GLOBAL EDITION

Management Information Systems

Managing the Digital Firm

FOURTEENTH EDITION

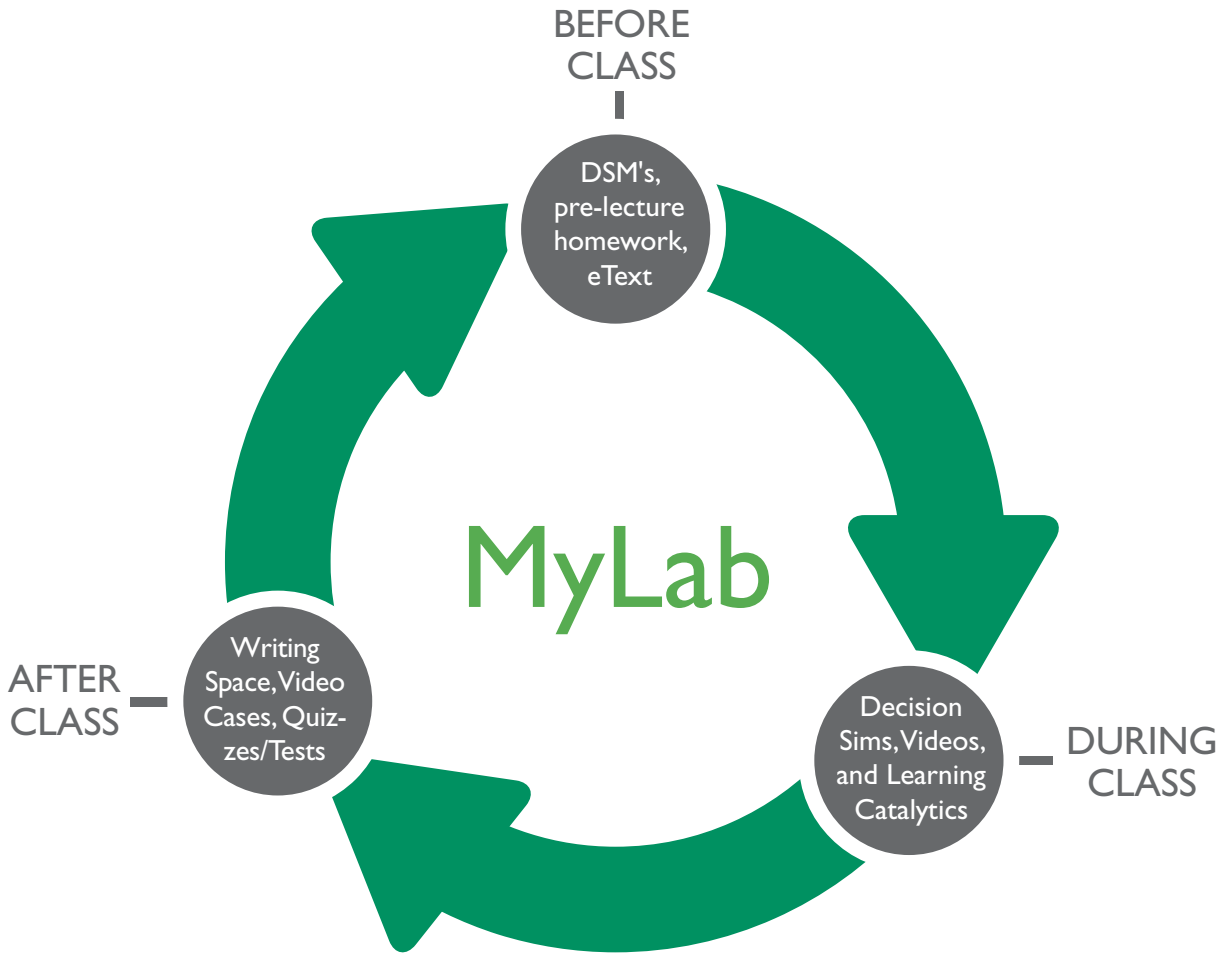
Kenneth C. Laudon • Jane P. Laudon

ALWAYS LEARNING

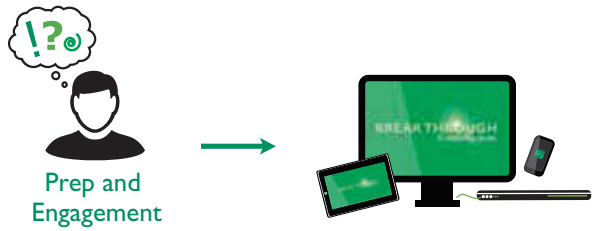
PEARSON

Full-Circle Learning

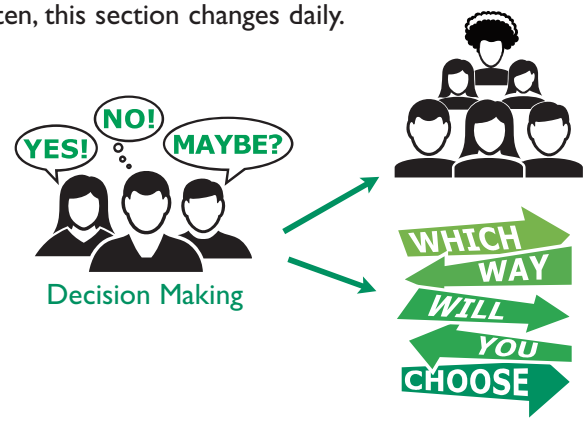
MyLab™: Learning Full Circle for Marketing, Management, Business Communication, Intro to Business, and MIS

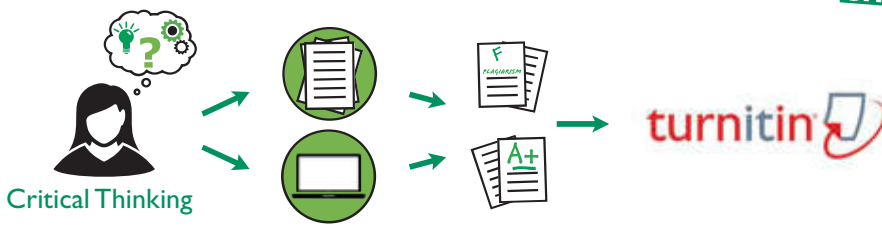


MyMISLab™: Improves Student Engagement Before, During, and After Class



- **Video exercises** – engaging videos that bring business concepts to life and explore business topics related to the theory students are learning in class. Quizzes then assess students' comprehension of the concepts covered in each video.
- **Learning Catalytics** – a "bring your own device" student engagement, assessment, and classroom intelligence system helps instructors analyze students' critical-thinking skills during lecture.
- **Dynamic Study Modules (DSMs)** – through adaptive learning, students get personalized guidance where and when they need it most, creating greater engagement, improving knowledge retention, and supporting subject-matter mastery. Also available on mobile devices.
- **Business Today** – bring current events alive in your classroom with videos, discussion questions, and author blogs. Be sure to check back often, this section changes daily.
