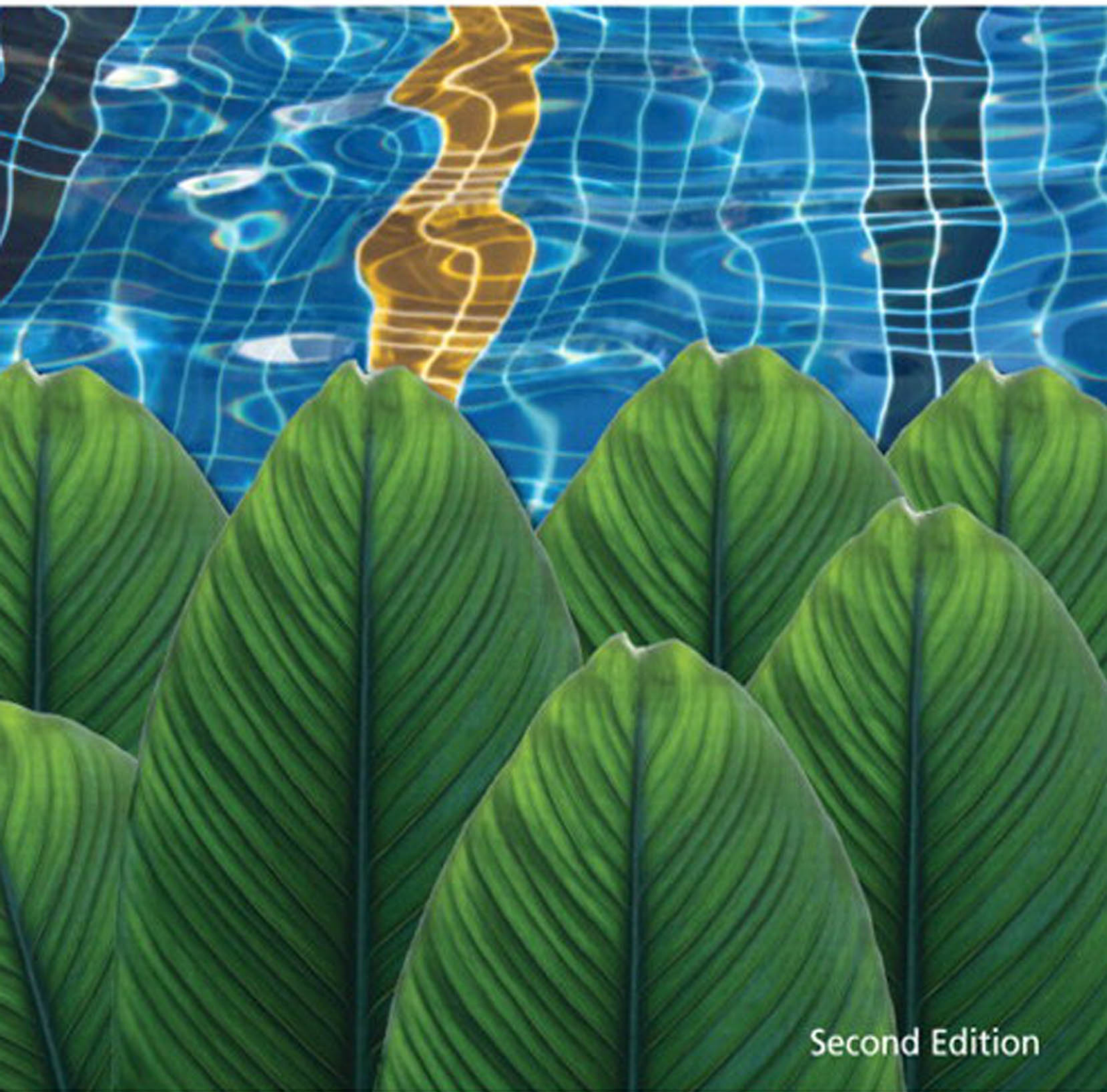


Processes, Systems, and Information

An Introduction to MIS



Second Edition

Earl H. McKinney Jr. • David M. Kroenke

Processes, Systems, and Information

An Introduction to MIS



This page intentionally left blank

Processes, Systems, and Information

An Introduction to MIS

Second Edition

Earl McKinney Jr.

Bowling Green State University

David M. Kroenke



PEARSON

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

Editor-in-Chief: Stephanie Wall
Executive Editor: Bob Horan
Development Editor: Laura Town
Program Manager Team Lead: Ashley Santora
Program Manager: Denise Vaughn
Editorial Assistant: Kaylee Rotella
Director of Marketing: Maggie Moylan
Executive Marketing Manager: Anne Fahlgren
Project Manager Team Lead: Judy Leale
Project Manager: Jane Bonnell
Operations Specialist: Michelle Klein
Creative Director: Blair Brown
Senior Art Director: Janet Slowik

Interior and Cover Designer: Karen Quigley
Interior Illustrations: Simon Alicea
Cover Photo: sopose/Shutterstock
VP, Director of Digital Strategy & Assessment: Paul Gentile
Digital Editor: Brian Surette
Digital Development Manager: Robin Lazrus
Senior Digital Project Manager: Alana Coles
Digital Production Project Manager: Lisa Rinaldi
Full-Service Project Management and Composition:
Integra
Printer/Binder: Courier/Kendallville
Cover Printer: Lehigh-Phoenix Color/Hagerstown
Text Font: 10/12 Times

Credits and acknowledgments borrowed from other sources and reproduced, with permission, in this textbook appear on the appropriate page within text.

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 the Microsoft Corporation in the U.S.A. and other countries. This book is not sponsored or endorsed by or affiliated with the Microsoft Corporation.

This publication contains references to the products of SAP AG. SAP, R/3, SAP NetWeaver, Duet, PartnerEdge, ByDesign, SAP BusinessObjects Explorer, StreamWork, and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG in Germany and other countries.

Business Objects and the Business Objects logo, BusinessObjects, Crystal Reports, Crystal Decisions, Web Intelligence, Xcelsius, and other Business Objects products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of Business Objects Software Ltd. Business Objects is an SAP company.

Sybase and Adaptive Server, iAnywhere, Sybase 365, SQL Anywhere, and other Sybase products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of Sybase, Inc. Sybase is an SAP company.

SAP AG is neither the author nor the publisher of this publication and is not responsible for its content. SAP Group shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP Group products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

Copyright © 2015, 2013 by Pearson Education, Inc. All rights reserved. Manufactured in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. To obtain permission(s) to use material from this work, please submit a written request to Pearson Education, Inc., Permissions Department, One Lake Street, Upper Saddle River, New Jersey 07458, or you may fax your request to 201-236-3290.

Many of the designations by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed in initial caps or all caps.

Library of Congress Cataloging-in-Publication Data

McKinney, Earl H., Jr.

Processes, systems, and information: An introduction to MIS / Earl H. McKinney Jr. and David M. Kroenke.

pages cm

Includes index.

ISBN 978-0-13-354675-0

1. Management information systems. I. Kroenke, David M. II. Title.

T58.6.K7733 2015

658.4'038011—dc23

2013039917

10 9 8 7 6 5 4 3 2 1

PEARSON

ISBN 10: 0-13-354675-6
ISBN 13: 978-0-13-354675-0

Brief Contents

PART 1 Why MIS? 1

- Chapter 1** The Importance of MIS 2
- Chapter 2** Business Processes, Information Systems, and Information 26

PART 2 Information Technology 47

- Chapter 3** Hardware, Software, and Networks 48
- Chapter 4** Database Processing 88

PART 3 Operational Processes and Information Systems 125

- Chapter 5** Using IS to Improve Processes 126
- Chapter 6** Supporting Processes with ERP Systems 153
- Chapter 7** Supporting the Procurement Process with SAP 181
- Appendix 7** SAP Procurement Tutorial 209
- Chapter 8** Supporting the Sales Process with SAP 226
- Appendix 8** SAP Sales Tutorial 251

PART 4 Dynamic Processes and Information Systems 269

- Chapter 9** Collaboration and IS 271
- Chapter 10** Social Media and IS 303
- Chapter 11** Business Intelligence and IS 330
- Appendix 11** SAP Business Intelligence Tutorial 361

PART 5 MIS Management Processes 365

- Chapter 12** MIS Management Processes: Process Management, Systems Development, and Security 366

Application Exercises 400
Glossary 419
Index 431

This page intentionally left blank

Contents

Preface xv
About the Authors xxv

PART 1 Why MIS? 1

Chapter 1 The Importance of MIS 2

Q1 Why Is Introduction to MIS the Most Important Class in the Business School? 3

- How Can I Attain Job Security? 5
- How Can Intro to MIS Help You Learn Nonroutine Skills? 6
- Jobs 8
- What Is the Bottom Line? 9

Q2 What Is MIS? 10

- Processes, Information Systems, and Information 10
- Management and Use 10
- Achieve Strategies 11

Q3 How Does MIS Relate to Organizational Strategy? 12

Q4 What Five Forces Determine Industry Structure? 12

Q5 What Is Competitive Strategy? 14

Q6 How Does Competitive Strategy Determine Value Chain Structure? 15

- Primary Activities in the Value Chain 15
- Support Activities in the Value Chain 16
- Value Chain Linkages 16
- MIS INCLASS 1: Industry Structure → Competitive Strategy → Value Chains → Business Processes ↔ Information Systems 17

Q7 How Does Competitive Strategy Determine Business Processes and Information Systems? 17

- ETHICS GUIDE: Ethics and Professional Responsibility 20
- CASE STUDY 1: Singing Valley 24

Chapter 2 Business Processes, Information Systems, and Information 26

Q1 What Is a Business Process? 27

- An Example Business Process 28
- Why Do Organizations Standardize Business Processes? 29

Q2 What Is an Information System? 30

- How Can I Use the Five-Component Model? 31

Q3 How Do Business Processes and Information Systems Relate? 31

- The Role of Procedures 32

Q4 How Do Structured and Dynamic Processes Vary? 33

- Characteristics of Structured Processes 33
- Characteristics of Dynamic Processes 34

