

MANAGEMENT INFORMATION SYSTEMS 17E

MANAGING the
DIGITAL FIRM



Kenneth C. Laudon | Jane P. Laudon

MANAGEMENT INFORMATION SYSTEMS

MANAGING THE DIGITAL FIRM

SEVENTEENTH EDITION

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

BRIEF CONTENTS

PART ONE

Organizations, Management, and the Networked Enterprise 1

Chapter 1

Information Systems in Global Business Today 2

Chapter 2

Global E-business and Collaboration 38

Chapter 3

Information Systems, Organizations, and Strategy 76

Chapter 4

Ethical and Social Issues in Information Systems 118

PART TWO

Information Technology Infrastructure 161

Chapter 5

IT Infrastructure and Emerging Technologies 162

Chapter 6

Foundations of Business Intelligence: Databases and Information Management 210

Chapter 7

Telecommunications, the Internet, and Wireless Technology 248

Chapter 8

Securing Information Systems 292

PART THREE

Key System Applications for the Digital Age 335

Chapter 9

Achieving Operational Excellence and Customer Intimacy: Enterprise Applications 336

Chapter 10

E-commerce: Digital Markets, Digital Goods 370

Chapter 11

Managing Knowledge and Artificial Intelligence 416

Chapter 12

Enhancing Decision Making 454

PART FOUR

Building and Managing Systems 487

Chapter 13

Building Information Systems 488

Chapter 14

Making the Business Case for Information Systems and Managing Projects 526

Chapter 15

Managing Global Systems 558

Glossary G-1

Indexes I-1

PART ONE Organizations, Management, and the Networked Enterprise 1

Chapter 1

Information Systems in Global Business Today 2

Opening Case: Smart Stores Reinvent the Retail Space 3

1-1 How are information systems transforming business, and why are they so essential for running and managing a business today? 5

What's New in Management Information Systems? 5 • Globalization Challenges and Opportunities: A Flattened World 7

Interactive Session | Organizations Will the Coronavirus Pandemic Make Working from Home the New Normal? 8

The Emerging Digital Firm 10 • Strategic Business Objectives of Information Systems 11

1-2 What is an information system? How does it work? What are its management, organization, and technology components? Why are complementary assets essential for ensuring that information systems provide genuine value for organizations? 14

What Is an Information System? 14 • Dimensions of Information Systems 16

Interactive Session | Technology UPS Competes Globally with Information Technology 21

It Isn't Just Technology: A Business Perspective on Information Systems 22 • Complementary Assets: Organizational Capital and the Right Business Model 23

1-3 What academic disciplines are used to study information systems, and how does each contribute to an understanding of information systems? 26

Technical Approach 26 • Behavioral Approach 26 • Approach of This Text: Sociotechnical Systems 27

1-4 How will MIS help my career? 28

The Company 28 • Position Description 28 • Job Requirements 29 • Interview Questions 29 • Author Tips 29

Review Summary 30 • Key Terms 31 • Review Questions 31 • Discussion Questions 32

Hands-On MIS Projects 32

Collaboration and Teamwork Project 33

Case Study: New Technology at UPS Clashes with Outdated Ways of Working 34

References: 36

Chapter 2

Global E-business and Collaboration 38

Opening Case: Enterprise Social Networking Transforms Sharp Corporation into a More Innovative Connected Organization 39

2-1 What are business processes? How are they related to information systems? 41

Business Processes 41 • How Information Technology Improves Business Processes 43

2-2 How do systems serve the different management groups in a business, and how do systems that link the enterprise improve organizational performance? 44

Systems for Different Management Groups 44 • Systems for Linking the Enterprise 49 • E-business, E-commerce, and E-government 52

Interactive Session | Organizations The City of Mississauga Goes Digital 53

2-3 Why are systems for collaboration and social business so important, and what technologies do they use? 54

What Is Collaboration? 54 • What Is Social Business? 56 • Business Benefits of Collaboration and Social Business 57 • Building a Collaborative Culture and Business Processes 57 • Tools and Technologies for Collaboration and Social Business 58

Interactive Session | Technology Quality Videoconferencing: Something for Every Budget 60

2-4 What is the role of the information systems function in a business? 64

The Information Systems Department 64 • Organizing the Information Systems Function 65

2-5 How will MIS help my career? 66

The Company 66 • Position Description 66 • Job Requirements 67 • Interview Questions 67 • Author Tips 67

Review Summary 68 • Key Terms 69 • Review Questions 69 • Discussion Questions 70

Hands-On MIS Projects 70

Collaboration and Teamwork Project 71

Case Study: Is Social Business Good Business? 72

References: 74

Chapter 3

Information Systems, Organizations, and Strategy 76

Opening Case: Walmart's New Supercenter Strategy 77

3-1 Which features of organizations do managers need to know about to build and use information systems successfully? 79

What Is an Organization? 79 • Features of Organizations 82

3-2 What is the impact of information systems on organizations? 86

Economic Impacts 86 • Organizational and Behavioral Impacts 88 • The Internet and Organizations 90 • Implications for the Design and Understanding of Information Systems 90

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? 91

Porter's Competitive Forces Model 91 • Information System Strategies for Dealing with Competitive Forces 93

Interactive Session | Organizations Shipping Wars 94

Interactive Session | Management Customer Experience Management: A New Strategic Weapon 96

The Internet's Impact on Competitive Advantage 98 • The Business Value Chain Model 100 • Synergies, Core Competencies, and Network-Based Strategies 103

3-4 What are the challenges posed by strategic information systems, and how should they be addressed? 106

Sustaining Competitive Advantage 106 • Aligning IT with Business Objectives 106

3-5 How will MIS help my career? 107

The Company 107 • Position Description 108 • Job Requirements 108 • Interview Questions 108 • Author Tips 108

Review Summary 109 • Key Terms 110 • Review Questions 110 • Discussion Questions 111

Hands-On MIS Projects 111

Collaboration and Teamwork Project 112

Case Study: Is Time Running Out for Bed Bath & Beyond? 113

References: 116

Chapter 4

Ethical and Social Issues in Information Systems 118

Opening Case: Your Smartphone: Big Brother's Best Friend 119

4-1 What ethical, social, and political issues are raised by information systems? 121

A Model for Thinking about Ethical, Social, and Political Issues 122 • Five Moral Dimensions of the Information Age 124 • Key Technology Trends that Raise Ethical Issues 124

4-2 What specific principles for conduct can be used to guide ethical decisions? 127

Basic Concepts: Responsibility, Accountability, and Liability 127 • Ethical Analysis 127 • Candidate Ethical Principles 128 • Professional Codes of Conduct 129 • Some Real-World Ethical Dilemmas 129

4-3 Why do contemporary information systems technology and the Internet pose challenges to the protection of individual privacy and intellectual property? 129

Information Rights: Privacy and Freedom in the Internet Age 130 • Property Rights: Intellectual Property 136

- 4-4** How have information systems affected laws for establishing accountability and liability and the quality of everyday life? 139
Computer-Related Liability Problems 140
- Interactive Session | Management** The Boeing 737 Max Crashes: What Happened and Why? 141
System Quality: Data Quality and System Errors 143 • Quality of Life: Equity, Access, and Boundaries 143 • Health Risks: RSI, CVS, and Cognitive Decline 148
- Interactive Session | Technology** Do Smartphones Harm Children? Maybe, Maybe Not 149
- 4-5** How will MIS help my career? 150
The Company 150 • Position Description 151 • Job Requirements 151 • Interview Questions 151 • Author Tips 151
- Review Summary 152 • Key Terms 152 • Review Questions 153 • Discussion Questions 153
- Hands-On MIS Projects 154
- Collaboration and Teamwork Project 155
- Case Study:** Facebook Privacy: Your Life for Sale 156
- References:** 159

PART TWO Information Technology Infrastructure 161

Chapter 5 IT Infrastructure and Emerging Technologies 162

- Opening Case:** American Airlines Heads for the Cloud 163
- 5-1** What is IT infrastructure, and what are the stages and drivers of IT infrastructure evolution? 165
Defining IT Infrastructure 165 • Evolution of IT Infrastructure 167
Technology Drivers of Infrastructure Evolution 171
- 5-2** What are the components of IT infrastructure? 175
Computer Hardware Platforms 176 • Operating System Platforms 178 • Enterprise Software Applications 178 • Data Management and Storage 179 • Networking/Telecommunications Platforms 179 • Internet Platforms 179 • Consulting and System Integration Services 180
- 5-3** What are the current trends in computer hardware platforms? 180
The Mobile Digital Platform 180 • Consumerization of IT and BYOD 180
- Interactive Session | Management** What Should Firms Do about BYOD? 181
Quantum Computing 183 • Virtualization 183 • Cloud Computing 183
- Interactive Session | Organizations** Look to the Cloud 186
Edge Computing 188 • Green Computing 189 • High-Performance and Power-Saving Processors 190
- 5-4** What are the current computer software platforms and trends? 190
Linux and Open Source Software 190 • Software for the Web: Java, HTML, and HTML5 191 • Web Services and Service-

Oriented Architecture 192 • Software Outsourcing and Cloud Services 193

5-5 What are the challenges of managing IT infrastructure and management solutions? 196

Dealing with Platform and Infrastructure Change 196 • Management and Governance 197 • Making Wise Infrastructure Investments 197

5-6 How will MIS help my career? 200

The Company 200 • Position Description 200 • Job Requirements 200 • Interview Questions 201 • Author Tips 201

Review Summary 202 • Key Terms 203 • Review Questions 153 • Discussion Questions 204 • Hands-On MIS Projects 204

Collaboration and Teamwork Project 205

Case Study: Project JEDI: A Cloud of Controversy 206

References: 208

Chapter 6

Foundations of Business Intelligence: Databases and Information Management 210

Opening Case: Domino's Pizza Masters Data One Pizza at a Time 211

6-1 What are the problems of managing data resources in a traditional file environment? 213

File Organization Terms and Concepts 213 • Problems With the Traditional File Environment 214

6-2 What are the major capabilities of database management systems (DBMS), and why is a relational DBMS so powerful? 216

Database Management Systems 217 • Capabilities of Database Management Systems 219 • Designing Databases 222 • Nonrelational Databases, Cloud Databases, and Blockchain 224

Interactive Session | Technology New Cloud Database Tools Help Vodafone Fiji Make Better Decisions 226

6-3 What are the principal tools and technologies for accessing information from databases to improve business performance and decision making? 228

The Challenge of Big Data 228

Interactive Session | Management Big Data Baseball 229

Business Intelligence Infrastructure 230 • Analytical Tools: Relationships, Patterns, Trends 233 • Databases and the Web 236

6-4 Why are data governance and data quality assurance essential for managing the firm's data resources? 237

Assuring Data Quality 238

6-5 How will MIS help my career? 239

The Company 239 • Position Description 239 • Job Requirements 239 • Interview Questions 240 • Author Tips 240

Review Summary 241 • Key Terms 242 • Review Questions 242 • Discussion Questions 243

Hands-On MIS Projects 243

Collaboration and Teamwork Project 244

Case Study: Does Big Data Provide the Answer? 245

References: 247

Chapter 7

Telecommunications, the Internet, and Wireless Technology 248

Opening Case: The National Hockey League Scores with Wireless Technology 249

7-1 What are the principal components of telecommunications networks and key networking technologies? 251

Networking and Communication Trends 251 • What Is a Computer Network? 252 • Key Digital Networking Technologies 254

7-2 What are the different types of networks? 256

Signals: Digital Versus Analog 256 • Types of Networks 257 • Transmission Media and Transmission Speed 258

7-3 How do the Internet and Internet technology work, and how do they support communication and e-business? 259

What Is the Internet? 259 • Internet Addressing and Architecture 260 • Internet Services and Communication Tools 263

Interactive Session | Management Monitoring Employees on Networks: Unethical or Good Business? 266

The Web 267

Interactive Session | Technology The Internet of Things Aids Waste Management 275

7-4 What are the principal technologies and standards for wireless networking, communication, and Internet access? 276

Cellular Systems 276 • Wireless Computer Networks and Internet Access 277 • RFID and Wireless Sensor Networks 280

7-5 How will MIS help my career? 282

The Company 282 • Position Description 282 • Job Requirements 283 • Interview Questions 283 • Author Tips 283

Review Summary 284 • Key Terms 285 • Review Questions 285 • Discussion Questions 286

Hands-On MIS Projects 286

Collaboration and Teamwork Project 287

Case Study: Google, Apple, and Facebook Battle for Your Internet Experience 288

References: 291

Chapter 8

Securing Information Systems 292

Opening Case: The Electric Power Grid Becomes a Cyberwarfare Battleground 293

8-1 Why are information systems vulnerable to destruction, error, and abuse? 295

Why Systems are Vulnerable 295 • Malicious Software: Viruses, Worms, Trojan Horses, and Spyware 298 • Hackers and Computer Crime 300 • Internal Threats: Employees 304

Interactive Session Technology	Capital One: A Big Bank Heist from the Cloud	305
	Software Vulnerability	306
8-2	What is the business value of security and control?	307
	Legal and Regulatory Requirements for Electronic Records Management	308 • Electronic Evidence and Computer Forensics
		309
8-3	What are the components of an organizational framework for security and control?	309
	Information Systems Controls	310 • Risk Assessment
		311 • Security Policy
		311 • Disaster Recovery Planning and Business Continuity Planning
		313 • The Role of Auditing
		313
8-4	What are the most important tools and technologies for safeguarding information resources?	314
	Identity Management and Authentication	314 • Firewalls, Intrusion Detection Systems, and Anti-malware Software
		316 • Securing Wireless Networks
		318 • Encryption and Public Key Infrastructure
		318 • Securing Transactions with Blockchain
		320 • Ensuring System Availability
		320 • Achieving Digital Resiliency
		321
Interactive Session Management	PayPal Ups Its Digital Resiliency	322
	Security Issues for Cloud Computing and the Mobile Digital Platform	323 • Ensuring Software Quality
		325
8-5	How will MIS help my career?	325
	The Company	325 • Position Description
		326 • Job Requirements
		326 • Interview Questions
		326 • Author Tips
		326
	Review Summary	327 • Key Terms
		327 • Review Questions
		328 • Discussion Questions
		329
	Hands-On MIS Projects	329
	Collaboration and Teamwork Project	330
	Case Study: Is the Equifax Hack the Worst Ever—and Why?	331
	References:	334

PART THREE Key System Applications for the Digital Age 335

Chapter 9

Achieving Operational Excellence and Customer Intimacy: Enterprise Applications 336

