exercises about real people and companies in the business world.
- Organizes the text around a simple **five-area framework** that emphasizes the IS knowledge a business end user needs to know.
- Distributes and integrates IS foundation theory throughout the text instead of concentrating it in several early chapters.
- Places a major emphasis on the strategic role of information technology in gaining competitive advantage, supporting electronic business operations and decision making, and enabling electronic commerce and enterprise collaboration.

Audience

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

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Key Features

The new Tenth Edition is the most comprehensive revision of this text in the last 10 years. Most chapters have been significantly "E-engineered," that is, text material has been radically restructured, eliminated, and augmented with new E-business and E-commerce topics and real world examples to provide students with a solid E-business introduction to the study of information systems and technologies in business.

All New Real World Cases and Examples

This text provides all new up-to-date real world case studies. These are not fictional stories, but actual situations faced by business firms and other organizations as reported in current business and IS periodicals. This includes four real world case studies in each chapter that apply specifically to that chapter's contents.

20 • *Module 1 / Foundation Concepts*

Section II

Foundation Concepts: Business Applications, Development, and Management

The Fundamental Roles of IS Applications in Business

There are three fundamental reasons for all business applications of information technology. They are found in the three vital roles that information systems can perform for a business enterprise.

- Support of its business processes and operations.
- Support of decision making by its employees and managers.
- Support of its strategies for competitive advantage.

We will introduce these roles and applications in this chapter, and cover them in more detail later. The strategic applications of information systems for competitive advantage will be covered in Chapter 2. Business applications of information technology for electronic business operations, electronic commerce, enterprise collaboration, and business decision making will be discussed in Chapters 7, 8, and 9.

Analyzing Lands' End

Read the Real World Case on Lands' End on the next page. We can learn a lot about the fundamental roles of information systems applications in business from this example. See Figure 1.11.

Figure 1.11

Customer service strategy at Lands' End is developed by a team led by (from left) Joan Conlin, director of distribution; Bill Bass, vice president of E-commerce; Denise Moran, Internet customer service representative; and Linda Severeson, IT manager.

Marc Berlow.

REAL WORLD CASE

Lands' End: Customer Service in E-Commerce

A customer places her order over the phone. But had she clicked in her order to www.lands end.com, she would have received the same seamless customer service, either by talking to a customer service representative over the phone or via text-based messages on-screen.

"One of the great fallacies of the Internet is that you'll save on customer service costs because customers would serve themselves," said Bill Bass, vice president of electronic commerce at the $1.4 billion retailer.

Lands' End has discovered that simply isn't the case, but it isn't worrying about it. Instead, the king of cotton turtlenecks, Polartec parkas, and other apparel is leveraging its already well-known customer service online as its chief means of moving customers to the Internet. That would cut right to the heart of its heftiest expense—the annual production and mailing of more that 250 million catalogs, which now accounts for 41 percent ($201 million) of its annual operating costs.

Examples of the company's online customer service features include one-click sizing tips and quick-time video demonstrations of how to take accurate measurements. Another example is its exclusive Shop With a Friend feature, which lets two friends or family members simultaneously view the same web pages and have an on-screen chat about what they're viewing.

Earlier this year, Lands' End struck a deal with WebLine Communications—now part of Cisco Systems—for exclusive use of the technology behind the Lands' End site's Shop With a Friend and live online help features, which let online customers communicate in real time with a customer service representative via on-screen text or phone. Lands' End information technology employees worked with WebLine to enhance the technology in exchange for exclusive use of it through the all-important holiday selling season.

Not only do all of these features improve customer service by helping shoppers order exactly what they want, but they should also help reduce merchandise returns, said David Marshak, an analyst at Patricia Seybold Group.

Online businesses lost $1.6 billion in online sales last year specifically because of a lack of customer service support, according to Datamonitor, a market analysis firm in New York. This year, customer service-related losses are expected to double to $3.2 billion because online customers who might otherwise make a purchase have no way to get answers to their questions online.

