

# Contents

## **PREFACE, xiii**

## **Chapter 1 INTRODUCING EXPERT SYSTEMS INTO THE FIRM, 1**

Jay Liebowitz, Dept. of Management Science, George Washington University,  
Washington, D.C. 20052

Introduction, 1  
Who Is Using Expert Systems for Their Business?, 1  
Why Are Companies Building Expert Systems?, 2  
How to Introduce Expert Systems into the Firm, 3  
What Is Needed at the Microlevel, 8  
Conclusions, 12  
References, 12

## **Chapter 2 AN EXPERT SYSTEM IN TAXATION: THE TAXPAYER SERVICE ASSISTANT, 13**

Thomas J. Beckman, Artificial Intelligence Lab, Internal Revenue Service,  
1201 E Street, Room 604, Washington, D.C. 20224

Introduction, 13  
Task Background, 14  
Conceptual Design Issues, 16  
Defining the Task, 22  
Aspects of Constructing the TSA, 27  
System Implementation, 38  
Two Approaches: Expert System versus Text Retrieval, 40  
Tentative Conclusions, 44  
Future Directions, 48  
References, 49

**Chapter 3 MODELING AND REASONING: INTEGRATING DECISION SUPPORT WITH EXPERT SYSTEMS, 51**

David King, AI Applications, Execucom Systems Corporation, 9442 Capital of Texas Highway North, Arboretum Plaza One, Austin, TX 78759

Introduction, 51  
 Expert Systems and Problem Solving, 55  
 Similarity of Expert Systems and Decision Support Systems, 59  
 Using Models to Build Expert Systems, 60  
 Explaining Modeling Results, 63  
 Why Is?, 64  
 Changes Across Columns, 65  
 Consolidated Results, 67  
 Data Base Results, 68  
 Explanations and Remedies, 71  
 Using an ES to Front-end a DDS  
 Concluding Remarks, 74  
 References, 76

**Chapter 4 EXPERT SYSTEMS AND DECISION SUPPORT SYSTEMS IN AUDITING, 77**

Daniel E. O'Leary and Paul Watkins, School of Accounting, University of Southern California, Los Angeles, CA 90089-1421

Introduction, 77  
 The Audit Environment, 78  
 EDP Auditing, 81  
 Academic-Based External-internal Auditing Systems, 83  
 External Auditing: Commercial-based Systems, 86  
 Governmental Auditing, 88  
 Internal Auditing, 90  
 Validating and Verifying Expert Systems, 93  
 Dangers in Expert System Development, 93  
 Sources of Expert System Contributions, 94  
 Conclusions, 95  
 References, 95

**Chapter 5 ANSWERS: AN EXPERT SYSTEM FOR FINANCIAL ANALYSIS, 101**

Edward Blocher, Department of Accounting, Graduate School of Business, University of North Carolina, Carroll Hall CB #3490, Chapel Hill, NC 27599-3490

Introduction, 101  
Financial Analysis Applications, 102  
Types of Expert Systems for Financial Analysis, 104  
An Illustration: The ANSWERS System, 108  
Development of the ANSWERS System, 117  
A Look to the Future, 123  
Summary, 124  
References, 125

## **Chapter 6 THE FINANCIAL STATEMENT ANALYZER, 127**

Chun Ka Mui, Carolyn F. Hassel and Lisa C. Curtis, Arthur Andersen & Co., 69 West Washington Street, Chicago, IL 60602

Introduction, 127  
ELOISE, 127  
FSA, 128  
Financial Decision Making, 128  
Standardized Processing for Familiarization Purposes, 130  
The Financial Statement Analyzer, 131  
Knowledge Representation, 132  
Technical Architecture, 135  
System Results, 137  
Integration with EDGAR, 138  
Enhancement, 138  
Future Uses of FSA Techniques, 140  
References, 141

## **Chapter 7 THE DEVELOPMENT OF AN EXPERT SYSTEM THAT ESTIMATES CASUALTY INSURANCE LOSS RESERVES, 143**

Betty C. Horn, Department of Accounting, George Mason University, Fairfax, VA 22030

Introduction, 143  
Estimating Loss Reserves, 144  
Knowledge Engineering, 147  
Conclusions, 157  
Appendix A: RESERVE's Output Reports, 159  
Appendix B: Factors and Procedures of the Committee on Loss Reserves, 161  
Appendix C: Input Checklists for Reserve, 162