Opening Case: Lenzing Sustainably Balances Supply and Demand 337

9-1 How do enterprise systems help businesses achieve operational excellence? 339

What Are Enterprise Systems? 339 • Enterprise Software 340 • Business Value of Enterprise Systems 341

9-2 How do supply chain management systems coordinate planning, production, and logistics with suppliers? 342

The Supply Chain 342 • Information Systems and Supply Chain Management 344 • Supply Chain Management Software 345 • Global

Supply Chains and the Internet 346 • Business Value of Supply Chain Management Systems 348

9-3 How do customer relationship management systems help firms achieve customer intimacy? 349

What Is Customer Relationship Management? 349 • Customer Relationship Management Software 350 • Operational and Analytical CRM 353 • Business Value of Customer Relationship Management Systems 354

Interactive Session | Organizations CRM Helps Adidas Know Its Customers One Shoe Buyer at a Time 355

9-4 What are the challenges that enterprise applications pose, and how are enterprise applications taking advantage of new technologies? 356

Enterprise Application Challenges 356 • Next-Generation Enterprise Applications 357

Interactive Session | Technology Versum's ERP Transformation 359

9-5 How will MIS help my career? 360

The Company 360 • Position Description 361 • Job Requirements 361 • Interview Questions 361 • Author Tips 361

Review Summary 362 • Key Terms 363 • Review Questions 363 • Discussion Questions 363

Hands-On MIS Projects 364

Collaboration and Teamwork Project 365

Case Study: The Coronavirus Pandemic Disrupts Supply Chains Around the World 366

References: 368

Chapter 10

E-commerce: Digital Markets, Digital Goods 370

Opening Case: E-commerce Comes to the Dashboard: The Battle for the "Fourth Screen" 371

10-1 What are the unique features of e-commerce, digital markets, and digital goods? 373

E-commerce Today 373 • The New E-commerce: Social, Mobile, Local 374 • Why E-commerce is Different 377 • Key Concepts in E-commerce: Digital Markets and Digital Goods in a Global Marketplace 379

10-2 What are the principal e-commerce business and revenue models? 382

Types of E-commerce 383 • E-commerce Business Models 383 • E-commerce Revenue Models 386

Interactive Session | Technology Small Business Loans from a FinTech App 388

10-3 How has e-commerce transformed marketing? 390

Behavioral Targeting 390 • Social E-commerce and Social Network Marketing 394

Interactive Session | Management Engaging "Socially" with Customers 396

10-4 How has e-commerce affected business-to-business transactions? 397

Electronic Data Interchange (EDI) 398 • New Ways of B2B Buying and Selling 399

- 10-5** What is the role of m-commerce in business, and what are the most important m-commerce applications? 401
 Location-Based Services and Applications 402 • Other Mobile Commerce Services 402 • Mobile App Payment Systems 403
- 10-6** What issues must be addressed when building an e-commerce presence? 404
 Develop an E-commerce Presence Map 404 • Develop a Timeline: Milestones 405
- 10-7** How will MIS help my career? 406
 The Company 406 • Job Description 406 • Job Requirements 406 • Interview Questions 406 • Author Tips 407
- Review Summary 408 • Key Terms 409 • Review Questions 409 • Discussion Questions 410
- Hands-On MIS Projects 410
- Collaboration and Teamwork Project 411
- Case Study:** Can Uber Be the Uber of Everything? 412
- References:** 415

Chapter 11

Managing Knowledge and Artificial Intelligence 416

Opening Case: Artificial Intelligence Beats Radiologists in Reading Mammograms 417

- 11-1** What is the role of knowledge management systems in business? 419
 Important Dimensions of Knowledge 419 • The Knowledge Management Value Chain 421 • Types of Knowledge Management Systems 423
- 11-2** What are artificial intelligence (AI) and machine learning? How do businesses use AI? 424
 Evolution of AI 425 • Major Types of AI 425 • Expert Systems 426 • Machine Learning 427 • Neural Networks 429
- Interactive Session | Technology** Do You Know Who Is Using Your Face? 431
 Genetic Algorithms 434 • Natural Language Processing, Computer Vision Systems, and Robotics 435 • Intelligent Agents 436
- Interactive Session | Organizations** Will Automation Steal Our Jobs? 437
- 11-3** What types of systems are used for enterprise-wide knowledge management, and how do they provide value for businesses? 439
 Enterprise Content Management Systems 440 • Locating and Sharing Expertise 441 • Learning Management Systems 441
- 11-4** What are the major types of knowledge work systems, and how do they provide value for firms? 442
 Knowledge Workers and Knowledge Work 442 • Requirements of Knowledge Work Systems 442 • Examples of Knowledge Work Systems 442
- 11-5** How will MIS help my career? 444
 The Company 444 • Position Description 444 • Job Requirements 445 • Interview Questions 445 • Author Tips 445
- Review Summary 446 • Key Terms 447 • Review Questions 447 • Discussion Questions 448
- Hands-On MIS Projects 448

Collaboration and Teamwork Project	449
Case Study: Are Self-Driving Cars Ready for the Road?	450
References:	453

Chapter 12 Enhancing Decision Making 454

Opening Case: Big Data and the Internet of Things Drive Precision Agriculture	455
--	-----

12-1 What are the different types of decisions, and how does the decision-making process work?	457
Business Value of Improved Decision Making	457 • Types of Decisions 458 • The Decision-Making Process 459
12-2 How do information systems support the activities of managers and management decision making?	460
Managerial Roles	461 • Real-World Decision Making 462 • High-Velocity Automated Decision Making 463
12-3 How do business intelligence and business analytics support decision making?	464
What Is Business Intelligence?	464 • The Business Intelligence Environment 464 • Business Intelligence and Analytics Capabilities 466
Interactive Session Organizations Predictive Maintenance in the Oil and Gas Industry	469
Interactive Session Management GIS Help Land O'Lakes Manage Assets Strategically	472
12-4 How do different decision-making constituencies in an organization use business intelligence?	473
Decision Support for Operational and Middle Management	473 • Decision Support for Senior Management: Balanced Scorecard and Enterprise Performance Management Methods 476
12-5 How will MIS help my career?	478
The Company	478 • Position Description 478 • Job Requirements 478 • Interview Questions 478 • Author Tips 479
Review Summary	480 • Key Terms 480 • Review Questions 481 • Discussion Questions 481
Hands-On MIS Projects	481
Collaboration and Teamwork Project	482
Case Study: Should an Algorithm Make Our Decisions?	483
References:	485

PART FOUR Building and Managing Systems 487

Chapter 13 Building Information Systems 488

Opening Case: Vinci Energies Builds a New Mobile Employee Time Sheet App	489
13-1 How does building new systems produce organizational change?	491
Systems Development and Organizational Change	491

Interactive Session Organizations	Tommy Hilfiger Transforms Its Wholesale Sales Process with Digital Showrooms	493
	Business Process Redesign	494
13-2	What are the core activities in the systems development process?	497
	Systems Analysis • Systems Design • Completing the Systems Development Process	498 • 499 • 500
13-3	What are the principal methodologies for modeling and designing systems?	503
	Structured Methodologies • Object-Oriented Development	503 • 505
13-4	What are alternative methods for building information systems?	506
	Traditional Systems Life Cycle • Prototyping • Application Software Packages, Software Services, and Outsourcing	507 • 508 • 509
13-5	What are new approaches for system building in the digital firm era?	512
	Rapid Application Development (RAD), Agile Development, Automated Software Testing, and DevOps	512
Interactive Session Technology	McAfee Turns to Automated Software Testing	514
	Mobile Application Development: Designing for a Multiscreen World	515
13-6	How will MIS help my career?	516
	The Company • Position Description • Job Requirements • Interview Questions • Author Tips	516 • 516 • 517 • 517
	Review Summary • Key Terms • Review Questions • Discussion Questions	518 • 519 • 519 • 520
	Hands-On MIS Projects	520
	Collaboration and Teamwork Project	522
Case Study:	Textron Moves ERP to the Cloud	523
References:		525

Chapter 14

Making the Business Case for Information Systems and Managing Projects 526

Opening Case: BDO Canada Selects New Project Management Software 527

- 14-1** How should managers build a business case for the acquisition and development of new information systems? 529
 - The Information Systems Plan • Portfolio Analysis • Scoring Models • Determining Solution Costs and Benefits 530 • 532 • 533 • 534
- 14-2** What are the objectives of project management, and why is it so essential in developing information systems? 536
 - Runaway Projects and System Failure • Project Management Objectives 536 • 537
- 14-3** What are the principal risk factors in information systems projects? 538
 - Dimensions of Project Risk • Change Management and the Concept of Implementation 538 • 539
- 14-4** How can project risks be managed? 541

Managing Technical Complexity 542 • Formal Planning and Control Tools 542 • Increasing User Involvement and Overcoming User Resistance 544 • Designing for the Organization 545

Interactive Session | Management Sauder Woodworking Gets ERP Implementation Right 546

Project Management Software Tools 547

Interactive Session | Technology Arup Moves Project Management to the Cloud 548

14-5 How will MIS help my career? 549

The Company 549 • Position Description 549 • Job

Requirements 550 • Interview Questions 550 • Author Tips 550

Review Summary 551 • Key Terms 551 • Review Questions 552 • Discussion Questions 552

Hands-On MIS Projects 552

Collaboration and Teamwork Project 553

Case Study: Pennsylvania's Unemployment Compensation Modernization System: Unfinished Business 554

References: 556

Chapter 15

Managing Global Systems 558

Opening Case: New Systems Help Eli Lilly Standardize as a Global Company 559

15-1 What major factors are driving the internationalization of business? 561

Developing an International Information Systems Architecture 562 • The Global Environment: Business Drivers and Challenges 563

Interactive Session | Management Rethinking Global Supply Chains 565
State of the Art 567

15-2 What are the alternative strategies for developing global businesses? 568

Global Strategies and Business Organization 568 • Global Systems to Fit the Strategy 569 • Reorganizing the Business 570

15-3 What are the challenges posed by global information systems and management solutions for these challenges? 571

A Typical Scenario: Disorganization on a Global Scale 571 • Global Systems Strategy 572 • The Management Solution: Implementation 574

15-4 What are the issues and technical alternatives to be considered when developing international information systems? 575

Computing Platforms and Systems Integration 576 • Connectivity 576

Interactive Session | Organizations Digital Nationalism 578

Software Localization 579

15-5 How will MIS help my career? 580

The Company 580 • Position Description 580 • Job Requirements 580 • Interview Questions 580 • Author Tips 581

Review Summary 582 • Key Terms 582 • Review Questions 583 • Discussion Questions 583

Hands-On MIS Projects	583
Collaboration and Teamwork Project	584
Case Study: E-commerce in China: Opportunities and Obstacles	585
References:	587

Glossary	G-1
----------	-----

Indexes	I-1
---------	-----

BUSINESS CASES AND INTERACTIVE SESSIONS

Here are some of the business firms you will find described in the cases and Interactive Sessions of this book:

Chapter 1: Information Systems in Global Business Today

Smart Stores Reinvent the Retail Space

Will the Coronavirus Pandemic Make Working from Home the New Normal?

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New Technology at UPS Clashes with Outdated Ways of Working

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Google, Apple, and Facebook Battle for Your Internet Experience

Chapter 8: Securing Information Systems

The Electric Power Grid Becomes a Cyberwarfare Battleground
Capital One: A Big Bank Heist from the Cloud
PayPal Ups Its Digital Resiliency
Is the Equifax Hack the Worst Ever—and Why?

Chapter 9: Achieving Operational Excellence and Customer Intimacy: Enterprise Applications

Lenzing Sustainably Balances Supply and Demand
CRM Helps Adidas Know Its Customers One Shoe Buyer at a Time
Versum's ERP Transformation
The Coronavirus Pandemic Disrupts Supply Chains Around the World

Chapter 10: E-commerce: Digital Markets, Digital Goods

E-commerce Comes to the Dashboard: The Battle for the “Fourth Screen”
Small Business Loans from a FinTech App
Engaging “Socially” with Customers
Can Uber Be the Uber of Everything?

Chapter 11: Managing Knowledge and Artificial Intelligence

Artificial Intelligence Beats Radiologists in Reading Mammograms
Do You Know Who Is Using Your Face?
Will Automation Steal Our Jobs?
Are Self-Driving Cars Ready for the Road?

Chapter 12: Enhancing Decision Making

Big Data and the Internet of Things Drive Precision Agriculture
Predictive Maintenance in the Oil and Gas Industry
GIS Help Land O'Lakes Manage Assets Strategically
Should an Algorithm Make Our Decisions?

Chapter 13: Building Information Systems

Vinci Energies Builds a New Mobile Employee Time Sheet App
Tommy Hilfiger Transforms Its Wholesale Sales Process with Digital Showrooms
McAfee Turns to Automated Software Testing
Textron Moves ERP to the Cloud

Chapter 14: Making the Business Case for Information Systems and Managing Projects

BDO Canada Selects New Project Management Software
Sauder Woodworking Gets ERP Implementation Right
Arup Moves Project Management to the Cloud
Pennsylvania's Unemployment Compensation Modernization System: Unfinished Business

Chapter 15: Managing Global Systems

New Systems Help Eli Lilly Standardize as a Global Company
Rethinking Global Supply Chains
Digital Nationalism
E-commerce in China: Opportunities and Obstacles

New to This Edition

Management Information Systems, 17th edition has been thoroughly updated to cover the latest industry and technology changes that impact the course.

MyLab MIS

The goal of *Management Information Systems* is to provide students and instructors with an authoritative, up-to-date, interactive, and engaging introduction to the MIS field. MyLab MIS for *Management Information Systems* is an extension of this goal in an interactive digital environment.

MyLab is the teaching and learning platform that empowers you to reach *every* student. By combining trusted author content with digital tools and a flexible platform, MyLab personalizes the learning experience and improves results for each student.

MyLab MIS features videos, animations, interactive quizzes to foster student comprehension of concepts, theories, and issues. The MyLab MIS environment reflects the new learning styles of students, which are more social, interactive, and usable on digital devices such as smartphones and tablets.