Q5 What Is Information? 35

- Definitions Vary 35
- Common Elements in the Definitions 35
- How Can I Use These Ideas About Information? 36

Q6 What Are Necessary Data Characteristics? 37

- Accurate 37
- Timely 37

- Relevant 38
- Just Sufficient 38
- Worth Its Cost 38
- Jennifer, Jake, and You 38
- MIS INCLASS 2: Peanut Butter and Jelly 39
- ETHICS GUIDE: Informing About Misinforming 40
- CASE STUDY 2: The Amazon of Innovation 44

PART 2 Information Technology 47

Chapter 3 Hardware, Software, and Networks 48

- Q1 What Do Business Professionals Need to Know About Computer Hardware? 50**
 - Hardware Components 50
 - Types of Hardware 50
 - Computer Data 51
- Q2 What Do Business Professionals Need to Know About Software? 52**
 - What Are the Major Operating Systems? 52
 - Virtualization 55
 - Own Versus License 56
 - What Types of Applications Exist, and How Do Organizations Obtain Them? 56
 - What Is Firmware? 58
 - Is Open Source a Viable Alternative? 58
- Q3 What Are the Differences Between Native and Thin-Client Applications? 59**
 - MIS INCLASS 3: 3D Print Yourself! 60
 - Developing Native Applications 60
 - Developing Thin-Client Applications 62
 - Which Is Better? 63
- Q4 What Characterizes Quality Mobile User Experiences? 63**
 - Feature Content 64
 - Use Context-Sensitive Chrome 64
 - Provide Animation and Lively Behavior 64
 - Design to Scale and Share 65
 - Use the Cloud 66
- Q5 What Do Business Professionals Need to Know About Data Communications? 67**
 - What Are the Components of a LAN? 67
 - How Can You Connect Your LAN to the Internet? 69
 - Communication over the Internet 70
 - An Internet Example 70
- Q6 What Happens on a Typical Web Server? 71**
 - Three-Tier Architecture 72
 - Watch the Three Tiers in Action! 73
 - Hypertext Markup Language (html) 73
- Q7 Why Is the Cloud the Future for Most Organizations? 74**
 - Why Is the Cloud Preferred to In-House Hosting? 76
 - Why Now? 77
 - When Does the Cloud Not Make Sense? 78
 - How Do Organizations Use the Cloud? 78
 - ETHICS GUIDE: Showrooming: The Consequences 80
 - CASE STUDY 3: The Apple of Your i 85

Chapter 4 Database Processing 88

- Q1 What Is the Purpose of a Database? 90**
- Q2 What Are the Contents of a Database? 91**
 - What Are Relationships Among Rows? 92
 - Metadata 93

Q3 What Are the Components of a Database Application System?	94
What Is a Database Management System?	94
Creating the Database and Its Structures	95
Processing the Database	95
Administering the Database	96
What Are the Components of a Database Application?	96
What Are Forms, Reports, Queries, and Application Programs?	97
Why Are Database Application Programs Needed?	98
Multi-User Processing	98
■ MIS INCLASS 4: How Much Is a Database Worth?	100
Enterprise DBMS Versus Personal DBMS	100
Q4 How Do Data Models Facilitate Database Design?	101
What Is the Entity-Relationship Data Model?	102
Entities	102
Relationships	103
Q5 How Is a Data Model Transformed into a Database Design?	105
Normalization	105
Data Integrity Problems	105
Normalizing for Data Integrity	106
Summary of Normalization	107
Representing Relationships	107
What Is the User's Role in the Development of Databases?	107
Q6 Why Are NoSQL and Big Data Important?	110
Will NoSQL Replace Relational DBMS Products?	110
How Does Big Data Differ from Relational Data?	110
Q7 How Can the Intramural League Improve Its Database?	111
League Database, Revision 1	112
League Database, Revision 2	113
■ ETHICS GUIDE: Querying Inequality?	116
■ CASE STUDY 4: Fail Away with Dynamo, Bigtable, and Cassandra	122

PART 3 Operational Processes and Information Systems 125

Chapter 5 Using IS to Improve Processes 126

Q1 What Are the Important Characteristics of Processes in Organizations?	128
Examples of Processes	128
Scope of Processes	129
Objectives of Processes	130
Q2 What Are Examples of Common Business Processes?	130
Inbound Logistics Processes	132
Operations Processes	132
Outbound Logistics Processes	132
Sales and Marketing Processes	132
Service Processes	132
Human Resources Processes	133
Technology Development Processes	133
Infrastructure Processes	133
Applying Process Characteristics	133
Q3 How Can Management Improve Processes?	134
Process Objectives	134
Process Measures	135
Q4 How Can Information Systems Be Used to Improve Processes?	135
Improve an Activity	136
Improve Data Flow Among Activities	136
Improve Control of Activities	136

Use Automation 137
 Improve Procedures 138

- Q5 How Can Process Management Principles Improve Processes? 140**
- Q6 How Do Process Teams Diagram Process Improvement? 141**
- Q7 How Can an IS Hinder a Process? 142**
 - Why Information Silos Exist 143
 - **MIS INCLASS 5: Improving the Process of Making Paper Airplanes 144**
 - **ETHICS GUIDE: Process Improvement or Privacy Problem? 146**
 - **CASE STUDY 5: Google Cars 151**

Chapter 6 Supporting Processes with ERP Systems 153

- Q1 What Problem Does an ERP System Solve? 154**
 - Enterprise Application Integration (EAI) 155
 - Enterprise Resource Planning (ERP) 156
 - ERP Implementation: Before and After Examples 156
- Q2 What Are the Elements of an ERP System? 159**
 - The Five Components of an ERP IS: Software, Hardware, Data, Procedures, and People 161
 - Inherent Business Processes 164
- Q3 What Are the Benefits of an ERP System? 165**
 - **MIS INCLASS 6: One Medical Source of Truth 166**
- Q4 What Are the Challenges of Implementing an ERP System? 166**
 - Decision-Making Challenges 167
 - People Challenges 168
 - ERP Upgrades 169
- Q5 What Types of Organizations Use ERP? 170**
 - ERP by Industry Type 170
 - ERP by Organization Size 171
 - International Firms and ERP 171
- Q6 Who Are the Major ERP Vendors? 172**
 - ERP Products 172
- Q7 What Makes SAP Different from Other ERP Products? 173**
 - SAP Inputs and Outputs 174
 - SAP Software 174
 - **ETHICS GUIDE: ERP Estimation 176**
 - **CASE STUDY 6: The Sudden End of the U.S. Air Force 180**

Chapter 7 Supporting the Procurement Process with SAP 181

- Q1 What Are the Fundamentals of a Procurement Process? 182**
- Q2 How Did the Procurement Process at CBI Work Before SAP? 185**
- Q3 What Were the Problems with the Procurement Process Before SAP? 186**
 - Warehouse Problems 187
 - Accounting Problems 187
 - Purchasing Problems 187
- Q4 How Does CBI Implement SAP? 188**
- Q5 How Does the Procurement Process Work at CBI After SAP? 190**
 - Purchasing 191
 - Warehouse 192
 - Accounting 193
 - The Benefits of SAP for the CBI Procurement Process 194
- Q6 How Can SAP Improve Supply Chain Processes at CBI? 195**
 - Supply Chain Processes 195
 - Improving Supply Chain Processes by Sharing Data 196
 - Improving Supply Chain Processes with Integration 197
 - Improving CBI Processes Beyond the Supply Chain 198
 - **MIS INCLASS 7: The Bicycle Supply Game 199**

- Q7 How Does the Use of SAP Change CBI?** 200
 - Wally's Job Change 201
- Q8 What New IS Will Affect the Procurement Process in 2024?** 202
 - **ETHICS GUIDE: Estimation Ethics** 204
 - **ACTIVE CASE 7: SAP Procurement Tutorial** 208

Appendix 7 SAP Procurement Tutorial 209

Chapter 8 Supporting the Sales Process with SAP 226

- Q1 What Are the Fundamentals of a Sales Process?** 227
- Q2 How Did the Sales Process at CBI Work Before SAP?** 229
- Q3 What Were the Problems with the Sales Process Before SAP?** 230
 - Sales Problems 230
 - Warehouse Problems 231
 - Accounting Problems 231
- Q4 How Does CBI Implement SAP?** 231
- Q5 How Does the Sales Process Work at CBI After SAP?** 232
 - Sales 232
 - Warehouse 233
 - Accounting 234
 - The Benefits of SAP for the CBI Sales Process 235
 - **MIS INCLASS 8: Building a Model** 237
- Q6 How Can SAP Improve Customer-Facing Processes at CBI?** 237
 - Improving Customer-Facing Processes by Sharing Data 238
 - Improving Customer-Facing Processes with Integration 239
 - Challenges 240
- Q7 How Does E-Commerce Improve Processes in an Industry?** 240
 - E-Commerce Merchant Companies 241
 - Nonmerchant E-Commerce 242
 - How Does E-Commerce Improve Market Efficiency? 242
- Q8 What New IS Will Affect the Sales Process in 2024?** 243
 - Process Integration and You in 2024 245
 - **ETHICS GUIDE: Are My Ethics for Sale?** 246
 - **ACTIVE CASE 8: SAP Sales Tutorial** 250

Appendix 8 SAP Sales Tutorial 251

PART 4 Dynamic Processes and Information Systems 269

Chapter 9 Collaboration and IS 271

- Q1 What Is Collaboration, and Why Is It Important to Business?** 272
 - The Two Key Activities of Collaboration 273
 - Importance of Effective Critical Feedback 273
 - Guidelines for Giving and Receiving Critical Feedback 275
 - Warning! 275
- Q2 What Are the Objectives of the Collaboration Process?** 276
 - Product Objective: Successful Output 276
 - Team Objective: Growth in Team Capability 276
 - Individual Objective: Meaningful and Satisfying Experience 277
- Q3 What Are the Key Components of a Collaboration IS?** 278
 - The Five Components of a Collaboration IS 278
 - Key Attributes of Collaboration IS 279
- Q4 How Can Collaboration IS Support the Communicating Activity?** 279
- Q5 How Can Collaboration IS Support the Iterating Activity?** 283
 - No Iteration Control 283

