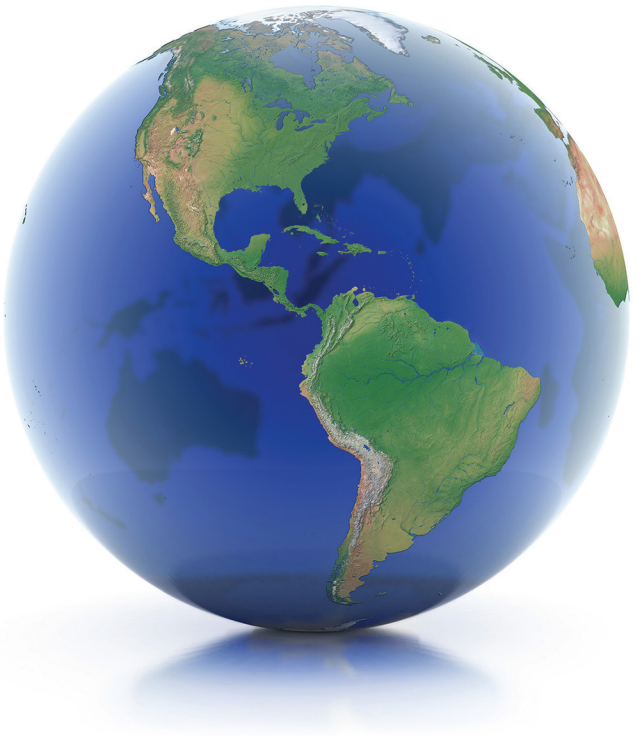
[FOURTH EDITION]

PROJECT AND PROGRAM MANAGEMENT

A COMPETENCY-BASED APPROACH



MITCHELL L. SPRINGER

Project and Program Management

Project and Program Management

A Competency-Based Approach, Fourth Edition

By Mitchell L. Springer

Purdue University Press, West Lafayette, Indiana

Printed in the United States of America.

Library of Congress Cataloging-in-Publication Data

Names: Springer, Mitchell L., 1959- author.
Title: Project and program management : a competency-based approach / by Mitchell L. Springer.
Description: Fourth edition. | West Lafayette, Indiana : Purdue University Press, [2019] | Includes bibliographical references and index.
Identifiers: LCCN 2018041532| ISBN 9781557538581 (hardback : alk. paper) | ISBN 9781612495705 (epdf) | ISBN 9781612495712 (epub)
Subjects: LCSH: Project management.
Classification: LCC HD69.P75 S684 2019 | DDC 658.4/04--dc23
LC record available at https://lccn.loc.gov/2018041532

Front cover by Santiago Grandlienard.

About the Author

Dr. Mitchell L. Springer, PMP, SPHR, SHRM-SCP

Dr. Mitchell L. Springer currently serves as an executive director for Purdue University's Polytechnic Institute located in West Lafayette, Indiana. He has over thirty-five years of theoretical and defense industry-based practical experience from four disciplines: software engineering, systems engineering, program management, and human resources. Dr. Springer possesses a significant strength in pattern recognition, analyzing, and improving organizational systems. He is internationally recognized, has contributions to scholarship of nearly 300 books, articles, presentations, editorials, and reviews on software development methodologies, management, organizational change, and program management. Dr. Springer sits on many university and community boards and advisory committees. He is the recipient of numerous awards and recognitions, most recently the Indiana Council for Continuing Education Diversity, Equity and Inclusion Award. Dr. Springer is the president of the Indiana Council for Continuing Education as well as the past chair of the Continuing Professional Development Division of the American Society for Engineering Education.

Dr. Springer received his Bachelor of Science in computer science from Purdue University, his MBA and doctorate in adult and community education with a cognate in executive development from Ball State University. He is certified as a Project Management Professional (PMP), Senior Professional in Human Resources (SPHR & SHRM-SCP) in Alternate Dispute Resolution (ADR), and in civil and domestic mediation. Dr. Springer is a State of Indiana Registered domestic mediator.