What's Included

- **Pearson eText** – Enhances learning – both in and out of the classroom. Students can highlight, take notes, and review key vocabulary all in one place, even when offline. Seamlessly integrated interactivities and Conceptual Animations bring concepts to life via MyLab or the app.
- **New Conceptual Animations** – Have author Ken Laudon walk students through three of the most important concepts in each chapter (45 total) using a contemporary animation platform. Available not only in the Pearson eText that lives in MyLab MIS but can also be purchased as a standalone eText.
- **New Video Cases** – Collections of video cases (two or more per chapter) and 6 additional instructional videos cover key concepts and experiences in the MIS world. The video cases illustrate how real-world corporations and managers are using information technology and systems. Each case is paired with a brief quiz. Video cases are listed at the beginning of each chapter.
- **MIS Decision Simulations** – Foster critical decision making skills with these interactive exercises that allow students to play the role of a manager and make business decisions.
- **Chapter Warm Ups, Chapter Quizzes** – These objective-based quizzes evaluate comprehension.
- **Discussion Questions** – Threaded discussion topics taken from the end of chapter encourage critical thinking.
- **Excel & Access Grader Projects** – Live in the application auto-graded Grader projects provided inside MyLab MIS to support classes covering Office tools. In addition, Hands-On MIS Projects from the book are also available.
- **Running Case on Dirt Bikes USA** provides additional hands-on projects for each chapter.

- **Dynamic Study Modules** help students study chapter topics and the language of MIS on their own by continuously assessing their knowledge application and performance in real time. These are available as graded assignments prior to class, and are accessible on smartphones, tablets, and computers.
- **Learning Catalytics™** is a student response tool that helps you generate class discussion, customize your lecture, and promote peer-to-peer learning based on real-time analytics. Learning Catalytics uses students' devices to engage them in more interactive tasks.
- **Learning Tracks:** 38 Learning Tracks in MyLab MIS provide additional coverage of selected topics. (See pages xxviii–xxix for list of Learning Tracks available.)

ENHANCED STAND-ALONE PEARSON eTEXT

Management Information Systems is also available as a stand-alone eText, which extends the learning experience, anytime and anywhere: The mobile app lets students use their eText whenever they have a moment in their day, on Android and iPhone mobile phones and tablets. Offline access ensures students never miss a chance to learn. The eText engages students with compelling media: Videos and animations written and produced by the authors bring key concepts to life, helping students place what they are reading into context. Other features include highlights that allow educators to share information directly with students within their eText, and analytics that let educators gain insight into how students use their eText, and plan more effective instruction.

Both the MyLab MIS and eText platforms provide an affordable, simple-to-use mobile-optimized reading experience that lets instructors and students extend learning beyond class time.

New and Updated Topics

The 17th edition features all new opening, closing, and Interactive Session cases. The text, figures, tables, and cases have been updated through July 2020 with the latest sources from industry and MIS research. New topics and coverage include:

- **Updated and expanded coverage of artificial intelligence (AI):** Chapter 11 has been rewritten to include new expanded coverage of machine learning, “deep learning,” natural language systems, computer vision systems, and robotics, reflecting the surging interest in business uses of AI and “intelligent” techniques.
- **Making the business case for systems:** Chapter 14 has been rewritten to provide expanded coverage of techniques and decision-making criteria for developing a business case for the acquisition and deployment of information systems and related technologies. The chapter shows how to evaluate and select systems projects and technologies that will deliver the greatest value to the firm.
- **System impacts of the coronavirus pandemic:** Up-to-date coverage of the impact of the coronavirus pandemic on business uses of information systems. Two Interactive Sessions and a chapter-ending case study cover topics such as working remotely, supply chain disruptions, and rethinking global supply chains.
- **Big Data and the Internet of Things:** In-depth coverage of big data, big data analytics, and the Internet of Things (IoT) in Chapters 1, 6, 7, and 12. Includes big data analytics, analyzing IoT data streams, Hadoop, in-memory computing, nonrelational databases, data lakes, and analytic platforms.

- **Cloud Computing:** Updated and expanded coverage of cloud computing in Chapter 5 (IT infrastructure) with more detail on types of cloud services, private and public clouds, hybrid clouds, managing cloud services, and a new Interactive Session on using cloud services. Cloud computing is also covered in Chapter 6 (databases in the cloud), Chapter 8 (cloud security), Chapter 9 (cloud-based CRM and ERP), Chapter 10 (e-commerce), and Chapter 13 (cloud-based systems development).
- Digital resiliency
- Customer experience management
- Low-code and no-code development
- Automated testing
- Data governance
- Dark web

The Laudon text, MyLab MIS, and eText provide the most up-to-date and comprehensive overview of information systems used by business firms today. After reading this book, we expect students will be able to participate in, and even lead, management discussions of information systems for their firms and understand how to use information technology in their jobs to achieve bottom-line business results. Regardless of whether students are accounting, finance, management, operations management, marketing, or information systems majors, the knowledge and information in this book will be valuable throughout their business careers.

Solving Teaching and Learning Challenges

MyLab MIS is the teaching and learning platform that empowers you to reach every student. By combining trusted authors' content with digital tools and a flexible platform, MyLab MIS personalizes the learning experience and improves results for each student. And with MIS Decision-Making Sims and auto-graded Excel and Access Projects, students understand how MIS concepts will help them succeed in their future careers.

MyLab MIS and Pearson eText offer unique digital interactive features that hold student attention spans longer and make learning more effective, including 45 conceptual animations that walk students through key concepts in each chapter, a collection of online video cases, and interactive quizzes. All of this is available anytime, anywhere, on any digital device. The result is a comprehensive learning environment that will heighten student engagement and learning in the MIS course.

The Laudon learning package is more current, real-world, and authoritative than competitors. Laudon *Management Information Systems* 17e, MyLab MIS, and Pearson eText help students understand MIS concepts and issues through extensive use of real-world company examples, a wide variety of text and video cases based on real-world organizations, and numerous line art illustrations, interactive animations, and hands-on software projects.

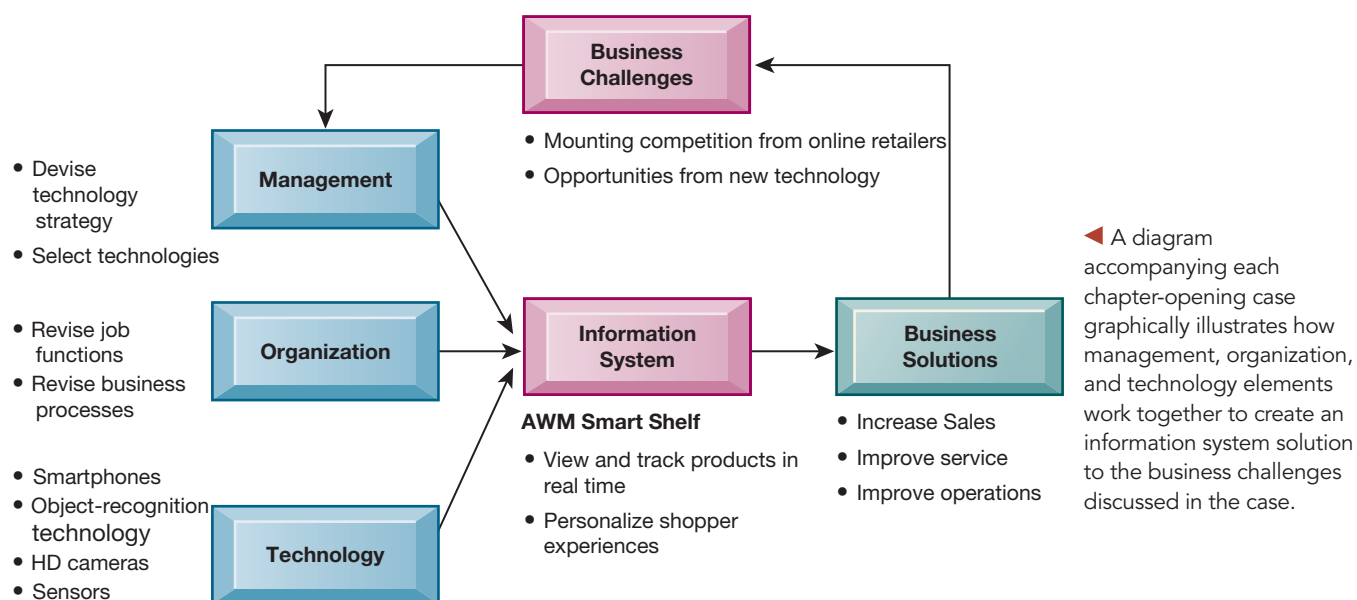
The Laudons are known for their outstanding real-world case studies, which describe how well-known business firms are using IT to solve problems and achieve objectives. Students are often asked to analyze the business problem and propose alternative solutions. The Laudons also provide hands-on MIS

software and management decision-making problems in each chapter that are based on real-world companies and business scenarios.

The Laudon text and learning package now has a very strong career focus, which incentivizes students to learn by showing exactly how each chapter will help them prepare for future jobs. In addition to Career Opportunities, MyLab MIS features Career Resources, including how to incorporate MIS knowledge into resumes, cover letters, and job interviews.

The Core Text

The Core text provides an overview of fundamental MIS concepts using an integrated framework for describing and analyzing information systems. This framework shows information systems composed of management, organization, and technology elements and is reinforced in student projects and case studies. The Core text consists of 15 chapters with hands-on projects covering the most essential topics in MIS. An important part of the Core text is the Video Case Study and Instructional Video Package: video case studies (two to three per chapter) plus 6 instructional videos that illustrate business uses of information systems, explain new technologies, and explore concepts. Videos are keyed to the topics of each chapter.



Chapter Organization

Each chapter contains the following elements:

- A Chapter Outline based on Learning Objectives
- Lists of all the Case Studies and Video Cases for each chapter
- A chapter-opening case describing a real-world organization to establish the theme and importance of the chapter

- A diagram analyzing the opening case in terms of the management, organization, and technology model used throughout the text
- Two Interactive Sessions with Case Study Questions
- A Career Opportunities section showing students how to use the text for job hunting and career preparation
- A Review Summary keyed to the Student Learning Objectives
- A list of Key Terms that students can use to review concepts
- Review questions for students to test their comprehension of chapter material
- Discussion questions raised by the broader themes of the chapter
- A series of Hands-on MIS Projects consisting of two Management Decision Problems, a hands-on application software project, and a project to develop Internet skills
- A Collaboration and Teamwork Project to develop teamwork and presentation skills with options for using open source collaboration tools
- A chapter-ending case study for students to apply chapter concepts
- Chapter references

Student Learning-Focused

Student Learning Objectives are organized around a set of study questions to focus student attention. Each chapter concludes with a Review Summary and Review Questions organized around these study questions, and each major chapter section is based on a Learning Objective.

Key Features

We have enhanced the text to make it more interactive, leading edge, and appealing to both students and instructors. The features and learning tools are described in the following sections.

Business-Driven with Real-World Business Cases and Examples

The text helps students see the direct connection between information systems and business performance. It describes the main business objectives driving the use of information systems and technologies in corporations all over the world: operational excellence, new products and services, customer and supplier intimacy, improved decision making, competitive advantage, and survival. In-text examples and case studies show students how specific companies use information systems to achieve these objectives. We use current (2020) examples from business and public organizations throughout the text to illustrate the important concepts in each chapter. Most of the case studies describe companies or organizations that are familiar to students, such as Uber, Major League Baseball (MLB), Facebook, Walmart, Amazon, Google, Adidas, and Zoom.

Hands-On Text Activities

Real-world business scenarios and data to learn firsthand what MIS is all about. These projects heighten student involvement in this exciting subject.

- **Interactive Sessions.** Two short cases in each chapter have been redesigned as Interactive Sessions that can be used to stimulate student

interest and active learning. Each case concludes with case study questions. The case study questions provide topics for discussion or written assignments.

INTERACTIVE SESSION TECHNOLOGY

UPS Competes Globally with Information Technology

United Parcel Service (UPS) started out in 1907 in a closet-sized basement office. Jim Casey and Claude Ryan—two teenagers from Seattle with two bicycles and one phone—promised the “best service and lowest rates.” UPS has used this formula successfully for more than a century to become the world’s largest ground and air package-delivery company. It’s a global enterprise with more than 495,000 employees, 125,000 delivery vehicles, and 572 aircraft.

Today UPS delivers 5.5 billion packages annually in more than 220 countries and territories. The firm has been able to maintain leadership in small-package delivery services despite stiff competition from FedEx and the US Postal Service by investing heavily in advanced information technology. UPS spends more than \$1 billion each year to maintain a high level of customer service while keeping costs low and streamlining its overall operations.

It all starts with the scannable bar-coded label attached to a package, which contains detailed information about the sender, the destination, and when the package should arrive. Customers can download and print their own labels using special software provided by UPS or by accessing the UPS website. Before the package is even picked up, information from the “smart” label is transmitted to one of UPS’s computer centers in Mahwah, New Jersey, or Alpharetta, Georgia, and sent to the distribution center nearest its final destination.

Dispatchers at this center download the label data and use special routing software called ORION to create the most efficient delivery route for each driver that considers traffic, weather conditions, and the location of each stop. Each UPS driver makes an average of 120 stops per day. In a network with 55,000 routes in the United States alone, shaving even one mile off each driver’s daily route translates into big savings in time, fuel consumption, miles driven, and carbon emissions—as much as \$50 million per year.

The first thing a UPS driver picks up each day is a handheld computer called a Delivery Information Acquisition Device (DIAD), which can access a wireless cell phone network. As soon as the driver logs on, his or her day’s route is downloaded onto the handheld. The DIAD also automatically captures customers’ signatures along with pickup and delivery information. Package tracking information is then transmitted to UPS’s computer network for storage and processing. From there, the information can be accessed worldwide to provide proof of delivery to customers or to respond to customer queries. It usually takes less than 60 seconds from the time a driver presses “complete” on the DIAD for the new information to be available on the web.

Through its automated package tracking system, UPS can monitor and even reroute packages throughout the delivery process. At various points along the route from sender to receiver, bar code devices scan shipping information on the package label and feed data about the progress of the package into the central computer. Customer service representatives are able to check the status of any package from desktop computers linked to the central computers and respond immediately to inquiries from customers. UPS customers can also access this information from the company’s website using their own computers or mobile phones. UPS now has mobile apps and a mobile website for iPhone and Android smartphone users.

Anyone with a package to ship can access the UPS website to track packages, check delivery routes, calculate shipping rates, determine time in transit, print labels, and schedule a pickup. The data collected at the UPS website are transmitted to the UPS central computer and then back to the customer after processing. UPS also provides tools that enable customers, such as Cisco Systems, to embed UPS functions, such as tracking and cost calculations, into their own

◀ Each chapter contains two Interactive Sessions on Management, Organizations, or Technology using real-world companies to illustrate chapter concepts and issues.