Iteration Management 284
Iteration Control 285

Q6 How Can Collaboration IS Support Business Processes? 286

The Project Management Process 286
The Workflow Process 287
Supporting New Processes with Collaboration IS 288

Q7 Which Collaboration IS Is Right for Your Team? 289

Three Sets of Collaboration Tools 289
Choosing the Set for Your Team 290
Don't Forget Procedures and People! 291
■ **MIS INCLASS 9: Virtual Practice!** 292

Q8 2024? 293

■ **ETHICS GUIDE: Virtual Ethics?** 294
■ **CASE STUDY 9: Eating Our Own Dog Food** 299

Chapter 10 Social Media and IS 303

Q1 What Is Social Media, and Why Is It Important to Business? 304

Q2 What Are the Objectives of the Social Media Process? 305

Effectiveness Objectives 306
Efficiency Objectives 307

Q3 What Are the Key Components of a Social Media IS? 308

The Five Components of a Social Media IS 308
Key Attributes of a Social Media IS 309

Q4 How Do Social Media IS Support Social Media Activities? 310

Creating 310
Sharing 311

Q5 How Can Social Media IS Support Business Processes? 313

The Promotion Process 313
The Customer Service Process 314
Supporting New Processes with Social Media IS 315
Tips for Conducting Social Media Promotions 316

Q6 How Can Social Media IS Support the Process of Building Social Capital? 317

■ **MIS INCLASS 10: Using Twitter to Support the Class Discussion Process** 317
How an Organization Can Use Social Media IS to Increase the Number of Relationships 318
How an Organization Can Use Social Media IS to Increase the Strength of Relationships 318
How an Organization Can Use Social Media IS to Connect to Those with More Assets 319

Q7 How Do Businesses Manage the Risks of Social Media? 320

Management Risks 320
Employee Communication Risks 321
User-Generated Content Risks 321
Responding to User Content Problems 322

Q8 2024? 323

■ **ETHICS GUIDE: Ethics, Social Marketing, and Stretching the Truth** 324
■ **CASE STUDY 10: Tourism Holdings Limited (thl)** 328

Chapter 11 Business Intelligence and IS 330

Q1 What Is Business Intelligence, and Why Is It Important to Business? 331

Examples of BI 333

Q2 What Are the Objectives of the BI Process? 333

Q3 What Are the Key Components of a Business Intelligence IS? 335

The Five Components of a BI Information System 335

Key Attributes of BI Information Systems 336

Q4 How Do BI Information Systems Support BI Activities? 336

Acquiring 337

Analyzing 338

Publishing 342

Q5 How Can BI Information Systems Support Business Processes? 343

Supporting Existing Processes with BI Information Systems 344

Supporting New Processes with BI Information Systems 346

Q6 What Is a Big Data BI System, and How Is It Used? 346

MapReduce Technique 347

SAP HANA Technique 347

Processes Supported by Big Data BI IS 348

Q7 How Do Businesses Manage the Risks of Business Intelligence? 349

Data Problems 349

People Problems 350

■ **MIS INCLASS 11: I Know That, I Think 351**

Q8 How Does SAP Do BI? 352

Q9 2024? 352

Mobile Devices 352

Unstructured Data 353

Real-Time Use 353

Technology Backlash 353

■ **ETHICS GUIDE: Unseen Cyberazzi 354**

■ **CASE STUDY 11: Hadoop the Cookie Cutter 358**

Appendix 11 SAP Business Intelligence Tutorial 361

PART 5 MIS Management Processes 365

Chapter 12 MIS Management Processes: Process Management, Systems Development, and Security 366

Q1 What Are the Activities of Business Process Management? 367

The BPM Monitoring Activity 368

The BPM Modeling Activity 369

The BPM Create Components Activity 369

The BPM Implement Process Activity 369

Q2 What Are the Activities of the Systems Development Life Cycle (SDLC) Development Process? 369

Define System 370

Determine Requirements 371

Create Components 372

Implement 372

Maintain the System 374

Q3 How Can the Scrum Process Overcome the Problems of the SDLC? 375

What Are the Principles of Agile Development Methodologies? 375

What Is the Scrum Process? 376

When Are We Done? 378

Q4 What Is Information Systems Security? 378

The IS Security Threat/Loss Scenario 379

What Are the Sources of Threats? 380

What Types of Security Loss Exist? 381

Challenges of Information Systems Security 383

Q5 How Should You Respond to Security Threats? 383

Q6 How Should Organizations Respond to Security Threats? 384

Q7 How Can Technical and Data Safeguards Protect Against Security Threats? 385

- Identification and Authentication 385
- Encryption 386
- Firewalls 386
- Malware Protection 387
- Data Safeguards 388

Q8 How Can Human Safeguards Protect Against Security Threats? 388

- Human Safeguards for Employees 389
- Human Safeguards for Nonemployee Personnel 390
- Account Administration 391
- Backup and Recovery Procedures 391
- Security Monitoring 392

Q9 How Should Organizations Respond to Security Incidents? 392

- **MIS INCLASS 12: Phishing for Credit Cards, Identifying Numbers, and Bank Accounts 393**
- **ETHICS GUIDE: Security Privacy 394**
- **CASE STUDY 12: Will You Trust FIDO? 398**

Application Exercises 400

Glossary 419

Index 431

Preface

Since the emergence of ERP and EAI systems in the early 1990s, the MIS discipline has undergone a slow but persistent change. Whereas the early emphasis of MIS was on the management and use of information systems *per se*, emerging cross-functional systems began to place the focus on processes that utilize such systems. We believe that existing MIS textbooks, particularly those at the introductory level, do not sufficiently recognize this change in emphasis. Hence, we offer this textbook that provides a strong process orientation.

Why This Second Edition?

The changes in this second edition are listed in Table 1. Several major changes led to these modifications. One *major change* was to make the flow of the three chapters on dynamic processes (Chapters 9–11) a single, reusable sequence of questions. We want students to see that a single process-oriented sequence of questions can be applied not only to these three chapters but to any dynamic process.

A second change was to add a question at the end of several chapters that summarizes what we expect to see in the next 10 years. While this simple “2024?” could include many topics, we attempted to limit this discussion to the changes in technology that will have the greatest impact on organizational processes and IS.

This second edition also includes a new SAP tutorial on business intelligence (BI). BI and Big Data are essential topics in business schools today for all students, not just for IS majors. In this tutorial, we give students with no IS background a hands-on experience with several of the BI operations discussed in the chapter.

To satisfy the growing number of schools who are “flipping” their classrooms, this edition includes several new MIS InClass exercises and offers improvements to many other InClass exercises. We have used these exercises for many years and have seen the positive benefits they offer as students become engaged in these active learning exercises.

We have also tried to improve the applicability of the major concepts in the book. We added sections on how students can immediately employ several of the conceptual models that form the textbook’s foundation. For example, we have now included sections on the application of the five components of IS, the definition of information, and characteristics of processes.

We also expanded our explanation of the importance of procedures. Procedures are the steps by which an IS is used to support a process activity and are often a key to improving the process. In several of the chapters, we more completely describe procedures and how poorly understood procedures can limit processes.

Chapter 3 has been updated to include discussions of Windows 8, native and thin clients, quality criteria for mobile interface user experiences, and a discussion of the cloud. In this edition, Chapter 4 now includes discussions of NoSQL DBMS products and databases as well as Big Data.

A final major change in this second edition concerns the teaching of ethics. In this edition, every Ethics Guide asks students to apply Immanuel Kant’s categorical imperative as well as utilitarianism to the business situation described in the guide.

As shown in Table 1, these broad changes led to many of the changes in the chapters, but there were many other changes as well. Several changes were made to keep the chapters up to date. Events and technology move fast, and to keep the text current, we check every sentence and industry reference for obsolescence.

Importance of MIS

Chapter 1 claims that MIS is the most important class in the business curriculum. That’s a bold statement, and every year we ask whether it remains true. Is there any discipline having a greater impact on contemporary business and government than IS? We continue to doubt there is. Every year brings important new technology to organizations, and many of these organizations respond by creating innovative applications that increase productivity and otherwise help them accomplish their strategies. In the past year, cloud-based services have continued to revolutionize the

TABLE 1 Changes in the Second Edition

Chapter	Change
1	<p>Added new employment data</p> <p>Updated job requirements based on NBER study</p> <p>Included a more complete description of the five forces</p> <p>Discussed differences between a business process and an information system</p> <p>Presented new data on worldwide Internet growth</p> <p>Added discussion about the explosion in data and mobile computing</p> <p>Added new Singing Valley Case Study 1</p>
2	<p>Included a more complete explanation of the relationship of procedures to processes</p> <p>Added new opening vignette about a fast food restaurant</p> <p>Made a comparison of two students' four nonroutine skills</p> <p>Changed the MIS InClass exercise to a demonstration of sandwich making</p> <p>Added how the five-component model can be applied</p> <p>Included discussion on how information definitions can be used</p>
3	<p>Added Windows 8, but reduced the emphasis on Microsoft</p> <p>Included Microsoft's CEO change</p> <p>Added comparison of native and thin-client applications</p> <p>Added discussion of quality mobile UX</p> <p>Increased emphasis on cloud</p> <p>Updated and adapted InClass exercise</p>
4	<p>Introduced NoSQL</p> <p>Introduced Big Data</p>
5	<p>Added new opening vignette about a pizza shop in the student union</p> <p>Included an application of the characteristics of processes</p> <p>Added new sections on automation and procedures</p> <p>Inserted new section on process management techniques</p> <p>Added new Case Study 5 on Google Cars</p>
6	<p>Added two key characteristics of ERP systems—a single database and inherent processes that integrate well</p> <p>Added new data terms—transactional, master, organizational; included single and multiple instance</p> <p>Added discussion on the ERP implementation and upgrade processes</p> <p>Added a new MIS InClass exercise demonstrating single source of data</p>
7	<p>Included discussion of the SAP implementation process at CBI</p> <p>Reorganized the end of the chapter and included a new 2024 question</p>
8	<p>Added a discussion of Google Adwords and Analytics to e-commerce question</p> <p>As in Chapter 7, a reorganization led to a new 2024 question</p>
9	<p>Reduced emphasis on SharePoint, BPMN, and process diagrams</p> <p>Added a new section on the five components of a collaboration IS</p> <p>Included new discussion of collaboration support of project management</p> <p>Added a new question on how students can apply collaboration IS to their teams</p> <p>Added a new 2024 question</p>
10	<p>Included the topic of competing social media objectives</p> <p>Added descriptions on connection data and hashtags</p> <p>Added many new examples of business process use of social media</p> <p>Added a new 2024 question</p>

