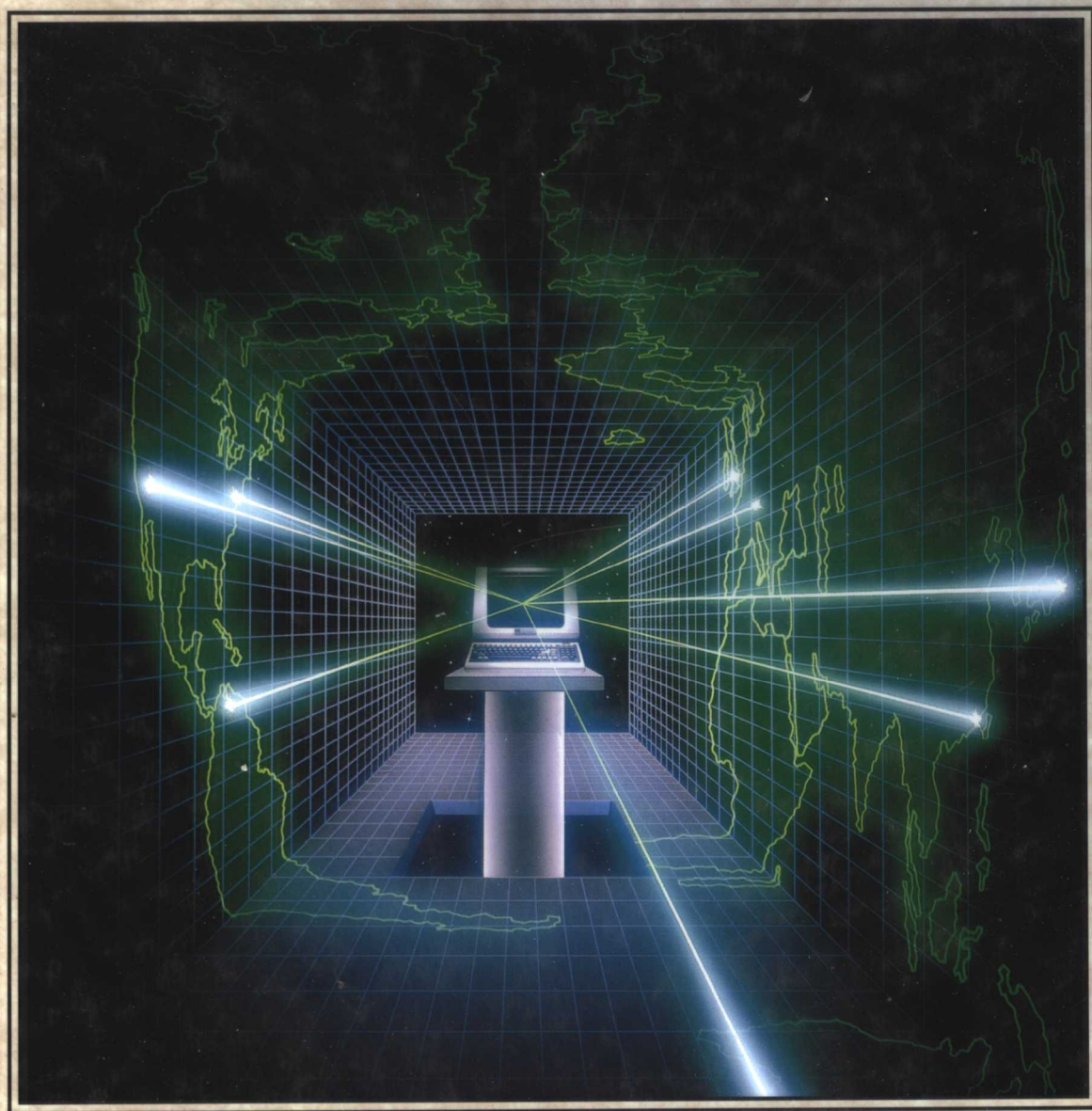


BUSINESS TECHNOLOGY: CAREERS 2000

COMPETITIVE ADVANTAGE THROUGH INFORMATION TECHNOLOGY

JACK D. CALLON



Competitive Advantage Through Information Technology



JACK D. CALLON

College of Business
San Jose State University
San Jose, California

The McGraw-Hill Companies, Inc.