- **Decision-making simulations** – place your students in the role of a key decision-maker. The simulation will change and branch based on the decisions students make, providing a variation of scenario paths. Upon completion of each simulation, students receive a grade, as well as a detailed report of the choices they made during the simulation and the associated consequences of those decisions.





- **Writing Space** – better writers make great learners—who perform better in their courses. Providing a single location to develop and assess concept mastery and critical thinking, the Writing Space offers automatic graded, assisted graded, and create your own writing assignments, allowing you to exchange personalized feedback with students quickly and easily.

  Writing Space can also check students' work for improper citation or plagiarism by comparing it against the world's most accurate text comparison database available from **Turnitin**.

- **Additional Features** – included with the MyLab are a powerful homework and test manager, robust gradebook tracking, comprehensive online course content, and easily scalable and shareable content.

http://www.pearsonmylabandmastering.com

Management Information Systems

MANAGING THE DIGITAL FIRM

FOURTEENTH EDITION

GLOBAL EDITION

Kenneth C. Laudon
New York University

Jane P. Laudon
Azimuth Information Systems

PEARSON

Boston Columbus Indianapolis New York San Francisco
Amsterdam Cape Town Dubai London Madrid Milan Munich Paris Montreal Toronto
Delhi Mexico City Sao Paulo Sydney Hong Kong Seoul Singapore Taipei Tokyo