Chapter	Change
11	<p>Included a new three-activity BI process—acquire, analyze, and publish</p> <p>Added OLAP slice and dice diagrams and examples</p> <p>Included an expanded discussion on visualization with examples</p> <p>Added new examples of business processes supported by BI</p> <p>Included a new question on Big Data</p> <p>Added new appendix with a hands-on tutorial to slice and dice Big Data</p> <p>Added a new 2024 question</p>
12	<p>Added a new opening vignette</p> <p>Added the scrum development process</p> <p>Included a new security scenario with the security discussion</p> <p>Added threats of XSS and APT</p> <p>Added personal security section</p> <p>Included a new chapter case study</p>
All	Used the categorical imperative and utilitarianism in Ethics Guides

economics of server hosting while mobile devices simplify yet enrich user experiences. More sophisticated and demanding users push organizations into a rapidly changing future, one that requires continual adjustments in business planning. To participate, our graduates need to know how to apply emerging technologies to better achieve their organizations' strategies. Knowledge of MIS is critical to this application.

The effects of changing technology and new user demands fall on processes and information systems at all levels—workgroup, organizational, and inter-enterprise. The impact on the latter is especially dramatic because cloud-based hosting and mobile devices enable independent organizations to work together in ways previously unimaginable.

As stated, we continue to believe we can enter the classroom with the confidence that we are teaching the single most important course in the business school—an argument that relies on two observations. First, because of nearly free data storage and data communications, businesses are increasingly finding and, more important, increasingly *required* to find innovative applications for information systems. The incorporation of Facebook and Twitter into marketing systems is an obvious example, but this example is only the tip of the iceberg. For at least the next 10 years, every business professional will, at a minimum, need to assess the efficacy of proposed IS applications. To excel, business professionals will need to not only assess but define innovative IS applications. Further, professionals who want to emerge from the middle ranks of management will, at some point, need to demonstrate the ability to manage projects that develop these innovative information systems.

Such skills will not be optional. Businesses that fail to create systems that take advantage of nearly free data storage and communication will fall prey to the competition that can create such systems. So, too, will business professionals.

The second premise for the singular importance of the MIS class relies on the work of Robert Reich, former Secretary of Labor for the Clinton administration. In *The Work of Nations*,¹ Reich identifies four essential skills for knowledge workers in the 21st century:

- Abstract reasoning
- Systems thinking
- Collaboration
- Experimentation

¹ Robert B. Reich, *The Work of Nations* (New York: Alfred A. Knopf, 1991), p. 229.

For reasons set out in Chapter 1, beginning on page 2, we believe the MIS course is the single best course in the curriculum for learning these four key skills.

While most Introduction to MIS textbooks address technical innovation and nonroutine skills, *Processes, Systems, and Information, Second Edition*, uniquely enables the Intro course to also address business processes. The process view of business is the dominant view of business today; students need a consistent, extended opportunity to master the language and apply it. The Introduction to MIS class that uses this textbook can expose both IS and non-IS students to process concepts and appropriately place IS in its vital role of supporting and improving processes. With this process foundation, students are better able to understand the benefits and challenges of ERP systems.

Background on Processes and IS

The relationship between business processes and information systems is complex. They are not one and the same; a given process might use several different information systems, and, at the same time, a given information system might support many different processes. So, we cannot say that a process encapsulates all of its information systems, nor can we say that an information system encapsulates all of its processes.

In part because of this complex relationship, we define *MIS* as the management and use of *processes, information systems, and information* to help organizations achieve their strategy (Chapter 1). We further define *management* not in the traditional sense of plan, organize, control, and staff, but rather as the *creation, monitoring, and adapting of processes, information systems, and information*. The fabric of this text is woven around and through these definitions.

Potential adopters of this textbook are departments that make business processes a key component or thread throughout their curricula. This group includes all of the universities that are part of the SAP University Alliance, those that are part of the Microsoft Dynamics Academic Alliance, and other institutions for which a business process orientation is important. Chapters 7 and 8 provide specific examples of the use of SAP, and the cases that conclude each of those chapters provide tutorial exercises that use the SAP University Alliance's Global Bikes Inc. (GBI) case. This is the same case and client data used in University Alliance training, so it will be familiar to many instructors.

In our opinion, a text must go beyond the operational processes that comprise Chapters 7 and 8. Of course, operational processes are most important, and five chapters of our text include or are devoted to them. However, other dynamic processes, such as collaboration, project management, problem solving, business intelligence, and social networking, are also important. Hence, we believe that this text should include much more than SAP-oriented processes.

Text Features

A challenge of teaching the Introduction to MIS course from a process orientation is the lack of business knowledge and experience on the part of most students. Many universities offer the Introduction to MIS course at the sophomore and even freshman levels. Most of these students have completed few business courses. Even when this course is taught to higher-level students, however, few of them have significant business or process experience. They have been lifeguards or baristas. When we attempt to talk about, for example, the impact of process change on departmental power, that discussion goes over the heads of students. They may memorize the terms, but they often lose the essence of the discussion. The features of this text are designed, in part, to address this problem.

Question-Based Pedagogy

Research by Marilla Svinicki in the Psychology Department of the University of Texas indicates that today's students need help managing their time. She asserts that we should never give homework assignments such as "read pages 75–95." The problem, she says, is that students will fiddle with those pages for 30 minutes and not know when they're done. Instead, she recommends that we give our students a list of questions and the assignment that they be able to answer those questions. When they can answer the questions, they're done studying. We have

used this approach in our classrooms, and we believe that it is most effective. Students like it as well. Hence, we have organized each chapter as a list of questions.

Opening Vignettes

Each chapter opens with a short vignette of a business situation and problem that necessitates knowledge of that chapter. We use two different fictitious organizational settings:

1. Central Colorado State, a university with students engaged in activities similar to the activities of our readers
2. Chuck's Bikes, Inc., a bicycle manufacturer that competes with Global Bikes

Each of these vignettes presents a situation that illustrates the use of the chapter's contents in an applied setting. Most contain a problem that requires knowledge of the chapter to understand and solve.

MIS InClass Exercises

Every chapter includes a student group exercise that is intended to be completed during class. These exercises are designed for teachers who seek to use active learning exercises, also called flipping the classroom. The purpose of the exercise is to engage the student with knowledge gained from the chapter. These exercises are part lab and part case study in nature. In our experience, some of them lead to spirited discussions, and we could have let them run on for two or three class periods, had we had that luxury.

SAP Tutorial Exercises

The appendices to Chapters 7 and 8 contain process exercises that involve the SAP Alliance's Global Bike case. Professors at institutions that are members of the alliance can use these with their students. Because not every department that uses this book is a member of that alliance, we have made these exercises optional appendices. You can omit the exercises without any loss of continuity.

The exercises are, we hope, purposeful yet simple to do. Our goal is to make it possible for them to be conducted by teaching assistants and faculty who have not yet attended the SAP university training. To that end, we provide extensive instructor support materials. Instructors who have had training by the SAP University Alliance will immediately recognize that these tutorials use exactly the same data and screens they used during training.

Earl McKinney, the author of the tutorial exercises, has been teaching SAP for 7 years at Bowling Green State University. The tutorial exercises included in this book have been tested extensively with Introduction to MIS students in a BGSU lab setting. In addition to the exercises, Earl has written a detailed teaching guide on how to best use the exercises as well as tips and pointers about their use and his experience about where students are most likely to struggle.

As mentioned earlier, with this second edition, we've added a BI tutorial after Chapter 11. This tutorial uses Business Objects Explorer from SAP. While a particular set of data is specified in the tutorial, students and instructors can also simply read the tutorial, learn how the operations like slicing and filtering are done, and use these Explorer skills on any dataset.

Over these years, Earl learned that when doing SAP exercises, it is far too easy for students to slip into "monkey-see, monkey-do" mode without any clear understanding of what they are doing or why. Based on this classroom experience, we believe that the setup to procurement and sales in Chapters 7 and 8, together with the exercises themselves, help students move beyond simple copy mode, in which they learn the SAP keystrokes, to learn the nature of process-oriented software and its role in organizations.

Like all who have used the GBI case, we are grateful to the SAP Alliance and to the case's authors. In accordance with both the letter and spirit of the SAP Alliance community's policy, we have placed these exercises on the SAP University Alliance Web site. We hope you will find sufficient value in this text to use it in your classroom, but please feel free to use these exercises even if you do not adopt this text.

By the way, the body of Chapters 7 and 8 uses the example of Chuck's Bikes, Inc., rather than GBI. We made this change at the request of the SAP Alliance. The alliance prefers that

authors not add new material to GBI, change any characters, make videos, and so forth. We created CBI so as to comply with that request while at the same time providing more detailed business scenarios that are compatible with GBI.

Ethics Guides

We believe that business ethics are a critically important component of the Introduction to MIS course and that the best way to teach ethics is in the context of case-like situations. We also believe that ethics ought not to be relegated to a single chapter or chapter section. Including ethics in one place leads to the inoculation theory of education: “We don’t need to discuss ethics, we’ve already done that.” Accordingly, each chapter contains one two-page spread called an Ethics Guide. They are shown in the table of contents; to sample just one of them, turn to page 20.