New York St. Louis San Francisco Auckland Bogotá
Caracas Lisbon London Madrid Mexico City Milan Montreal /
New Delhi San Juan Singapore Sydney Tokyo Toronto

McGraw-Hill

A Division of The McGraw-Hill Companies



Competitive Advantage Through Information Technology

Copyright © 1996 by The McGraw-Hill Companies, Inc. All rights reserved.
Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

4 5 6 7 8 9 10 FGRFGR 9 9 8 7

ISBN 0-07-011250-9

Sponsoring editor: Frank Ruggirello
Editorial assistant: Kyle Thomes
Production supervisor: Natalie Durbin
Project management: Graphics West, Inc.
Copyeditor: Susan Defosset
Interior design: Graphics West, Inc.
Cover designer: John Edeen
Cover photo: Richard Wahlstrom Photography, Inc.
Composition: Graphics West, Inc.
Printer and binder: Quebecor Printing

Library of Congress Catalog Card Number 95-81166

Information has been obtained by The McGraw-Hill Companies, Inc. from sources believed to be reliable. However, because of the possibility of human or mechanical error by our sources, The McGraw-Hill Companies, Inc., or others, The McGraw-Hill Companies, Inc. does not guarantee the accuracy, adequacy, or completeness of any information and is not responsible for any errors or omissions or the results obtained from use of such information.

DEDICATION



This book is dedicated to those who must compete in an increasingly complex, dynamic and global business environment. I wish you the best of success in your competitive endeavors and hope that the contents of this book provide the help that is intended.

PREFACE

Successful use of information systems within a business enterprise is often an elusive goal. This book will provide an understanding and appreciation for the use of information technology to successfully manage an enterprise. The competitive role of information systems, which contributes to the overall success of the business through an effective integration of business strategies, information technology and people, is a major focus of the book. Students will gain an understanding and appreciation for the increasing importance of information systems to obtain organizational efficiencies, broaden individual effectiveness and/or gain a competitive advantage.

This book was written to be used in classes that provide a business focus to the use of information systems. The primary courses where this book could be used include Information Technology and Corporate Strategy, Management of MIS, graduate level MIS courses, MBA classes dealing with business strategy and technology, and an undergraduate capstone MIS class.

The book does an excellent job of merging the technical and business training of undergraduate MIS majors. The author has used much of the enclosed material for four MBA MIS classes and two undergraduate classes during the past year.

◆◆◆ PREMISE OF THE BOOK

Literally every enterprise, whether private or public, faces unprecedented competitive challenges. The source of these challenges is becoming more global, and the pace of change within the business environment is accelerating.

To respond to these challenges an enterprise needs to develop a necessary and logical vision based on an understanding of the business environment and the strengths and potential of the enterprise. The business vision and its supporting strategies drive the role and use of information systems within the organization.

The compression of time and events has significantly increased information needs for the growing number of people involved in making decisions within an enterprise. Information technology is a major contributor to the growing competitive threats and an enabler of possible responses to these same threats.

For the above reasons the potential role of information systems as a competitive resource has increased.

Innovative use of information technology dictates a systematic approach. It is essential that there be an ongoing working relationship

between those who run a business and the people charged with a responsibility for information systems.

This book emphasizes the importance of establishing and maintaining three distinct perspectives. The first is an understanding of the *business environment*—the industry within which a company competes. The second is a realistic assessment of the *company environment* and its ability to achieve and sustain a competitive advantage. The third, the *use of information systems*, can then be positioned as a competitive resource following the assessment of the business and company environments.

