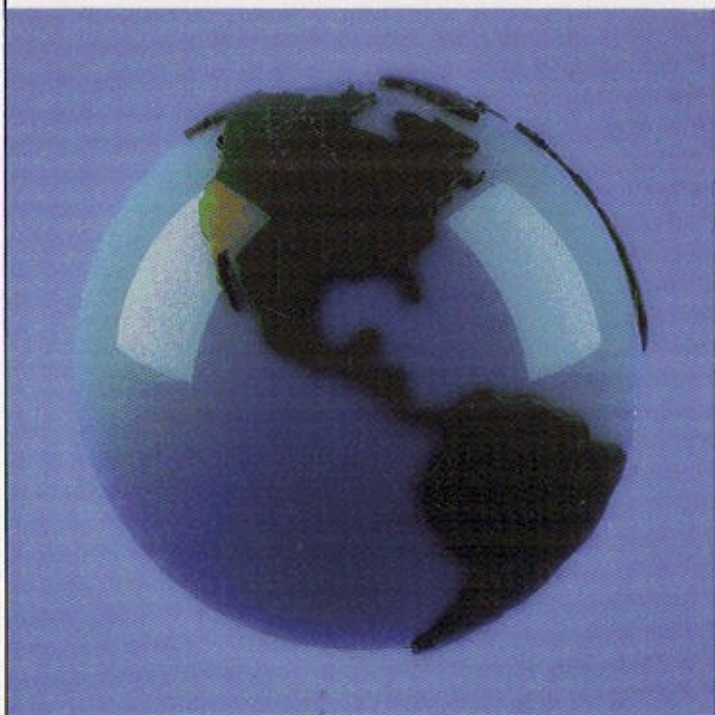


JAMES A. O'BRIEN
GEORGE M. MARAKAS



MANAGEMENT
INFORMATION
SYSTEMS

SEVENTH EDITION

McGRAW-HILL INTERNATIONAL EDITION



Contents

Module I Foundation Concepts

Chapter 1

Foundations of Information Systems in Business 3

Section I: Foundation Concepts: Information Systems in Business 4

Introduction 4

The Real World of Information Systems 4

Real World Case 1: The 2004 Athens Olympics Network: Faster, Stronger—and Redundant 5

What Is an Information System? 6

Information Technologies 6

What You Need to Know 6

An IS Framework for Business Professionals 6

The Fundamental Roles of IS in Business 8

Trends in Information Systems 9

The Role of e-Business in Business 11

Types of Information Systems 12

Operations Support Systems 13

Management Support Systems 14

Other Classifications of Information Systems 14

Managerial Challenges of Information Technology 16

Success and Failure with IT 16

Developing IS Solutions 17

Challenges of Ethics and IT 19

Challenges of IT Careers 20

The IS Function 21

Section II: Foundation Concepts: The Components of Information Systems 22

System Concepts: A Foundation 22

What Is a System? 22

Real World Case 2: Lufthansa: Taking Mobile Computing to the Skies While Keeping the Mobile Workforce Connected 23

Feedback and Control 24

Other System Characteristics 24

Components of an Information System 26

Information System Resources 27

People Resources 27

Hardware Resources 28

Software Resources 28

Data Resources 28

Network Resources 29

Information System Activities 30

Input of Data Resources 30

Processing of Data into Information 30

Output of Information Products 31

Storage of Data Resources 31

Control of System Performance 31

Recognizing Information Systems 31

Real World Case 3: Aviall Inc.: From Failure to Success with Information Technology 37

Real World Case 4: Continental Airlines: This Call Is Being Monitored 38

Chapter 2

Competing with Information Technology 39

Section I: Fundamentals of Strategic Advantage 40

Strategic IT 40

Competitive Strategy Concepts 40

Real World Case 1: GE, Dell, Intel, and Others: The Competitive Advantage of Information Technology 41

