

Systems Analysis and Design in a Changing World

系统分析 与设计

(英文版)

John W. Satzinger
(美) Robert B. Jackson 著
Stephen D. Burd



机械工业出版社
China Machine Press



COURSE
TECHNOLOGY

计算机科学丛书

系统分析与设计

(英文版)

Systems Analysis and Design
in a Changing World

John W. Satzinger

(美) Robert B. Jackson 著

Stephen D. Burd



机械工业出版社
China Machine Press

John W.Satzinger, Robert B.Jackson and Stephen D.Burd: Systems Analysis and Design in a Changing World.

Original copyright © 2000 by Course Technology. All rights reserved.

First published by Course Technology, a division of Thomson Learning, United States of America.

Reprinted for People's Republic of China by Thomson Asia Pte Ltd and China Machine Press under the authorization of Thomson Learning. No part of this book may be reproduced in any form without the prior written permission of Thomson Learning and China Machine Press.

本书影印版由美国汤姆森公司授权机械工业出版社独家出版。未经出版者书面许可，不得以任何方式复制或抄袭本书内容。

版权所有，侵权必究。

本书版权登记号：图字：01-2000-1858

图书在版编目 (CIP) 数据

系统分析与设计：英文 / (美) 赛金格 (Satzinger, J. W.), (美) 杰克逊 (Jackson, R. B.), (美) 伯德 (Burd, S. D.) 著. -北京：机械工业出版社，2000.5

(计算机科学丛书)

书名原文：Systems Analysis and Design in a Changing World

ISBN 7-111-08037-8

I. 系… II. ① 赛… ② 杰… ③ 伯… III. ① 系统分析-英文 ② 系统设计-英文
IV. V945

中国版本图书馆CIP数据核字 (2000) 第22478号

机械工业出版社 (北京市西城区百万庄大街22号 邮政编码 100037)

责任编辑：廉一兵

北京第二外国语学院印刷厂印刷 · 新华书店北京发行所发行

2001年4月第1版第1次印刷

787mm × 1092mm 1/16 · 41 印张

印数：0 001-3 000 册

定价：60.00 元

凡购本书，如有倒页、脱页、缺页，由本社发行部调换

CONTENTS

PART 1 | The Modern Systems Analyst

CHAPTER 1	The World of the Modern Systems Analyst	2
	<i>A Systems Analyst at Rutherford Manufacturing</i>	<i>3</i>
	The Analyst as a Business Problem Solver	4
	Systems That Solve Business Problems	6
	Information Systems	6
	Types of Information Systems	8
	Required Skills of the Systems Analyst	10
	Technical Knowledge and Skills	10
	Business Knowledge and Skills	11
	People Knowledge and Skills	11
	A Few Words about Integrity and Ethics	12
	The Environment Surrounding the Analyst	12
	Types of Technology Encountered	12
	Typical Job Titles and Places of Employment	13
	The Analyst's Role in Strategic Planning	14
	Special Projects	14
	Strategic Planning Processes	14
	Information Systems Strategic Planning	14
	Enterprise Resource Planning (ERP)	15
	Strategic Systems Plan for Rocky Mountain Outfitters	16
	Overview of Rocky Mountain Outfitters	16
	Organization and Locations	17
	Information Systems Department Organization	18
	Existing Systems	19
	The Information Systems Strategic Plan	20
	Two Major New Systems	21
	The Analyst as a System Developer (The Heart of the Course)	22
	Part 1: The Modern Systems Analyst	22
	Part 2: Systems Analysis Tasks	23
	Part 3: System Design Tasks	24
	Part 4: System Implementation and Support	24
	Summary	25
	Key Terms	25
	Review Questions	25
	Thinking Critically	26
	Experiential Exercises	26
	Case Study	27
	Association for Information Technology Professionals Meeting	27
	Further Resources	27