Acknowledgment, 166  
References, 166

## **Chapter 8 EXPERT SYSTEMS IN HEALTH INSURANCE: CASE STUDIES AT BLUE CROSS OF WESTERN PENNSYLVANIA, 167**

David J. Gorney, Rawson Technologies, Inc., 727 Charles Street, Wellsburg, WV 26070

Introduction, 167  
In the Beginning, 168  
Finding Some Help, 168  
Management Support, 170  
Blue Cross—University of Pittsburgh Partnership, 173  
Knowledge Acquisition, 174  
NERSYS, 176  
NERSYS Design, 176  
Technology Selection, 178  
Plantracker Hardware—Software Platform, 178  
Why Not a Mainframe?, 179  
NERSYS Hardware—Software Platform, 179  
Future Plans, 180

## **Chapter 9 EXPERT SYSTEMS IN SALES AND MARKETING, 181**

Louis L. Odette, Applied Expert Systems, Inc., Five Cambridge Center, Cambridge, MA 02142 and L. J. Berkman, Advantage Systems, Inc., 950 Winter Street, Suite 2100, Waltham, MA 02154

Introduction, 181  
Choosing the Domain, 183  
APEX Sales and Marketing Support Systems, 192  
Instances of the System Output, 193  
How a System Is Built, 202  
Conclusion, 214  
Appendix A: Outline for KE Expert Interview Session Notes, 217  
Appendix B: Outline for Expert System Specification, 218  
Acknowledgments, 220  
References, 220

**Chapter 10 AN EXPERT SYSTEM AT THE U.S. ENERGY INFORMATION ADMINISTRATION FOR QUALITY ASSURANCE AND STATISTICAL SURVEY SUPPORT, 221**

Jerald L. Feinstein, ICF/Phase Linear Systems, Howard Magnas, Energy Information Administration, and David L. Bailey, ICF/Phase Linear Systems Inc., 9300 Lee Highway, Fairfax, VA 22031

Introduction, 221

The Expert System Approach, 223

Approach with Significant Benefits in Resolving Computer Edit Flags, 224

Selecting the Shell, 225

Knowledge Engineering at EIA, 225

Building the EIA Prototype System, 226

Expert Systems Life-Cycle Management and Quality Assurance, 227

User Evaluation, 228

User Training, 224

Summary, 234

**Chapter 11 EXPERT SYSTEMS FOR CRISIS MANAGEMENT: THE HIT PROJECT, 235**

Richard G. Vedder, Department of Business Computer Information Systems, University of North Texas, Denton, TX 76203-3677

Introduction, 235

Some Aspects of Crisis Management, 235

Hostage-Taking Incidents as an ES Domain Problem, 237

Initial Development of HIT, 237

Later Development, 241

Evaluation, 244

References, 248

**Chapter 12 AN EXPERT SYSTEM DEVELOPMENT METHODOLOGY AS APPLIED TO PROJECT MANAGEMENT, 249**

William Casey Mattimore and Robert T. Plant, Department of Computer Information Systems, Intelligent Computer Systems Research Institute, University of Miami, Coral Gables, FL 33124

Introduction, 249

Introduction to Expert System Design Methods, 250

The Initial Specification 253

The Knowledge Elicitation Phase, 254
Choice of Elicitation Technique, 254
The Elicited Representation, 255
The Knowledge Acquisition Phase, 255
Primary Representations, 255
The Transformational Characteristics, 256
Summary of Knowledge Acquisition Phase, 259
Using the Primary Representation, 259
Domain Specifications, 260
Toward the Representation Specification, 260
The Concrete Specification, 263
The Application of KBS to PERT Development, 264
Conclusion, 279
References, 279

**Chapter 13 CESA: AN EXPERT SYSTEM PROTOTYPE FOR AIDING U.S.  
DEPARTMENT OF DEFENSE RESEARCH CONTRACTING, 281**

Jay Liebowitz, Dept. of Management Science, George Washington University,  
Washington, D.C. 20052

Laura C. Davis and Wilson F. Harris, Navy Center for Applied Research in  
Artificial Intelligence, Naval Research Laboratory, Code 5510, Washington,  
D.C. 20375

Introduction, 281
Brief Survey of Some Automated Techniques Used in Contracting, 282
Need for CESA, 283
Development of the CESA Prototype, 284
Summary, 295
Acknowledgments, 296
References, 297

**INDEX, 299**