When it comes to online shopping and customer service, "Lands' End is the leader. They set the bar for others," said Marshak. From 1997 to 1998, Lands' End's online sales jumped from $18 million to $61 million. By mid-November 1999, Lands' End had sold more than $150 million worth of apparel online, more than anyone else in cyberspace. And its innovative online customer service features also are helping Lands' End reach a new set of consumers. Prior to 1999, roughly 20 percent of the company's online purchases were made by new customers. In 2000 that figure is expected to more than double, said Bass.

Lands' End also extended its E-commerce reach by targeting corporate clients. Besides an interactive E-commerce website for corporate business wear, the retailer is developing online custom stores for clients, providing merchandise and web content tailored to individual companies. So far, seven stores have been built for corporate clients, including General Motors Saturn Corp. division and RadioShack, Tandy Corp.'s retail operating arm. Lands' End expects to build a total of 30 online stores by year's end. For example, Saturn's store services 8,000 employees through its corporate intranet and more than 400 retailers over the Internet.

Analysts said Lands' End's business-to-business move will expand its customer reach. "They've set the standard of best practices in logo apparel," said Bob Parker, an analyst at AMR Research. Lands' End was first in its space to integrate real-time customer service with online shopping, Parker said, beating out its main competitors, Eddie Bauer Inc. and L.L. Bean Inc.

Case Study Questions

1. What are the major business benefits of Lands' End's use of information technology for customer service in E-commerce?
2. What information systems resources and activities can you identify or visualize in the Lands' End E-commerce system?
3. Visit the landsend.com website. What should be Lands' End's next step in the use of the Internet to serve their customers? Why?

Source: Adapted from Julia King, "Service Needs Drive Tech Decisions at Lands' End," *Computerworld*, December 20, 1999, p. 38; and Kathleen Olson, "Lands' End Tailors to Corporate Clients," *Computerworld*, March 20, 2000, p. 10. Copyright 1999 and 2000 by Computerworld, Inc., Framingham, MA 01701. Reprinted from *Computerworld*.

In addition, each chapter contains several application exercises, including two hands-on spreadsheet or database software assignments in Chapters 2 through 11, and new Internet-based assignments in many chapters. Also, many new highlighted in-text real world examples have been added to illustrate concepts in every chapter. The purpose of this variety of learning and assignment options is to give instructors and students many opportunities to apply each chapter's material to real world situations.

Boeing and Analog Devices: IT Failure and Success

In 1994, the Boeing Company embarked on a major business process reengineering campaign, buying off-the-shelf enterprise resources planning (ERP) software to replace hundreds of mainframe legacy systems used to manufacture commercial aircraft. For example, Boeing bought Baan's manufacturing, finance, purchasing, and distribution ERP software suite; Metaphase's product data management package; CIMLINC's Linkage for process planning; and Trilogy's SalesBUILDER for configuration management, along with other software packages.

Fast-forward to late 1998, when Boeing announced lousy financial results and major layoffs. It predicted a pathetic pretax profit margin of only 1 to 3 percent for its commercial aircraft group by the year 2000, up from 0 percent in 1998. A precipitous decline in airplane orders by Asian airlines is the culprit according to the company. But Wall Street analysts and others watching the company say production inefficiencies, poor planning, and a host of other internal failures bear part of the responsibility for the dismal margin and poor financial results, according to articles about the project in, among others, *The New York Times* and *The Wall Street Journal.*

However, other ERP implementations have proved their worth through the positive results achieved. The ERP implementation at chip maker Analog Devices, Inc., for instance, helped the company weather tough times in 1998, when declining prices drove down revenues and otherwise put pressure on the entire semiconductor industry. Analog has continued to show progress in reducing costs in a variety of areas, including production, staffing, and inventory.

Bottom line: If the right combination of ERP software, business processes, and managerial expertise are working together, there should be a substantial financial return, as there was for Analog [11].

New Chapters on Electronic Business and Commerce

This edition contains many thoroughly *E-engineered* chapters that emphasize how Internet and Web technologies provide the technological infrastructure and business tools that enable internetworked enterprises to engage in electronic business and commerce and enterprise collaboration. This is demonstrated, not only in the text materials in Chapters 7 and 8, but in other chapters and Real World Cases and examples in the text. Examples include Alteon WebSystems; Lands' End; LoudCloud, Inc.; Amazon.com; BarnesandNoble.com; GE, Ocean Spray, Shell, and Honeywell; Sun Microelectronics; FreeMarkets Inc.; Cabletron Systems, Calico Commerce, and Flextronics; FedEx, UPS, and Cisco Systems; Intuit and Quicken Loans; to name a few.