CHAPTER 2	The Analyst as a Project Manager	28
	<i>Blue Sky Family of Mutual Funds: Managing the IRA Project</i>	<i>29</i>
	Systems Development Projects and the SDLC	30
	The Systems Development Life Cycle	30
	The First Four Phases of the Systems Development Life Cycle	31
	Scheduling of Project Phases	35
	The Project Team	36
	Project Management	38
	Planning and Organizing	39
	Directing—Executing, Monitoring, and Controlling	39
	Project Initiation	40
	Project Initiation for Rocky Mountain Outfitters	41
	The Project Planning Phase	41
	Defining the Problem	42
	Confirming Project Feasibility	45
	Developing the Project Schedule	52
	Staffing the Project	56
	Launching the Project	57
	Summary	57
	Key Terms	57
	Review Questions	58
	Thinking Critically	58
	Experiential Exercises	59
	Case Study	60
	<i>Custom Load Trucking</i>	60
	Further Resources	60
CHAPTER 3	Approaches to System Development	62
	<i>Development Approaches at Ajax Corporation, Consolidated Concepts, and Pinnacle Manufacturing</i>	<i>63</i>
	Methodologies, Models, Tools, and Techniques	64
	Methodologies	64
	Models	64
	Tools	65
	Techniques	66
	Three Approaches to System Development	67
	The Structured Approach	67
	The Information Engineering Approach	72
	The Object-Oriented Approach	73
	System Development Life Cycle Variations	75
	Variations of the Phases (Waterfall Models)	76
	Variations Based on Iteration	77
	Variations Based on an Emphasis on People	78
	Variations Based on Speed of Development	79
	Computer-Aided System Engineering (CASE) Tools	80
	Analysis and Design Phases in More Detail	83
	The Analysis Phase	83
	The Design Phase	87
	Summary	90
	Key Terms	91
	Review Questions	91
	Thinking Critically	91
	Experiential Exercises	92
	Case Study	92
	<i>Factory System Development Project</i>	92
	Further Resources	93

PART 2 | Systems Analysis Tasks

CHAPTER 4	Investigating System Requirements	96
	<i>Providing Customer Service—and Gasoline—at Convenience America.</i>	<i>97</i>
	Functional and Technical Requirements	98
	Stakeholders—the Source of System Requirements	99
	User Stakeholders.	100
	Client Stakeholders.	101
	Technical Stakeholders.	102
	The Stakeholders for Rocky Mountain Outfitters.	102
	Identifying System Requirements	104
	Distribute and Collect Questionnaires	106
	Review Existing Reports, Forms, and Procedure Descriptions	107
	Conduct Interviews and Discussions with Users	108
	Observe Business Processes and Workflows	112
	Building Prototypes	113
	Conduct Joint Application Design Sessions	113
	Structured Walkthroughs	116
	What and When	117
	Who	117
	How	118
	Business Process Reengineering.	119
	Summary	120
	Key Terms	121
	Review Questions	122
	Thinking Critically.	122
	Experiential Exercises	122
	Case Study	123
	<i>John and Jacob, Inc. On-Line Trading System.</i>	<i>123</i>
	Further Resources	124
 CHAPTER 5	 Modeling System Requirements: Events and Things.	 126
	<i>Walters on Wheels: Computerized Delivery Tracking.</i>	<i>127</i>
	Models and Modeling	128
	The Purpose of Models.	128
	Types of Models.	130
	Overview of Models used in Analysis and Design	132
	Events and System Requirements	133
	The Background of the Event Concept	134
	Types of Events	135
	Identifying Events.	136
	Events in the Rocky Mountain Outfitters Case	139
	Looking at Each Event	140
	Things and System Requirements.	142
	Types of Things	143
	Relationships among Things.	144
	Attributes of Things.	145
	Data Entities and Objects	146
	The Entity-Relationship Diagram	147
	Examples of ERD Notation	147
	The Rocky Mountain Outfitters Case ERD	151
	The Class Diagram	153
	More Complex Issues about Classes of Objects	153
	Examples of Class Diagram Notation	154
	The Rocky Mountain Outfitters Case Class Diagram.	157