Editor-in-Chief: Stephanie Wall
Acquisitions Editor: Nicole Sam
Program Manager Team Lead: Ashley Santora
Program Manager: Denise Vaughn
Editorial Assistant: Daniel Petrino
Vice President, Product Marketing: Maggie Moylan
Director of Marketing, Digital Services and Products: Jeanette Koskinas
Executive Product Marketing Manager: Anne Fahlgren
Field Marketing Manager: Lenny Ann Raper
Senior Strategic Marketing Manager: Erin Gardner
Project Manager Team Lead: Judy Leale
Project Manager: Karalyn Holland
Senior Acquisitions Editor, Global Edition: Steven Jackson
Senior Project Editor, Global Edition: Daniel Luiz
Media Producer, Global Edition: M. Vikram Kumar
Senior Manufacturing Controller, Production, Global Edition: Trudy Kimber
Operations Specialist: Diane Peirano
Creative Director: Blair Brown
Senior Art Director: Janet Slowik
Cover Designer: Lumina Datamatics Ltd.
Cover Image: 3dreams/Shutterstock
Vice President, Director of Digital Strategy & Assessment: Paul Gentile
Manager of Learning Applications: Paul Deluca
Digital Editor: Brian Surette
Digital Studio Manager: Diane Lombardo
Digital Studio Project Manager: Robin Lazrus
Digital Studio Project Manager: Alana Coles
Digital Studio Project Manager: Monique Lawrence
Digital Studio Project Manager: Regina DaSilva
Full-Service Project Management and Composition: Azimuth Interactive, Inc.

Microsoft and/or its respective suppliers make no representations about the suitability of the information contained in the documents and related graphics published as part of the services for any purpose. All such documents and related graphics are provided "as is" without warranty of any kind. Microsoft and/or its respective suppliers hereby disclaim all warranties and conditions with regard to this information, including all warranties and conditions of merchantability, whether express, implied or statutory, fitness for a particular purpose, title and non-infringement. In no event shall Microsoft and/or its respective suppliers be liable for any special, indirect or consequential damages or any damages whatsoever resulting from loss of use, data or profits, whether in an action of contract, negligence or other tortious action, arising out of or in connection with the use or performance of information available from the services.

The documents and related graphics contained herein could include technical inaccuracies or typographical errors. Changes are periodically added to the information herein. Microsoft and/or its respective suppliers may make improvements and/or changes in the product(s) and/or the program(s) described herein at any time. Partial screen shots may be viewed in full within the software version specified.

Microsoft® Windows®, and Microsoft Office® are registered trademarks of Microsoft Corporation in the U.S.A. and other countries. This book is not sponsored or endorsed by or affiliated with the Microsoft Corporation.

Pearson Education Limited
Edinburgh Gate
Harlow
Essex CM20 2JE
England

and Associated Companies throughout the world

Visit us on the World Wide Web at:
www.pearsonglobaleditions.com

© Pearson Education Limited 2016

The rights of Kenneth C. Laudon and Jane P. Laudon to be identified as the authors of this work have been asserted by them in accordance with the Copyright, Designs and Patents Act 1988.

Authorized adaptation from the United States edition, entitled Management Information Systems: Managing the Digital Firm, 14th edition, ISBN 978-0-13-389816-3, by Kenneth C. Laudon and Jane P. Laudon, published by Pearson Education © 2016.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without either the prior written permission of the publisher or a license permitting restricted copying in the United Kingdom issued by the Copyright Licensing Agency Ltd, Saffron House, 6–10 Kirby Street, London EC1N 8TS.

All trademarks used herein are the property of their respective owners. The use of any trademark in this text does not vest in the author or publisher any trademark ownership rights in such trademarks, nor does the use of such trademarks imply any affiliation with or endorsement of this book by such owners.

ISBN 10: 1292094001
ISBN 13: 9781292094007

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library.

10 9 8 7 6 5 4 3 2 1
14 13 12 11 10

Typeset in 10.5/13 ITC Veljovic Std Book by Azimuth Interactive, Inc.
Printed and bound by Courier Kendalville in United States of America.

About the Authors

Kenneth C. Laudon is a Professor of Information Systems at New York University's Stern School of Business. He holds a B.A. in Economics from Stanford and a Ph.D. from Columbia University. He has authored twelve books dealing with electronic commerce, information systems, organizations, and society. Professor Laudon has also written over forty articles concerned with the social, organizational, and management impacts of information systems, privacy, ethics, and multimedia technology.