Competitive Forces and Strategies 42

Strategic Uses of Information Technology 43

Other Competitive Strategies 43

Building a Customer-Focused Business 47

The Value Chain and Strategic IS 49

Value Chain Examples 49

Section II: Using Information Technology for Strategic Advantage 51

Strategic Uses of IT 51

Reengineering Business Processes 51

Real World Case 2: The U.S. Department of Commerce: Using IT to Tap Experts' Know-How Through Knowledge Management 52

The Role of Information Technology 53

Becoming an Agile Company 54

Creating a Virtual Company 56

Virtual Company Strategies 56

Building a Knowledge-Creating Company 57

Knowledge Management Systems 58

Real World Case 3: Shareware Grows Up: CIOs Are Saving Money by Pooling Resources and Software 64

Real World Case 4: CDW and Harrah's Entertainment: Developing Strategic Customer-Loyalty Systems 65

Module II Information Technologies

Chapter 3

Computer Hardware 67

Section I: Computer Systems: End User and Enterprise Computing 68

Types of Computer Systems 68

Real World Case 1: Mobile Devices and Wireless Technologies Are a Must-Have: Return on Investment Is No Longer a Concern 69

Microcomputer Systems 70

Computer Terminals 72

Network Computers 72

Information Appliances 73

Midrange Systems 74

Mainframe Computer Systems 75

Supercomputer Systems 76

Technical Note: The Computer System Concept 77

Computer Processing Speeds 79

Section II: Computer Peripherals: Input, Output, and Storage Technologies 80

Peripherals 80

Input Technologies 80

Real World Case 2: Delta and Northwest Airlines: The Business Value of Customer Self-Service Kiosks 81

Pointing Devices 82

Pen-Based Computing 83

Speech Recognition Systems 84

Optical Scanning 85

Other Input Technologies 87

Output Technologies 88

Video Output 88

Printed Output 89

Storage Trade-Offs 90

Computer Storage Fundamentals 90

Direct and Sequential Access 92

Semiconductor Memory 93

Magnetic Disks 93

Types of Magnetic Disks 94

RAID Storage 94

Magnetic Tape 94

Optical Disks 95

Business Applications 96

Real World Case 3: Verizon Communications: Advances in Speech Recognition Software Are Extending the Utility of Traditional Applications 101

Real World Case 4: Wisconsin Physicians Service and Winnebago: Moving to Linux on the Mainframe 102

Chapter 4

Computer Software 103

Section I: Application Software: End User Applications 104

Introduction to Software 104

What Is Software? 104

Types of Software 104

Real World Case 1: Microsoft: Looking at How Companies Do Business—and Writing Software for the Processes 105

Application Software for End Users 106

Business Application Software 107

Software Suites and Integrated Packages 108

Web Browsers and More 109

Electronic Mail and Instant Messaging 109

Word Processing and Desktop Publishing 110

Electronic Spreadsheets 111

Presentation Graphics 113

Personal Information Managers 114

Groupware 114

Software Alternatives	115
<i>Application Service Providers</i>	116
<i>Software Licensing</i>	117
Section II: System Software: Computer System Management	118
System Software Overview	118
<i>Overview</i>	118
Operating Systems	118
Real World Case 2: Amazon and eBay: The New Face of Web Services	119
<i>Operating System Functions</i>	120
<i>Microsoft Windows</i>	122
<i>UNIX</i>	122
<i>Linux</i>	122
<i>Mac OS X</i>	123
Other System Management Programs	123
Programming Languages	124
<i>Machine Languages</i>	124
<i>Assembler Languages</i>	125
<i>High-Level Languages</i>	125
<i>Fourth-Generation Languages</i>	126
<i>Object-Oriented Languages</i>	126
Web Languages and Services	127
<i>HTML</i>	128
<i>XML</i>	128
<i>Java</i>	128
<i>Web Services</i>	128
Programming Software	131
<i>Language Translator Programs</i>	131
<i>Programming Tools</i>	131
Real World Case 3: Merrill Lynch and Others: The Growth of Linux in Business	137
Real World Case 4: Mark's Work Wearhouse and Others: Using Java in Business	138