Contents

List of Illustrations xii

Preface xix

Introduction 1

Chapter 1. Program/Project Management Competencies 5
- Student PM Competency Model Paper Guidelines 7

Chapter 2. The Importance of Program/Project Management 11

Chapter 3. Process Management—Evolution and Definition 19
- Historical Orientation 19
- General Program Planning Models 25
- Integrated Linear Models versus Integrated Nonlinear Models 26
- Evaluation Methodologies and Accountability 27
- Composition of a Planning Process 28

Chapter 4. Contract Types—What Type of Contract Should I Enter Into? 31
- Factors in Selecting a Contract Type 32
- Fixed Price Contracts 33
- Cost Reimbursement Contracts 35
- Time and Materials Contracts 37
- Labor Hour Contracts 37
- Letter Contracts 38
- Exercises 38

Chapter 5. The Bidding Process—Obtaining a Price Quote 41
- Bid Organization 43
- Responsibility Assignment Matrix 45
- Before the Request for Proposal 45
- On Receipt of the Request for Proposal 45
- Proposal Generation Process 48
- Review and Approval Process 48
- Submittal Process 50
- Post-Submittal Process 50
- Post-Decision Process 51
- Statement of Work 52
- Technical Specification 53
- Work Breakdown Structure 54
- Classes of Estimates 54

Chapter 6. Defining the Work to be Performed 57
- A Shortened Perspective 57
- A More Detailed Perspective 65

Chapter 7. Scheduling and Staffing the Work 77
Types of Schedules 77
Network Approaches 82
Closing Thoughts on Developing a Network Diagram 87
Master Schedule 88
Intermediate Schedule 88
Detailed Schedules 89
Human Resource Plan 90
A More Detailed Perspective 91
Chapter 8. Risk Management—Mitigating the Impact 103
Risk Planning 104
Risk Assessment 105
Risk Analysis 107
Risk Handling 110
Chapter 9. Disruptive Technologies—Thinking Outside of the Box 113
Chapter 10. Cost, Schedule, and Performance Management—
A Quantitative Premise 121
Defining the Initial Budget 121
Determining How We Are Performing against the Initial Budget 122
Keeping Track of Actual Costs 123
Getting Back on Schedule and Within Cost 124
A More Detailed Perspective 125
Course Project Details and Examples 141
Chapter 11. Multiple Generations in the Workplace—
It's How We Grew Up 147
Late Adulthood Gerontological Life Phase (60+) 151
Middle Adulthood Gerontological Life Phase (40–60) 153
Early Adulthood Gerontological Life Phase (20–40) 154
Adolescence Gerontological Life Phase (10–20) 155
Cohort Group (Veterans) 155
Cohort Group (Boomers) 160
Cohort Group (Generation X'ers) 166
Cohort Group (Gen Y; Nexters; Millennials) 171
The New Next Professional Working Adult Learner (2019 Perspective) 176
Who Are the Students? 177
Why Are College Costs So High? 179
Moving Back Home and Its Implications 181
Postponing Marriage and Children 182
Postponing the Purchasing of Material Possessions 186
Concluding Thoughts 187
Cohort Group (Gen Z; iGen) 187
Concluding Remarks on the Nurture Side 194
Chapter 12. Connecting Generational Cohorts to Associative Thinking 195
Understanding the Breadth and Depth of a Discipline 195
"Seeing" across Disciplines 195
Practical Experience and Ability to Recognize the Bigger Picture 196
Ability to Recognize Cultural Realities 196
Understanding of Current Technologies 196

Unbounded by Hierarchical Pressures 197
Propensity for "Just Trying It" 197
Chapter 13. Leadership and Gender—A Science-Based Understanding 199
Differences in Neural Blood Flow Patterns 201
Differences in Structures of the Brain 202
Differences in Brain Chemistry 203
Leadership—Interpersonal Relationships 203
Leadership—Management Styles 204
Leadership—Things We Might See 204
Leadership—In Meetings 204
Chapter 14. Motivation and Leadership—Why We Do What We Do 207
Need Theories 207
Goal-Setting Theory 209
Reinforcement Theory 210
Equity Theory 210
Expectancy Theory 210
Chapter 15. Organization Design Models—
Not Right or Wrong, More or Less Applicable 213
Traditional 213
Product 215
Matrix 216
Project Management 218
Criteria for Selecting an Organizational Structure 219
Summary Remarks 219
Chapter 16. Building Teams—
Understanding Ourselves and Others through MBTI 221
Sensing (S) and Intuition (N) 221
Thinking (T) and Feeling (F) 222
Extraversion (E) and Introversion (I) 222
Judging (J) and Perceiving (P) 223
Type Combinations 223
Type and Organizational Change 223
Type Dynamics 224
Summary Thoughts by Type 225
Chapter 17. Capitalizing on the Collective Knowledge of the World 229
Availability of Skilled Labor 229
Skilled Labor Shortage Forecasts 230
Aging World Population 231
Retirement and the Working Senior Population 236
Science and Engineering Demographics 243
International Impact 247
Growing World Population 252
World's Education 253
Outsourcing of Goods and Services 263
Concluding Thoughts on the International Impact 269
Innovation, Technology, and the Systems Integrator 269
Understanding Technology as a Discipline 271
Integrating Intersectional Ideas 278