Professor Laudon's current research is on the planning and management of large-scale information systems and multimedia information technology. He has received grants from the National Science Foundation to study the evolution of national information systems at the Social Security Administration, the IRS, and the FBI. Ken's research focuses on enterprise system implementation, computer-related organizational and occupational changes in large organizations, changes in management ideology, changes in public policy, and understanding productivity change in the knowledge sector.

Ken Laudon has testified as an expert before the United States Congress. He has been a researcher and consultant to the Office of Technology Assessment (United States Congress), Department of Homeland Security, and to the Office of the President, several executive branch agencies, and Congressional Committees. Professor Laudon also acts as an in-house educator for several consulting firms and as a consultant on systems planning and strategy to several Fortune 500 firms.

At NYU's Stern School of Business, Ken Laudon teaches courses on Managing the Digital Firm, Information Technology and Corporate Strategy, Professional Responsibility (Ethics), and Electronic Commerce and Digital Markets. Ken Laudon's hobby is sailing.

Jane Price Laudon is a management consultant in the information systems area and the author of seven books. Her special interests include systems analysis, data management, MIS auditing, software evaluation, and teaching business professionals how to design and use information systems.

Jane received her Ph.D. from Columbia University, her M.A. from Harvard University, and her B.A. from Barnard College. She has taught at Columbia University and the New York University Graduate School of Business. She maintains a lifelong interest in Oriental languages and civilizations.

The Laudons have two daughters, Erica and Elisabeth, to whom this book is dedicated.

Brief Contents

Part One Organizations, Management, and the Networked Enterprise 33

Chapter 1 Information Systems in Global Business Today 34
Chapter 2 Global E-Business and Collaboration 72
Chapter 3 Information Systems, Organizations, and Strategy 110
Chapter 4 Ethical and Social Issues in Information Systems 154

Part Two Information Technology Infrastructure 197

Chapter 5 IT Infrastructure and Emerging Technologies 198
Chapter 6 Foundations of Business Intelligence: Databases and Information Management 246
Chapter 7 Telecommunications, the Internet, and Wireless Technology 286
Chapter 8 Securing Information Systems 334

Part Three Key System Applications for the Digital Age 377

Chapter 9 Achieving Operational Excellence and Customer Intimacy: Enterprise Applications 378
Chapter 10 E-Commerce: Digital Markets, Digital Goods 412
Chapter 11 Managing Knowledge 458
Chapter 12 Enhancing Decision Making 496

Part Four Building and Managing Systems 531

Chapter 13 Building Information Systems 532
Chapter 14 Managing Projects 572
Chapter 15 Managing Global Systems 606

Glossary 637
Indexes 651

Complete Contents

Part One Organizations, Management, and the Networked Enterprise 33

Chapter 1 Information Systems in Global Business Today 34

◆**Opening Case:** Rugby Football Union Tries Big Data 35

1.1 How are information systems transforming business, and why are they so essential for running and managing a business today? 37

How Information Systems are Transforming Business 37 • What's New In Management Information Systems? 39 • Globalization Challenges and Opportunities: A Flattened World 40

◆**Interactive Session: Management** Meet the New Mobile Workers 41

The Emerging Digital Firm 44 • Strategic Business Objectives of Information Systems 44

1.2 What is an information system? How does it work? What are its management, organization, and technology components and why are complementary assets essential for ensuring that information systems provide genuine value for an organization? 48

What is an Information System? 48 • Dimensions of Information Systems 50

◆**Interactive Session: Technology** UPS Competes Globally with Information Technology 55

It Isn't Just Technology: A Business Perspective on Information Systems 57 • Complementary Assets: Organizational Capital and the Right Business Model 58

1.3 What academic disciplines are used to study information systems and how does each contribute to an understanding of information systems? 61

Technical Approach 61 • Behavioral Approach 62 • Approach of This Text: Sociotechnical Systems 62

Review Summary 64 • Key Terms 65 • Review Questions 65 • Discussion Questions 66

Hands-On MIS Projects 66

Management Decision Problems 66 • Improving Decision Making: Using Databases to Analyze Sales Trends 66 • Improving Decision Making: Using the Internet to Locate Jobs Requiring Information Systems Knowledge 67