◆◆ KEY TOPICS

- ♦ Challenges: competitive environment, organizational and information technology issues
- ♦ The effects of IT on competition (the way that an enterprise competes)
- ♦ Extended enterprise as a way to compete
- ♦ Competitive analysis methodology and structure
- ♦ Vision, strategy, tactics and business plan
- ♦ Identifying strategic information systems applications
- ♦ The three potential roles of information systems
- ♦ The concept of Roles, Roles and Relationships
- ♦ Information systems as a business within a business
- ♦ The Redefine/Define concept
- ♦ Telecommunications as the delivery vehicle
- ♦ Information systems architectural alternatives
- ♦ Examples of successful organizations
- ♦ A Success Factor Profile
- ♦ Information systems personnel and organizational issues
- ♦ The value of information systems
- ♦ Information systems financial strategies
- ♦ Business and information systems planning
- ♦ TQM and information systems
- ♦ Conclusions on the entire subject of using information systems to compete

◆◆ STUDENT ASSIGNMENTS

The author recommends that a term paper involving a business analysis be assigned, which requires the student to apply the concepts being learned

by evaluating a specific company. The analysis term paper is a challenging assignment, but a number of companies can be evaluated based entirely on public domain, printed material. There is significant printed material available on companies like Charles Schwab, USAA, Federal Express, American Airlines and Wal-Mart. The recommended outline of the paper and a more complete list of companies that can be evaluated based on public domain material is included in the instructor manual. The outline for the paper is also consistent with the three perspectives covered in the book. Section I of the paper addresses the industry, Section II deals with the company and Section III is an analysis of the use of information systems using the structured analysis concepts covered in Chapters 8 to 12.

A class could also be taught using case studies. There are a number of Harvard Business School cases that address the concepts and management issues covered in the book. A third option would be to assign selected exercises at the end of the chapters.



INSTRUCTOR SUPPORT

Accompanying this text is a detailed Instructor's Manual, which includes optional course schedules, supplementary readings, lecture suggestions, transparency masters, exam questions, and suggestions for administering the term paper.



ORGANIZATION

The book is organized into four sections, preceded by an introductory chapter that introduces the challenges and issues that are addressed in each section. The first three sections correspond to the perspectives needed to understand the impact that the use of information systems has on a business. Section I starts where it must start, with a consideration of the business environment. Section II builds on this by examining important factors that impact the individual company. Then, and only then, does it make sense to look at the role and use of information systems, which is presented in Section III. The final section, Section IV, deals with major information systems management issues.



BASIC TERMINOLOGY

The subject of information technology is complicated enough, but the lack of common usage of terms further adds to the confusion. The following

three basic terms are used throughout the book consistent with the definitions provided:

Information technology (IT) is the “pieces and things” that are used to create information systems. It is the mainframes, the personal computers, the disk files, the modems, etc. It is both the hardware and software that is used to implement computer-based systems.

Information systems (IS) include both computers and telecommunications and are the result of a design and implementation process.

The actual design and implementation of information systems are accomplished primarily by the **information systems organization** working closely with the user organizations to define systems requirements. An alternative to this approach would be a joint development effort between the information systems organization and user departments, with the latter playing a more involved role in the technical aspects of the new system. A third approach would be a separate, independent development effort by a user department. There is a difference between information systems and the organization that has a primary responsibility for this organizational resource. This distinction between information systems and the information systems organization has been carefully noted throughout the book.



THE INFORMATION TECHNOLOGY SPECTRUM

Ask someone what they think they need to know about information technology to function effectively in the business environment of today. Their response will undoubtedly be an indication of their own personal background and experience. It is important to keep in mind that there are multiple levels of information technology, representing a very broad spectrum. Where a person works and functions within this spectrum will greatly influence the answer to the question regarding a logical focus within a business-oriented class. The multiple levels within this information technology spectrum include:

- ♦ **Research**—basic research on physical science and information technologies.
- ♦ **Product development**—translating basic research into marketable IT products.
- ♦ **Manufacturing**—making the actual products.
- ♦ **Marketing**—identifying markets and selling the products.
- ♦ **Design and implementation**—obtaining information technology products and creating information systems through an analysis and development process.
- ♦ **Use of information technology-based systems**—applying information systems to functions and processes within an organization.