Where You Are Headed	158
Summary	160
Key Terms	161
Review Questions	161
Thinking Critically	162
Experiential Exercises	163
Case Studies	164
<i>The Spring Breaks 'R' Us Travel Service Booking System</i>	164
<i>The Real Estate Multiple Listing Service System</i>	164
<i>The State Patrol Ticket Processing System</i>	165
Further Resources	166

CHAPTER 6

The Traditional Approach to Requirements	168
<i>Performance Auto Electric: Following the Data Flow</i>	169
Traditional and Object-Oriented Views of Activities	170
Data Flow Diagrams	170
Data Flow Diagrams and Levels of Abstraction	172
Context Diagrams	173
DFD Fragments	174
The Event-Partitioned System Model	175
Decomposing Processes to See Detail of One Activity	182
Physical and Logical DFDs	184
Evaluating DFD Quality	186
Documenting DFD Components	190
Process Descriptions	190
Data Flow Definitions	195
Data Element Definitions	196
Data Store Definitions	197
DFD Summary	197
Information Engineering Models	198
The IE System Development Life Cycle	198
IE and Structured Development Compared	199
Process Decomposition and Dependency Models	200
Considering Locations and Communication through Networks	204
Workflow Modeling	208
Summary	211
Key Terms	211
Review Questions	212
Thinking Critically	212
Experiential Exercises	213
Case Studies	213
<i>The Real Estate Multiple Listing Service System</i>	213
<i>The State Patrol Ticket Processing System</i>	213
<i>The Reliable Pharmaceutical Service</i>	213
Further Resources	215

CHAPTER 7

The Object-Oriented Approach to Requirements.	216
<i>Northwoods Kayaks: Identifying the Methods within the Objects</i>	217
The Unified Modeling Language and the Object Management Group.	218
Object-Oriented Requirements	218
The Class Diagram	220
The System Activities: An Object-Oriented Use Case/Scenario View	221
Use Cases and Actors	221
Scenarios	221
The Use Case Diagram	223

Object Interactions: Collaboration and Sequence Diagrams	227
Sequence Diagrams	228
Collaboration Diagrams	236
Object Behavior: States, State Transitions, and Statechart Diagrams	238
Object States	239
Object Transitions	241
Messages, Transitions, and Actions	243
Statechart Diagrams	244
Concurrent Behavior	247
Statechart Development	250
Summary	252
Key Terms	253
Review Questions	253
Thinking Critically	254
Experiential Exercises	256
Case Studies	256
<i>The Real Estate Multiple Listing Service System</i>	256
<i>The State Patrol Ticket Processing System</i>	256
<i>The Downtown Videos Rental System</i>	257
Further Resources	257
 CHAPTER 8	
Environments, Alternatives, and Decisions	258
<i>Tropic Fish Tales: Netting the Right System</i>	259
Assessing the Target Processing Environment	260
Centralized Systems	261
Distributed Computing	263
The Internet and Intranets	266
Development and System Software Environments	269
The Environment at Rocky Mountain Outfitters	270
Deciding on Scope and Level of Automation	273
Determining Scope	273
Defining the Level of Automation	275
Selecting Alternatives	278
Generating Alternatives for Implementation	282
Facilities Management	283
Packaged and Turnkey Software Systems	283
Custom Software Development	284
In-House Development	285
Choosing an Alternative for Implementation	285
Identifying Criteria for Selection	286
Making the Selection	289
Considering Outsourced Solutions	290
Generating a Request for Proposal	290
Benchmarking and Choosing a Vendor	291
Presenting the Results and Making the Decisions	292
Summary	293
Key Terms	293
Review Questions	294
Thinking Critically	294
Experiential Exercises	295
Case Study	296
<i>Tropic Fish Tales' RFPs</i>	296
Further Resources	296