Creating an Integrative Mind-set 279
Systems Engineering—
The Cross-Discipline Eclectic Nature of Knowledge 280
Diversify Our Knowledge through Multiple Job Experiences 281
Summary Thoughts 282
Technology from a Worldwide Perspective 282
The Bio-Economy—A Truly Worldwide Experience 284
Dwindling Graduate Student Enrollments
in Distance-Based Programs (An Example) 290

Chapter 18. Establishing Program/Project Management as a Discipline 305

Chapter 19. Managers, Leaders, and Entrepreneurs 315
Defining Management 315
Management Functions 316
Management Roles 316
Management Skills 318
Leaders 319
Theories of Leadership 319
Power 322
Military Leadership Fundamentals 323
Entrepreneurs 325
Ethics at All Levels 327
Concluding Thoughts 328

Chapter 20. The American Social Economic Context 329
Prior to 1920 331
1920 to 1945 338
1945 to 1960 340
1960 to 1980 344
1980 to Present 346

Chapter 21. Career Development—Models 349
Moving Forward—The Four Questions 353
Educational Requirements of Engineering and Technology
Professional Working Adult Learners (Real-Life Example) 365
Mapping Employee Training and Development to Market
Requirements: Using a Corporate Market-Based Approach 372

Chapter 22. Succession Planning—Providing Opportunities for Growth 375
Why Is Succession Planning Important? 375
Who Is Succession Planning For? 376
Activities of Effective Succession Planning 376
What Do We Do When a Position Vacates? 376
Things to Remember 378
Who Is Responsible? 378

Chapter 23. The Business Case for Diversity and Inclusivity 379
Business Case for Diversity and Inclusivity: It's All about Growth 382
Millennials Usher in Minority Majority 385
The Millennial View of Diversity and Inclusivity 387
Coercion, Groupthink, Bias, and Inherent Discrimination 390
The Need to Survive and Reproduce 390
Reexamining Our Subconscious and Unconscious Mind 394
We Are More Alike Than Different—Genomically Speaking 395

Chapter 24. Effective Communication Skills 397
Encoding and Decoding Skills 398
Basic Rules for Addressing an Audience 399
Questions After the Presentation 400
Nonverbal Communication Skills 400
Listening Skills 400
Reading Skills 401
Skipping Judiciously 401
Communication Barriers 402
Organizational Communication 402
Conducting an Effective Meeting 403
Chapter 25. Change Management—People, the Hardest Part 405
Organizational Development—The Context of Change 405
Models of Change Management 407
Activities or Phases of the Change Management Process 409
Why Change Fails 410
Trust Through Character, Communication, and Capability 411
Managing Our Own Personal Change 412
Running the Academy as a Business (An Example) 415
The Synergistic Implications of Personal Ownership (A Comprehensive Example) 424
Creating Pride in Individual Efforts 425
How to Create Vision through Market-Based Analysis 427
Ownership Can Create Motivation 428
Fear Can Equally Stifle Action 430
Motivation is Hampered Through Entitlement 432
Closing Thoughts 434
Appendix A—Evaluating the Program Plan 435
Committee of Stakeholders 435
Primary Activities 435
Interviewing Program Participants 436
Outcome-Based Evaluation Methodology 437
Summary of Outcome-Based Evaluation Data Analysis Method 439
Appendix B—Executing the Program Plan 441
Appendix C—Changes to the Program Plan 447
Recognizing Changes 451
What Is a Change? 452
What Determines How a Contract Is Changed? 453
How Do Contractual Relationships Affect Changes? 453
Why Are Government Contract Changes Unique? 453
Why Do Changes Occur? 454
When Are Changes Likely to Occur? 456
What Are the Elements of a Change? 457
Common Names Given to Changes 457
What Types of Change Orders Can Occur? 460
Who Has the Authority to Order Changes? 461
When Can Changes Be Ordered? 463
What Changes Can Be Ordered? 463