- ♦ **Management of the use of information technology-based systems**—addressing the specific information needs of the organization.

Where within the above spectrum should the emphasis of a business-oriented class dealing with information systems be placed? Most people, including the author of this book, conclude that the focus needs to be on the use of information systems and the management of this use. That is exactly what has been emphasized in this book.

ACKNOWLEDGMENTS



A book like this may be prepared by a single author, but it is actually written by many people. It is with difficulty that I attempt to acknowledge all of those who have contributed to the writing of this book, as I am sure that I will overlook some whom I should recognize. People who have assisted fall into three categories: (1) authors of other publications, (2) personal contacts as a source of information and (3) those willing to review specific chapters to validate the contents.

The first category is referenced within the book, but particularly significant are Michael Porter (competitive strategy), Kenichi Ohmae (multinational company role in global competition), Peter Keen (vision process and telecommunications), Peter Drucker (business perspective and Redefine/Define concept), Charles Wiseman (Strategic Option Generator), Marilyn Parker and Robert Benson (IS value and planning structure), David Kearns and David Nadler (Xerox and TQM) and W. Edwards Deming (TQM).

Personal contacts were invaluable as an information source and included Robert McDermott of USAA, T.R. Reid and Dan McNichol of Whirlpool, Rhoda Verner of Lifescan, Cyril Yonsouni of Read-Rite, Tom Waitman of UB Networks, Skip Ross of Hewlett-Packard, Dee Hock and Richard Chew of VISA International, Dawn Lepore of Charles Schwab, Donna Mikov of Boeing Commercial Airplane Group, Al Becker of American Airlines, Au Soo Wei of Singapore Airlines, Sue O'Sullivan of British Airways, Steve Anderson of *USA Today*, Congressman Norman Mineta, Jim Feeman of IBM, Allan Ditchfield and Leslie Heinrich of Progressive Corporation, John Vaughn of Intel, Bob Pospischil of Bissett Nursery and Judd Everhart of Xerox.

Particular thanks go to those who were willing to review specific chapters and provide constructive criticism on how they could be improved. This included Tom Waitman of UB Networks (introduction and telecommunications chapters), Rhoda Verner of Lifescan and previously with Xerox (chapter dealing with TQM and IS), Les Clark of Hoechst, Marion and Roussel (business and IS planning chapter), the airline people cited above who critiqued the sections in the airline chapter about their respective companies, and the numerous university faculty arranged by the publisher who reviewed specific chapters and in some cases the entire book.

I would be remiss if I did not thank my students, both graduate and undergraduate, as they have been the ones upon whom the enclosed material has been tested and honed. They are the ones that prove that the material makes sense and that the structured analysis can be a good learning

tool. The paper in the appendix written by Ali Eridiaz as an MBA student is offered as tangible evidence of this contention.

Frank Ruggirello was a positive, steady influence as my editor, and Peter Keen provided insightful critiques and recommendations as a consulting editor. Jehanne Schweitzer did an excellent job in managing the final production, and Susan Defosset was a pleasure to work with as the final content editor of the book. Her biology training was a good check on whether material was understandable to those not possessing an information systems background.

The following reviewers provided numerous helpful and insightful suggestions for improving the book:

Michele Brown, University of Richmond
Albert Harris, Appalachian State
Richard Hauser, East Carolina University
Kenneth Kozar, University of Colorado
Albert Lederer, University of Kentucky
Prashant Palvia, Fogelman College of Business
Rodney Pearson, Mississippi State
John Quigley, East Tennessee State University
Arthur Rasher, University of Tulsa
Robert Trent, University of Virginia

One does not do a project like this without some personal sacrifices, and I particularly thank my wife Linda for her understanding and acceptance of the hours of my time that were needed to complete it. My sons John, Scott and Mark also assisted with proofreading and critiquing, proving that today's generation does know how to spell and can write very well.

