

#### Preface xvii

CONTRIBUTION OF THIS BOOK xviii USE OF THIS BOOK BY PRACTICING MANAGERS AND CONSULTANTS xviii USE OF THIS BOOK AS A TEXT xix THE INSTRUCTOR'S GUIDE xx FORMAT AND CONTENTS xxi ACKNOWLEDGMENTS xxi

#### The Growing Importance Of Information Systems Management 1

INTRODUCTION 1 A LITTLE HISTORY 1 The Classic Infrastructure, 3 Pressures for Integration, 4 THE TECHNOLOGY ENVIRONMENT 6 Hardware Trends, 6 Software Trends, 7 Data Trends, 8 Communication Trends, 8 THE BUSINESS ENVIRONMENT 9 The Changing Marketplace, 9 The Changing Work Environment, 10 THE MISSION OF INFORMATION SYSTEMS 12 A SIMPLE MODEL 13

A BETTER MODEL 15 The Products, 15 The Customers, 16 Bridging the Gap, 17 Information Systems Management, 20 ORGANIZATION OF THIS BOOK 21 CASE EXAMPLE: MEAD CORPORATION 22 QUESTIONS AND EXERCISES 29 REFERENCES 30

## PART I LEADERSHIP ISSUES

## **2** Information Systems Management's New Leadership Role 32

INTRODUCTION 32 SUMMARY OF NEW RESPONSIBILITIES 33 Learn About the Business, 33 Establish Systems Department Credibility, 34 Increase Technological Maturity, 34 Create a Vision and Sell It, 35 Implement an Information System Architecture, 36 SEVEN WAYS TO LEARN THE BUSINESS Have Project Teams Study the Marketplace, 37 Concentrate on Lines of Business, 38 Sponsor Weekly Briefings, 39 Attend Industry Meetings With Line Executives, 39 Read Industry Publications, 39 Hold Informal Listening Sessions, 40 Become a "Partner" with a Line Manager, 40 CREATING A VISION AND SELLING IT 42 Effective Visions, 43 Why Develop a Vision?, 45 Who Should Create the Vision?, 45 Creating a Vision, 47 Six Lessons About Selling, 50 Case Example: The Boeing Company, 52 QUESTIONS AND EXERCISES 55 REFERENCES 56

### **3** The New Strategic Role of Information Systems 58

INTRODUCTION 58 WHAT ARE STRATEGIC SYSTEMS? 59 COMPETITIVE SYSTEMS 60 Case Example: McKesson Corporation, 60 Three Approaches to Use, 62 Two Processes to Follow, 68 Case Example: GTE, 69 COOPERATIVE SYSTEMS 71 Electronic Data Interchange, 74 Case Example: The U.S. Chemical Industry, 75 STRATEGIC SYSTEMS CAN CHANGE HOW ORGANIZATIONS WORK 78 Changing How Decisions are Made, 79 Case Example: U.S. Navy, 80 Offering More Communications Options, 82 Providing Tools for Coordination, 84 SUMMARY 86 QUESTIONS AND EXERCISES 86 REFERENCES 87

#### 4 Information Systems Planning 89

INTRODUCTION 89 A Typical Planning Cycle, 90 Case Example: The Boeing Company, 92 Linking Business and Systems Planning, 93 VARIOUS APPROACHES TO SYSTEMS PLANNING 95 Stages of Growth, 95 Critical Success Factors, 96 Case Example: Southwestern Ohio Steel, 98 Business Systems Planning, 102 Investment Strategy Analysis, 104 The Scenario Approach to Planning, 107 Case Example: Denny's Inc., 112 The Architecture Building Approach, 113 Case Example: Spadab, 115 SUMMARY 119 **QUESTIONS AND EXERCISES** 119 REFERENCES 120

## PART II MANAGING THE ESSENTIAL TECHNOLOGIES



Distributed Systems: The Overall Architecture 123

INTRODUCTION 123

What Is a Distributed System?, 124
Four Attributes, 126
Why Distributed Systems?, 129
DISTRIBUTED SYSTEM ARCHITECTURES 131
A Six-Level Architecture, 131
A Three-Level Architecture: SUMURU, 133
Case Example: Texas Instruments, 136
GUIDELINES FOR DISTRIBUTING APPLICATIONS 141
Who Should Make the Key Management Decisions?, 142
Are the Operations Interdependent?, 142
Are the Businesses Really Homogeneous?, 143
Does the Corporate Culture Support Decentralization?, 143
What Are the Characteristics of the Applications?, 143
DISTRIBUTING DATA 146
Approaches for Distributing Data, 147
Maintaining Data Quality, 149
Case Example: Digital Equipment Corporation, 150
CONCLUSION 151
QUESTIONS AND EXERCISES 152
REFERENCES 153