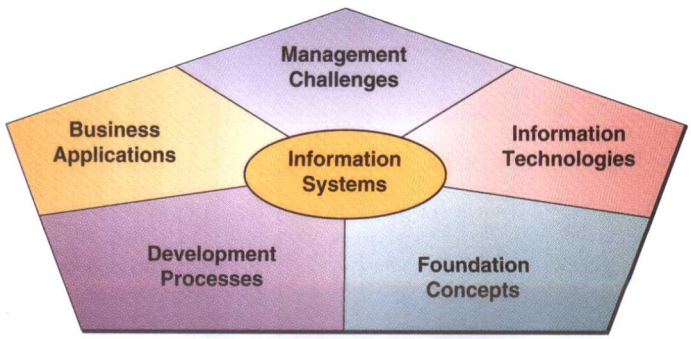
An Information Systems Framework

This text reduces the complexity of an introductory course in information systems by using a conceptual framework that organizes the knowledge needed by business students into five major areas (see Figure 1):

- **Foundation Concepts.** Fundamental business information systems concepts including trends, components, and roles of information systems (Chapter 1) and competitive advantage concepts and applications (Chapter 2). Other behavioral,

Figure 1

The five-area information systems framework.



managerial, and technical concepts are presented where appropriate in selected chapters.

- **Information Technologies.** Major concepts, developments, and managerial implications involved in computer hardware, software, telecommunications networks, and data resource management technologies (Chapters 3, 4, 5, and 6). Other technologies used in computer-based information systems are discussed where appropriate in selected chapters.
- **Business Applications.** How the Internet, intranets, extranets, and other information technologies are used in E-business enterprises to support electronic business and commerce, team and enterprise collaboration, and business decision making (Chapters 7, 8, and 9).
- **Development Processes.** Developing and implementing E-business systems using several application development approaches (Chapter 10).
- **Management Challenges.** The challenges of E-business technologies and strategies, including security and ethical challenges and global IT management (discussed in many chapters, but emphasized in Chapters 11 and 12).

Strategic, International, and Ethical Dimensions

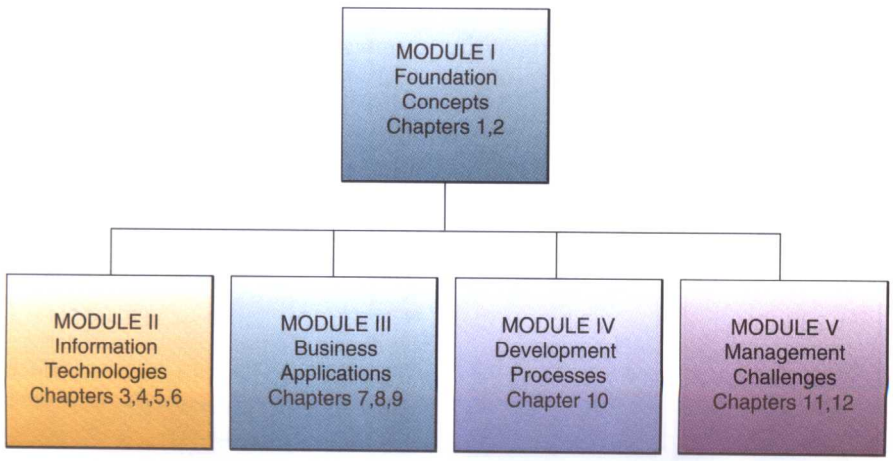
This text also contains substantial text material and cases reflecting the strategic, international, and ethical dimensions of information systems. This can be found not only in Chapters 2, 11, and 12, but also in all other chapters of the text. This is especially evident in many real world cases and examples, such as Safeway PLC; Ford Motor Company; Etrade Group; Pyramid Operating Systems; K-tel, Amazon, InfoSpace, and eBay; Napster.com and the Recording Industry; Northwest Airlines and ITEX Corp.; Manheim Auctions, Gillette, and Nypro; Volkswagen, Hershey and W.W. Grainger; General Motors and Inchcape Shipping Services; and many, many others. These examples repeatedly demonstrate the strategic and ethical challenges of managing E-business technologies for competitive advantage in global business markets and in the global information society in which we all live and work.