CASE STUDY QUESTIONS

1. What are the inputs, processing, and outputs of UPS’s package tracking system?
2. What technologies are used by UPS? How are these technologies related to UPS’s business strategy?
3. What strategic business objectives do UPS’s information systems address?
4. What would happen if UPS’s information systems were not available?

◀ Case Study Questions encourage students to apply chapter concepts to real-world companies in class discussions, student presentations, or writing assignments.

- **Hands-On MIS Projects.** Every chapter concludes with a Hands-On MIS Projects section containing three types of projects: two Management Decision Problems; a hands-on application software exercise using Microsoft Excel, Access, or web page and blog creation tools; and a project that develops Internet business skills. Files for these projects are available in MyLab. As mentioned, the Dirt Bikes USA running case in MyLab MIS provides additional hands-on projects for each chapter.
- **Collaboration and Teamwork Projects.** Each chapter features a collaborative project that encourages students working in teams to use Google Drive, Google Docs, or other open source collaboration tools. The first team project in Chapter 1 asks students to build a collaborative Google site.

► Students practice using software in real-world settings for achieving operational excellence and enhancing decision making.

I	Store	Sales Region	Item	Item Description	Unit Price	Units Sold	Week Ending	Click to Add
1	1	South	2005	17" Monitor	\$229.00	28	10/27/2020	
2	1	South	2005	17" Monitor	\$229.00	30	11/24/2020	
3	1	South	2005	17" Monitor	\$229.00	9	12/29/2020	
4	1	South	3006	101 Keyboard	\$19.95	30	10/27/2020	
5	1	South	3006	101 Keyboard	\$19.95	35	11/24/2020	
6	1	South	3006	101 Keyboard	\$19.95	39	12/29/2020	
7	1	South	6050	PC Mouse	\$8.95	28	10/27/2020	
8	1	South	6050	PC Mouse	\$8.95	3	11/24/2020	
9	1	South	6050	PC Mouse	\$8.95	38	12/29/2020	
10	1	South	8500	Desktop CPU	\$849.95	25	10/27/2020	
11	1	South	8500	Desktop CPU	\$849.95	27	11/24/2020	
12	1	South	8500	Desktop CPU	\$849.95	33	12/29/2020	
13	2	South	2005	17" Monitor	\$229.00	8	10/27/2020	
14	2	South	2005	17" Monitor	\$229.00	8	11/24/2020	
15	2	South	2005	17" Monitor	\$229.00	10	12/29/2020	
16	2	South	3006	101 Keyboard	\$19.95	8	10/27/2020	
17	2	South	3006	101 Keyboard	\$19.95	8	11/24/2020	
18	2	South	3006	101 Keyboard	\$19.95	8	12/29/2020	
19	2	South	6050	PC Mouse	\$8.95	9	10/27/2020	
20	2	South	6050	PC Mouse	\$8.95	9	11/24/2020	
21	2	South	6050	PC Mouse	\$8.95	8	12/29/2020	
22	2	South	8500	Desktop CPU	\$849.95	18	10/27/2020	
23	2	South	8500	Desktop CPU	\$849.95	18	11/24/2020	
24	2	South	8500	Desktop CPU	\$849.95	20	12/29/2020	
25	3	South	2005	17" Monitor	\$229.00	38	10/27/2020	
26	3	South	2005	17" Monitor	\$229.00	30	11/24/2020	

► Each chapter features a project to develop Internet skills for accessing information, conducting research, and performing online calculations and analysis.

Improving Decision Making: Using Web Tools to Configure and Price an Automobile

Software skills: Internet-based software
Business skills: Researching product information and pricing

3-11 In this exercise, you will use software at car websites to find product information about a car of your choice and use that information to make an important purchase decision. You will also evaluate two of these sites as selling tools.

Developing Career Skills

For students to succeed in a rapidly changing job market, they should be aware of their career options and how to go about developing a variety of skills. With MyLab MIS and *Management Information Systems* 17e, we focus on these skills in the following ways.

Career Opportunities and Resources

Every student who reads this text wants to know: How will this book help my career? The Career Opportunities feature shows how to use this text, MyLab MIS, and eText as tools for job-hunting and career-building. Job interviewers will typically ask about why you want the job, along with your ability to communicate, multitask, work in a team, show leadership, solve problems, and meet goals. These are general skills and behaviors you'll need to succeed in any job, and you should be prepared to provide examples from your course work and job experiences that demonstrate these skills. But there are also business knowledge and professional skills that employers will ask you about. Career Opportunities will show you how to use what you have learned in this text to demonstrate these skills.

The Career Opportunities section, identified by this icon  is the last major section of each chapter under the heading "How will MIS help my career?". There you will find a description of an entry-level job for a recent college graduate based on a real-world job description from major online job sites related to the topics covered in that chapter. The name of the company offering the job and its location have been changed. Each chapter's job posting describes the

required educational background and specific job skills, and suggests some of the business-related questions that might arise during the job interview. The authors provide tips for answering the questions and preparing for the interview. Career Opportunities also show where students can find out more information about the technical and business knowledge required for the job in this text and on the web and social media.

Below are the job descriptions used in this edition based on postings from both large and small businesses. A few of these jobs call for an MIS major, others for MIS course work, but many postings are not that specific. Some require some previous internship or job experience, but many are entry-level positions suitable for new college graduates, and some of these positions provide on-the-job training. However, all require knowledge of business information systems and applications and the ability to work in a digital environment.

CHAPTER	CAREER OPPORTUNITY JOB DESCRIPTION
1. Information Systems in Global Business Today	Financial Client Support and Sales Assistant
2. Global E-business and Collaboration	Entry Level Sales Support Specialist
3. Information Systems, Organizations, and Strategy	Entry Level Business Development Representative
4. Ethical and Social Issues in Information Systems	Junior Privacy Analyst
5. IT Infrastructure and Emerging Technologies	Entry Level IT Consultant
6. Foundations of Business Intelligence: Databases and Information Management	Entry Level Data Analyst
7. Telecommunications, the Internet, and Wireless Technology	Automotive Digital Advisor
8. Securing Information Systems	Entry Level Identity Access and Management Support Specialist
9. Achieving Operational Excellence and Customer Intimacy: Enterprise Applications	Manufacturing Management Trainee
10. E-commerce: Digital Markets, Digital Goods	Junior E-Commerce Data Analyst
11. Managing Knowledge and Artificial Intelligence	AI Technology Sales Assistant
12. Enhancing Decision Making	Entry Level Data Analyst
13. Building Information Systems	Entry Level Junior Business Systems Analyst
14. Making the Business Case for Information Systems and Managing Projects	IT Project Management Assistant
15. Managing Global Systems	Global Data Services Sales and Marketing Trainee

Students can use Career Opportunities to shape their resumes and career plans as well as to prepare for interviews. For instructors, Career Opportunities are potential projects for student research and in-class discussion.

In MyLab MIS we have provided additional Career Resources, including job hunting guides and instructions on how to build a Digital Portfolio demonstrating the business knowledge, application software proficiency, and Internet skills acquired from using the text. The portfolio can be included in a resume or job application or used as a learning assessment tool for instructors.

Instructor Teaching Resources

SUPPLEMENTS AVAILABLE TO INSTRUCTORS AT WWW.

PEARSONHIGHERED.COM/LAUDON

FEATURES OF THE SUPPLEMENT

Instructor's Manual	• Chapter-by-chapter summaries • Examples and activities not in the main book • Teaching outlines • Teaching tips • Solutions to all questions and problems in the book
Test Bank authored by Professor Kenneth Laudon, New York University	The authors have worked closely with skilled test item writers to ensure that higher-level cognitive skills are tested. Test bank multiple-choice questions include questions on content but also include many questions that require analysis, synthesis, and evaluation skills. AACSB Assessment Guidelines As a part of its accreditation activities, the AACSB has developed an Assurance of Learning Program designed to ensure that schools do in fact teach students what they promise. Schools are required to state a clear mission, develop a coherent business program, identify student learning objectives, and then prove that students do in fact achieve the objectives. We have attempted in this book to support AACSB efforts to encourage assessment-based education. The end papers of this edition identify student learning objectives and anticipated outcomes for our Hands-On MIS projects. The authors will provide custom advice on how to use this text in colleges with different missions and assessment needs. Please email the authors or contact your local Pearson representative for contact information.
Computerized TestGen	TestGen allows instructors to: • Customize, save, and generate classroom tests • Edit, add, or delete questions from the Test Item Files • Analyze test results • Organize a database of tests and student results
PowerPoints authored by Professor Kenneth Laudon, New York University	The authors have prepared a comprehensive collection of 50 PowerPoint slides for each chapter to be used in your lectures. Many of these slides are the same as used by Ken Laudon in his MIS classes and executive education presentations. Each of the slides is annotated with teaching suggestions for asking students questions, developing in-class lists that illustrate key concepts, and recommending other firms as examples in addition to those provided in the text. The annotations are like an Instructor's Manual built into the slides and make it easier to teach the course effectively. PowerPoints meet accessibility standards for students with disabilities. Features include but are not limited to: • Keyboard and Screen Reader access • Alternative text for images • High color contrast between background and foreground colors

Learning Tracks

There are 38 Learning Tracks in MyLab MIS available to instructors and students. This supplementary content takes students deeper into MIS topics, concepts, and debates and reviews basic technology concepts in hardware, software, database design, and other areas.

CHAPTER	LEARNING TRACKS
Chapter 1: Information Systems in Global Business Today	How Much Does IT Matter? Information Systems and Your Career The Mobile Digital Platform
Chapter 2: Global E-business and Collaboration	Systems from a Functional Perspective IT Enables Collaboration and Teamwork Challenges of Using Business Information Systems Organizing the Information Systems Function
Chapter 3: Information Systems, Organizations, and Strategy	The Changing Business Environment for IT
Chapter 4: Ethical and Social Issues in Information Systems	Developing a Corporate Code of Ethics for IT
Chapter 5: IT Infrastructure and Emerging Technologies	How Computer Hardware and Software Work Service Level Agreements The Open Source Software Initiative Cloud Computing
Chapter 6: Foundations of Business Intelligence: Databases and Information Management	Database Design, Normalization, and Entity-Relationship Diagramming Introduction to SQL Hierarchical and Network Data Models
Chapter 7: Telecommunications, the Internet, and Wireless Technology	Wireless Applications for Customer Relationship Management, Supply Chain Management, and Healthcare
Chapter 8: Securing Information Systems	The Booming Job Market in IT Security The Sarbanes-Oxley Act Computer Forensics General and Application Controls for Information Systems Management Challenges of Security and Control Software Vulnerability and Reliability
Chapter 9: Achieving Operational Excellence and Customer Intimacy: Enterprise Applications	Best-Practice Business Processes in CRM Software
Chapter 10: E-commerce: Digital Markets, Digital Goods	E-commerce Challenges: The Story of Online Groceries Build an E-commerce Business Plan Hot New Careers in E-Commerce E-commerce Payment Systems
Chapter 11: Managing Knowledge and Artificial Intelligence	Challenges of Knowledge Management Systems Case-Based Reasoning Fuzzy Logic
Chapter 12: Enhancing Decision Making	Building and Using Pivot Tables
Chapter 13: Building Information Systems	Unified Modeling Language Primer on Business Process Design and Documentation Primer on Business Process Management
Chapter 14: Making the Business Case for Information Systems and Managing Projects	Capital Budgeting Methods for Information Systems Investments Enterprise Analysis (Business Systems Planning) and Critical Success Factors Information Technology Investments and Productivity

Video Cases and Instructional Videos

Instructors can download step-by-step instructions for accessing the video cases from the Instructor Resources Center.

CHAPTER	VIDEO
Chapter 1: Information Systems in Global Business Today	Business in the Cloud: Facebook, Google, and eBay Data Centers UPS Global Operations with the DIAD and Worldport Instructional Video: Tour IBM's Raleigh Data Center
Chapter 2: Global E-business and Collaboration	VisionX Grows with SAP Business One CEMEX: Becoming a Social Business
Chapter 3: Information Systems, Organizations, and Strategy	GE Becomes a Digital Firm: The Emerging Industrial Internet National Basketball Association: Competing on Global Delivery with Akamai OS Streaming
Chapter 4: Ethical and Social Issues in Information Systems	What Net Neutrality Means for You Facebook and Google Privacy: What Privacy? United States vs. Terrorism: Data Mining for Terrorists and Innocents Instructional Video: Viktor Mayer-Schönberger on the Right to Be Forgotten
Chapter 5: IT Infrastructure and Emerging Technologies	Rockwell Automation Fuels the Oil and Gas Industry with the Internet of Things (IoT) ESPN.com: The Future of Sports Coverage in the Cloud Netflix: Building a Business in the Cloud
Chapter 6: Foundations of Business Intelligence: Databases and Information Management	Brooks Brothers Closes In on Omnichannel Retail Maruti Suzuki Business Intelligence and Enterprise Databases
Chapter 7: Telecommunications, the Internet, and Wireless Technology	Telepresence Moves out of the Boardroom and into the Field Virtual Collaboration with IBM Sametime
Chapter 8: Securing Information Systems	Stuxnet and Cyberwarfare Cyberespionage: The Chinese Threat Instructional Video: Sony PlayStation Hacked; Data Stolen from 77 Million Users Instructional Video: Meet the Hackers: Anonymous Statement on Hacking Sony
Chapter 9: Achieving Operational Excellence and Customer Intimacy: Enterprise Applications	Maersk Develops a Global Shipping Management System
Chapter 10: E-commerce: Digital Markets, Digital Goods	Walmart Takes On Amazon: A Battle of IT and Management Systems Groupon: Deals Galore Etsy: A Marketplace and Community
Chapter 11: Managing Knowledge and Artificial Intelligence	How IBM's Watson Became a Jeopardy Champion Alfresco: Open Source Document Management and Collaboration
Chapter 12: Enhancing Decision Making	PSEG Leverages Big Data and Business Analytics Using GE's Predix Platform FreshDirect Uses Business Intelligence to Manage Its Online Grocery Business Intelligence Helps the Cincinnati Zoo Work Smarter
Chapter 13: Building Information Systems	IBM: Business Process Management in a SaaS Environment IBM Helps the City of Madrid with Real-Time BPM Software Instructional Video: BPM Business Process Management Customer Story Instructional Video: Workflow Management Visualized

CHAPTER	VIDEO
Chapter 14: Making the Business Case for Information Systems and Managing Projects	NASA Project Management Challenges
Chapter 15: Managing Global Systems	Daum Runs Oracle Apps on Linux Lean Manufacturing and Global ERP: Humanetics and Global Shop

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PART ONE

Organizations, Management, and the Networked Enterprise

CHAPTER 1

Information Systems in Global
Business Today

CHAPTER 2

Global E-business and Collaboration

CHAPTER 3

Information Systems, Organizations,
and Strategy

CHAPTER 4

Ethical and Social Issues in
Information Systems

PART ONE introduces the major themes of this book, raising a series of important questions: What is an information system, and what are its management, organization, and technology dimensions? Why are information systems so essential in businesses today? Why are systems for collaboration and social business so important? How can information systems help businesses become more competitive? What broader ethical and social issues are raised by widespread use of information systems?