CONTENTS

| | |
|--|-------|
| <i>Preface</i> | xvii |
| <i>Premise of the Book</i> | xvii |
| <i>Key Topics</i> | xviii |
| <i>Student Assignments</i> | xviii |
| <i>Instructor Support</i> | xix |
| <i>Organization</i> | xix |
| <i>Basic Terminology</i> | xix |
| <i>The Information Technology Spectrum</i> | xx |
| <i>Acknowledgments</i> | xxiii |

CHAPTER 1 Business and Information Systems Management Challenges 1

| | |
|---|----|
| It Is Not Getting Any Easier to Run a Successful Business | 2 |
| Business Success Factors | 2 |
| Business Leadership | 3 |
| Ability to Fit the Pieces into the Increasingly Bigger Business Picture | 3 |
| Organizational Responsiveness and Resilience | 4 |
| Solving Customer Problems Through a Combined Organizational Effort | 4 |
| A Strong Company Culture | 4 |
| Ability and Willingness to Innovate, Change and Take Risks | 4 |
| Accomplishing These Factors While Maintaining a Balance | 5 |
| Communication Across the Entire Organization | 5 |
| Three Necessary Perspectives | 5 |
| Simultaneous Revolutions in the Business Environment | 6 |
| A Business Driver Model | 7 |
| Market | 8 |
| Technology | 8 |
| Regulation | 8 |
| Employees and Work | 9 |
| Innovative Use of Information Systems Requires a Systematic Approach | 9 |
| What Is the Point (Objective) of Information Systems? | 11 |
| Examples of Successful Use of Information Systems to Compete | 12 |
| Boeing | 12 |
| Wal-Mart Stores | 13 |
| Bissett Nursery Corporation | 14 |
| Federal Express | 15 |
| Charles Schwab | 15 |
| USAA | 16 |
| L.L. Bean | 16 |

| | |
|---|----|
| Progressive Corporation | 17 |
| A Quick Information Systems Assessment | 17 |
| The Best Industries at Using Information Systems to Compete | 18 |
| <i>Conclusion</i> | 19 |
| <i>Recommended Reading</i> | 19 |
| <i>Exercises</i> | 20 |

SECTION I THE FIRST OF THREE PERSPECTIVES: THE BUSINESS ENVIRONMENT 23

CHAPTER 2 Business Competitive Environment 24

| | |
|--|----|
| Defining Competitiveness and a Competitive Model | 25 |
| A Competitive Model | 25 |
| Who Is Going to Make It Happen? | 27 |
| How Does a Company Gain a Competitive Advantage? | 27 |
| The Competitive Advantage of Nations | 28 |
| The Nation and Local Processes | 29 |
| Disagreement on the Role of the Nation | 31 |
| The Company Agenda | 31 |
| The Role of Government | 32 |
| <i>Conclusion</i> | 32 |
| <i>Recommended Reading</i> | 33 |
| <i>Exercises</i> | 34 |

CHAPTER 3 The Porter Competitive Model for Industry Structure Analysis 36

| | |
|---|----|
| The Porter Competitive Model | 37 |
| An Analysis of Wal-Mart Using the Porter Competitive Model | 39 |
| Intraindustry Rivalry | 39 |
| Bargaining Power of Buyers | 41 |
| Bargaining Power of Suppliers | 41 |
| Threat of New Entrants | 41 |
| Threat of Substitute Products or Services | 42 |
| Industry Structure and the Company Position | 42 |
| Computer Industry Analysis | 42 |
| The Strategic Business Unit and Competitive Strategies | 45 |
| Differentiation Strategy | 45 |
| Low-Cost Strategy | 46 |
| Supporting Strategies | 46 |
| The Value Chain and Competitive Advantage | 47 |
| Using the Value Chain to Summarize Potential for Information Technology | 50 |

| | |
|----------------------------|----|
| <i>Conclusion</i> | 51 |
| <i>Recommended Reading</i> | 52 |
| <i>Exercises</i> | 53 |