## 6

#### Building the Telecommunications Highway System 154

INTRODUCTION 154The Current Situation, 155 CREATING AN OVERALL ARCHITECTURE 158Factors to Consider, 158 Case Example: The Pillsbury Company, 160 Planning for the 1990s, 162 EMPHASIZING CONNECTIVITY 163Technical Connectivity, 164 Procedural Connectivity, 165 Difficulties in Getting Increased Connectivity, 166 Solutions to the Difficulties, 168 Case Example: "Clark Fibers, Inc.," 170 USING INTERNATIONAL STANDARDS 171 The OSI Reference Model, 172 The IBM Standard, 174 National Standards, 174 Migrating to OSI, 174 Case Example: Northrop Research and Technology Center, 176 NEW DEVELOPMENTS IN TELECOMMUNICATIONS 179 T-Carriers. 179 Fiber Optics, 180 Satellite Transmission, 181 ISDN, 182

CONCLUSION 183 QUESTIONS AND EXERCISES 184 REFERENCES 185

#### 7 Managing Information Resources 187

INTRODUCTION 187 GETTING CORPORATE DATA INTO SHAPE 188 Inconsistent Data Definitions, 188 The Database Approach, 189 Case Example: TRW Defense Systems Group, 192 THE ROLE OF DATA ADMINISTRATION 194 Four Main Functions, 195 The Importance of Data Dictionaries, 196 Case Example: An Information Resource Dictionary, 198 TOWARD MANAGING INFORMATION 199 Four Types of Information, 199 Internal Record-Based Information, 200 Internal Document-Based Information, 201 External Record-Based Information, 201 Case Example: PIMS, 201 External Document-Based Information, 204 Emphasis on Managing All Data, 205 MULTIMEDIA SYSTEMS 207The Various Kinds of Data, 207 Case Example: Home Savings of America, 209 The Driving Forces, 212 Guidelines for Planning Multimedia Systems, 214 215SUMMARY QUESTIONS AND EXERCISES 216REFERENCES 217

#### Managing Information Systems Operations 220

INTRODUCTION 220 WHAT ARE OPERATIONS? 221 RUNNING AN EFFICIENT DATA CENTER 223Case Example: Mutual of Omaha, 225 MOVING TOWARD UNATTENDED COMPUTER CENTERS 226How Close Are Fully Unattended Operations?, 228 A Product Wish List, 229 Case Example: US West, 230 Technical Problems in Operatorless Networks, 233 PHYSICAL SECURITY IN DISTRIBUTED SYSTEMS 235Vulnerabilities in a Distributed Environment, 235

Threats in a Distributed Environment, 236 Possible Countermeasures, 238 DISASTER RECOVERY IN DISTRIBUTED SYSTEMS 239 Using Internal Resources, 240 Using External Resources, 243 Case Example: Household International, 245 CONCLUSION 248 QUESTIONS AND EXERCISES 249 REFERENCES 250

## PART III MANAGING SYSTEM DEVELOPMENT

### 9 The Evolving System Development Spectrum 252

INTRODUCTION 252Thirty Years of Progress, 252 THE 1950s THROUGH 1970s 253Goals of Traditional and Structured Development, 253 Emphasis on the Early Phases, 256 THE EARLY 1980s 256Fourth Generation Languages, 257 Software Prototyping, 262 Case Example: Santa Fe Railroad, 263 A Programming Controversy, 266 THE LATE 1980s 267Computer-Aided Software Engineering (CASE), 267 Case Example: Irving Trust, 269 A Desirable Development Environment, 272 AI Development Tools Represent the Future, 276 Case Example: Southern California Edison, 276 **Object Oriented Programming**, 280 SUMMARY 281QUESTIONS AND EXERCISES 282REFERENCES 283

### **10** Management Issues in System Development 285

INTRODUCTION 285
HOW CAN PROGRAMMER PRODUCTIVITY BE MEASURED? 286
Function Point Analysis, 286
HOW CAN SYSTEM BENEFITS BE MEASURED? 288
Convert Benefits to Monetary Terms, 290