What Response Does a Change Order Require? 464
When Is Changed Work Performed? 464
Appendix D—Program Planning Master Process Flow 467
Establish Planning Organization 467
Establish Program Management Library 469
Generate Requirements Database 472
Generate Master Program Schedule 473
Generate Preliminary Extended CWBS and Dictionary 475
Generate Preliminary Responsibility Assignment Matrix 477
Generate Intermediate Schedules 479
Generate Preliminary Detailed Schedules 480
Generate Human Resource Plan 482
Establish Program Organization 484
Post-Contract Award 485
Glossary 489
Bibliography 521
Index 531

List of Illustrations

1.1. Most Identified Behaviors across Companies 8
2.1. Projected New Positions by Sector Groups 13
2.2. IBM 1998 Newspaper Seeking PMI Certification 14
2.3. PM Education, Training, and Continued Knowledge Acquisition 15
3.1. Context Diagram 20
3.2. Cyclical Nature of a Sequential Process 27
3.3. Program Management Process Flow 29
5.1. Overall Bidding Process 42
5.2. Pre-RFP to RFP Interaction 42
5.3. Typical Bid Organization 43
5.4. Bid and Proposal Responsibility Assignment Matrix 46
5.5. Pre-RFP Process Flow 47
5.6. RFP Process 47
5.7. Proposal Generation Process 48
5.8. Review and Approval Process 49
5.9. Submittal Process 50
5.10. Post-Submittal Process 51
5.11. Post-Decision Process 52
5.12. Example Work Breakdown Structure (WBS) 55
6.1. Derived Requirements—Four Bedroom House 58
6.2. Hosting a Thanksgiving Dinner 59
6.3. Business Process Reengineering 60
6.4. WBS for Building a House—by Function 61
6.5. WBS for Building a House—by Phase 62
6.6. WBS—Heaven on Earth Wedding Planners 63
6.7. Heaven on Earth Wedding Planners Responsibility Assignment Matrix 64
6.8. Requirements Management Process Flow 65
6.9. Work Breakdown Structure 67
6.10. Example Subcontract Cost Account Content 69
6.11. WBS Element Dictionary 71
6.12. WBS and Dictionary Detailed Process Flow 71
6.13. Detailed Costed Preliminary Responsibility Assignment Matrix 72
6.14. Preliminary RAM Detailed Process Flow 73
6.15. Budget Development Process 75
7.1. Gantt Chart 78
7.2. Symbology of Milestone Charts 79
7.3. Example Milestone Chart 80
7.4. Permutation of Gantt and Milestone Chart 81
7.5. AOA Rule #1—One and Only One Arrow in the Network 83
7.6. AOA Rule #2—No Two Head and Tail Events 83
7.7. Dummy Activities are Like One Way Water Pipes Full of Data 83
7.8. Is “E” Preceded by “B” and “C” Alone? 84
7.9. Exercise #1—Correct Solution 84
7.10. Exercise #2—Correct Solution? 85
7.11. Exercise #2—Correct Solution 85
7.12. Example of Early/Late Start and Finish Times 86
7.13. Example with Total Slack Calculated 87

7.14. Example Master Program Schedule 89
7.15. Example Intermediate Schedule 89
7.16. Example Detailed Schedule 90
7.17. Lead and Lag Relationships 90
7.18. Example Human Resource Plan 91
7.19. Example Master Program Schedule 92
7.20. Master Program Schedule Process Flow 92
7.21. Example Intermediate Schedule 94
7.22. Intermediate Schedule Detailed Process Flow 94
7.23. Example Detailed Schedule 95
7.24. Detailed Schedules Detailed Process Flow 96
7.25. Example Human Resource Plan 100
7.26. Human Resource Plan Detailed Process Flow 101
8.1. Gain versus Acceptability of Risk 103
8.2. Consequence versus Acceptability of Risk 104
8.3. Probability versus Seriousness of the Risk 105
8.4. Decision Analysis Decision Tree 108
8.5. Risk Management Analysis to Handling 111
8.6. Risk Management Phases 112
9.1. iPhone as a Disruptive Technology 115
9.2. Apple Macintosh 116
9.3. Reintroduction of Extinct Species (Google CRISPR images) 119
9.4. DNA-Modified CRISPR Images (Google CRISPR images) 120
10.1. Setting the Cost Baseline; Identifying the Value of Each Activity 121
10.2. Amount Paid for the Work Performed 122
10.3. Actual Cost to Do the Work 123
10.4. Estimate at Complete 124
10.5. Schedule Hierarchy Development and Statusing 127
10.6. Planned Schedule Timeline 128
10.7. Worked Scheduled and Performance Credit 128
10.8. Work Performed and Actual Costs 129
10.9. Actual Costs—Cumulative Representation 130
10.10. Earned Value Management Concepts Chart 130
10.11. The Language of Earned Value Management 131
10.12. BCWS/BCWP/ACWP Exercise 133
10.13. BCWS/BCWP/ACWP Exercise Solutions 133
10.14. 25/75 Earned Value Management Technique 135
10.15. Example of Milestone Weights 136
10.16. Milestone Weights with Percent Complete 136
10.17. Apportioned Effort Example 138
10.18. Example Cost Account Plan 139
10.19. Cost Account Plan Detailed Process Flow 139
10.20. Risk Management Analysis to Handling 146
11.1. Births by Year 148
11.2. Baby Boomer Cohort Movement through Time 149
11.3. Millennials Surpass Boomers and GenX, in Population and at Work 150
11.4. Myths and Facts About Aging—Veterans 160
11.5. At What Age Do You Plan To Retire—Survey Report, Age Wave 164