In recent years, we believe there has been a shift in students’ attitudes about ethics. Many students seem to be increasingly cynical and callous about ethical issues. As a result, when we try to raise interest with them about unethical behavior, we find ourselves interjecting and defending a particular set of values, a role that strikes many students as inappropriate. A common attitude seems to be, “We should think for ourselves, thank you anyway.”

In frustration about the situation, we turned to a good friend of many years, Dr. Chuck Yoos, emeritus professor from the U.S. Air Force Academy. We told him our goals for presenting the Ethics Guides and asked him what criteria he would use with his students if he only had 20 minutes per guide. His response was that while there are many ways of addressing ethics in business, Kant’s categorical imperative and the utilitarianism of Bentham and Mill would be at the top of his list. We investigated both and decided to use them with this edition.

Our goal in doing so is to ask students, whose ethical standards may be immature, to learn and apply the categorical imperative and utilitarianism perspectives. By doing so, students are asked to “try on” those perspectives and in the process think more deeply about ethical principles than they do when we allow them simply to apply their personal ethical standards.

The Ethics Guide in Chapter 1 introduces the categorical imperative, whereas the Ethics Guide in Chapter 2 introduces utilitarianism. If you choose to use these perspectives, you will need to assign both of those guides.

Collaboration Exercises

As stated in Chapter 1, collaboration is a key skill for today’s business professionals. Accordingly, we believe that teaching collaboration, collaboration processes, and collaboration information systems is an important component of this course. To that end, each chapter includes a collaboration exercise to be accomplished by a student team. In our opinion, it is not possible for students to complete all of these in one term. Instead, we recommend using three or four of them throughout the term.

In doing these exercises, we recommend that students not meet face to face, at least not most of the time, but use modern collaboration tools for their meetings. Google Docs and related tools are one possibility. We prefer requiring students to use Office 365 and Microsoft SharePoint.

End-of-Chapter Cases

The chapter-opening vignettes are based on real-life experience, but the organizations they describe are fictitious. We use fictitious companies because we want students to learn from organizational mistakes and, at times, even organizational foolishness. We have not found many real companies that will allow us to share their laundry in this way, and, in any case, it seems unfair to ask for an organization’s cooperation and then turn around and publish its problems.

However, we do believe students need to see examples of the role of MIS in actual organizations to help them bridge the chapter content to the real world. Hence, each chapter concludes with a case that illustrates some aspect of the chapter’s contents in a real-world company. Unlike the introductory vignettes, the cases all have happy endings.

Active Reviews

Each chapter includes an Active Review at the end. These reviews help students ensure that they have learned the most essential material. They also serve as a list of potential exam questions and thus help students prepare for exams.

Application Exercises

For courses that involve a Microsoft Office component, we have developed a set of Excel and Access exercises for all chapters. These exercises, which assume the student has beginner's level expertise with these products, appear beginning on page 400. They are listed approximately in increasing order of difficulty.

What We Left Out

We chose to keep this book to the traditional 12-chapter length because we find that this number of chapters fits best into the number of class lessons of most courses. Because we are adding substantial process-oriented material, however, that meant we needed to remove some content from the typical Introduction to MIS text.

In this text, we have reduced and simplified the discussions of hardware, software, and data communications to fit into a single chapter. Furthermore, we simplified and shortened the discussion of information systems development. Finally, you will find no mention of IS departmental management in this text. It is not that we believe the shortened and omitted content is unimportant; rather, we think the opportunity cost is the least for these topics.

This text includes some material that has been previously published in David Kroenke's text *Using MIS*. The two texts differ in that *Using MIS* makes information systems primary, whereas this text makes business processes primary. Both texts will continue to be published. Because of this difference, however, every sentence that was brought over was examined from the perspective of business processes and much of that content was changed in both minor and major ways. The discussion of collaboration, for example, is reframed into the context of dynamic business processes. That said, the majority of the material in this text is new.

Chapter Outline

This text is organized into five parts: Introduction, Technology, Structured Processes, Dynamic Processes, and MIS Management.

Introduction

Chapter 1 sets the stage by illustrating the need for this course and especially for the behaviors and skills that students gain in the course. It defines *MIS* and summarizes the means by which organizations obtain goals and objectives. Porter's industry, five forces, and value chain models are presented.

Chapter 2 defines and illustrates processes, information systems, and information. It uses a common fast food restaurant to illustrate the relationship of processes and information systems. It also defines information using the Gregory Bateson definition that *information* is a difference that makes a difference.

Technology

Chapters 3 and 4 address technology. Chapter 3 provides a quick summary of hardware, software, and network products and technologies. Chapter 4 discusses database processing. These chapters serve as a technology platform for the discussions in the remaining chapters.

Structured Processes

Chapters 5 through 8 discuss structured processes and related information systems and information. Chapter 5 provides an overview of the scope and objectives of business processes. It also discusses process adaptation and improvement and the use of process objectives and measures in making process changes. Chapter 6 is a survey of ERP information systems, their benefits, and their challenges.

Chapters 7 and 8 are “applied” chapters. They show how SAP is used in two representative processes: procurement and sales. Two processes were chosen so that students could begin to see what is common to all processes and what might differ between processes. These two processes, buying and selling, are fundamental to business and are widely used. Each chapter includes a student lab exercise appendix that uses the Global Bikes case from the SAP Alliance’s curriculum.

Dynamic Processes

Chapters 9 through 11 address what we term *dynamic processes*. Such processes are neither as structured nor as rigid as the more structured operational processes. We dislike the term *unstructured processes* because we believe that such processes do have structure, at least at a meta-level. Each of the three chapters follows a similar flow: The IS that supports each process is discussed first, followed by the activities in the process, and concluding with the business processes supported by the dynamic process.

Chapter 9 discusses collaboration processes for both project management and workflow applications. Chapter 10 addresses the use of social media in organizations. We discuss Lin’s theory of social capital, apply that theory to organizational use of social media systems, and survey the processes supported by social media systems. Chapter 11 considers business processes supported by business intelligence (BI) systems and discusses BI systems, data warehouses, data mining, and Big Data.

MIS Management

Part 5 consists of a single chapter, Chapter 12, that addresses MIS management processes. It includes business process management (BPM), the systems development life cycle (SDLC), the scrum development process, and information security. It includes a discussion of processes involved in creating and using an organizational security program.

Supplements

The following supplements are available at the Online Instructor Resource Center, accessible through www.pearsonhighered.com/kroenke.

Instructor’s Manual

The Instructor’s Manual, prepared by Timothy O’Keefe of the University of North Dakota, includes a chapter outline, list of key terms, suggested answers to the MIS InClass questions, and answers to all end-of-chapter questions.

Test Item File

This Test Item File, prepared by ANSR Source, Inc., contains more than 1,500 questions, including multiple-choice, true/false, and essay questions. Each question is followed by the correct answer, the learning objective it ties to, page reference, AACSB category, and difficulty rating.

PowerPoint Presentations

The PowerPoints, prepared by Robert Szymanski of Georgia Southern University, highlight text learning objectives and key topics and serve as an excellent aid for classroom presentations and lectures.

Image Library

This collection of the figures and tables from the text offers another aid for classroom presentations and PowerPoint slides.

TestGen

Pearson Education’s test-generating software is available from www.pearsonhighered.com/irc. The software is PC/MAC compatible and preloaded with all of the Test Item File questions. You

can manually or randomly view test questions and drag and drop to create a test. You can add or modify test bank questions as needed. Our TestGens are converted for use in BlackBoard, WebCT, Moodle, D2L, and Angel. These conversions can be found on the Instructor's Resource Center. The TestGen is also available in Respondus and can be found on *www.respondus.com*.

CourseSmart

CourseSmart eTextbooks were developed for students looking to save on required or recommended textbooks. Students simply select their eText by title or author and purchase immediate access to the content for the duration of the course using any major credit card. With a CourseSmart eText, students can search for specific keywords or page numbers, take notes online, print out reading assignments that incorporate lecture notes, and bookmark important passages for later review. For more information or to purchase a CourseSmart eTextbook, visit *www.coursesmart.com*.

Acknowledgments

First, we thank the numerous fellow-traveler professors and professionals who encouraged the development of this text and who have helped us in many ways along our path. In particular, we thank:

Yvonne Antonucci, *Widener University*
 Cynthia Barnes, *Lamar University*
 John Baxter, *SAP*
 William Cantor, *Pennsylvania State University–York Campus*
 Thomas Case, *Georgia Southern University*
 Gail Corbitt, *SAP*
 Darice Corey, *Albertus Magnus College*
 Mike Curry, *Oregon State University*
 Heather Czech, *SAP*
 Peter Daboul, *Western New England University*
 Janelle Daugherty, *Microsoft Dynamics*
 Peter DeVries, *University of Houston, Downtown*
 Lauren Eder, *Rider University*
 Kevin Elder, *Georgia Southern University*
 John Erickson, *University of Nebraska at Omaha*
 Donna Everett, *Morehead State University*
 David Firth, *The University of Montana*
 Jerry Flatto, *University of Indianapolis*
 Kent Foster, *Microsoft*
 Biswadip Ghosh, *Metropolitan State College of Denver*
 Bin Gu, *University of Texas at Austin*
 William Haseman, *University of Wisconsin–Milwaukee*
 Jun He, *University of Michigan–Dearborn*
 Mark Hwang, *Central Michigan University*
 Gerald Isaacs, *Carroll University*
 Stephen Klein, *Ramapo University*
 Ben Martz, *University of Northern Kentucky*
 William McMillan, *Madonna University*
 Natalie Nazarenko, *SUNY College at Fredonia*

Timothy O'Keefe, *University of North Dakota*
Tony Pittarese, *East Tennessee State University*
Martin Ruddy, *Bowling Green State University*
James Sager, *California State University—Chico*
Narcissus Shambare, *College of Saint Mary*
Robert Szymanski, *Georgia Southern University*
Lou Thompson, *University of Texas, Dallas*
Ming Wang, *California State University*
Harold Webb, *University of Tampa*

We wish to thank the unique production team that helped us bring this book into existence. First and foremost, we thank Bob Horan, our editor, for his vision for a process-oriented introductory MIS text and for his untiring support throughout the process. Thanks, too, to Laura Town, our developmental editor, whose direction, guidance, and patient efforts to help us improve the book paid, we believe, great dividends. Everyone should have an opportunity to work with a person like Laura—she's a joy to work with and exceedingly competent. We thank Jane Bonnell who helped us marshal this text and all its supplements through the Pearson production process and Sue Nodine of Integra for her management of the project as well. We also thank Janet Slowik, art director, and her team for designing this book.