Chapter 5

Data Resource Management 139

Section I: Managing Data Resources 140

Data Resource Management 140

Foundation Data Concepts 140

Real World Case 1: Argosy Gaming Co.: Challenges in Building a Data Warehouse 141

Character 142

Field 142

Record 142

File 142

Database 142

Types of Databases 143

Operational Databases 143

Distributed Databases 144

External Databases 144

Hypermedia Databases 144

Data Warehouses and Data Mining 145

Data Mining 147

Traditional File Processing 148

Problems of File Processing 149

The Database Management Approach 150

Database Management Software 151

Database Interrogation 153

Database Maintenance 154

Application Development 154

Section II: Technical Foundations of Database Management 155

Database Management 155

Database Structures 155

Hierarchical Structure 155

Real World Case 2: Harrah's Entertainment and Others:

Protecting the Data Jewels 156

Network Structure 157

Relational Structure 158

Multidimensional Structure 158

Object-Oriented Structure 158

Evaluation of Database Structures 159

Database Development 162

Data Planning and Database Design 163

Real World Case 3: Henry Schein Inc.: The Business Value of a Data Warehouse 169

Real World Case 4: Emerson and Sanofi: Data Stewards Seek Data Conformity 170

Chapter 6

Telecommunications and Networks 171

Section I: The Networked Enterprise 172

Networking the Enterprise 172

Trends in Telecommunications 172

Real World Case 1: Celanese Chemicals and Others: Wireless Business Applications 173

Industry Trends 174

Technology Trends 175

Business Application Trends 175

Internet2 176

The Business Value of Telecommunications Networks 176

- The Internet Revolution 177
 - Internet Applications* 178
- Business Use of the Internet 179
- The Business Value of the Internet 180
- The Role of Intranets 181
 - The Business Value of Intranets* 181
- The Role of Extranets 183
 - Business Value of Extranets* 183
- Section II: Telecommunications Network Alternatives 185**
- Telecommunications Alternatives 185
- A Telecommunications Network Model 185
- Real World Case 2: The State of Maryland: Serving Its Citizens Without Using Wires 186**
- Types of Telecommunications Networks 188
 - Wide Area Networks* 188
 - Local Area Networks* 188
 - Virtual Private Networks* 189
 - Client/Server Networks* 190
 - Network Computing* 191
 - Peer-to-Peer Networks* 192
- Telecommunications Media 193
 - Twisted-Pair Wire* 193
 - Coaxial Cable* 193
 - Fiber Optics* 194
- Wireless Technologies 194
 - Terrestrial Microwave* 194
 - Communications Satellites* 195
 - Cellular and PCS Systems* 195
 - Wireless LANs* 196
 - The Wireless Web* 196
- Telecommunications Processors 197
 - Modems* 197
 - Multiplexers* 198
 - Internetwork Processors* 199
- Telecommunications Software 199
 - Network Management* 200
- Network Topologies 200
- Network Architectures and Protocols 201
 - The OSI Model* 202
 - The Internet's TCP/IP* 203
- Bandwidth Alternatives 204
- Switching Alternatives 205
- Real World Case 3: UPS, Wells' Dairy, Novell, and GM: The Business Value and Challenges of Wi-Fi Networks 210**
- Real World Case 4: Boeing Company and Others: Converging Voice and Data Using Voice Over IP 211**

Module III Business Applications

Chapter 7

Electronic Business Systems 213

Section I: Enterprise Business Systems 214

- Introduction 214
- Cross-Functional Enterprise Applications 214
- Real World Case 1: Hilton Hotels Corporation: Data-Driven Hospitality 215**
 - Enterprise Application Architecture* 216
- Enterprise Application Integration 218
- Transaction Processing Systems 220
 - The Transaction Processing Cycle* 220
- Enterprise Collaboration Systems 222
 - Tools for Enterprise Collaboration* 223

Section II: Functional Business Systems 226

- Introduction 226
 - IT in Business* 226
- Real World Case 2: GE Power Systems and Corporate Express: The Business Case for Enterprise Application Integration 227**