11.6. Reasons for Wanting to Work Later in Lif52 Survey Report, HSBC, *USA Today* 165
11.7. Biggest Fear is Cost of Illness—Survey Report 165
11.8. International Reduction in Working Age Population 166
11.9. Predominance of Working Mothers and Peaked Divorce Rate, BLS/NCHS 170
11.10. Then and Now—AARP 2008 173
11.11. Comparison of Perspectives 175
11.12. A Brief History of "Cool" and Other Slang Terms, *Fast Company* 176
11.13. Newest Students of Professional Distance Programs 179
11.14. Student Debt to Other Household Debt 180
11.15. Percent of Young Adults Living with Parents 182
11.16. Percent Young Adults Living with Family 183
11.17. Impact of Economic Conditions 183
11.18. Median Age of First Marriage 184
11.19. Education vs. Total Fertility Rate 185
11.20. Household Income vs. Total Fertility Rate 185
11.21. Images of Technology from Prior Generations (Google Images) 188
11.22. New Minority Majority in U.S. 189
13.1. Male and Female Brains at Rest 200
13.2. Leadership Traits More True of . . . , Survey Results, Pew Research Center 205
14.1. Maslow's Hierarchy of Needs 208
14.2. Perception of Equity 210
14.3. Expectancy Theory 211
15.1. Traditional Organizational Design Model 214
15.2. Product Organizational Design Model 215
15.3. Matrix Organizational Design Model 217
15.4. Project Management Organizational Design Model 219
16.1. Type Combinations 223
16.2. Order of Preferences by Type 224
16.3. Type Preference Order Potential for Conflict 225
17.1. Skills Gap in Manufacturing 2015–2025 232
17.2. Reasons for Working by Age— Percent Who Say This is a "Big Reason" They Work, Pew 235
17.3. Job Satisfaction by Age, Pew 235
17.4. Ratio of Workers to Retirees 237
17.5. Projected Growth of Baby Boomer Segment of Population through 2024 (BLS, Dec. 2015) 237
17.6. Men's Pensionable Age in OECD Countries, 1949–2050 240
17.7. Women's Pensionable Age in OECD Countries, 1949–2050 241
17.8. Decomposition of the Life Course, OECD 242
17.9. 2012–2022 Projected Growth Rate Comparison, NSF 2016 242
17.10. International Students Enrolled in U.S. Higher Education Institutions by Broad Field and Academic Level 2008 – 2014 246
17.11. Current U.S. World Standings, OECD 2010 249
17.12. Tertiary-Educated Population 15 Years Old or Older, by Country/Economy: 1980 and 2000, NSF, 2010 255