We thank our friend and colleague, Chuck Yoos, of Fort Lewis College, for hours and hours and hours of conversation on the meaning of information, the role of information in organizations today, and how to address the instruction of business ethics. Chuck is responsible for the helpful distinction between *perceiving data* and *conceiving information* and many other insights that have shaped this text's material. Chuck's Bikes is named in honor of him.

Finally, we are most grateful to our families, who have lovingly supported us through these processes; to them we dedicate this book.

Earl McKinney Jr.
Bowling Green, Ohio

David Kroenke
Whidbey Island, Washington

About the Authors

Earl McKinney Jr. Teaching the introduction to MIS course has been Earl McKinney's passion for 20 years. He first caught the bug at his alma mater, the U.S. Air Force Academy, and has continued his addiction during his tenure at Bowling Green State University. While teaching that class and other undergraduate and graduate classes, Earl has also introduced a half dozen new courses on security, social media, ERP, and information. He has been awarded a number of department and college teaching awards by students and fellow faculty. His interest in the broader context of the business curriculum is reflected in several of his publications and by the Decision Science Institute's National Instructional Innovation Award.

Earl's research in e-commerce, small team communication during a crisis, and theoretical work on the notion of information has been published in *Behaviour and Information Technology*, *Human Factors, Information and Management*, and *MIS Quarterly*. He consults with James Hall, the former head of the NTSB for British Petroleum, the U.S. Forest Service, and several Air Force agencies on human factors and aviation communication issues.

He holds an undergraduate economics degree from the Air Force Academy, a Master's of Engineering from Cornell University, and a PhD in MIS from the University of Texas. A former Air Force fighter pilot, Earl lives in Bowling Green with his wife and has two grown sons.



David Kroenke David Kroenke has many years of teaching experience at Colorado State University, Seattle University, and the University of Washington. He has led dozens of seminars for college professors on the teaching of information systems and technology; in 1991 the International Association of Information Systems named him Computer Educator of the Year. In 2009, David was named Educator of the Year by the Association of Information Technology Professionals-Education Special Interest Group (AITP-EDSIG).

David worked for the U.S. Air Force and Boeing Computer Services. He was a principal in the start-up of three companies. He also was vice president of product marketing and development for the Microrim Corporation and was chief of technologies for the database division of Wall Data, Inc. He is the father of the semantic object data model. David's consulting clients have included IBM, Microsoft, and Computer Sciences Corporations, as well as numerous smaller companies. Recently, David has focused on using information systems for collaboration in education and industry.

His text *Database Processing* was first published in 1977 and is now in its 13th edition. He has published many other textbooks, including *Database Concepts*, 6th ed. (2013), *Using MIS*, 7th ed. (2015), *Experiencing MIS*, 5th ed. (2015), *MIS Essentials*, 4th ed. (2015), *SharePoint for Students* (2012), and *Office 365 in Business* (2012). David lives on Whidbey Island, Washington. He has two children and three grandchildren.



This page intentionally left blank

Processes, Systems, and Information

An Introduction to MIS



This page intentionally left blank



WHY MIS?

Knowledge of information systems will be critical to your success in business. If you major in accounting, marketing, management, or another major, you may not yet know how important such knowledge will be to you. The purposes of Part 1 of this textbook are to demonstrate why this subject is so important to every business professional today and to introduce important terms and concepts that you will need to succeed in business.

Chapter 1 lays the foundation. First, we discuss why this course is of critical importance to every business student today. We claim, in fact, that it is the most important course you will take. Then we define *MIS* and explain how organizational strategy determines the structure and functions of MIS components.

In Chapter 2, we will define and illustrate business processes, information systems, and information. As you will see, these three constructs are closely interwoven. Understanding the relationships among them sets the foundation for the rest of this text.

We begin each chapter with a short business vignette to help you relate the chapter's concepts to the business world. Chapter 1 begins with Chuck's Bikes, Inc. (CBI), a bicycle wholesaler that also assembles its own line of bicycles. Throughout the text, we'll meet various employees of CBI; in Chapter 1, we see Kelly terminating an employee, for reasons that you will soon learn.

In Chapter 2, we will investigate the processes of a fast food restaurant near a typical university named Central Colorado State. At the restaurant we'll meet Jake, a student at the university, and see how he puts the ideas of this course to work.



Chapter 1 The Importance of MIS

Fired? You're firing me?"

"Well, *fired* is a harsh word, but... well, Chuck's Bikes has no further need for your services."

"But, Kelly, I don't get it. I really don't. I worked hard, and I did everything you told me to do."

"Jennifer, that's just it. You did everything *I* told you to do."

"I put in so many hours. How could you fire me?"

"Your job was to find ways we can generate additional revenue from our existing retailers."

"Right! And I did that."

"No, you didn't. You followed up on ideas *that I gave you*. But we don't need someone who can follow up on my plans. We need someone who can figure out what we need to do, create her own plans, and bring them back to me... and others."

"How could you expect me to do that? I've only been here 4 months!"

"It's called teamwork. Sure, you're just learning our business, but I made sure all of our best salespeople would be available to you..."

"I didn't want to bother them."

"Well, you succeeded. I asked Jason what he thought of the plans you're working on."

"Who's Jennifer?" he asked."

"But doesn't he work out of our other office?"

"Right...and 37 percent of our sales come out of that office. Probably worth talking to him."

"I'll go do that!"

"Jennifer, do you see what just happened? I gave you an idea, and you said you'll do it. That's not what I need. I need you to find solutions on your own."



Q1. Why is Introduction to MIS the most important class in the business school?

Q2. What is MIS?

Q3. How does MIS relate to organizational strategy?

Q4. What five forces determine industry structure?

Q5. What is competitive strategy?

Q6. How does competitive strategy determine value chain structure?

Q7. How does competitive strategy determine business processes and information systems?

“I worked really hard. I put in a lot of hours. I’ve got all these sales reports written.”

“Has anyone seen them?”

“I talked to you about some of them, but I was waiting until I was satisfied with them.”

“Right. That’s not how we do things here. We develop ideas and then kick them around with each other. Nobody has all the answers. Our plans get better when we discuss and rework them... I think I told you that.”

“Maybe you did. But I’m just not comfortable with that.”

“Well, it’s a required skill here.”

“I know I can do this job.”

“Jennifer, you’ve been here almost 4 months; you have a degree in business. Several weeks ago, I asked you for your first idea about how to up-sell our customers. Do you remember what you said?”

“Yes, I wasn’t sure how to proceed. I didn’t want to just throw something out that might not work.”

“But how would you find out if it would work?”

“I don’t want to waste money...”

“No, you don’t. So, when you didn’t get very far with that task, I backed up and asked you to send me a diagram of the life cycle for new clients... how we first contact them, how we make our first sale, how we grow our sales to them...”

“Yes, I sent you that diagram.”

“Jennifer, it made no sense. Your diagram had clients talking to Neil in accounts receivable before they were even customers.”

“I know that process; I just couldn’t put it down on paper. But I’ll try again!”

“Well, I appreciate that attitude, but times are tight. We don’t have room for trainees. When the economy was strong, I’d have been able to look for a spot for you, see if we can bring you along. But we can’t afford to do that now.”

“What about my references?”

“I’ll be happy to tell anyone that you’re reliable, that you work 40 to 45 hours a week, and that you’re honest and have integrity.”

“Those are important!”

“Yes, they are. But today, they’re not enough.”

For a similar story, see also www.youtube.com/watch?v=8UQx-zUuGf4.

“But today, they’re not enough.”

Do you find that statement sobering? And if timely hard work isn’t enough, what is? We will begin this book by discussing the key skills that Jennifer (and you) needs and explain why this course is the single best course in all of the business school for teaching you those key skills.

You may find that last statement surprising. If you are like most students, you have no clear idea what your MIS class will be about. If someone were to ask you, “What do you study in that class?” you might respond that the class has something to do with computers and maybe computer programming. Beyond that, you might be hard-pressed to say more. You might add, “Well, it has something to do with computers in business,” or maybe, “We are going to learn to solve business problems with computers using spreadsheets and other programs.” So, how could this course be the most important one in the business school?

We begin with that question. Once you have gained an understanding of how important this class will be to your career, we will discuss fundamental concepts.