- Marketing Systems 228
 - Interactive Marketing* 229
 - Targeted Marketing* 229
 - Sales Force Automation* 230
- Manufacturing Systems 231
 - Computer-Integrated Manufacturing* 232
- Human Resource Systems 234
 - HRM and the Internet* 235
 - HRM and Corporate Intranets* 235
- Accounting Systems 236
 - Online Accounting Systems* 236
- Financial Management Systems 238
- Real World Case 3: Brunswick Corporation: Improving Supply-Chain Results 245**
- Real World Case 4: Lowe and HP: The Business Case for Swarming Collaboration 246**

Chapter 8**Enterprise Business Systems 247****Section I: Customer Relationship Management:
The Business Focus 248**

Introduction 248

Real World Case 1: Mitsubishi Motor Sales: Implementing Customer Relationship Management Systems 249

What Is CRM? 250

*Contact and Account Management 250**Sales 250**Marketing and Fulfillment 251**Customer Service and Support 251**Retention and Loyalty Programs 251*

The Three Phases of CRM 253

Benefits and Challenges of CRM 254

CRM Failures 255

Trends in CRM 255

**Section II: Enterprise Resource Planning:
The Business Backbone 258**

Introduction 258

What Is ERP? 258

Real World Case 2: Agilent Technologies and Russ Berrie: Challenges of Implementing ERP Systems 259

Benefits and Challenges of ERP 262

*The Costs of ERP 262**Causes of ERP Failures 263*

Trends in ERP 264

**Section III: Supply Chain Management: The
Business Network 267**

Introduction 267

What Is SCM? 267

Real World Case 3: TaylorMade Golf and HON Industries: The Business Value of Supply Chain Management 268*Electronic Data Interchange 270*

The Role of SCM 272

Benefits and Challenges of SCM 274

Trends in SCM 275

Real World Case 4: H-P, Eastman Chemical, and Others: The Benefits and Challenges of SCM Systems 281**Real World Case 5:** Wal-Mart and Mattel: Supply Chain Management Best Practices 282**Chapter 9****Electronic Commerce
Systems 283****Section I: Electronic Commerce
Fundamentals 284**

Introduction to e-Commerce 284

Real World Case 1: eBay Inc.: Managing Success in a Dynamic Online Marketplace 285

The Scope of e-Commerce 286

*e-Commerce Technologies 286**Categories of e-Commerce 286*

Essential e-Commerce Processes 288

*Access Control and Security 288**Profiling and Personalizing 289**Search Management 290**Content and Catalog Management 290**Workflow Management 291**Event Notification 293**Collaboration and Training 293*

Electronic Payment Processes 293

*Web Payment Processes 293**Electronic Funds Transfer 294**Secure Electronic Payments 294***Section II: e-Commerce Applications
and Issues 296**

e-Commerce Application Trends 296

*e-Commerce Trends 296***Real World Case 2:** Keihin Aircon NA Inc.: Lean Manufacturing Is a Process Whose Time Has Come 297

Business-to-Consumer e-Commerce 298

e-Commerce Success Factors 299

Web Store Requirements 302

*Developing a Web Store 302**Serving Your Customers 304**Managing a Web Store 304*

Business-to-Business e-Commerce 305

e-Commerce Marketplaces 306

Clicks and Bricks in e-Commerce 308

*e-Commerce Integration 309**Other Clicks and Bricks Strategies 309**e-Commerce Channel Choices 310***Real World Case 3:** E-Trade and Wells Fargo: The Business Case for Clicks and Bricks e-Commerce 317**Real World Case 4:** Microsoft and Dell: The WWW Is Anything but Business as Usual 318**Chapter 10****Decision Support Systems 319****Section I: Decision Support in Business 320**

Introduction 320

*Information, Decisions, and Management 320***Real World Case 1:** Allstate Insurance, Aviva Canada, and Others: Centralized Business Intelligence at Work 321