Devise "Proxy Variables," 290 Develop a Work Profile Matrix, 290 Measure What Is Important to Management, 292 Case Example: GTE, 293 HOW CAN HIGHER QUALITY SYSTEMS BE DEVELOPED? 297Use a Managed Data Approach, 298 Keep Up With Current Technology, 298 Concentrate on the "Right" Work, 299 Evaluate Maintainability, 300 Develop a Maintenance Strategy, 301 HOW CAN OLD SYSTEMS BE IMPROVED? 304 Restructuring Old Systems, 304 Refurbishing Old Systems, 305 Rejuvenating Old Systems, 309 Case Example: ITT Diversified Credit Corporation, 309 Rewriting Old Systems, 312 Replacing Old Systems with a Purchased Package, 312 Case Example: General Mills, Inc., 313 SUMMARY 315QUESTIONS AND EXERCISES 316 REFERENCES 317

## PART IV MANAGING END USER COMPUTING

### **1** Managing End User Computing 319

INTRODUCTION 319 THE HUGE GROWTH OF END USER COMPUTING 320 Why This Growth?, 321 Thirteen Categories of Uses, 322 The Need for Logical Offices, 324 THE EVOLUTION OF INFORMATION CENTERS 325The "Original" Information Center: IBM Canada, Ltd., 326 The Expanding Role of Information Centers, 328 THREE VIEWS ON EUC STRATEGY 331 Understand the Stages of Growth, 331 Aim for a "Managed Free Economy," 332 Concentrate on Application Development, 333 Case Example: Texas Instruments, 334 A POSSIBLE EUC STRATEGY 336 Plan Service Offerings, 337 Encourage Self-Sufficiency, 337 Maintain a Small Staff, 338 Aim for Real Financial Benefits, 338

Contents

Become an Information Clearinghouse, 339 THE FUTURE OF END USER COMPUTING 340 Case Example: Baxter International, 341 Creating a Business Systems Group, 343 Some Dilemmas, 344 Case Example: Owens-Corning Fiberglas, 347 SUMMARY 349 QUESTIONS AND EXERCISES 350 REFERENCES 351

## **12** Managing End User Computing Technology 353

INTRODUCTION 353

THE ALLURE OF WORKSTATIONS 354 The Psychology of Personal Computers, 354 Personal Computers, Terminals, and Workstations, 355 The Appeal of Powerful Workstations, 357 Case Example: Physician Services, 361

MANAGEMENT ISSUES 363 Hardware Issues, 363 Software Issues, 366 Data Issues, 368 Communication Issues, 369 Case Example: American Medical International, 372

THE FUTURE 376 Workstations Will Dominate, 376 Traditional Mainframes, 376 File Servers, 377 Engelbart's Ideas, 378 SUMMARY 380 QUESTIONS AND EXERCISES 380 REFERENCES 382

## PART V SUPPORT SYSTEMS

## 13

#### Decision Support Systems and Executive Information Systems 383

INTRODUCTION 383 THE CURRENT STATUS OF DSS 384 Continued Use of Institutional DSS, 385 The Growing Use of "Quick Hit" DSS, 387 Expanding Role of Computer Graphics, 389 Case Example: Marine Terminals Corporation, 392

Explosive Growth of Spreadsheets, 393 TRENDS 394 Short-Term Trends, 394 More "User Friendly." 395 EXECUTIVE INFORMATION SYSTEMS 397 Will Executives Use Computers?, 397 An EIS Failure, 398 EIS Successes, 400 ACHIEVING SUCCESSFUL EIS 402 Why Install an EIS?, 403 What Should it Do?, 403 How Should it Operate, 406 CSFs for EIS, 406 Looking Ahead, 407 Case Example: Lockhead Gerogia, 408 SUMMARY 411 QUESTIONS AND EXERCISES 412 REFERENCES 413