17.13. First University Degrees by Selected Region/Country/Economy, 2012 255
17.14. First University Degrees in Natural Sciences and Engineering, Selected Countries: 2001–2010, NSF, 2014 256
17.15. First University Degrees by Country (NSF 2016, P. O-7) 257
17.16. Destination Countries of Internationally Mobile Students (NSF 2016, O-9) 258
17.17. Researchers in Selected Regions/Countries/Economies: 1995–2011, NSF, 2014 259
17.18. Researchers in Selected Regions/Countries/Economies: 2000–2013, NSF, 2016 260
17.19. Average Annual Growth in Number of Researchers in Selected Regions/Countries/Economies: 1995–2007, NSF, 2010 260
17.20. Researchers as a Share of Total Employment in Selected Regions/Countries/Economies: 2000–2013 261
17.21. Education Pays, Bureau of Labor Statistics, 2016 262
17.22. Top Reasons Companies Outsource, Outsourcing World Summit, 2002 264
17.23. Top Reasons Companies Outsource (Deloitte, 2017) 265
17.24. Share of Global High-Technology Exports, by Region/Country: 1995–2008, NSF, 2010 267
17.25. Share of Global High-Technology Exports, by Region/Country: 1995–2008, NSF, 2010 268
17.26. Levels of Integration 274
17.27. Systems Integrator Framework 275
17.28. Management Level versus Expected Skill Sets 278
17.29. Enrollments by Type of Institution 292
17.30. Number and Percent of Student Decline from 2012–2015 293
17.31. Student enrollment Decline by Institution Sector 294
17.32. Enrollment Past and Future Through 2032 298
17.33. Private Religious and Nonsectarian Declines 298
17.34. Declining High School Enrollment Impact by Region 299
17.35. Break Even Perspective from 2008–2009 Academic Year 299
17.36. Increase in Distance Education by Type 300
17.37. Distance Enrollments Increased at Both the Undergraduate and Graduate Levels 300
17.38. Distance Education Enrollments by Type of Institution 301
17.39. Enrollments Unevenly Distributed by Institution Type 302
17.40. Distance Enrollments Percent Change 2012–2015 302
17.41. Distance Enrollment Differences by Institutional Sector 303
18.1. Corporate Program Office 306
18.2. Corporate PM Office Responsibility Assignment Matrix 306
18.3. Level Three Work Breakdown Structure 307
18.4. Breakdown of Define Program Management Process 308
18.5. Breakdown of Implement Program Management Process 309
18.6. Breakdown of Perform Program Management Quality Assurance 310
18.7. Breakdown of Manage Program Management Personnel 310
18.8. Program Management Process Master Schedule 311

19.1. Resource Utilization versus Goal Attainment 316
19.2. Management Levels versus Required Skills 319
19.3. Managerial Grid 321
20.1. Context Diagram 330
21.1. The Four Levels of Decision 350
21.2. Basic Career Development Model 360
21.3. Initial Job Requirements 363
21.4. Requirements Gap Analysis 363
21.5. Gap Analysis—Chart Depiction 363
21.6. Career Development Responsibility Assignment Matrix 364
21.7. Career Development Schedule of Activities 364
21.8. Technologist and Engineering Titles/Roles Mapping to Product Life-Cycle Phases 367
21.9. Participant Originating Disciplines 369
21.10. Engineering-Technology Higher Education Continuums 370
21.11. Potential Engineering—Technology Curriculum Mapping 371
21.12. Flow of Potential Students into Technology Prog 371
21.13. Strategic and Tactical Model for Business Growth 374
21.14. Example Strategic and Tactical Training Plan 374
22.1. Highly Integrated, Fully Synchronized Effort 375
22.2. Potential Successors by Position 377
22.3. Position Incumbent Characteristics 377
23.1. Growth, Innovation, Ideas, and Inclusion 384
23.2. Race and Ethnic Profiles by Age Group (Frey, 2018) 386
23.3. Net Population Gains/Losses by Race/Ethnicity: 2000–2015 (Frey, 2018) 386
23.4. Millennial Definitions of Diversity Distinguish Them from Other Generations 388
24.1. Basic Communications Model 398
25.1. Five Stems of Organizational Development 406
25.2. Lewin's Model of Planned Change 408
25.3. Action Research Model 408
25.4. Appreciative Inquiry Model (Positive Model) 408
25.5. General Model of Planned Change 409
25.6. Phases of Personal Change; adapted from *Managing Personal Change* 414
25.7. Profits vs. the Good of the Nation 416
25.8. The Mentality of Investing 417
25.9. Continuum of Knowledge, Skills, and Abilities 425
25.10. Hierarchy of Maximum Potential 425
25.11. If You Don't Know Where You Are Going, Any Road Will Get You There 426
25.12. Strategic and Tactical Model for Business Growth 428
25.13. Levels of Fear 430
25.14. The Burning Platform 432
A.1. Evaluation Process Activities 436
A.2. Sample Likert Scale Question 438
A.3. Example of an Observation Form 438