1

Information Systems in Global Business Today

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

- 1-1** How are information systems transforming business, and why are they so essential for running and managing a business today?
- 1-2** What is an information system? How does it work? What are its management, organization, and technology components? Why are complementary assets essential for ensuring that information systems provide genuine value for organizations?
- 1-3** What academic disciplines are used to study information systems, and how does each contribute to an understanding of information systems?
- 1-4** How will MIS help my career?

CHAPTER CASES

Smart Stores Reinvent the Retail Space
 Will the Coronavirus Pandemic Make Working from Home the New Normal?
 UPS Competes Globally with Information Technology
 New Technology at UPS Clashes with Outdated Ways of Working

VIDEO CASES

Business in the Cloud: Facebook, Google, and eBay Data Centers
 UPS Global Operations with the DIAD and Worldport

Instructional Video:
 Tour IBM's Raleigh Data Center

MyLab MIS

Discussion Questions: 1-4, 1-5, 1-6; Hands-On MIS Projects: 1-7, 1-8, 1-9, 1-10;
 eText with Conceptual Animations

Smart Stores Reinvent the Retail Space

Although there has been an upsurge in online shopping, retail stores are not going away. Some traditional retailers are fighting back by using information technology to provide new ways to bring people into physical stores or enhance their in-store experiences, even with new requirements for social distancing.

Acrelec, a French digital signage company, is piloting technology to help retailers manage store curbside pickups by customers placing orders online. Customers can use a retailer's smartphone app to indicate they are coming to pick up an order, and the Acrelec system will estimate when a customer will arrive at a particular store. Object-recognition cameras identify exactly when a customer's car arrives and where it is parked. Acrelec is especially useful for big-box retailers, grocery stores, and home-improvement stores.

Shelves have become more than just a surface for storing and displaying objects. New systems for "smart" shelves use proximity sensors, 3D cameras, microphones, RFID readers, and weight sensors to enable interactions between shoppers in physical stores and the shelves they're standing in front of. These systems can create a highly personalized shopping experience that fundamentally improves the way shoppers move inside physical stores.

Brands and retailers such as Pepsi, Walmart, and Albertsons are starting to use Smart Shelf by AWM to replicate the benefits of the online experience in physical retail environments. Using super-wide-angle low-light HD cameras, retailers deploying Smart Shelf are able to view and track their products in real-time. The solution improves operational efficiencies by highlighting specific shelves that need product stocking and allows for real-time on-shelf marketing to consumers. When retailers connect Smart Shelf to their mobile apps, they can help shoppers locate products themselves through their smartphones and tablets.

AWM Frictionless is a walk-in, walk-out solution enabling customers to shop as normal and check out by simply exiting the store. The system uses digital shelving and object-recognition cameras to keep track of which customers leave with which items. When customers enter a store, they are required to have mobile device and facial recognition scans, which allow the system to charge their digital accounts when they leave with purchases and receive a receipt via email or text message.



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In March 2020 AWM opened a low-contact cashierless micromarket called QuickEats at a luxury apartment community owned by Greenwood & McKenzie in Santa Ana California. QuickEats utilizes AWM Frictionless and features grab-and-go products such as sodas, water, juice drinks, sandwiches, cheese plates, fruit, and household cleaning items.

AWM Smart Shelf is able to personalize shoppers' experiences when they are in stores based on the items they pick up, even if they don't purchase them. For example, if a customer picks up a box of cookies and then puts it back, the retailer can use the system to offer a discount on the shelf beneath that item the next time the shopper encounters it in the store. Cofounder Kurtis Van Horn believes that Smart Shelf can provide the same level of customization and personalization as found in online shopping to brick-and-mortar stores.

AWM also offers an anonymous consumer behavior tracking application that can direct customers to other parts of a store using digital signage, enabling up-to-the-minute advertising and pricing. AWM solutions can be implemented in a wide range of store sizes and formats, from micromarkets, to convenience stores, to larger-format retailers. Technology is redefining the role of the shelf in retail marketing.

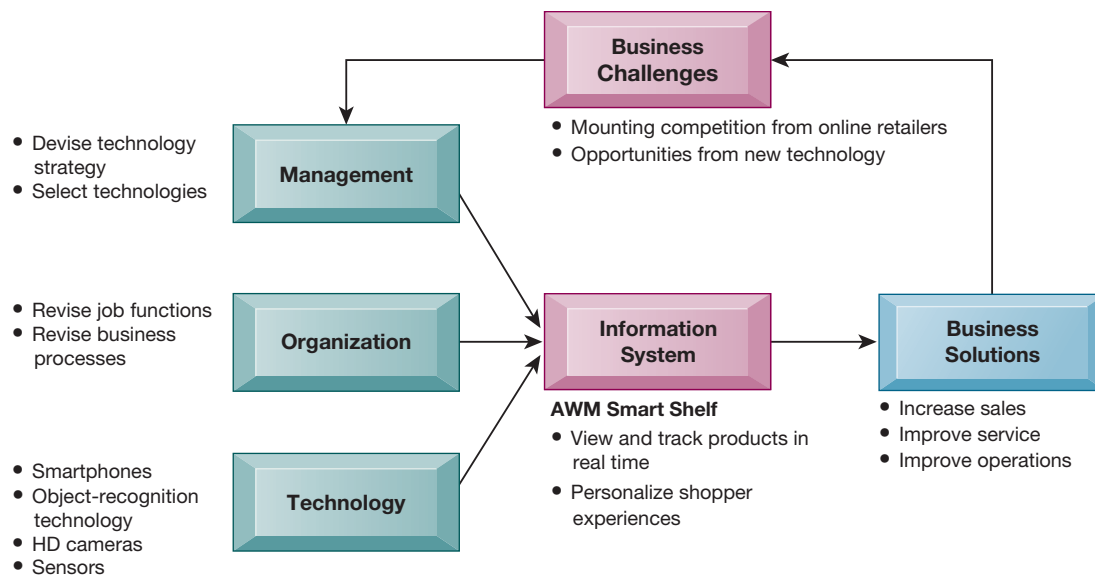
Sources: Jared Council, "Retailers Hope In-Store Tech Will Keep Shoppers in Stores," *Wall Street Journal*, January 15, 2020; "Micromarket in Santa Ana's Nineteen01 Community," *Businesswire*, March 24, 2020; www.smartshelf.com, accessed April 29, 2020

The companies and technologies described here show how essential information systems are today. Today, retail stores are struggling to stay alive and relevant as more shoppers gravitate to online shopping and the Internet. One solution is to use leading-edge innovative information technology to provide new ways of drawing buyers into physical stores and making the in-store buying experience more efficient, safe, and pleasant. The information flows that drive these reimagined retail businesses have become much more digital, making use of mobile tools and object-recognition technology.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. To compete more effectively against online retailers and take advantage of new technology solutions, brick-and-mortar retail stores are using innovative systems based on object-recognition technology, sensors, and smartphones. The use of leading-edge digital technologies to drive business operations and management decisions is a key topic today in the MIS world and will be discussed throughout this text.

It is also important to note that deploying information technology has changed the way customers of Acrelec and AWM Smart Shelf run their businesses. To effectively use new digital tools, these companies had to redesign jobs and procedures for gathering, inputting, and accessing information. These changes had to be carefully planned to make sure they enhanced efficiency, service, and profitability.

Here are some questions to think about: How do Acrelec's and AWM's systems change retail operations? How do they improve the customer experience?



1-1 How are information systems transforming business, and why are they so essential for running and managing a business today?

It's not business as usual in the United States or the rest of the global economy anymore. In 2019, global spending on information technology (IT) and IT services was nearly \$3.8 trillion (Gartner, 2019). In addition, firms spent another \$160 billion on management consulting and services—much of which involves redesigning firms' business operations to take advantage of these new technologies (Statista, 2020). In fact, most of the business value of IT investment derives from these organizational, management, and cultural changes inside firms (Saunders and Brynjolfsson, 2016). Figure 1.1 shows that between 1999 and 2019, capital investment in information technology consisting of IT equipment, software, and research and development (R&D) accounted for over 40 percent of US total capital spending.

As managers, most of you will work for firms that are intensively using information systems and making large investments in information technology. You will certainly want to know how to invest this money wisely. If you make wise choices, your firm can outperform competitors. If you make poor choices, you will be wasting valuable capital. This book is dedicated to helping you make wise decisions about information technology and information systems.

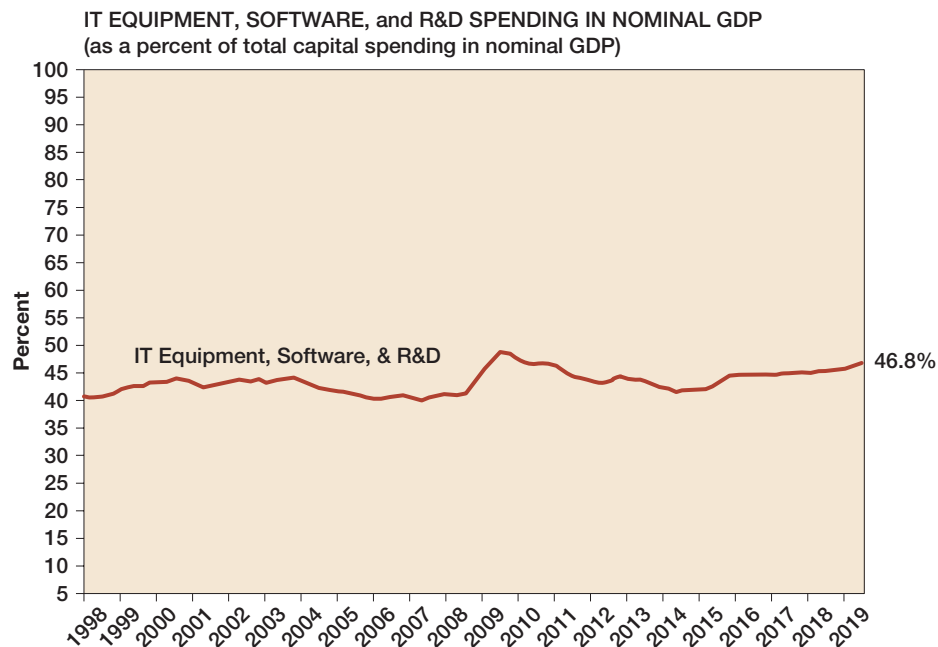
What's New in Management Information Systems?

Plenty. In fact, there's a whole new world of doing business using new technologies for managing and organizing. What makes the MIS field the most exciting area of study in schools of business is the continuous change in technology, management, and business processes. Five changes are of paramount importance.

FIGURE 1.1 INFORMATION TECHNOLOGY CAPITAL INVESTMENT

Information technology capital investment, defined as IT equipment, software and research and development (R&D) spending, amounted to over 40 percent of total US capital spending (in nominal GDP) between 1999 and 2019.

Source: US Bureau of Economic Analysis.



IT Innovations A continuing stream of information technology innovations is transforming the traditional business world. Examples include the emergence of cloud computing, the growth of a mobile digital business platform based on smartphones and tablet computers, big data and the Internet of Things (IoT), business analytics, machine learning systems, and the use of social networks by managers to achieve business objectives. Most of these changes have occurred in the past few years. These innovations are enabling entrepreneurs and innovative traditional firms to create new products and services, develop new business models, and transform the day-to-day conduct of business. In the process, some old businesses, even industries, are being destroyed while new businesses are springing up.

New Business Models For instance, the emergence of online video services for streaming or downloading, such as Netflix, Apple TV Channels, and Amazon, has forever changed how premium video is distributed and even created. Netflix by early 2020 had attracted more than 167 million subscribers worldwide to what it calls the “Internet TV revolution.” Netflix has moved into premium TV show production with nearly 1,200 original shows in 2019, such as *American Vandal*, *Suburra*, *The Crown*, *Friends From College*, *House of Cards*, and *Orange Is the New Black*, challenging cable and broadcast producers of TV shows, and potentially disrupting cable network dominance of TV show production. Apple has struck deals with major Hollywood studios for recent movies and TV shows. A growing trickle of viewers are unplugging from cable and using only the Internet for entertainment.

E-commerce Expansion E-commerce sales worldwide amounted to nearly \$3.6 trillion in 2019 and are expected to approach \$5 trillion by 2021 (Lipsman, 2019). E-commerce is changing how firms design, produce, and deliver their products and services. E-commerce has reinvented itself again, disrupting the traditional marketing and advertising industry and putting major media and content firms

in jeopardy. Facebook and other social networking sites such as YouTube, Twitter, and Tumblr, along with Netflix, Apple Music, and many other media firms, exemplify the new face of e-commerce in the twenty-first century. They sell services. When we think of e-commerce, we tend to think of selling physical products. While this iconic vision of e-commerce is still very powerful and the fastest-growing form of retail in the United States, growing up alongside is a whole new value stream based on selling services, not goods. It's a services model of e-commerce. Growth in social commerce is spurred by powerful growth of the mobile platform: 98 percent of Facebook's users access the service from mobile phones and tablets. Information systems and technologies are the foundation of this new services-based e-commerce. Mobile retail e-commerce approached \$300 billion in 2020 (and is growing more than 20 percent a year) (Meola, 2019).

Management Changes The management of business firms has changed: With new mobile smartphones, high-speed wireless Wi-Fi networks, and tablets, remote salespeople on the road are only seconds away from their managers' questions and oversight. Management is going mobile. Managers on the move are in direct, continuous contact with their employees. The growth of enterprise-wide information systems with extraordinarily rich data means that managers no longer operate in a fog of confusion but instead have online, nearly instant access to the really important information they need for accurate and timely decisions. In addition to their public uses on the web, social networking tools, wikis, and blogs are becoming important corporate tools for communication, collaboration, and information sharing.