PART 3 | System Design Tasks

CHAPTER 9	Moving to Design	298
	<i>New Capital Bank: Object-Oriented Development of a Payroll System</i>	299
	Understanding the Elements of Design	300
	Inputs: Moving from Analysis to Design	300
	Major Components and Levels of Design	300
	Outputs: Structured Models and Object-Oriented Models	303
	Designing the Application Architecture: The Structured Approach	305
	The Automation System Boundary	306
	The System Flow Chart	308
	The Structure Chart	311
	Module Algorithm Design: Pseudocode	323
	Integration of the Structured Application Design with User-Interface Design, Database Design, and Network Design	325
	Designing the Application Architecture: The Object-Oriented Approach	325
	Object-Oriented Programs	326
	Object-Oriented Models	329
	Package Diagrams	329
	Design Class Diagrams	331
	Design Class Diagram Development	335
	Method Development and Pseudocode	339
	Inheritance, Overriding, and Polymorphism	340
	Integrating the Object-oriented Application Design with User Interface Design, Database Design, and Network Design	340
	Coordinating the Project	341
	Coordinating Project Teams	342
	Coordinating Information	342
	Summary	344
	Key Terms	344
	Review Questions	344
	Thinking Critically	345
	Experiential Exercises	351
	Case Studies	351
	<i>The Real Estate Multiple Listing Service System (Structured)</i>	351
	<i>The Reliable Pharmaceutical Service System</i>	351
	<i>The Real Estate Multiple Listing Service System (Object-Oriented)</i>	351
	<i>The Downtown Video Rental System</i>	351
	Further Resources	352
CHAPTER 10	Designing Databases	354
	<i>Nationwide Books: Designing a New Database</i>	355
	Databases and Database Management Systems	356
	Database Models	357
	Relational Databases	358
	Designing Relational Databases	360
	Representing Entities	361
	Representing Relationships	363
	Enforcing Referential Integrity	365
	Evaluating Schema Quality	365
	Object-Oriented Databases	372
	Designing Object Databases	372
	Representing Classes	372
	Representing Relationships	373
	Hybrid Object-Relational Database Design	378
	Classes and Attributes	379
	Relationships	381

	Data Types	382
	Relational DBMS Data Types	383
	Object DBMS Data Types	383
	Distributed Databases	384
	Distributed Database Architectures	385
	The RMO Distributed Database Architecture	390
	Summary	393
	Key Terms	393
	Review Questions	394
	Thinking Critically	395
	Experiential Exercises	395
	Case Studies	396
	<i>The Real Estate Multiple Listing Service System</i>	396
	<i>The State Patrol Ticket Processing System</i>	396
	<i>The Reliable Pharmaceutical Service</i>	396
	Further Resources	396
CHAPTER 11	Designing Inputs, Outputs, and Controls	398
	<i>Customized Cars Clearinghouse: Moving into Electronic Commerce</i>	399
	Integrity Controls	400
	Objectives of Integrity Controls	400
	System Access Controls	401
	Input Integrity Controls	404
	Output Integrity Controls	405
	Design of System Inputs	406
	Identifying Devices and Mechanisms	407
	Developing the List of Inputs and Data Requirements of Each	409
	Designing and Prototyping Input Forms	417
	Design of System Outputs	418
	Determining the Type of Output	419
	Making a List of Specific Reports Based on the Application Design	424
	Designing and Prototyping Reports	426
	Summary	427
	Key Terms	427
	Review Questions	428
	Thinking Critically	428
	Experiential Exercises	429
	Case Study	429
	<i>All-Shop Superstores</i>	429
	Further Resources	431
CHAPTER 12	Human-Computer Interaction	432
	<i>Interface Design at Aviation Electronics</i>	433
	The User Interface	434
	Physical Aspects of the User Interface	434
	Perceptual Aspects of the User Interface	435
	Conceptual Aspects of the User Interface	435
	User-Centered Design	435
	Human-Computer Interaction as a Field of Study	436
	Metaphors for Human-Computer Interaction	438
	Interface Design Guidelines	444
	Visibility and Affordance	444
	Eight Golden Rules	444
	Documenting Dialog Designs	448