B.1. Example Variance Analysis Report 443
B.2. Example Cost Performance Report 445
B.3. Execution Phase Responsibility Assignment Matrix (RAM) 446
C.1. Change Management Process 448
C.2. Identify the Change Process 449
C.3. Determine Impact of the Change Process 450
C.4. Implementing the Change Process 452
D.1. Program Planning Master Process Flow 468
D.2. Establishing Planning Organization Process Flow 470
D.3. Example Data to be Placed in Program Management Library 471
D.4. Program Management Library Process Flow 472
D.5. Master Program Schedule Process Flow 475
D.6. Extended CWBS and Dictionary Process Flow 478
D.7. Generating the RAM Process Flow 479
D.8. Generate Intermediate Schedule Process Flow 481
D.9. Generate Detailed Schedules Process Flow 483
D.10. Human Resource Plan Process Flow 484
D.11. Program Organization Process Flow 486
D.12. Cost Account Plans Process Flow 488

Preface

Over thirty-five years ago I graduated from Purdue University in computer science. I was the first college graduate in my family. Walking down the aisle at graduation, I couldn't believe it was real. My family was very poor. I could tell stories that would bring most to tears. We lived a meager existence, struggling to get by. I remember how I decided to go to college. I was a senior in high school, and our school was hosting a college day. Colleges came from all over Indiana and the region, set up their tables, and passed out literature. I remember thinking that I didn't want to be poor anymore. I was tired of not having what my friends had, of worrying about whether we could afford oil for our furnace to heat our home, and not being able to buy the essentials at the grocery store. I remember hearing how education would provide opportunity, which in turn would provide a chance to live a normal life like most of my friends had. I walked that day to the table where an Indiana University recruiter sat. I told him my strengths were computers and math, and asked if they had something that would take me out of poverty. What that gentleman from IU did for me on that day changed my life forever. He pointed to the Purdue table and said, "See that guy at the Purdue table? Purdue has a degree in computer science that you might be suited for."

As I walked down the aisle of Hovde Hall that graduation day, I had never felt the commitment to an organization or the love for a place as I had, and do, for Purdue University. Purdue was, and is, more than a place. It's where I grew up mentally and emotionally. It's where I learned true independence and real responsibility. Although I didn't have any idea where it would take me in life, I knew my Purdue education would pave the way for a very bright future.

As I walked down the aisle in Hovde Hall to accept my diploma, I remember choking back tears. They were tears of disbelief, of happiness, of love for a place, for the people, and for a life I had come to deeply appreciate. I knew right then that one day, I would return to Purdue in some capacity, to dedicate my life to serving the greater good, as others had done for me. I wanted to be a part of the Purdue family; I wanted to one day live and work in the heart of the campus and immerse myself in the rich tradition of one of the greatest universities in the world; I wanted to change people's lives forever. At that time, I made a commitment to return to serve in a different capacity.

Over the next nearly thirty years, with support and guidance from numerous members of my Purdue family, I methodically did as I was instructed to do. I pursued and earned my MBA and then my doctorate. I published professionally refereed articles and presentations. I even wrote a number of books. My career took me away from Indiana to Texas and by no accident, back to Indianapolis. During that time my two sons had graduated from Purdue and had subsequently gone on to law school. Then the most ideal job opportunity presented itself and I was able to return home—to my Purdue family. There is not a single day that goes by that I don't stop and simply look around at the campus, giving thanks for this life I have been given. I am living proof that dreams do come true. I love my life, my job, my Purdue family, and being able to live the dream. Being at Purdue is a great honor; I do not take it for granted. I am honored to be a member of the Purdue family, and extremely thankful for the opportunity.

". . . for wisdom will come into your heart, and knowledge will be pleasant to your soul; discretion will watch over you, understanding will guard you"
Proverbs 2:10-11

Introduction

The first edition of this text evolved from nearly 17 years of research, teaching, and writing. It came to be through an iterative process of understanding the research and development phases of the program/project management life-cycle of major system product development. The text began with a basic underlying understanding and desire to write about program planning, that being the pre-contract award period of the overarching process for managing programs.

Program Planning was written in 1995. It dealt primarily with the program/project management planning process; again, that being prior to a contract being awarded. It identified a process made up of a series of activities, each with its own attendant products. Back in 1995, the whole discipline of program and project management was just starting to evolve into a recognized and accepted discipline. Now, it can be readily argued that program/project management has been around since the beginning of time, and in fact the most widely recognized credentialing authority, the Project Management Institute, has been around since 1959. The Defense Systems Management College has equally been around since that time. But, program and project management as a recognized and essential discipline didn't really begin to proliferate in literature until around 1995.