CHAPTER 4 Airline Industry Analysis 55

| | |
|---|----|
| The Airline Industry and American Airlines | 56 |
| American's Plans to Increase Profits | 57 |
| Causes of Poor Airline Profits | 58 |
| Major Lessons of the Consistently Profitable Carriers | 60 |
| Singapore Airlines | 60 |
| British Airways | 64 |
| Southwest Airlines | 65 |
| Airline Industry Analysis Using the Porter Competitive Model | 67 |
| Intraindustry Rivalry | 67 |
| Buyers (Customers) | 70 |
| Suppliers | 71 |
| New Entrants | 72 |
| Substitute Products or Services | 72 |
| Importance of Information Technology | 73 |
| Benefits of Information Systems to American Airlines | 73 |
| Airline Reservation Systems: A Changing Competitive Resource? | 75 |
| The Airline Industry: Deregulated but Still Very Regulated | 76 |
| <i>Conclusion</i> | 77 |
| <i>Recommended Reading</i> | 78 |
| <i>Exercises</i> | 79 |

CHAPTER 5 Information Systems Can Redefine Competitive Boundaries 81

| | |
|--|----|
| Networks Cross Company Boundaries to Reap Benefits | 82 |
| Efficiency from Interorganizational Systems | 82 |
| Effectiveness from Interorganizational Systems | 83 |
| Competitive Advantage Through Better Customer Service with Interorganizational Systems | 83 |
| Competitive Advantage Through Strategic Alliances and Interorganizational Systems | 84 |
| Company Examples of Interorganizational Systems | 85 |
| Payment Process Industry | 86 |
| Alliances Provide Growth Opportunities | 87 |
| Globalization | 88 |
| Global, International or Interdependent? | 89 |
| Electronic Data Interchange (EDI) | 89 |
| Successful EDI Systems Are Logical Extensions of Existing Systems | 90 |
| EDI Implementation Obstacles | 91 |
| EDI Value-Added Network (VAN) Services | 93 |

| | |
|-----------------------------|----|
| EDI at Mervyn's | 94 |
| E-Mail-Enabled Applications | 95 |
| The Internet | 96 |
| Conclusion | 96 |
| Recommended Reading | 96 |
| Exercises | 98 |

SECTION II THE SECOND PERSPECTIVE: THE COMPANY ENVIRONMENT

99

CHAPTER 6 Business Vision 101

| | |
|---|-----|
| What Is a Vision? | 102 |
| A Leader with a Vision at USAA | 103 |
| Customer Service Is the Vision Driver | 105 |
| Employees Make a Vision Happen | 105 |
| Vision 2000: Evolution to a Financial Services Organization | 106 |
| USAA Uses Prototyping to Build New Information Systems | 108 |
| The Role and Contribution of Information Systems | 111 |
| Summary of USAA's Success | 112 |
| Whirlpool Corporation: The World's Largest Manufacturer and Marketer of Major Home Appliances | 113 |
| A Global Vision | 115 |
| Why Did Whirlpool Pursue a Global Strategy? | 115 |
| Implementation of the Global Strategy | 116 |
| The Role of Information Systems in Global Business Strategies | 118 |
| Challenges to Realizing the Global Vision | 120 |
| The Global Large-Appliance Industry in 2005? | 121 |
| Why a Vision? | 121 |
| The Vision Process | 123 |
| A Logical Action Plan | 123 |
| Conclusion | 124 |
| Recommended Reading | 124 |
| Exercises | 126 |