Events, Subsystems, and Menu Hierarchy	448
Dialogs and Storyboards	449
Dialog Documentation with UML Diagrams	452
Guidelines for Designing Windows Forms	455
Form Layout and Formatting	456
Data Keying and Entry for Standard Windows	458
Navigation and Support Controls	459
Data Keying and Entry for the Browser Interface	459
Help Support	459
Dialog Design for Rocky Mountain Outfitters	459
Dialog Design for Web Sites	466
Summary	468
Key Terms	469
Review Questions	469
Thinking Critically	470
Experiential Exercises	470
Case Studies	471
<i>The 21st Century University System</i>	471
<i>The Downtown Videos Rental System</i>	472
<i>The Waiters on Wheels System</i>	472
<i>The State Patrol Ticket Processing System</i>	473
<i>Another Alternative for Rocky Mountain Outfitters</i>	473
Further Resources	473

PART 4 | Implementation and Support

xvi

CHAPTER 13

Rapid Application Development and Component Based Development	476
<i>CDs Direct 2U: Speeding Development of a Customer Support System</i>	<i>477</i>
Rapid Application Development	478
Reasons for Slow Development	478
What Is RAD?	480
Rapid Development Approaches	480
The Prototyping Approach to Development	482
The Spiral Approach to Development	487
Rapid Development Techniques	490
Risk Management	490
Joint Application Design	494
Tool-Based Development	495
Software Reuse	497
Object Frameworks	498
A Sample Object Framework	498
Object Framework Types	500
The Impact of Object Frameworks on Design and Implementation Tasks	501
Pitfalls to Consider for Object Frameworks	502
Components	503
Component Standards and Infrastructure	504
Components and the Development Life Cycle	506
Summary	509
Key Terms	509
Review Questions	510
Thinking Critically	510
Experiential Exercises	512
Case Study	512
Further Resources	515

CHAPTER 14	Packaged Software and Enterprise Resource Planning	516
	<i>Pizza Amore: Revamping Systems to Manage More Information</i>	517
	Packaged Software	519
	The Trend toward Packaged Software	520
	Implementation and Support of Packaged Software	520
	Enterprise Resource Planning	523
	What Is ERP?	523
	Why Consider ERP?	526
	Implementing ERP	528
	An ERP System Development Methodology	531
	Special Topics on ERP Development	533
	The Future of ERP	536
	A Closer Look at One ERP Package: SAP R/3	537
	What Is SAP?	537
	Implementing SAP R/3	540
	Using SAP R/3	541
	Summary	544
	Key Terms	544
	Review Questions	545
	Thinking Critically	545
	Experiential Exercises	545
	Case Study	546
	<i>Rayco Products Corporation</i>	546
	Further Resources	547
 CHAPTER 15	 Making the System Operational (Implementation, Conversion and Support)	 548
	<i>Tri-State Heating Oil: Juggling Priorities to Begin Operation</i>	549
	Program Development	550
	Order of Implementation	551
	Framework Development	556
	Team-Based Program Development	556
	Source Code Control	558
	Versioning	559
	Quality Assurance	562
	Technical Reviews	563
	Testing	564
	Installation	570
	Direct Installation	571
	Parallel Installation	571
	Phased Installation	573
	Personnel Issues	574
	Documentation	575
	System Documentation	575
	User Documentation	577
	Training and User Support	579
	Ongoing Training and User Support	581
	Maintenance	582
	Submitting Change Requests and Error Reports	582
	Implementing a Change	584
	Upgrading Computing Infrastructure	585
	Summary	586
	Key Terms	586
	Review Questions	587

Thinking Critically	587
Experiential Exercises	588
Case Studies	588
<i>The HudsonBanc Billing System Upgrade</i>	588
<i>The DownTown Videos Rental System</i>	589
<i>The Reliable Pharmaceutical Service System</i>	589
Further Resources	589