Collaboration and Teamwork: 67

◆**Case Study:** Mashaweer: Online Personal Services in the Gulf 67

◆**References:** 71

Chapter 2 Global E-Business and Collaboration 72

◆**Opening Case:** Social Business at BASF 73

2.1 What are business processes? How are they related to information systems? 75

Business Processes 75 • How Information Technology Enhances Business Processes 77

2.2 How do systems serve the different management groups in a business and how do systems that link the enterprise improve organizational performance? 77

Systems for Different Management Groups 78

◆**Interactive Session: Technology** Schiphol International Hub to Become Faultless: Truth or Dare? 82

Systems for Linking the Enterprise 85 • E-business, E-commerce, and E-government 87

2.3 Why are systems for collaboration and social business so important and what technologies do they use? 88

What is Collaboration? 88 • What is Social Business? 89 • Business Benefits of Collaboration and Social Business 90 • Building a Collaborative Culture and Business Processes 91 • Tools and Technologies for Collaboration and Social Business 92

◆**Interactive Session: Management** Is Social Business Working Out? 97

2.4 What is the role of the information systems function in a business? 99

The Information Systems Department 99 • Organizing the Information Systems Function 100

Review Summary 101 • Key Terms 102 • Review Questions 102 • Discussion Questions 103

Hands-On MIS Projects 103

Management Decision Problems 103 • Improving Decision Making: Using a Spreadsheet to Select Suppliers 104 • Achieving Operational Excellence: Using Internet Software to Plan Efficient Transportation Routes 104

Collaboration and Teamwork: 104

◆**Case Study:** Modernization of NTUC Income 105

◆**References:** 108

Chapter 3 Information Systems, Organizations, and Strategy 110

◆**Opening Case:** Grupo Modelo: Competing On Processes 111

3.1 Which features of organizations do managers need to know about to build and use information systems successfully? 113

What is an Organization? 114 • Features of Organizations 116

3.2 What is the impact of information systems on organizations? 121

Economic Impacts 121 • Organizational and Behavioral Impacts 122 • The Internet and Organizations 124 • Implications for the Design and Understanding of Information Systems 125

3.3 How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems? 126

Porter's Competitive Forces Model 126 • Information System Strategies for Dealing with Competitive Forces 128

◆**Interactive Session: Technology** Automakers Become Software Companies 130

The Internet's Impact on Competitive Advantage 132

◆**Interactive Session: Organizations** Identifying Market Niches in the Age of Big Data 133

The Business Value Chain Model 135 • Synergies, Core Competencies, and Network-Based Strategies 138

3.4 What are the challenges posed by strategic information systems and how should they be addressed? 142

Sustaining Competitive Advantage 142 • Aligning IT with Business Objectives 143 • Managing Strategic Transitions 144

Review Summary 144 • Key Terms 145 • Review Questions 145 • Discussion Questions 146

Hands-On MIS Projects 146

Management Decision Problems 146 • Improving Decision Making: Using a Database to Clarify Business Strategy 147 • Improving Decision Making: Using Web Tools to Configure and Price an Automobile 147

Collaboration and Teamwork: 147

◆**Case Study:** Can This Bookstore Be Saved? 148

◆**References:** 151

Chapter 4 Ethical and Social Issues in Information Systems 154

◆**Opening Case:** Content Pirates Sail the Web 155

4.1 What ethical, social, and political issues are raised by information systems? 157

A Model for Thinking About Ethical, Social, and Political Issues 159 • Five Moral Dimensions of the Information Age 160 • Key Technology Trends That Raise Ethical Issues 160

4.2 What specific principles for conduct can be used to guide ethical decisions? 163

Basic Concepts: Responsibility, Accountability, and Liability 163

◆**Interactive Session: Management** Monitoring in the Workplace 164

Ethical Analysis 166 • Candidate Ethical Principles 166 • Professional Codes of Conduct 167 • Some Real-World Ethical Dilemmas 167

4.3 Why do contemporary information systems technology and the Internet pose challenges to the protection of individual privacy and intellectual property? 168

Information Rights: Privacy and Freedom in the Internet Age 168 •

◆**Interactive Session: Technology** Big Data Gets Personal: Behavioral Targeting 173

Property Rights: Intellectual Property 176

4.4 How have information systems affected laws for establishing accountability, liability, and the quality of everyday life? 180

Computer-Related Liability Problems 180 • System Quality: Data Quality and System Errors 181 • Quality of Life: Equity, Access, and Boundaries 182