Changes in Firms and Organizations Compared to industrial organizations of the previous century, new fast-growing twenty-first-century business firms put less emphasis on hierarchy and structure and more emphasis on employees taking on multiple roles and tasks and collaborating with others on a team. They put greater emphasis on competency and skills rather than position in the hierarchy. They emphasize higher-speed and more-accurate decision making based on data and analysis. They are more aware of changes in technology, consumer attitudes, and culture. They use social media to enter into conversations with consumers and demonstrate a greater willingness to listen to consumers, in part because they have no choice. They show better understanding of the importance of information technology in creating and managing business firms and other organizations. To the extent organizations and business firms demonstrate these characteristics, they are twenty-first-century digital firms.

You can see some of these trends at work in the Interactive Session on Organizations, which examines the impact on work and management as many companies had their employees work remotely during the coronavirus pandemic of 2020.

Globalization Challenges and Opportunities: A Flattened World

Prior to AD 1500, there was no truly global economic system of trade that connected all the continents on earth although there were active regional trade markets. After the sixteenth century, a global trading system began to emerge based on advances in navigation and ship technology. The world trade that ensued after these developments has brought the peoples and cultures of the world much closer together. The Industrial Revolution was really a worldwide phenomenon energized by expansion of trade among nations, making nations both competitors and collaborators in business. The Internet has greatly heightened the competitive tensions among nations as global trade expands

INTERACTIVE SESSION ORGANIZATIONS

Will the Coronavirus Pandemic Make Working from Home the New Normal?

As COVID-19 continued to spread around the globe, companies large and small started to make changes to the way they work, shuttering their offices and requiring most or all of their employees to work remotely from their homes.

- During the pandemic, ClearRisk, which offers integrated, cloud-based software solutions for claims, fleet, incident, and insurance certificate management had its entire staff working from home.
- Many large law firms, including Reed Smith, Baker McKenzie, and Nixon Peabody, closed offices and required work at home during the pandemic. The law firms emphasized that they could continue to serve clients despite office closings and remote work.
- OpenText Corp., a Canadian provider of enterprise information management products, plans to eliminate more than half of its 120 offices globally, with 2000 of its 15,000-person workforce working from home permanently.
- In mid-May 2020, Twitter Inc. notified employees that most of them could work from home indefinitely.

According to a recent MIT report, 34 percent of Americans who previously commuted to work stated that they were working from home by the first week of April 2020 due to the coronavirus outbreak. Prior to the pandemic, the number of people regularly working from home remained in the single digits, with only about 4 percent of the US workforce working from home at least half the time. However, the trend of working from home had been slowly gaining momentum thanks to advances in information technology for remote work and changes in corporate work culture. The coronavirus pandemic may mark a tipping point.

It's likely that many people who started working from home for the first time during the pandemic will continue to do so thereafter. New health guidelines about distancing will require some workplaces to expand to accommodate all their employees or to have a significant percentage of employees work permanently from home.

Information technologies driving these changes include broadband high-speed Internet connections,

laptop computers, tablets, smartphones, email, messaging, and videoconferencing tools. As companies shift their work from face-to-face to remote, video conferencing is becoming the new normal for meetings. People are trying to have good conversations, share critical information, generate new ideas, reach consensus, and make decisions quickly on this platform.

Although less than ideal for face-to-face interactions, videoconferencing is becoming more powerful and affordable. There are many options, including Skype, Skype for Business, Zoom, Microsoft Teams, Amazon Chime, BlueJeans, Cisco's WebEx, GoToMeetings, and Google Meet. Some business people are using the same tools they do in their personal communications, such as FaceTime and Facebook Messenger. (FaceTime now supports group video chat with up to 32 people.)

Video conference software such as WebEx and BlueJeans appears designed for more corporate uses. Other software such as Microsoft's Skype and Zoom feels more consumer-friendly and easier to set up, with free or low-cost versions suitable for smaller businesses. Skype works for video chats, calls, and instant messaging and can handle up to 50 people in a single video call. Skype allows calls to be recorded in case someone misses a meeting. Skype also provides file-sharing capabilities, caller ID, voicemail, a split view mode to keep conversations separate, and screen share on mobile devices.

Up to 1,000 users can participate in a single Zoom video call, and 49 videos can appear on the screen at once. Zoom includes collaboration tools like simultaneous screen-sharing and co-annotation, and the ability to record meetings and generate transcripts. Users can adjust meeting times, select multiple hosts, and communicate via chat if microphones and cameras are turned off.

There are definite benefits to remote work: lower overhead, more flexible schedules, reductions in employee commuting time and attrition rates, and increases in productivity. (Many companies reported that productivity did not suffer when employees worked at home during the pandemic.) According to Global Workplace Analytics, a typical company saves about \$11,000 per half-time telecommuter per year. Working remotely also poses challenges.

Not all employees have access to the Internet at home, and many work in industries that require on-site work. About 80 percent of American adults have high-speed broadband Internet service at home. However, according to a Pew Research Center study, racial minorities, older adults, rural residents, and people with lower levels of education and income are less likely to have in-home broadband service. In addition, one in five American adults access the Internet only through their smartphones. Employees with little children or small apartments find working at home more difficult.

Full-time employees are four times more likely to have remote work options than part-time employees. According to Global Workplace Analytics, a typical remote worker is college-educated, at least 45 years old, and earns an annual salary of \$58,000 while working for a company with more than 100 employees.

Although email and text messaging are very useful, they are not effective tools for communication compared to the information exchange and personal

connection of face-to-face conversations. Remote work also inhibits the creativity and innovative thinking that take place when people interact with each other face-to-face, and videoconferencing is only a partial solution. Studies have found that people working together in the same room tend to solve problems more quickly than remote collaborators, and that team cohesion suffers when members work remotely.

Sources: Lindsey Jacobson, "As Coronavirus Forces Millions to Work Remotely, the US Economy May Have Reached a 'Tipping Point' in Favor of Working from Home," CNBC, March 23, 2020; Rita Zeidner, "Coronavirus Makes Work from Home the New Normal," *All Things Work*, March 21, 2020; Dana Mattioli and Konrad Putzier, "The End of the Office," *Wall Street Journal*, May 16-17, 2020; Cate Pye, "Coronavirus: What Does the 'New Normal' Mean for How We Work?" *Computer Weekly*, April 3, 2020; Josh Lowy, "Overcoming Remote Work Challenges," *MIT Sloan Management Review*, April 9, 2020; Derek Thompson, "The Coronavirus Is Creating a Huge, Stressful Experiment in Working from Home," *The Atlantic*, March 13, 2020; Kevin Roose, "Sorry, but Working from Home Is Overrated," *New York Times*, March 10, 2020; Rani Molla, "This Is the End of the Office as We Know It," *Vox*, April 14, 2020.

CASE STUDY QUESTIONS

1. Define the problem described in this case. What are the management, organization, and technology issues raised by this problem?
2. Identify the information technologies used to provide a solution to this problem. Was this a successful solution? Why or why not?
3. Will working from home become the dominant way of working in the future? Why or why not?

and strengthened the benefits that flow from trade, and also created significant dislocations in labor markets.

In 2005, journalist Thomas Friedman wrote an influential book declaring the world was now flat, by which he meant that the Internet and global communications had greatly expanded the opportunities for people to communicate with one another and reduced the economic and cultural advantages of developed countries. The United States and European countries were in a fight for their economic lives, according to Friedman, competing for jobs, markets, resources, and even ideas with highly educated, motivated populations in low-wage areas in the less developed world (Friedman, 2007). This globalization presents you and your business with both challenges and opportunities.

A growing percentage of the economy of the United States and other advanced industrial countries in Europe and Asia depends on imports and exports. In 2019, an estimated 30 percent of the world economy resulted from foreign trade of goods and services, both imports and exports. Half of *Fortune* 500 US firms obtain nearly 50 percent of their revenue from foreign operations. For instance, more than 50 percent of Intel's revenues in 2019 came from overseas sales of its microprocessors.

It's not just goods that move across borders. So too do jobs, some of them high-level jobs that pay well and require a college degree. Since 2000, the United States has lost an estimated 5 million manufacturing jobs to offshore, low-wage producers, so manufacturing is now a small part of US employment (less than 9 percent). In a normal year, about 300,000 service jobs move offshore to lower-wage countries, many of them in less-skilled information system occupations but also in tradable service jobs in architecture, financial services, customer call centers, consulting, engineering, and even radiology.

On the plus side, the US economy created 2.6 million new jobs in 2018. Employment in information systems and the other service occupations listed previously has rapidly expanded in sheer numbers, wages, productivity, and quality of work. Outsourcing has actually accelerated the development of new systems in the United States and worldwide by reducing the cost of building and maintaining them. In 2019 job openings in information systems and technologies far exceeded the supply of applicants.

The challenge for you as a business student is to develop high-level skills through education and on-the-job experience that cannot be outsourced. The challenge for your business is to avoid markets for goods and services that can be produced offshore much less expensively. The opportunities are equally immense. Throughout this book you will find examples of companies and individuals who either failed or succeeded in using information systems to adapt to this new global environment.

What does globalization have to do with management information systems? That's simple: everything. The emergence of the Internet into a full-blown international communications system has drastically reduced the costs of operating and transacting on a global scale. Communication between a factory floor in Shanghai and a distribution center in Rapid City, South Dakota, is now instant and virtually free. Customers can now shop in a worldwide marketplace, obtaining price and quality information reliably 24 hours a day. Firms producing goods and services on a global scale achieve extraordinary cost reductions by finding low-cost suppliers and managing production facilities in other countries. Internet service firms, such as Google and eBay, are able to replicate their business models and services in multiple countries without having to redesign their expensive fixed-cost information systems infrastructure. Briefly, information systems enable globalization.

The Emerging Digital Firm

All of the changes we have just described, coupled with equally significant organizational redesign, have created the conditions for a fully digital firm. A digital firm can be defined along several dimensions. A **digital firm** is one in which nearly all of the organization's *significant business relationships* with customers, suppliers, and employees are digitally enabled and mediated. *Core business processes* are accomplished through digital networks spanning the entire organization or linking multiple organizations.

Business processes refer to the set of logically related tasks and behaviors that organizations develop over time to produce specific business results and the unique manner in which these activities are organized and coordinated. Developing a new product, generating and fulfilling an order, creating a marketing plan, and hiring an employee are examples of business processes, and the ways organizations accomplish their business processes can be a source of competitive strength. (A detailed discussion of business processes can be found in Chapter 2.)

Key corporate assets—intellectual property, core competencies, and financial and human assets—are managed through digital means. In a digital firm, any piece of information required to support key business decisions is available at any time and anywhere in the firm.

Digital firms sense and respond to their environments far more rapidly than traditional firms, giving them more flexibility to survive in turbulent times. Digital firms offer extraordinary opportunities for more-flexible global organization and management. In digital firms, both time shifting and space shifting are the norm. *Time shifting* refers to business being conducted continuously, 24/7, rather than in narrow “work day” time bands of 9 a.m. to 5 p.m. *Space shifting* means that work takes place in a global workshop as well as within national boundaries. Work is accomplished physically wherever in the world it is best accomplished.

Many firms, such as Cisco Systems, 3M, and GE, are close to becoming digital firms, using the Internet to drive every aspect of their business. Most other companies are not fully digital, but they are moving toward close digital integration with suppliers, customers, and employees.

Strategic Business Objectives of Information Systems

What makes information systems so essential today? Why are businesses investing so much in information systems and technologies? In the United States, more than 25 million business and financial managers, and 36 million professional workers in the labor force rely on information systems to conduct business. Information systems are essential for conducting day-to-day business in the United States and most other advanced countries as well as achieving strategic business objectives.

Entire sectors of the economy are nearly inconceivable without substantial investments in information systems. E-commerce firms such as Amazon, eBay, Google, and E*Trade simply would not exist. Today's service industries—finance, insurance, and real estate as well as personal services such as travel, medicine, and education—could not operate without information systems. Similarly, retail firms such as Walmart and Target and manufacturing firms such as General Motors and GE require information systems to survive and prosper. Just as offices, telephones, filing cabinets, and efficient tall buildings with elevators were once the foundations of business in the twentieth century, information technology is a foundation for business in the twenty-first century.

There is a growing interdependence between a firm's ability to use information technology and its ability to implement corporate strategies and achieve corporate goals (see Figure 1.2). What a business would like to do in five years often depends on what its systems will be able to do. Increasing market share, becoming the high-quality or low-cost producer, developing new products, and increasing employee productivity depend more and more on the kinds and quality of information systems in the organization. The more you understand about this relationship, the more valuable you will be as a manager.

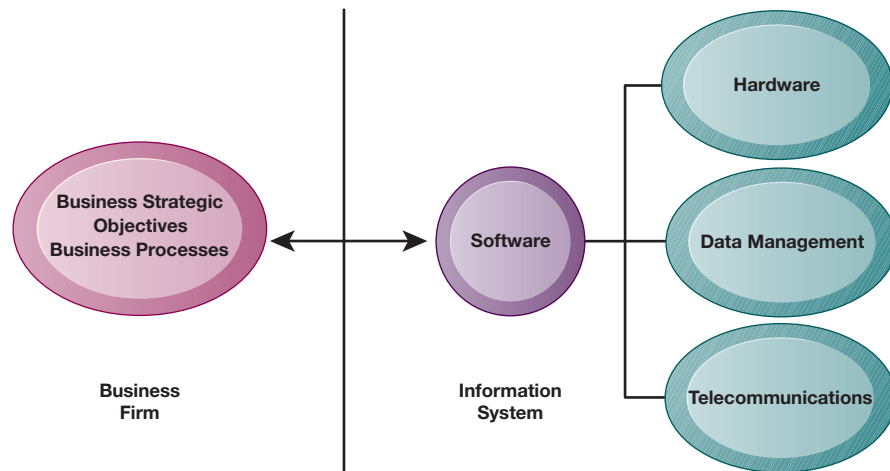
Specifically, business firms invest heavily in information systems to achieve six strategic business objectives: operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival.

Operational Excellence

Businesses continuously seek to improve the efficiency of their operations in order to achieve higher profitability. Information systems and technologies are some of the most important tools available to managers for achieving higher

FIGURE 1.2 THE INTERDEPENDENCE BETWEEN ORGANIZATIONS AND INFORMATION SYSTEMS

In contemporary systems, there is a growing interdependence between a firm's information systems and its business capabilities. Changes in strategy, rules, and business processes increasingly require changes in hardware, software, databases, and telecommunications. Often, what the organization would like to do depends on what its systems will permit it to do.



levels of efficiency and productivity in business operations, especially when coupled with changes in business practices and management behavior.