<i>Information Quality</i>	322
<i>Decision Structure</i>	323
Decision Support Trends	324
Decision Support Systems	326
<i>DSS Components</i>	326
Management Information Systems	328
<i>Management Reporting Alternatives</i>	328
Online Analytical Processing	329
<i>Geographic Information and Data</i>	
<i>Visualization Systems</i>	331
Using Decision Support Systems	333
<i>What-If Analysis</i>	333
<i>Sensitivity Analysis</i>	334
<i>Goal-Seeking Analysis</i>	335
<i>Optimization Analysis</i>	335
<i>Data Mining for Decision Support</i>	336
Executive Information Systems	338
<i>Features of an EIS</i>	338
Enterprise Portals and Decision Support	339
<i>Enterprise Information Portals</i>	339
Knowledge Management Systems	341
Section II: Artificial Intelligence Technologies in Business	343

Business and AI	343
An Overview of Artificial Intelligence	343
Real World Case 2: Wal-Mart, BankFinancial, and HP: The Business Value of AI	344
<i>The Domains of Artificial Intelligence</i>	345
Expert Systems	348
<i>Components of an Expert System</i>	348
<i>Expert System Applications</i>	349
<i>Benefits of Expert Systems</i>	350
<i>Limitations of Expert Systems</i>	350
Developing Expert Systems	352
<i>Knowledge Engineering</i>	353
Neural Networks	354
Fuzzy Logic Systems	355
<i>Fuzzy Logic in Business</i>	356
Genetic Algorithms	356
Virtual Reality	356
<i>VR Applications</i>	358
Intelligent Agents	359
Real World Case 3: Procter & Gamble and Others: Using Agent-Based Modeling for Supply Chain Management	366
Real World Case 4: Boehringer Ingelheim: Using Web-Based Tools for Financial Analysis and Reporting	367

Module IV Development Processes

Chapter 11

Developing Business/IT Strategies 369

Section I: Planning Fundamentals 370

Introduction 370

Real World Case 1: The Rowe Cos. and Merrill Lynch: The ROI Process in Business/IT Planning 371

Organizational Planning 372

The Scenario Approach 373

Planning for Competitive Advantage 374

SWOT Analysis 374

Business Models and Planning 375

Business/IT Planning 378

Information Technology Architecture 378

Identifying Business/IT Strategies 379

Business Application Planning 381

Business/IT Architecture Planning 382

Section II: Implementation Challenges 384

Implementation 384

Implementing Information Technology 384

Real World Case 2: Johnson Controls and Bank of New York: The Challenges of Global Application Integration 385

End User Resistance and Involvement 387

Change Management 389

A Change Management Process 391

Real World Case 3: Corning Inc.: Business/IT Planning Strategies in Challenging Times 397

Real World Case 4: Cincinnati Bell: Change Management Challenges of Business Convergence 398

Chapter 12

Developing Business/IT Solutions 399

Section I: Developing Business Systems 400

IS Development 400

The Systems Approach 400

Real World Case 1: Blue Cross, AT&T Wireless, and CitiStreet: Development Challenges of Self-Service Web Systems 401

Systems Thinking 402

The Systems Development Cycle	402
Prototyping	403
<i>The Prototyping Process</i>	403
Starting the Systems Development Process	406
<i>Feasibility Studies</i>	406
Systems Analysis	407
<i>Organizational Analysis</i>	408
<i>Analysis of the Present System</i>	408
<i>Functional Requirements Analysis</i>	409
Systems Design	409
<i>User Interface Design</i>	410
<i>System Specifications</i>	411
End User Development	411
<i>Focus on IS Activities</i>	412
<i>Doing End User Development</i>	413
Section II: Implementing Business Systems	416
Implementation	416
Implementing New Systems	416

Real World Case 2: InterContinental Hotels, Del Taco, and Cardinal Health: Implementation Strategies	417
Evaluating Hardware, Software, and Services	419
<i>Hardware Evaluation Factors</i>	420
<i>Software Evaluation Factors</i>	420
<i>Evaluating IS Services</i>	421
Other Implementation Activities	421
<i>Testing</i>	421
<i>Data Conversion</i>	422
<i>Documentation</i>	422
<i>Training</i>	423
<i>Conversion Methods</i>	423
<i>IS Maintenance</i>	424
Real World Case 3: Du Pont and Southwire: Implementing Successful Enterprise Information Portals	430
Real World Case 4: Wyndham International and Amazon.com: Cost-Effective IT	431

