Contents

Preface vii

CHAPTER 1 INFORMATION SYSTEMS: PAST, PRESENT, AND EMERGING 1

Introduction 1
A Taxonomy of Management Information Systems 3

CHAPTER 2 INTELLIGENCE DENSITY: A METRIC FOR KNOWLEDGE WORK 7

Intelligence Density: A Measure of Organizational Intelligence 9
Making the Right Tradeoffs 12

CHAPTER 3 THE VOCABULARY OF INTELLIGENCE DENSITY 15

Introduction 15
Dimensions of Problems and Solutions 17
The “Stretch Plot”: A Vocabulary for Requirements and Analysis 20
Using the Stretch Plot 22
Summary 25
Appendix to Chapter 3: Dimensions of Problems and Solutions 26

CHAPTER 4 METHOD ONE: DATA-DRIVEN DECISION SUPPORT 30

Introduction 30
The ABCs of Data-Driven Decision Support 33
Intelligence Density Issues 47
Suggested Reading 50

CHAPTER 5 METHOD TWO: EVOLVING SOLUTIONS: GENETIC ALGORITHMS 52

Introduction 53
Optimization 53
The ABCs of Genetic Algorithms 60
Intelligence Density Issues 70
Suggested Reading 76
CHAPTER 6  METHOD THREE: SIMULATING THE BRAIN TO SOLVE PROBLEMS: NEURAL NETWORKS  77

Introduction  77
The ABCs of Neural Networks  81
Intelligence Density Issues  94
Suggested Reading  101

CHAPTER 7  METHOD FOUR: PUTTING EXPERT REASONING IN A BOX: RULE-BASED SYSTEMS  104

Introduction  104
The ABCs of Rule-Based Systems  106
Intelligence Density Issues  117
Suggested Reading  123

CHAPTER 8  METHOD FIVE: DEALING WITH LINGUISTIC AMBIGUITY: FUZZY LOGIC  126

Introduction  126
The ABCs of Fuzzy Logic  128
Intelligence Density Issues  142
Suggested Reading  148

CHAPTER 9  METHOD SIX: SOLVING PROBLEMS BY ANALOGY: CASE-BASED REASONING  149

Introduction  150
The ABCs of Case-Based Reasoning  151
Intelligence Density Issues  161
Suggested Reading  166

CHAPTER 10  METHOD SEVEN: DERIVING RULES FROM DATA: MACHINE LEARNING  167

Introduction  168
The ABCs of Machine Learning  171
Intelligence Density Issues  180
Suggested Reading  186

APPENDIX A  SAVING TIME AND MONEY WITH OBJECTS  191

Introduction  191
A Case  197

APPENDIX B  AI SOFTWARE PRODUCTS  199

APPENDIX C  GENERAL READING  201
APPENDIX D CASE STUDIES 203

1. Quality Control and Monitoring of Suppliers, *Kaufhof AG* 203
   The Organization 203
   The Problem 204
   The Solution 206
   Suggested Reading 210

2. Workflow Monitoring and Improvement for Rapid Customer Service, *U S WEST* 211
   The Organization 211
   The Problem 211
   The Solution 213
   Suggested Reading 219

3. Help Desk Task Scheduling, *Moody's Investors Service* 219
   The Organization 219
   The Problem 220
   The Solution 222
   Suggested Reading 227

   The Organization 228
   The Problem 228
   The Solution 231
   Suggested Reading 236

   The Organization 236
   The Problem 237
   The Solution 239
   Suggested Reading 243

6. Pattern Directed Data Mining of Point-of-Sale Data, *A. C. Neilson* 244
   The Organization 244
   The Problem 244
   The Solution 247
   Suggested Reading 251

7. Improving Personnel Dispatching, *NYNEX, Inc.* 251
   Preface 251
   The Organization 251
   The Problem 252
   The Solution 253
   Suggested Reading 258

INDEX 259