Walmart, the largest retailer on earth, exemplifies the power of information systems coupled with state-of-the-art business practices and supportive management to achieve world-class operational efficiency. In fiscal year 2019, Walmart achieved \$524 billion in sales—nearly one-tenth of retail sales in the United States—in large part because of its Retail Link system, which digitally links its suppliers to every one of Walmart's stores. As soon as a customer purchases an item, the supplier monitoring the item knows to ship a replacement to the shelf. Walmart is the most efficient retail store in the industry.

New Products, Services, and Business Models

Information systems and technologies are a major enabling tool for firms to create new products and services as well as entirely new business models. A **business model** describes how a company produces, delivers, and sells a product or service to create wealth.

Today's music industry is vastly different from the industry a decade ago. Apple Inc. transformed an old business model of music distribution based on vinyl records, tapes, and CDs into an online, legal distribution model based on its own technology platform. Apple has prospered from a continuing stream of innovations, including the iTunes music service, the iPad, and the iPhone.

Customer and Supplier Intimacy

When a business really knows its customers and serves them well, the customers generally respond by returning and purchasing more. This raises revenues and profits. Likewise with suppliers—the more a business engages its suppliers, the better the suppliers can provide vital inputs. This lowers costs. How to really know your customers or suppliers is a central problem for businesses with millions of offline and online customers.

The Mandarin Oriental in Manhattan and other high-end hotels exemplify the use of information systems and technologies to achieve customer intimacy. These hotels use computers to keep track of guests' preferences, such as their preferred room temperature, check-in time, frequently dialed telephone numbers, and television programs, and store these data in a large data repository. Individual rooms in the hotels are networked to a central network server computer so that they can be remotely monitored and controlled. When a customer arrives at one of these hotels, the system automatically changes the room conditions, such as dimming the lights, setting the room temperature, or selecting appropriate music, based on the customer's digital profile. The hotels also analyze their customer data to identify their best customers and to develop individualized marketing campaigns based on customers' preferences.

JCPenney exemplifies the benefits of information systems-enabled supplier intimacy. Every time a dress shirt is bought at a JCPenney store in the United States, the record of the sale appears immediately on computers in Hong Kong at the TAL Apparel Ltd. supplier, a contract manufacturer that produces one in eight dress shirts sold in the United States. TAL runs the numbers through a computer model it developed and then decides how many replacement shirts to make and in what styles, colors, and sizes. TAL then sends the shirts to each JCPenney store, bypassing completely the retailer's warehouses. In other words, JCPenney's shirt inventory is near zero, as is the cost of storing it.

Improved Decision Making

Many business managers operate in an information fog bank, never really having the right information at the right time to make an informed decision. Instead, managers rely on forecasts, best guesses, and luck. The result is over- or underproduction of goods and services, misallocation of resources, and poor response times. These poor outcomes raise costs and lose customers. In the past decade, information systems and technologies have made it possible for managers to use real-time data from the marketplace when making decisions.

For instance, Verizon Corporation, one of the largest telecommunications companies in the United States, uses a web-based digital dashboard to provide managers with precise real-time information on customer complaints, network performance for each locality served, and line outages or storm-damaged lines. Using this information, managers can immediately allocate repair resources to affected areas, inform consumers of repair efforts, and restore service fast.

Competitive Advantage

When firms achieve one or more of these business objectives—operational excellence; new products, services, and business models; customer/supplier intimacy; and improved decision making—chances are they have already achieved a competitive advantage. Doing things better than your competitors, charging less for superior products, and responding to customers and suppliers in real time all add up to higher sales and higher profits that your competitors cannot match. Apple Inc., Walmart, and UPS, described later in this chapter, are industry leaders because they know how to use information systems for this purpose.

Survival

Business firms also invest in information systems and technologies because they are necessities of doing business. Sometimes these “necessities” are driven by industry-level changes. For instance, after Citibank introduced the first automated teller machines (ATMs) in the New York region in 1977 to attract customers through higher service levels, its competitors rushed to provide ATMs

to their customers to keep up with Citibank. Today, virtually all banks in the United States have regional ATMs and link to national and international ATM networks, such as Cirrus. Providing ATM services to retail banking customers is simply a requirement of being in and surviving in the retail banking business.

There are many federal and state statutes and regulations that create a legal duty for companies and their employees to retain records, including digital records. For instance, the Toxic Substances Control Act (1976), which regulates the exposure of US workers to more than 75,000 toxic chemicals, requires firms to retain records on employee exposure for 30 years. The Sarbanes-Oxley Act (2002), which was intended to improve the accountability of public firms and their auditors, requires certified public accounting firms that audit public companies to retain audit working papers and records, including all emails, for five years. The Dodd-Frank Wall Street Reform and Consumer Protection Act (2010), which was intended to strengthen regulation of the banking industry, requires firms to retain all records for 10 years. Many other pieces of federal and state legislation in health care, financial services, education, and privacy protection impose significant information retention and reporting requirements on US businesses. Firms turn to information systems and technologies to provide the capability to respond to these challenges.

1-2 What is an information system? How does it work? What are its management, organization, and technology components? Why are complementary assets essential for ensuring that information systems provide genuine value for organizations?

So far we've used *information systems* and *technologies* informally without defining the terms. **Information technology (IT)** consists of all the hardware and software that a firm needs to use in order to achieve its business objectives. This includes not only computer machines, storage devices, and handheld mobile devices but also software, such as the Windows or Linux operating systems, the Microsoft Office desktop productivity suite, and the many thousands of computer programs that can be found in a typical large firm. "Information systems" are more complex and can be best understood by looking at them from both a technology and a business perspective.

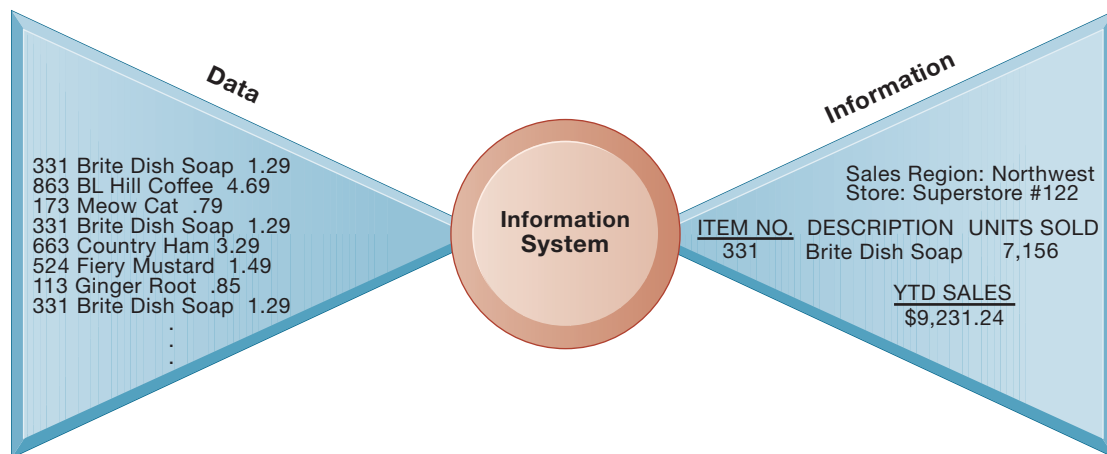
What Is an Information System?

An **information system** can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products.

Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By **information** we mean data that have been shaped into a form that is meaningful and useful to human beings. **Data**, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

FIGURE 1.3 DATA AND INFORMATION

Raw data from a supermarket checkout counter can be processed and organized to produce meaningful information, such as the total unit sales of dish detergent or the total sales revenue from dish detergent for a specific store or sales territory.



A brief example contrasting information and data may prove useful. Supermarket checkout counters scan millions of pieces of data from bar codes, which describe each product. Such pieces of data can be totaled and analyzed to provide meaningful information, such as the total number of bottles of dish detergent sold at a particular store, which brands of dish detergent were selling the most rapidly at that store or sales territory, or the total amount spent on that brand of dish detergent at that store or sales region (see Figure 1.3).

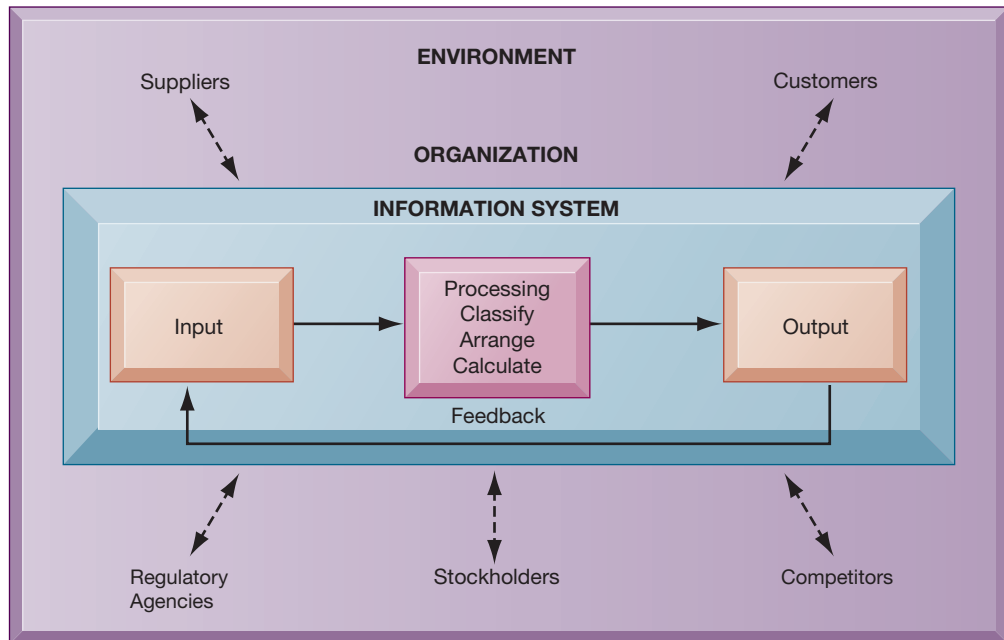
Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new products or services. These activities are input, processing, and output (see Figure 1.4). **Input** captures or collects raw data from within the organization or from its external environment. **Processing** converts this raw input into a meaningful form. **Output** transfers the processed information to the people who will use it or to the activities for which it will be used. Information systems also require **feedback**, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.

In the AWM Smart Shelf system, input includes the digital results from scanning on-shelf products and store shelf identification codes, along with scanned images of items customers have selected for purchase. Computers store and process these data to keep track of the items on each shelf, the items each customer purchases or examines, and a history of the customer's purchases and items of interest. The system then determines what items on what shelves need restocking, and what items should be recommended to each customer. The system provides meaningful information such as all the items sold in a particular store or on a particular store shelf on a specific day, what items have been purchased by a specific customer, and which items need restocking.

Although computer-based information systems use computer technology to process raw data into meaningful information, there is a sharp distinction between a computer and a computer program on the one hand and an information system on the other. Computers and related software programs are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information. Computer programs, or software, are sets of operating instructions that direct and control computer processing. Knowing how computers and computer

FIGURE 1.4 FUNCTIONS OF AN INFORMATION SYSTEM

An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental actors, such as customers, suppliers, competitors, stockholders, and regulatory agencies, interact with the organization and its information systems.



programs work is important in designing solutions to organizational problems, but computers are only part of an information system.

A house is an appropriate analogy. Houses are built with hammers, nails, and wood, but these do not make a house. The architecture, design, setting, landscaping, and all of the decisions that lead to the creation of these features are part of the house and are crucial for solving the problem of putting a roof over one's head. Computers and programs are the hammers, nails, and lumber of computer-based information systems, but alone they cannot produce the information a particular organization needs. To understand information systems, you must understand the problems they are designed to solve, their architectural and design elements, and the organizational processes that lead to the solutions.

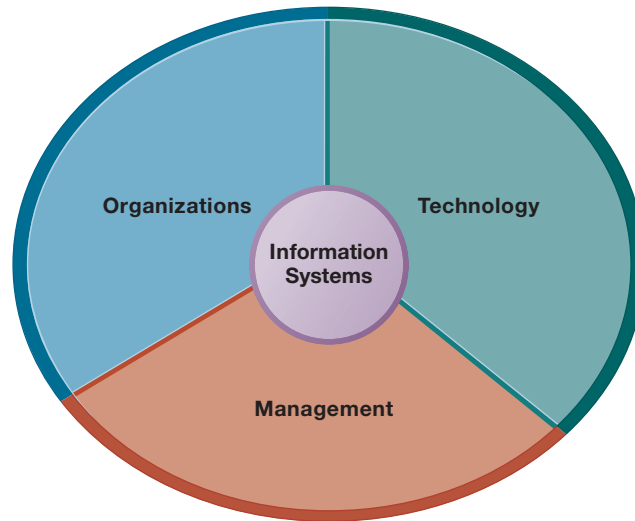
Dimensions of Information Systems

To fully understand information systems, you must understand the broader organization, management, and information technology dimensions of systems (see Figure 1.5) and their power to provide solutions to challenges and problems in the business environment. We refer to this broader understanding of information systems, which encompasses an understanding of the management and organizational dimensions of systems as well as the technical dimensions of systems, as **information systems literacy**. **Computer literacy**, in contrast, focuses primarily on knowledge of information technology.

The field of **management information systems (MIS)** tries to achieve this broader information systems literacy. MIS deals with behavioral issues as well as technical issues surrounding the development, use, and impact of information systems used by managers and employees in the firm.

FIGURE 1.5 INFORMATION SYSTEMS ARE MORE THAN COMPUTERS

Using information systems effectively requires an understanding of the organization, management, and information technology shaping the systems. An information system creates value for the firm as an organizational and management solution to challenges posed by the environment.



Let's examine each of the dimensions of information systems—organizations, management, and information technology.

Organizations

Information systems are an integral part of organizations. Indeed, for some companies, such as credit reporting firms, there would be no business without an information system. The key elements of an organization are its people, structure, business processes, politics, and culture. We introduce these components of organizations here and describe them in greater detail in Chapters 2 and 3.

Organizations have a structure that is composed of different levels and specialties. Their structures reveal a clear-cut division of labor. Authority and responsibility in a business firm are organized as a hierarchy, or a pyramid structure. The upper levels of the hierarchy consist of managerial, professional, and technical employees, whereas the lower levels consist of operational personnel.