APPENDICES

APPENDIX A	The Responsibilities of a Project Manager	591
	Providing Leadership and Vision	591
	Planning and Organizing the Project	592
	Organizing and Managing the Project Team	593
	Estimating Costs and Developing the Project Budget	594
	Monitoring and Controlling the Project Schedule	595
	Ensuring the Quality of the Final Result	596
	Key Terms	597
	Review Questions	597
	Application Questions	597
APPENDIX B	Calculating Net Present Value, Payback Period, and Return on Investment	598
	Net Present Value Calculations	598
	Payback Period Calculations	600
	Return on Investment	601
	Key Terms	601
	Review Questions	602
	Thinking Critically	602
APPENDIX C	Developing a Project Schedule with PERT/CPM Charts	603
	Building PERT/CPM Charts	603
	Creating the RMO Project Schedule with Microsoft Project	610
	Building Gantt Charts	611
	Key Terms	612
	Review Questions	612
	Thinking Critically	612
APPENDIX D	Presenting the Results to Management	613
	Preparing the Presentation	614
	The Opening	614
	The Agenda	614
	The Body	614
	The Closing	615
	Giving the Presentation	615
	Use of Visual Aids	616
	Questions and Answers	617
	INDEX	619

PART I

The Modern Systems Analyst

Chapter 1

The World of the Modern Systems Analyst

Chapter 2

The Analyst as a Project Manager

Chapter 3

The Variety of Approaches to System Development

The World of the Modern Systems Analyst

Learning Objectives

After reading this chapter, you should be able to:

- Explain the key role of a systems analyst in business
- Describe the various types of systems an analyst might work on
- Explain the importance of technical, people, and business skills for an analyst
- Explain why ethical behavior is crucial for a systems analyst's career
- Describe the many types of technology an analyst needs to understand
- Describe various job titles and places of employment where analysis and design work is done
- Discuss the analyst's role in strategic planning for an organization
- Describe the analyst's role in a system development project

Chapter Outline

The Analyst as a Business Problem Solver

Systems that Solve Business Problems

Required Skills of the Systems Analyst

The Environment Surrounding the Analyst

The Analyst's Role in Strategic Planning

A Strategic Systems Plan for the Rocky Mountain Outfitters Case

The Analyst as a System Developer (The Heart of the Course)

A SYSTEMS ANALYST AT RUTHERFORD MANUFACTURING

Mary Wright thought back about her two-year career as a programmer analyst. She had been asked to talk to visiting computer information system (CIS) students about life on the job. "It seems like yesterday that I finally graduated from college and loaded up a U-Haul to start my new job at Rutherford," she began.

Rutherford Manufacturing is a sporting goods manufacturer located in St. Louis. Rutherford sells mainly to retail store chains but recently began selling directly to consumers over the Internet. This, and other competitive changes in manufacturing and distribution, made information systems particularly important to Rutherford.

"At first I did programming, mainly fixing things that end users wanted done. I completed some training on C++ and object-oriented analysis to round out my experience," explained Mary. "The job was pretty much what I had expected at first," she continued, "until everything went crazy over the IMDS project."

The Integrated Manufacturing and Distribution System (IMDS) project had

been part of the company's information systems plan drawn up the year before. Edward Duke, the CEO of Rutherford Manufacturing, pushed for more strategic planning overall at the company from the beginning, including having a five-year strategic plan for information systems. IMDS was scheduled for the third or fourth year of the plan, but suddenly priorities changed. One of the larger retail customers of Rutherford went out of business. Then another retailer decided to eliminate sporting goods altogether. Additionally, sporting goods, like virtually all consumer goods, were beginning to be sold over the Internet.

Rutherford's sales dropped 15 percent in one quarter. A decision was made to make a major commitment to the Internet. The IMDS project was the key, launched immediately with the objective of radically improving manufacturing and distribution processes, mainly using Internet technology and direct sales.

"It seemed like the IMDS project was the only thing the company cared about," continued Mary. "I was

assigned to the project as the junior analyst assisting the project manager, so I got in on everything. Suddenly I was in meeting after meeting, and I had to digest all kinds of information about manufacturing and retailing, like I was in business school. I met with manufacturing supervisors and marketing managers. I traveled all over to visit supplier locations (including a four-day trip to Seoul, Korea, on about two days notice!). I interviewed technology vendor representatives and consultants. I spend a lot of time at my computer, too, writing reports, letters, and memos; not programming!"