Module V Management Challenges

Chapter 13

Security and Ethical Challenges 433

Section I: Security, Ethical, and Societal Challenges of IT 434

Introduction	434
<i>Business/IT Security, Ethics, and Society</i>	434
Real World Case 1: F-Secure, Microsoft, GM, and Verizon: The Business Challenge of Computer Viruses	435
Ethical Responsibility of Business Professionals	436
<i>Business Ethics</i>	436
<i>Technology Ethics</i>	437
<i>Ethical Guidelines</i>	438
Computer Crime	439
<i>Hacking</i>	441
<i>Cyber Theft</i>	442
<i>Unauthorized Use at Work</i>	443
<i>Software Piracy</i>	445
<i>Piracy of Intellectual Property</i>	445
<i>Computer Viruses and Worms</i>	446
Privacy Issues	447
<i>Privacy on the Internet</i>	448
<i>Computer Matching</i>	450
<i>Privacy Laws</i>	450
<i>Computer Libel and Censorship</i>	450

Other Challenges	450
<i>Employment Challenges</i>	450
<i>Computer Monitoring</i>	451
<i>Challenges in Working Conditions</i>	452
<i>Challenges to Individuality</i>	452
Health Issues	453
<i>Ergonomics</i>	453
Societal Solutions	454
Section II: Security Management of Information Technology 455	455
Introduction	455
Real World Case 2: Geisinger Health Systems and Du Pont: Security Management	456
Tools of Security Management	457
Internetworked Security Defenses	458
<i>Encryption</i>	458
<i>Firewalls</i>	458
<i>Denial of Service Defenses</i>	461
<i>e-Mail Monitoring</i>	462
<i>Virus Defenses</i>	462
Other Security Measures	464
<i>Security Codes</i>	464
<i>Backup Files</i>	464
<i>Security Monitors</i>	464
<i>Biometric Security</i>	465
<i>Computer Failure Controls</i>	465

Fault Tolerant Systems 465

Disaster Recovery 467

System Controls and Audits 467

Information System Controls 467

Auditing IT Security 468

Real World Case 3: The Federal Reserve Bank: Creating a Sound Software Patch Management Strategy 473

Real World Case 4: Online Resources, Lehman Brothers, and Others: Managing Network Security Systems 474

Chapter 14

Enterprise and Global Management of Information Technology 475

Section I: Managing Information Technology 476

Business and IT 476

Real World Case 1: Chicago Board of Trade: From Failure to Success in Managing Information Technology 477

Managing Information Technology 478

Business/IT Planning 479

Information Technology Architecture 480

Managing the IS Function 481

Organizing IT 481

Managing Application Development 483

Managing IS Operations 483

Human Resource Management of IT 484

The CIO and Other IT Executives 484

Technology Management 485

Managing User Services 486

Failures in IT Management 486

Management Involvement and Governance 487

Section II: Managing Global IT 489

The International Dimension 489

Global IT Management 489

Real World Case 2: Global Exchange Services and Allstate: Challenges and Solutions in Offshore Systems Development 490

Cultural, Political, and Goeconomic Challenges 491

Global Business/IT Strategies 493

Global Business/IT Applications 494

Global IT Platforms 495

The Internet as a Global IT Platform 497

Global Data Access Issues 498

Internet Access Issues 499

Global Systems Development 500

Systems Development Strategies 500

Real World Case 3: Bio-ERA and Burlington Northern Santa Fe: The Business Case for Global Collaborative Development 507

Real World Case 4: Avon Products and Guardian Life Insurance: Successful Management of IT Projects 508

Appendix: Real World Case Studies 509

Review Quiz Answers 538

Selected References 541

Glossary for Business Professionals 551

Name Index 570

Company Index 574

Subject Index 578