Modular Structure of the Text

The text is organized into five modules that reflect the five major areas of the framework for information systems knowledge mentioned earlier. See Figure 2. Also each chapter is organized into two distinct sections. This is done to avoid proliferation of

Figure 2

The modular organization of the text.



chapters, as well as to provide better conceptual organization of the text and each chapter. This organization increases instructor flexibility in assigning course material since it structures the text into modular levels (i.e., modules, chapters, and sections) while reducing the number of chapters that need to be covered.

Each chapter starts with Chapter Highlights and Learning Objectives and ends with a Summary, Key Terms and Concepts, a Review Quiz tied directly to the Key Terms and Concepts, Discussion Questions, Additional Real World Cases, Application Exercises, Review Quiz Answers, and Selected References. Real World Cases are placed at the beginning of the two sections of each chapter (with a brief analysis), to help students understand the chapter material in the context of examples from the real world of business.

Changes to This Edition

As stated earlier, besides providing all new Real World Cases, this edition represents a comprehensive E-business revision of the text. Highlights of the changes made to the Ninth Edition are found in the following Tenth Edition chapters:

Chapter 1: ***Foundations of Information Systems in Business***
This chapter features a complete reorganization and major changes in content to present an overview of topics in the five areas of IS knowledge of the text. Thus, Section I covers foundation concepts in information systems and technologies, and Section II presents concepts in E-business applications, the IS development process, and management challenges of IT.

Chapter 2: ***Competing with Information Technology***
This was Chapter 9 in the previous edition. It was moved to the Foundation Concepts module at the urging of reviewers to emphasize the vital importance of using IT for competitive advantage. The strategic use of Internet technologies and E-business concepts are major content additions, along with revising previous coverage and replacing many in-text real world examples.

Chapter 3: ***Computer Hardware***
Coverage of computer hardware has been updated and revised, including added content on information appliances and thin clients, and elimination of technical details on CPU components.

Chapter 4: ***Computer Software***
Updated coverage of computer software, including business application software, the Windows 2000 and Linux operating systems, and the XML language .

Chapter 5: ***Data Resource Management***
Includes new content on data resource management, data warehouses, and data mining, and new in-text real world examples.

Chapter 6: ***Telecommunications and Networks***
Updated coverage of telecommunications network content, including trends, the Internet, fiber optics and wireless technologies, and bandwidth alternatives. Coverage of business applications of telecommunications and the Internet has been moved to Chapter 7.

Chapter 7: ***The Internetworked E-Business Enterprise***
Section I of this chapter features new topics and thoroughly revised content on E-business applications and the business use and value of the Internet. The chapter includes new material on intranet enterprise portals and technologies, and new in-text real world examples.

Chapter 8: *Electronic Business and Commerce*
This chapter has been completely E-engineered to provide students with two solid sections on E-business and E-commerce. Section I on E-business systems features major new content on cross-functional integrated enterprise applications, including enterprise application integration (EAI), enterprise resource planning (ERP), and customer relationship management (CRM). Section II on E-commerce fundamentals features new material on the types, trends, technologies, processes, platforms, and payment systems of E-commerce, as well as new coverage of supply chain management (SCM) and new in-text real world examples.

Chapter 9: *E-Business Decision Support*
The focus of Section I of this chapter has been revised to emphasize the major trends and changes occurring in E-business decision support, which is empowering business professionals and knowledge workers (not just managers and executives) with web-enabled decision support tools. The chapter also features new material on using data mining and enterprise portals for decision support, and new in-text real world examples.

Chapter 10: *Developing E-Business Solutions*
This chapter is thoroughly revised and reorganized to stress an E-business systems development perspective, including prototyping, user interface, web design, and end user development topics (Section I), and E-business system implementation and organizational change topics (Section II). The hypothetical case study example of Auto Shack Stores, the checklist for end user development, and material on the system component matrix have been moved to the text's online learning center and replaced with new in-text real world examples.