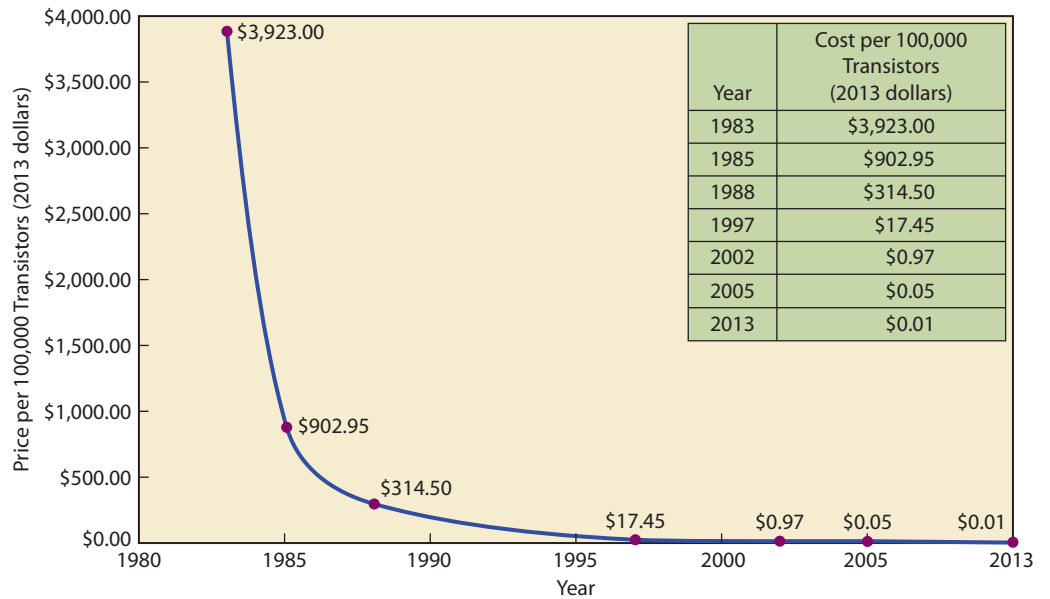
Chapter Preview

Q1. Why Is Introduction to MIS the Most Important Class in the Business School?

Introduction to MIS is the most important class in the business school. That statement was not true in 2005, and it may not be true in 2024. But it is true in 2014.

Why?

FIGURE 1-1
Changes in Price/
Performance of
Processors



The ultimate reason lies in a principle known as **Moore’s Law**. In 1965, Gordon Moore, co-founder of Intel Corporation, stated that because of technology improvements in electronic chip design and manufacturing, “The number of transistors per square inch on an integrated chip doubles every 18 months.” His statement has been commonly misunderstood to be “The speed of a computer doubles every 18 months,” which is incorrect but captures the essence of his principle.

Because of Moore’s Law, the ratio of price to performance of computers has fallen from something like \$4,000 for a standard computing device to a fraction of a penny for that same computing device.¹ See Figure 1-1.

As a future business professional, however, you needn’t care how fast a computer your company can buy for \$100. That’s not the point. Here’s the point:

Because of Moore’s Law, the cost of data processing, communications, and storage is essentially zero.

Think about that statement before you hurry to the next paragraph. What happens when those costs are essentially zero? Here are some consequences:

- YouTube Tumblr
- Skype Instagram
- Facebook Google+
- Twitter LinkedIn

In addition to these new apps, Moore’s law is also driving several other trends. First, access to the Internet is growing rapidly worldwide, as shown in Figure 1-2. While U.S. growth has slowed, in some countries, access more than doubled over the period of 2008–2012. This growth is expected to continue, because in most of these countries less than half of the population had Internet access in 2012.

Moore’s law is also leading to an explosion in data. As shown in Figure 1-3, since 2011, more data is being produced each year than in all the years in human history before 2007 *combined*.

Finally, the most recent significant impact of Moore’s law is in mobile platforms. With improved computing performance, mobile device use is expanding rapidly, as shown in Figure 1-4.

These trends of new apps, more access, more data, and greater mobile use are rapidly changing the way businesses use IT. In addition, the opportunities they present to connect to customers throughout the world and improve business activities within the organization mean that

¹ These figures represent the cost of 100,000 transistors, which can roughly be translated into a unit of a computing device. For our purposes, the details don’t matter. If you doubt any of this, just look at your \$49 cell phone and realize that you pay \$40 a month to use it.

Country	2008–2012 New Internet Users (millions)	2012 Internet Users (millions)	Growth 2008–2012 (percent)	Population Penetration (percent)
China	264	564	88%	42%
India	88	137	180	11
Indonesia	39	55	244	23
Iran	35	42	500	55
Russia	33	70	89	49
Nigeria	31	48	182	30
Philippines	28	34	467	35
Brazil	27	88	44	45
Mexico	19	42	83	37
USA	18	244	8	78
Argentina	17	28	155	68
Egypt	17	30	131	38
Columbia	13	25	108	54
Turkey	13	35	59	47
Vietnam	12	31	63	35

FIGURE 1-2
Top 15 Countries in New
Internet Users

Source: United Nations/International
Telecommunications Union,
internetworldstats.com

IT is more important to businesses today than any other time in history. This leads us to the first reason Introduction to MIS is the most important course in the business school today:

Future business professionals need to be able to assess, evaluate, and apply emerging information technology to business.

You need the knowledge of this course to attain these skills, and having these skills will lead to greater job security.

How Can I Attain Job Security?

A wise and experienced business executive once said that the only job security that exists is “a marketable skill and the courage to use it.” He continued, “There is no security in our company, there is no security in any government program, there is no security in your investments, and there is no security in Social Security.” Alas, how right he turned out to be.

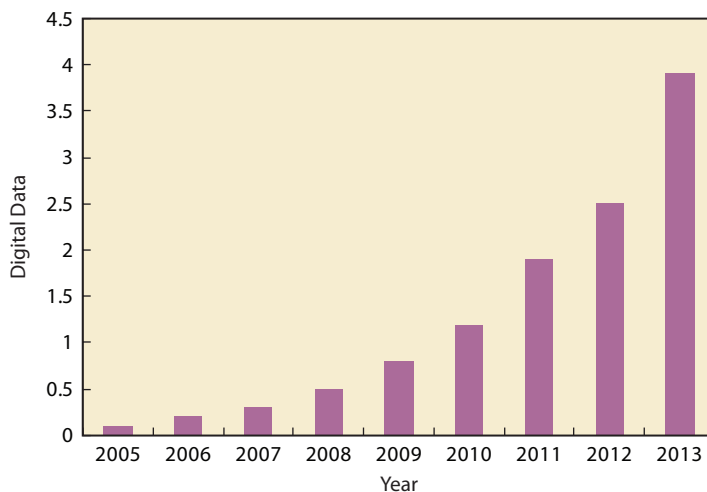
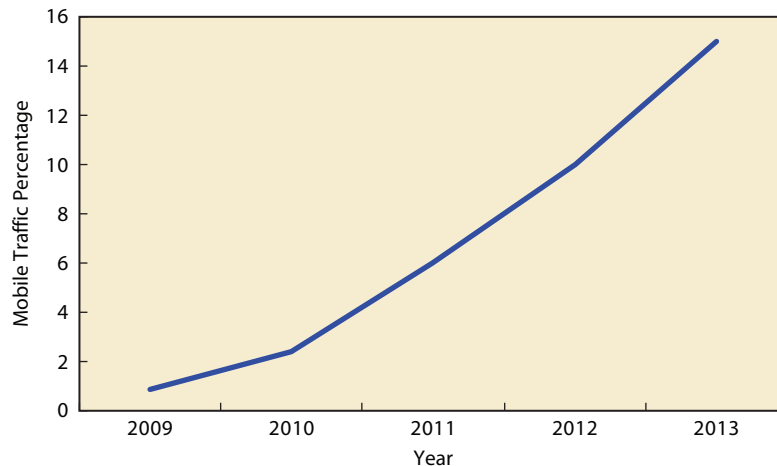


FIGURE 1-3
Global Digital Data
Created (in Millions
of Petabytes)

Source: Mary Meeker and Liang Wu,
“Internet Trends,” May 29, 2013,
<http://www.kpcb.com/insights/2013-internet-trends>, slide 11.

FIGURE 1-4
Global Mobile Traffic
as Percentage of Total
Internet Traffic

Source: Statcounter global stats.
<http://gs.statcounter.com/>



So, what is a marketable skill? Job seekers used to name particular skills, such as computer programming, tax accounting, or marketing. But today, because of Moore's Law, because the cost of data processing, storage, and communications is essentially zero, any routine skill can and will be outsourced to the lowest bidder. And if you live in the United States, Canada, Australia, Europe, and so on, that is unlikely to be you. Numerous organizations and experts have studied the question of what skills will be marketable during your career. Consider two of them.

First, the RAND Corporation, a think tank located in Santa Monica, California, has published innovative and groundbreaking ideas for more than 60 years, including the initial design for the Internet. In 2004, RAND published a description of the skills that workers in the twenty-first century will need:

Rapid technological change and increased international competition place the spotlight on the skills and preparation of the workforce, particularly the ability to adapt to changing technology and shifting demand. These shifts in the nature of organizations . . . favor strong nonroutine cognitive skills.²

Whether you are majoring in accounting or marketing or finance or information systems, you need to develop strong nonroutine cognitive skills.

A second study by Robert Reich, former Secretary of Labor, enumerates these nonroutine cognitive skills:³

- Abstract reasoning
- Systems thinking
- Collaboration
- Ability to experiment

Figure 1-5 shows an example of each. Reread the CBI case that started this chapter, and you will see that Jennifer lost her job because of her inability to practice these skills.

How Can Intro to MIS Help You Learn Nonroutine Skills?

Introduction to MIS is the best course in the business school for learning and practicing these four key skills, because every topic will require you to apply and practice them. Here's how.

ABSTRACT REASONING **Abstract reasoning** is the ability to make and manipulate models. An abstraction is a simplification of an object; it is an idea, model or concept that can then be manipulated with a logical or reasonable thought process. You will work with one or more

² Lynn A. Karoly and Constantijn W. A. Panis, *The 21st Century at Work* (Santa Monica, CA: RAND Corporation, 2004), p. xiv.

³ Robert B. Reich, *The Work of Nations* (New York: Alfred A. Knopf, 1991), p. 229.

Skill	Example	Jennifer's Problem
Abstract reasoning	Construct a model or representation.	Confusion about life cycle for new clients.
Systems thinking	Model system components and show how components' inputs and outputs relate to one another.	Confusion about when/how customers contact accounts receivable.
Collaboration	Develop ideas and plans with others. Provide and receive critical feedback.	Unwilling to work with others with work-in-progress.
Experimentation	Create and test promising new alternatives, consistent with available resources.	Fear of failure prohibited discussion of new ideas.