CHAPTER 7 Implementing a Vision: Strategy, Tactics and Business Plan 127

| | |
|---|-----|
| Progressive Corporation's Strategies Fit Its Name | 128 |
| Information Systems Support of the Business Strategies | 130 |
| Summary of Progressive Corporation | 132 |
| Components and Issues Relating to a New Business Strategy | 132 |
| Strategic Management Process | 134 |
| Strategy-to-Tactics Implementation | 136 |
| The Issue of Control | 138 |

| | |
|--|-----|
| The Business Plan | 139 |
| Information Technology-Based Strategies | 139 |
| Significant Structural Change to the Marketplace | 140 |
| Significant Structural Change to Operations | 140 |
| Redefining Traditional Products and Processes for the Marketplace | 141 |
| Redefining Traditional Operational Processes | 141 |
| An Information-Oriented Infrastructure Is Key to a Responsive Competitive Strategy | 142 |
| Data Management | 142 |
| User Applications | 143 |
| Voice Management | 143 |
| Network Management | 143 |
| Planning Process | 143 |
| Financial Strategy and Organization | 143 |
| Moving from Plan to Action | 144 |
| Conclusion | 144 |
| Recommended Reading | 144 |
| Exercises | 146 |

SECTION III THE THIRD PERSPECTIVE: THE USE OF INFORMATION SYSTEMS 147

CHAPTER 8 Evaluating Business Strategies and the Use of Information Systems: The Strategic Option Generator 149

| | |
|--|-----|
| Strategic Option Generator | 150 |
| Strategic Targets | 151 |
| Thrust | 152 |
| Mode: Offensive or Defensive? | 153 |
| Direction | 153 |
| Execution | 154 |
| Analyzing Federal Express Using the Strategic Option Generator | 154 |
| Analyzing UPS Using the Strategic Option Generator | 156 |
| Conclusion | 157 |
| Recommended Reading | 158 |
| Exercises | 158 |

CHAPTER 9 The Roles, Roles and Relationships Concept 159

| | |
|--|-----|
| Using Information Systems to Compete Dictates an Essential Partnership | 160 |
| Roles, Roles and Relationships | 161 |
| The Role of the Senior Executive | 161 |
| The Role of Other Senior Management (Managers of Major Business Functions) | 162 |

| | |
|---|-----|
| The Role of the IS Executive and the IS Organization | 162 |
| The Role of Users of Information Systems | 162 |
| Relationships | 163 |
| Technology Transfer Through Organizational Learning | 164 |
| Phases of Information Systems Management | 166 |
| Direction | 166 |
| Conceptual Approach | 166 |
| Specific Approach | 167 |
| Making Things Happen: Capitalizing on Information Systems Opportunity | 167 |
| Threat to the Business (Crisis Management) | 168 |
| Personal Power | 168 |
| Improvement of Business Practices | 168 |
| Summary of the Three Options | 169 |
| A Road Map to Business Success | 169 |
| Leadership Phases | 169 |
| The IS Organization as a Business Within a Business | 170 |
| Does the IS Organization Fit Within the Business Model? | 171 |
| Advantages of a Business-Within-a-Business Orientation | 172 |
| Outsourcing Information Systems | 173 |
| Company Examples of Outsourcing | 174 |
| Conclusion | 175 |
| Recommended Reading | 175 |
| Exercises | 176 |

CHAPTER 10 The Redefine/Define Concept and Change Management 177

| | |
|---|-----|
| The Redefine/Define Concept | 178 |
| Redefine/Define the Business | 179 |
| USA Today: The First National, General-Interest Newspaper | 180 |
| American Airlines Is in Two Primary Businesses | 181 |
| American President Companies | 181 |
| Redefine/Define Products or Services | 182 |
| A Change in Business Strategy at Charles Schwab | 182 |
| A Change in Products and Services at Banc One | 183 |
| Redefine/Define Business Processes | 184 |
| Boeing Redefines Its Design Process for the 777 | 185 |
| L.L. Bean: From a Mail Order to an 800-Number Order Process | 186 |
| The Product and Service Delivery Process | 187 |
| Change Management: A Major Management Challenge | 189 |
| IS Change Management at Hewlett-Packard | 191 |
| A Little Creativity Can Go a Long Way | 192 |
| Learning from the NUMMI Approach | 192 |
| A Vehicle for Change: Automating and Informating | 193 |
| Conclusion | 193 |
| Recommended Reading | 194 |
| Exercises | 195 |