Review Summary 189 • Key Terms 189 • Review Questions 190 • Discussion Questions 190

Hands-On MIS Projects 191

Management Decision Problems 191 • Achieving Operational Excellence: Creating a Simple Blog 191 • Improving Decision Making: Analyzing Web Browser Privacy 191

Collaboration and Teamwork: 192

◆**Case Study:** Facebook Privacy: There Is No Privacy 192

◆**References:** 196

Part Two Information Technology Infrastructure 197

Chapter 5 IT Infrastructure and Emerging Technologies 198

◆**Opening Case:** Toyota Motor Europe Manages with the Cloud 199

5.1 What is IT infrastructure and what are the stages and drivers of IT infrastructure evolution? 201

Defining IT Infrastructure 202 • Evolution of IT Infrastructure 203 • Technology Drivers of Infrastructure Evolution 207

5.2 What are the components of IT infrastructure? 212

Computer Hardware Platforms 212 • Operating System Platforms 214 • Enterprise Software Applications 215 • Data Management and Storage 215 • Networking/Telecommunications Platforms 216 • Internet Platforms 216 • Consulting and System Integration Services 216

5.3 What are the current trends in computer hardware platforms? 217

The Mobile Digital Platform 217 • Consumerization of IT and BYOD 217 •

◆**Interactive Session: Technology** The Greening of the Data Center 218

Quantum Computing 220 • Virtualization 220 • Cloud Computing 220

• Green Computing 216 • Autonomic Computing 217 • High-performance and Power-saving Processors 217 • The Mobile Digital Platform 217 • Consumerization of IT and BYOD 217

Quantum Computing 220 • Virtualization 220 • Cloud Computing 220

◆**Interactive Session: Organizations** Is It Time for Cloud Computing? 223

Green Computing 225 • High-Performance and Power-Saving Processors 225

5.4 What are the current trends in computer software platforms? 226

Linux and Open Source Software 226 • Software for the Web: Java, HTML, and HTML5 226 • Web Services and Service-Oriented Architecture 227 • Software Outsourcing and Cloud Services 229

5.5 What are the challenges of managing IT infrastructure and management solutions? 232

Dealing with Platform and Infrastructure Change 232 • Management and Governance 233 • Making Wise Infrastructure Investments 233

Review Summary 236 • Key Terms 237 • Review Questions 238 • Discussion Questions 238

Hands-On MIS Projects 239

Management Decision Problems 239 • Improving Decision Making: Using a Spreadsheet to Evaluate Hardware and Software Options 239 • Improving Decision Making: Using Web Research to Budget for a Sales Conference 239

Collaboration and Teamwork: 240

◆**Case Study:** The Pleasures and Pitfalls of BYOD 241

◆**References:** 244

Chapter 6 Foundations of Business Intelligence: Databases and Information Management 246

◆**Opening Case:** BAE Systems 247

6.1 What are the problems of managing data resources in a traditional file environment? 250

File Organization Concepts 250 • Problems with the Traditional File Environment 250

6.2 What are the major capabilities of database management systems (DBMS) and why is a relational DBMS so powerful? 253

Database Management Systems 253 • Capabilities of Database Management Systems 258 • Designing Databases 259

6.3 What are the principal tools and technologies for accessing information from databases to improve business performance and decision making? 262

The Challenge of Big Data 262 • Business Intelligence Infrastructure 263

◆**Interactive Session: Technology** Driving ARI Fleet Management with Real-Time Analytics 265

Analytical Tools: Relationships, Patterns, Trends 267 • Databases and the Web 270

6.4 Why are information policy, data administration, and data quality assurance essential for managing the firm's data resources? 272

Establishing an Information Policy 272 • Ensuring Data Quality 273

◆**Interactive Session: Management** American Water Keeps Data Flowing 275

Review Summary 276 • Key Terms 277 • Review Questions 278 • Discussion Questions 279

Hands-On MIS Projects 279

Management Decision Problems 279 • Achieving Operational Excellence: Building a Relational Database for Inventory Management 279 • Improving Decision Making: Searching Online Databases for Overseas Business Resources 280

Collaboration and Teamwork: 280

◆**Case Study:** Lego: Embracing Change by Combining BI with a Flexible Information System 281

◆**References:** 284