### **14** Group Support 415

INTRODUCTION 415THE IMPORTANCE OF GROUPS 416 Characteristics of Groups and Their Needs, 418 Types of Groups, 419 Case Example: Novell, Inc., 421 TYPES OF GROUP SUPPORT SYSTEMS 424 Enhanced Electronic Mail, 424 Coordinating Group Activity, 426 Improving Meetings, 427 Other Possible Services, 429 COMPUTER CONFERENCING 429 Case Example: Digital Equipment Corporation, 431 Types of Computer Conferencing, 432 A Range of Uses, 433 Summary, 435 GROUP DECISION SUPPORT SYSTEMS 436 Group Decision-Making, 436 Environments and Processes, 437 Desirable Functions, 438 Assumption Surfacing, 438 Case Example: Colab at Xerox PARC, 440 THE FUTURE 443 QUESTIONS AND EXERCISES 445 **REFERENCES 445** 

## **15** The Growing Importance of Expert Systems 447

INTRODUCTION 447

WHAT IS AN EXPERT SYSTEM? 447 Expert System Components, 448 Knowledge Representation, 449 Characteristics of Expert Systems, 450 Variations in Expert Systems, 451 Types of Expert Systems, 453

TWO TRENDS IN EXPERT SYSTEMS 456 Expert Systems Have Strategic Value, 456 Case Example: GM Delco Products, 456 Expert Systems Augment Conventional Systems, 457 Case Example: Northern Telecom, 459 A STRATEGY FOR GETTING STARTED 463 Take a Balanced Approach, 463 Provide Migration Paths, 466 Draw on End User Computing Lessons, 467 Manage Technology Transfer, 469 Case Example: E.I. du Pont de Nemours, 471 CONCLUSION 474 QUESTIONS AND EXERCISES 474 REFERENCES 475

## **16** The Maturation of Office Systems 477

INTRODUCTION 477 LESSONS LEARNED THUS FAR 478 A Piecemeal Approach Will Not Work, 478 Solutions Have Been "Too Grand" or "Too Limited," 479 Technology Has Been Oversold, 480 It Cannot Be Departmentalized, 480 Case Example: Security Pacific National Bank, 480 THE LATEST ADDITION: DESKTOP PUBLISHING 482 Components of a Desktop Publishing System, 483 Progress in Optical Scanners, 484 Management Issues in Corporate Electronic Publishing, 485 SHORTCOMINGS OF TODAY'S BUILDINGS 487 Not Enough Electricity, 487 Centralized HVAC, 488 Inflexible Space Design, 488 Cannot Accommodate Continual Relocation of Offices, 489 Limited Cable Ducting, 489 Rigid Construction Standards, 489

THE CAUTIOUS APPROACH TO INTRODUCING OFFICE SYSTEMS 490 Case Example: Lincoln National Life Insurance Company, 490 CONCLUSION 503 QUESTIONS AND EXERCISES 503 REFERENCES 504

## PART VI INFORMATION SYSTEMS AND PEOPLE

#### **17** Helping People Become Comfortable With Information Technology 506

INTRODUCTION 506 Increasing Technological Maturity, 507 EDUCATING EXECUTIVES ON INFORMATION TECHNOLOGY 507Why Educate Executives?, 508 Types of Executive Education Programs, 509 Case Example: E.I. du Pont de Nemours, 512 Changes in Management Education, 515 HELPING LINE MANAGERS MANAGE INFORMATION 517 TECHNOLOGY Managing Technological Change, 518 Case Example: First National Bank of Atlanta, 519 "Championing" Information Technology Projects, 520 Case Example: Aetna Life and Casualty, 521 TRAINING END USERS ON THE TECHNOLOGY 524Computer-Based Training, 525 End User Training Needs, 525 Case Example: 3M Company, 527 TRAINING FOR THE FUTURE SYSTEMS ORGANIZATION 531 The Broadening Systems Staff, 531 Possible Future Systems Professionals, 533 Case Example: Aetna Life and Casualty, 534 CONCLUSION 537QUESTIONS AND EXERCISES 537 REFERENCES 538

# **18** Managing the Human Side of Systems 540

INTRODUCTION 540 A CONCERN FOR EMPLOYEE WELL-BEING 541 An Example: The Japanese Management Style, 541 INVOLVING EMPLOYEES IN JOB REDESIGN 543 Two Interesting Studies, 544 The Job Diagnostic Survey, 546 The Socio-Technical System Approach, 550 Case Example: Five Secretaries, 553 Self-Managed Work Groups, 554 CREATING THE NEW WORK ENVIRONMENT 556 Case Example: Monsanto Corporation, 558 SUMMARY 563 QUESTIONS AND EXERCISES 564 REFERENCES 565

Index 566