"We have been working on the project for seven months now, and every time I turn around, Mr. Duke, our CEO, is saying something about how important the IMDS project is to the future of the company—to the employees and to the stockholders. Mr. Duke is in on many of our meetings, and he even sat next to me the day I presented a list of key requirements for the system to the top management team. This is not at all the way I thought it would be."

OVERVIEW

Information systems are crucial to the success of modern business organizations, and new systems are constantly being developed to make businesses more competitive. The key to successful system development is thorough systems analysis and design. System analysis means understanding and specifying in detail what the information system should do. System design means specifying in detail how the many components of the information system should be physically implemented. This text is about systems analysis and design techniques used by a systems analyst, a business professional who develops information systems.

This chapter describes the world of the systems analyst—the nature of the work, the knowledge and skills that are important, and the types of systems and special projects an analyst works on. First, the analyst's work is described as problem solving for an organization, so the problem-solving process followed by the analyst is described. Next, since most problems an analyst works on are solved in part by an information system, it is important to review the types of information systems involved. A systems analyst is a business professional that requires extensive technical, business, and people knowledge and skills, so these are reviewed. Next, the office

systems analysis
the process of understanding and specifying in detail what the information system should do

systems design
the process of specifying in detail how the many component parts of the information system should be physically implemented

systems analyst
a business professional who uses analysis and design techniques to solve business problems using information technology

technologies worked with and the variety of work places and positions where analysis work is done are surveyed. Sometimes an analyst works on special projects like strategic planning and enterprise resource planning.

Finally, this chapter introduces Rocky Mountain Outfitters (RMO), a large, regional sports clothing distributor headquartered in Park City, Utah. They are following a strategic information systems plan that calls for a new customer support system that will integrate phone orders, mail orders, and direct customer orders via the Internet. The Rocky Mountain Outfitters case is used throughout the text to illustrate analysis and design techniques.

The Analyst as a Business Problem Solver

Systems analysis and design is, first and foremost, a practical field. Analysts must certainly know about computers and computer programs. They possess special skills and develop expertise in programming. But they must also bring a fundamental curiosity to explore how things are done and the determination to make them work better.

Developing information systems is not just about writing programs. Information systems are developed to solve problems for organizations, as the opening case demonstrated, and a systems analyst is often thought of as a problem solver rather than a programmer. So, what kind of problems does an analyst typically solve?

- Customers want to order products any time of the day or night. So the problem is being able to process those orders round the clock without adding to the selling cost.
- Employees want paychecks automatically deposited in their accounts with options for withholding money for 401(k) plans. So the problem is being able to process payroll transactions that handle these options.
- Management wants to know the current financial picture of the company first thing every morning. So the problem is how to collect and present the information to them.
- Shipping needs to know what shipments to arrange for each day so the department can get them ready. So the problem is how to get the details about the day's shipments to the department.
- Production needs to plan very carefully the amount of each type of product to produce each week. So the problem is how to estimate the dozens of parameters that affect production and then allow planners to explore different scenarios before committing to a specific plan.

Information system developers work on problems such as these—and many more. Their focus is the business and how to make it run efficiently and effectively. All programming eventually done for the system contributes to solving the business problem, but these are not just programming problems.

How does an analyst solve problems? Systems analysis and design focuses on understanding the business problem and outlining the approach to be taken to solve it (see Figure 1-1). Usually the solution takes advantage of information technology—an information system. But that is just part of the story.

To thoroughly understand the problem, the analyst must learn everything possible about it—who is involved, what business processes come into play, what data need to be stored and used, what other systems would be affected when solving this problem. Then the analyst needs to confirm for management that the benefits of solving the problem outweigh the costs. Sometimes it would cost a fortune to solve the problem. Is it worth it to try to solve it at all?