FIGURE 1-5
Need for Reich's Four
Critical Skills

models in every course topic and book chapter. For example, in Chapter 2 you will learn ways to *model* business processes, and you will also learn a *model* of the five components of an information system.

In this course, you will not just manipulate models provided in this text or a model that your instructor has developed; you will also be asked to construct models of your own. In Chapter 4, for example, you will learn how to create data models, and in Chapter 5 you will learn how to make process models.

SYSTEMS THINKING Can you go to a grocery store, look at a can of green beans, and connect that can to U.S. immigration policy? Can you watch tractors dig up a forest of pulpwood trees and connect that woody trash to Moore's Law? Do you know why one of the major beneficiaries of YouTube is Cisco Systems? Answers to all of these questions require systems thinking. **Systems thinking** is the ability to model the components of the system and to connect the inputs and outputs among those components into a sensible whole, one that explains the phenomenon observed. For example, how do all of those items get on the shelves at Walmart? It involves the supply chain, business processes, and computer networks, but how?

As you are about to learn, this class is about processes and information *systems*. Processes are parts of systems—the output of one process is the input to another process. For example, the process of acquiring the material to make bicycles is the input to the process of production; and the output of production is the input to the sales process. Systems thinking is also important to information systems. Throughout this book, we will discuss and illustrate systems. You will be asked to critique systems, compare alternative systems, and apply different systems to different situations. All of those tasks will prepare you for systems thinking as a professional.

COLLABORATION Here's a fact that surprises many students: Effective collaboration isn't about being nice. In fact, surveys indicate the single most important skill for effective collaboration is to give and receive critical feedback. Advance a proposal in business that challenges the cherished program of the VP of marketing, and you will quickly learn that effective collaboration skills differ from party manners at the neighborhood barbeque. So, how do you advance your idea in the face of the VP's resistance? And without losing your job?

In this course, you can learn both skills and information systems that will be of use for such collaboration. Even better, you will have many opportunities to practice them. Chapter 9 will teach you collaboration skills and illustrate several sample collaboration information systems. In addition, every chapter of this book includes collaboration exercises that you may be assigned in class or as homework.

ABILITY TO EXPERIMENT

"I've never done this before."

"I don't know how to do it."

"But will it work?"

"Is it too weird for the market?"

The fear of failure is a major stumbling block that paralyzes so many good people and so many good ideas. In the days when business was stable, when new ideas were just different verses of the same song, professionals could allow themselves to be limited by the fear of failure.

But think again about the application of social networking to the oil change business. Is there a legitimate application of social networking there? If so, has anyone ever done it? Is there anyone in the world who can tell you what to do? How to proceed? No. As Reich says, professionals in the twenty-first century need to develop experimentation skills.

Successful experimentation is not throwing buckets of money at every crazy idea that enters your head. **Experimentation** is, however, making a careful and reasoned analysis of an opportunity, envisioning potential products or solutions or applications of technology, and then developing those ideas that seem to have the most promise, consistent with the resources you have. Successful experimentation also means learning from the experience: If it worked, why? If not, why not?

In this course, you will be asked to use products with which you have no familiarity. Those products might be Microsoft Access, Visio, or something called SAP, or they might be features and functions of Blackboard that you have not used. You may be asked to collaborate using Microsoft Office 365 or Google Docs with Google+. Will your instructor explain every feature of those products that you will need? You should hope not. You should hope your instructor will leave it up to you to envision new possibilities on your own and to experiment with those possibilities, consistent with the time you have available.

Jobs

Employment is the third factor that makes the Introduction to MIS course vitally important to you. During most of 2013, the U.S. unemployment rate averaged 7.5 percent over all ages and job categories; but according to the U.S. Bureau of Labor Statistics, unemployment of those ages 20 to 24 averaged over 13 percent. Employment was better for college graduates than for those without degrees, but even college grads had a high rate of unemployment. Hope Yen, writing for the Associated Press, said in April 2012 that one in two college graduates are either unemployed or underemployed.⁴ But this is not the case in all job categories.

Spence and Hlatshwayo studied employment in the United States from 1990 to 2008.⁵ They defined a *tradable job* as one that was not dependent on a particular location; this distinction is important because such jobs can be outsourced overseas. As shown in Figure 1-6, Computer Systems Design and Related Services had the strongest growth of any tradable job type in the United States. By the way, because this graph shows tradable jobs, it puts an end to the myth that all the good computer jobs have gone overseas. According to their data analysis, sourced from the U.S. Bureau of Labor Statistics, many computer jobs remain in the United States.

The number of jobs in Computer Systems Design dipped substantially after the dot-com bust in 2000; since 2003, however, job growth has not only recovered but accelerated dramatically. While this category includes technical positions such as computer programmer and database administrator, it also includes nontechnical sales, support, and business management jobs.

However, information systems and computer technology provide job and wage benefits beyond just IS professionals. Acemoglu and Autor published an impressive empirical study of job and wages in the United States and parts of Europe from the 1960s to 2010.⁶ They found that early in this period, education and industry were the strongest determinants of employment and salary. However, since 1990, the most significant determinant of employment and salary is the nature of work performed. In short, as the price of computer technology plummets, the value of jobs that benefit from it increases dramatically. For example, plentiful, high-paying jobs are available to business professionals who know how to use

⁴ Hope Yen, "1 in 2 new graduates are jobless or underemployed," Associated Press April 23, 2012, <http://news.yahoo.com/1-2-graduates-jobless-underemployed-140300522.html>.

⁵ Michael Spence and Sandile Hlatshwayo, *The Evolving Structure of the American Economy and the Employment Challenge* (New York: Council on Foreign Relations, 2011).

⁶ Daron Acemoglu and David Autor, "Skills, Tasks, and Technologies: Implications for Employment and Earnings" (working paper), National Bureau of Economic Research June 2010, <http://www.nber.org/papers/w16082>.

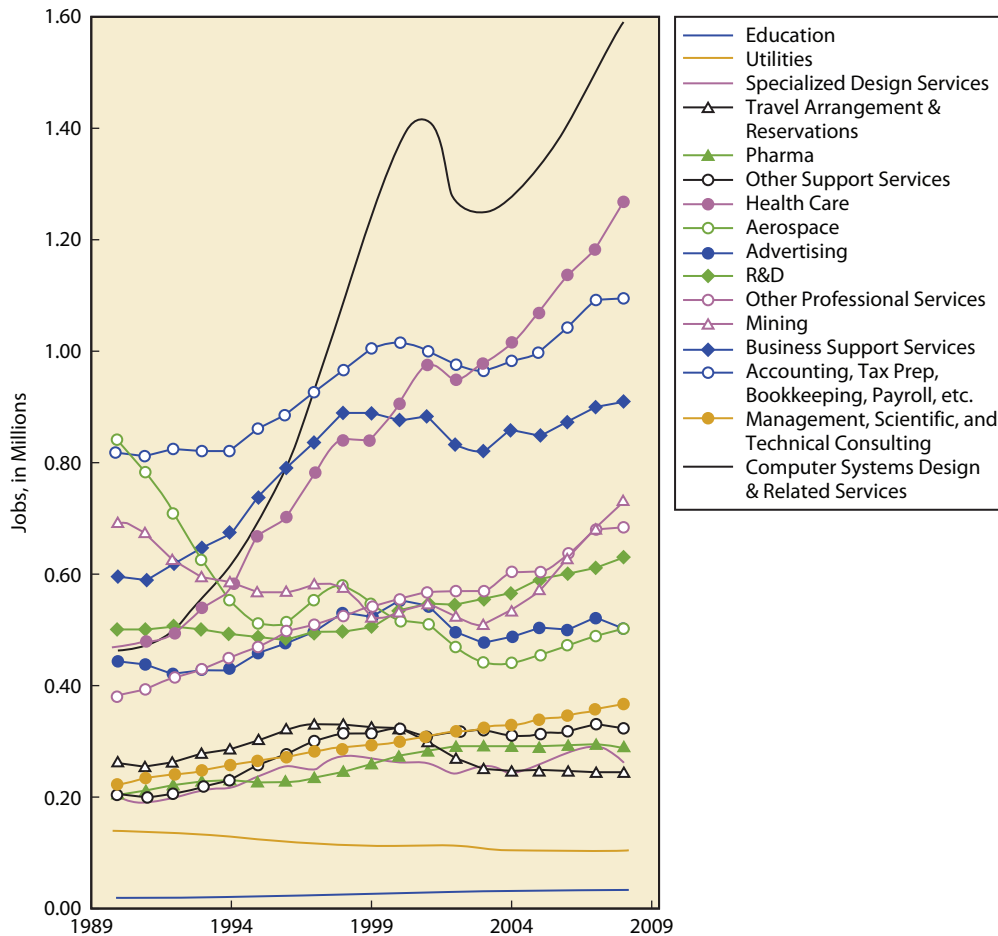


FIGURE 1-6
Growth of Tradable Jobs
by Sector over the Past
20 Years

Source: From *The Evolving Structure of the American Economy and the Employment Challenge* by Michael Spence and Sandile Hlatshwayo. Copyright © 2011 by The Council on Foreign Relations Press. Reprinted with permission.

information systems to improve business process quality, interpret data mining results for improved marketing, or use emerging technology like 3D printing to create new products and address new markets.

What Is the Bottom Line?

The bottom line? This course is the most important course in the business school because:

1. It will give you the background you need to assess, evaluate, and apply emerging information systems technology to business.
2. It can give you the ultimate in job security—marketable skills—by helping you learn abstract reasoning, systems thinking, collaboration, and experimentation.

Please give this course your best shot; we believe that effort will pay off handsomely. We understand everyone says this about their topic, so ask non-IS friends, teachers, friends of parents, and others how important is it for you to be able to use and understand how technology is employed by businesses. Think of it this way: If you were planning a future in Germany, wouldn't you want to be good with the German language? Same here—you're going into a high-tech business environment... so be good with technology language. With that introduction, let's get started!⁷

⁷ For another perspective on the importance of these skills, read www.nytimes.com/2011/07/13/opinion/13friedman.html?_r=1.