Senior management makes long-range strategic decisions about products and services as well as ensures financial performance of the firm. **Middle management** carries out the programs and plans of senior management, and **operational management** is responsible for monitoring the daily activities of the business. **Knowledge workers**, such as engineers, scientists, or architects, design products or services and create new knowledge for the firm, whereas **data workers**, such as secretaries or clerks, assist with scheduling and communications at all levels of the firm. **Production or service workers** actually produce the product and deliver the service (see Figure 1.6).

Experts are employed and trained for different business functions. The major **business functions**, or specialized tasks performed by business organizations, consist of sales and marketing, manufacturing and production, finance and accounting, and human resources (see Table 1.1). Chapter 2 provides more detail on these business functions and the ways in which they are supported by information systems.

An organization coordinates work through its hierarchy and through its *business processes*. Most organizations' business processes include formal rules that

TABLE 1.1 MAJOR BUSINESS FUNCTIONS

FUNCTION	PURPOSE
Sales and marketing	Selling the organization's products and services
Manufacturing and production	Producing and delivering products and services
Finance and accounting	Managing the organization's financial assets and maintaining the organization's financial records
Human resources	Attracting, developing, and maintaining the organization's labor force; maintaining employee records

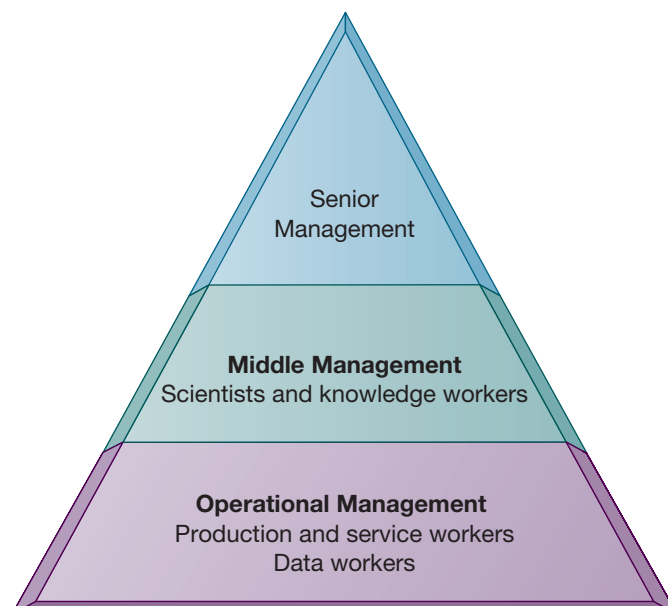
have been developed over a long time for accomplishing tasks. These rules guide employees in a variety of procedures, from writing an invoice to responding to customer complaints. Some of these business processes have been written down, but others are informal work practices, such as a requirement to return telephone calls from coworkers or customers, that are not formally documented. Information systems automate many business processes. For instance, how a customer receives credit or how a customer is billed is often determined by an information system that incorporates a set of formal business processes.

Each organization has a unique **culture**, or fundamental set of assumptions, values, and ways of doing things, that has been accepted by most of its members. You can see organizational culture at work by looking around your university or college. Some bedrock assumptions of university life are that professors know more than students, that the reason students attend college is to learn, and that classes follow a regular schedule.

Parts of an organization's culture can always be found embedded in its information systems. For instance, UPS's first priority is customer service, which is an aspect of its organizational culture that can be found in the company's package tracking systems, which we describe in this section.

FIGURE 1.6 LEVELS IN A FIRM

Business organizations are hierarchies consisting of three principal levels: senior management, middle management, and operational management. Information systems serve each of these levels. Scientists and knowledge workers often work with middle management.



Different levels and specialties in an organization create different interests and points of view. These views often conflict over how the company should be run and how resources and rewards should be distributed. Conflict is the basis for organizational politics. Information systems come out of this cauldron of differing perspectives, conflicts, compromises, and agreements that are a natural part of all organizations. In Chapter 3, we examine these features of organizations and their role in the development of information systems in greater detail.

Management

Management's job is to make sense out of the many situations faced by organizations, make decisions, and formulate action plans to solve organizational problems. Managers perceive business challenges in the environment, they set the organizational strategy for responding to those challenges, and they allocate the human and financial resources to coordinate the work and achieve success. Throughout, they must exercise responsible leadership. The business information systems described in this book reflect the hopes, dreams, and realities of real-world managers.

But managers must do more than manage what already exists. They must also create new products and services and even re-create the organization from time to time. A substantial part of management responsibility is creative work driven by new knowledge and information. Information technology can play a powerful role in helping managers design and deliver new products and services and redirecting and redesigning their organizations. Chapter 12 treats management decision making in detail.

Information Technology

Information technology is one of many tools managers use to cope with change.

Computer hardware is the physical equipment used for input, processing, and output activities in an information system. It consists of the following: computers of various sizes and shapes (including mobile handheld devices); various input, output, and storage devices; and telecommunications devices that link computers together.

Computer software consists of the detailed, preprogrammed instructions that control and coordinate the computer hardware components in an information system. Chapter 5 describes the contemporary software and hardware platforms used by firms today in greater detail.

Data management technology consists of the software governing the organization of data on physical storage media. More detail on data organization and access methods can be found in Chapter 6.

Networking and telecommunications technology, consisting of both physical devices and software, links the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipment can be connected in networks for sharing voice, data, images, sound, and video. A **network** links two or more computers to share data or resources, such as a printer.

The world's largest and most widely used network is the **Internet**. The Internet is a global "network of networks" that uses universal standards (described in Chapter 7) to connect millions of networks in more than 230 countries around the world.

The Internet has created a new "universal" technology platform on which to build new products, services, strategies, and business models. This same technology platform has internal uses, providing the connectivity to link different systems and networks within the firm. Internal corporate networks based on Internet

technology are called **intranets**. Private intranets extended to authorized users outside the organization are called **extranets**, and firms use such networks to coordinate their activities with other firms for making purchases, collaborating on design, and other interorganizational work. For most business firms today, using Internet technology is both a business necessity and a competitive advantage.

The **World Wide Web** is a service provided by the Internet that uses universally accepted standards for storing, retrieving, formatting, and displaying information in a page format on the Internet. Web pages contain text, graphics, animations, sound, and video and are linked to other web pages. By clicking on highlighted words or buttons on a web page, you can link to related pages to find additional information and links to other locations on the web. The web can serve as the foundation for new kinds of information systems such as UPS's web-based package tracking system described in the Interactive Session on Technology.

All of these technologies, along with the people required to run and manage them, represent resources that can be shared throughout the organization and constitute the firm's **information technology (IT) infrastructure**. The IT infrastructure provides the foundation, or *platform*, on which the firm can build its specific information systems. Each organization must carefully design and manage its IT infrastructure so that it has the set of technology services it needs for the work it wants to accomplish with information systems. Chapters 5 through 8 of this book examine each major technology component of information technology infrastructure and show how they all work together to create the technology platform for the organization.

The Interactive Session on Technology describes some of the typical technologies used in computer-based information systems today. UPS invests heavily in information systems technology to make its business more efficient and customer oriented. It uses an array of information technologies, including bar code scanning systems, wireless networks, large mainframe computers, handheld computers, the Internet, and many different pieces of software for tracking packages, calculating fees, maintaining customer accounts, and managing logistics.

Let's identify the organization, management, and technology elements in the UPS package tracking system we have described. The organization element anchors the package tracking system in UPS's sales and production functions (the main product of UPS is a service—package delivery). It specifies the required procedures for identifying packages with both sender and recipient information, taking inventory, tracking the packages en route, and providing package status reports for UPS customers and customer service representatives.

The system must also provide information to satisfy the needs of managers and workers. UPS drivers need to be trained in both package pickup and delivery procedures and in how to use the package tracking system so that they can work efficiently and effectively. UPS customers may need some training to use UPS in-house package tracking software or the UPS website.

UPS's management is responsible for monitoring service levels and costs and for promoting the company's strategy of combining low cost and superior service. Management decided to use computer systems to increase the ease of sending a package using UPS and of checking its delivery status, thereby reducing delivery costs and increasing sales revenues.

The technology supporting this system consists of handheld computers, bar code scanners, desktop computers, wired and wireless communications networks, UPS's data center, storage technology for the package delivery data, UPS in-house package tracking software, and software to access the web. The result is an information system solution to the business challenge of providing a high level of service with low prices in the face of mounting competition.

INTERACTIVE SESSION TECHNOLOGY

UPS Competes Globally with Information Technology

United Parcel Service (UPS) started out in 1907 in a closet-sized basement office. Jim Casey and Claude Ryan—two teenagers from Seattle with two bicycles and one phone—promised the “best service and lowest rates.” UPS has used this formula successfully for more than a century to become the world’s largest ground and air package-delivery company. It’s a global enterprise with more than 495,000 employees, 125,000 delivery vehicles, and 572 aircraft.

Today UPS delivers 5.5 billion packages annually in more than 220 countries and territories. The firm has been able to maintain leadership in small-package delivery services despite stiff competition from FedEx and the US Postal Service by investing heavily in advanced information technology. UPS spends more than \$1 billion each year to maintain a high level of customer service while keeping costs low and streamlining its overall operations.

It all starts with the scannable bar-coded label attached to a package, which contains detailed information about the sender, the destination, and when the package should arrive. Customers can download and print their own labels using special software provided by UPS or by accessing the UPS website. Before the package is even picked up, information from the “smart” label is transmitted to one of UPS’s computer centers in Mahwah, New Jersey, or Alpharetta, Georgia, and sent to the distribution center nearest its final destination.

Dispatchers at this center download the label data and use special routing software called ORION to create the most efficient delivery route for each driver that considers traffic, weather conditions, and the location of each stop. Each UPS driver makes an average of 120 stops per day. In a network with 55,000 routes in the United States alone, shaving even one mile off each driver’s daily route translates into big savings in time, fuel consumption, miles driven, and carbon emissions—as much as \$50 million per year.

These savings are critical as UPS tries to boost earnings growth as more of its business shifts to less-profitable e-commerce deliveries. UPS drivers who used to drop off several heavy packages a day at one retailer now often make multiple stops scattered across residential neighborhoods, delivering one package per household. The shift requires more fuel and more time, increasing the cost to deliver each package.

The first thing a UPS driver picks up each day is a handheld computer called a Delivery Information Acquisition Device (DIAD), which can access a wireless cell phone network. As soon as the driver logs on, his or her day’s route is downloaded onto the handheld. The DIAD also automatically captures customers’ signatures along with pickup and delivery information. Package tracking information is then transmitted to UPS’s computer network for storage and processing. From there, the information can be accessed worldwide to provide proof of delivery to customers or to respond to customer queries. It usually takes less than 60 seconds from the time a driver presses “complete” on the DIAD for the new information to be available on the web.

Through its automated package tracking system, UPS can monitor and even reroute packages throughout the delivery process. At various points along the route from sender to receiver, bar code devices scan shipping information on the package label and feed data about the progress of the package into the central computer. Customer service representatives are able to check the status of any package from desktop computers linked to the central computers and respond immediately to inquiries from customers. UPS customers can also access this information from the company’s website using their own computers or mobile phones. UPS now has mobile apps and a mobile website for iPhone and Android smartphone users.

Anyone with a package to ship can access the UPS website to track packages, check delivery routes, calculate shipping rates, determine time in transit, print labels, and schedule a pickup. The data collected at the UPS website are transmitted to the UPS central computer and then back to the customer after processing. UPS also provides tools that enable customers, such as Cisco Systems, to embed UPS functions, such as tracking and cost calculations, into their own websites so that they can track shipments without visiting the UPS site.

UPS is now leveraging its decades of expertise managing its own global delivery network to manage logistics and supply chain activities for other companies. It created a UPS Supply Chain Solutions division that provides a complete bundle of standardized services to subscribing companies at a fraction of what it would cost to build their own systems and

infrastructure. These services include supply chain design and management, freight forwarding, customs brokerage, mail services, multimodal transportation, and financial services in addition to logistics services.

UPS technology and business services are helpful to businesses of all sizes, including small start-ups. Fondarific is a Savannah-based company that manufactures and sells fondant icings for decorating wedding cakes and childrens' cakes. UPS made it possible for Fondarific to grow rapidly when international sales took off. UPS set up a class in exporting to teach Fondarific how to manage international sales and logistics and how to use its WorldShip global shipping software for UPS package and freight services. UPS also showed the company how to integrate shipping

systems with Quickbooks accounting software and inventory software.

UPS provides both financial and shipping advice and services to 4Moms, a Pittsburgh-headquartered company with 80 employees that makes innovative baby products using consumer technology. 4Moms uses UPS Trade Direct, which enables companies to reduce freight and inventory costs by bypassing distribution centers and shipping their goods directly to retailers. The UPS Cargo Finance service helps 4Moms manage the cost of inventory as it is shipped around the world.

Sources: www.ups.com, accessed April 27, 2020; Sean Galea-Pace, "UPS Supply Chain Introduces Smart Warehouse Technology," *Supply Chain Digital*, April 24, 2020; and Bloomberg, "UPS Sees Payoff From \$20Bn Tech Bet," *SupplyChainBrain*, April 24, 2019.

CASE STUDY QUESTIONS

1. What are the inputs, processing, and outputs of UPS's package tracking system?
2. What technologies are used by UPS? How are these technologies related to UPS's business strategy?
3. What strategic business objectives do UPS's information systems address?
4. What would happen if UPS's information systems were not available?

It Isn't Just Technology: A Business Perspective on Information Systems

Managers and business firms invest in information technology and systems because they provide real economic value to the business. The decision to build or maintain an information system assumes that the returns on this investment will be superior to other investments in buildings, machines, or other assets. These superior returns will be expressed as increases in productivity, as increases in revenues (which will increase the firm's stock market value), or perhaps as superior long-term strategic positioning of the firm in certain markets (which will produce superior revenues in the future).

We can see that from a business perspective, an information system is an important instrument for creating value for the firm. Information systems enable the firm to increase its revenue or decrease its costs by providing information that helps managers make better decisions or that improves the execution of business processes. For example, the information system for analyzing supermarket checkout data illustrated in Figure 1.3 can increase firm profitability by helping managers make better decisions as to which products to stock and promote in retail supermarkets.

Every business has an information value chain, illustrated in Figure 1.7, in which raw information is systematically acquired and then transformed through various stages that add value to that information. The value of an information system to a business, as well as the decision to invest in any new information system, is, in large part, determined by the extent to which the system will lead to better management decisions, more efficient business processes, and higher