Chapter 11: *Security and Ethical Challenges of E-Business*
This chapter is completely E-engineered to stress security, ethical, and societal challenges faced by E-businesses, including computer crime in Section I. Section II is a new, completely rewritten treatment that focuses on methods of E-business security management to counter the threats to E-business and E-commerce introduced in Section I.

Chapter 12: *Enterprise and Global Management of E-Business Technology*
The first section of this chapter is a completely E-engineered and new treatment of the impact of E-business on managers, organizations, and the management of information technologies and the IS function, eliminating much previous material that focused on more traditional approaches. Section II retains its global IT management structure, but includes new treatment and in-text real world examples on cultural and political challenges, E-business strategies, and data and Internet access issues in global E-business.

Teaching and Learning Resources

New to this edition, E-Tutor is an electronic tutor available free on CD-ROM that helps students master basic key concepts before advancing to more complex topics. E-Tutor is an interactive electronic product, with content from the textbook embedded into a software shell, that provides learning sessions in coordination with sections and subsections from the textbook. It has the flexibility to allow students to work through the material at their own pace. A **presentation manager Instructor CD-ROM** is available to adopters and offers the following resources for course presentation and management:

- An Instructor's Resource Manual contains suggestions for using the book in courses of varying lengths, detailed chapter outlines with teaching suggestions for use in lectures, and answers to all end-of-chapter questions, application exercises, and problems and case study questions. Teaching tips for incorporating the video clips are included for many chapters.
- A printed Test Bank, containing true-false, multiple choice, fill-in-the-blank, and short essay questions.
- Computerized/Network Testing with Brownstone Diploma software is fully networkable for LAN test administration; tests also can be printed for standard paper delivery or posted to a website for student access.
- Slide shows in Microsoft PowerPoint are available for each chapter to support classroom discussion of chapter concepts and real world cases.
- Data/solutions files for the database and spreadsheet application exercises in the text are included.
- Video clips are available that highlight how specific companies apply and use information technology.

The McGraw-Hill/Irwin Information Systems Video Library contains 14 10- to 12-minute videos on numerous companies demonstrating use of a variety of IT like intranets, multimedia, or computer-based training systems, and concepts like client/server computing and business process reengineering. This library is available free to adopters. For further information, visit www.mhhe.com/business/mis/videos or contact your local McGraw-Hill/Irwin sales representative. A video lecture guide for all 14 videos is included in the Instructor's Resource Manual.

Digital Solutions

- Website/OLC—The book's website at http://www.mhhe.com/business/mis/obrien/obrien10e provides resources for instructors and students using the text. The Online Learning Center (OLC) builds on the book's pedagogy and features with self-assessment quizzes, extra material not found in the text, web links, and other resources for students and instructors.
- Pageout—our Course Website Development Center. Pageout offers a syllabus page, website address, Online Learning Center content, online quizzing, gradebook, discussion forum, and student web page creation.

Packaging Options

The McGraw-Hill/Irwin *Advantage*, O'Leary, and Laudon Interactive computing series are collections of software application manuals and interactive computer-based training products for Microsoft Office. In addition, we offer several paperback Internet literacy books or CDs, perfect for introducing the World Wide Web, E-mail, and web page design to students. These texts and CDs are available for discounted packaging options with any McGraw-Hill/Irwin title. For more about our discount options, contact your local McGraw-Hill/Irwin sales representative or visit our website at www.mhhe.com/it.

In addition, a software casebook—*Application Cases in MIS: Using Spreadsheet and Database Software and the Internet,* third edition, by James N. Morgan of Northern Arizona University—is available to supplement the hands-on exercises in this edition. This optional casebook contains an extensive number of hands-on cases, many of which include a suggested approach for solving each case with the Internet, spreadsheet, or database management software packages to develop solutions for realistic business problems.

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Acknowledging the Real World of Business

The unique contribution of the hundreds of business firms and other computer-using organizations that are the subject of the real world cases, exercises, and examples in this text is gratefully acknowledged. The real-life situations faced by these firms and organizations provide the readers of this text with a valuable demonstration of the benefits and limitations of using the Internet and other information technologies to enable electronic business and commerce, and enterprise communications and collaboration in support of the business processes, managerial decision making, and strategic advantage of the internetworked E-business enterprise.

James A. O'Brien

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