Program Planning defined a planning process with multiple time-phased, semi-sequential activities and their attendant products. In retrospect, although somewhat narrow in perspective, the book covered the basics of the quantitative aspects of program/project management. Through teaching program/project management in multiple universities, primarily to working professionals and graduate students, came the realization that a text for planning programs that was entirely quantitatively focused was insufficient. It became clear that the actual practice of program/project management, if taught correctly, needed to include more than the quantitative component; it also needed to include the peripheral disciplines and concepts. This more thorough understanding, evolving from actual teaching experience, led to *Program Management: A Comprehensive Overview of the Discipline.* This book gained recognition internationally and was published in seven countries around the world. Interestingly enough, the title itself brought many questions. How can something be a comprehensive overview? Can't something be less than a comprehensive overview? It was the breadth of the discipline that was gaining the breadth of discussion.

Again, as before, it was the numerous and varied disciplines as represented by the students that led to the natural conclusion that my defense industry background had caused the use of a very defense industry-specific set of terminology and an unnecessarily complex process. The terminology, process, and practice as defined and implemented in the defense industry is the most complex in any industry and certainly doesn't lend itself readily to assimilation from those not in the more acronym-oriented defense industry. What was needed was a much simpler overview and discussion of the process and products themselves. To this end, *A Concise Guide to Program Management* evolved.

The value of *A Concise Guide to Program Management* was that the process and products were discussed in terms of a much simpler industry, one oriented toward something with which a large number of students had at least some familiarity: home building. This book, then, focused on describing program/project management from a commercial perspective, versus the previous attempts at describing the discipline from a defense-oriented perspective.

To summarize, at the time of *A Concise Guide to Program Management*, experience with students had led to an enlarged writing perspective from simply planning programs to describing the comprehensive nature of program/project management to describing program/project management from a commercially oriented perspective. Through additional teaching, it was discovered that students preferred to actually have a little of the defense perspective, with a more detailed discussion involving the commercial perspective. In this sense, both books served to more completely define the program/project management process, such that a more comprehensive understanding could be attained. This was good and would prove to be the winning combination for maximum assimilation and subsequent application.

What is left then to write about on this topic? The answer: another perspective that entails the work previously discussed and now formalizes the knowledge into a structure that allows the exhibition of behaviors believed to be required for success as program managers of the future. In other words, we need a model of competencies premised on behaviors that entail the concepts presented in previous work around planning and other interrelated disciplines: a competency-based approach.

Aren't there already books on competency-based approaches to program/project management? The answer is yes, but they do not include the breadth of discussion required to fully understand the discipline. Other books on competency-based approaches to program/project management simply discuss what the authors feel are required competencies, and not all authors agree.

What differentiated the first edition of this book from other competency-based perspectives, then, was that the book rounded-out the discussion on competencies required for future program/project management success by incorporating the more complex discussion already evolved and expanded on in previous works on planning and the interrelatedness of peripheral disciplines. The first edition of this book used a broader stroke to paint a more complete perspective of not only the process and products identified to be the program/project management process, but equally, placed these elements into a competency-based framework, which could then be tied directly to a competency model and subsequent training.

The second edition of *Project and Program Management: A Competency-Based Approach* really took the first edition to a new level. To begin with, through years of teaching and writing, there were a number of new chapters, significant expansion of existing ones, and a major shuffling of the order of the material. This revision had expanded and new chapters recognizing the qualitative significance of the discipline—this idea coming directly from the students. Additionally, the many students over the years have helped to evolve a much greater understanding of the competencies required to be a successful program/project manager. This effort was reflected through 315 references to 107 unique companies. Where within those 107 unique companies, there are a total of 54 unique behaviors identified; across those 54 unique behaviors, there are 229 unique skills, where each behavior had two or more skills, and on average around four skills per behavior. The work provided significant insight into the business and industrial perspective of what constitutes a well-rounded program/project manager.

The quantitative chapters, those dealing directly with the program/project management process, activities, and outcomes (products), had been refined to bring together the non-jargon-oriented commercial perspective, then followed by what may be termed a deeper dive. This more detailed perspective provided insight into the complexities of each activity and attendant outputs. The deeper dive is for those who wish a more thorough understanding and the challenges that might arise from a large-scale implementation of the process.

The new qualitative chapters included material dealing with disruptive technologies, leadership and gender, succession planning, change management, and, perhaps most excitedly, providing an insight into what it means to capitalize on the world's collective knowledge. As before, all of these chapters were researched, taught on more than one occasion, and suggested by the many students to be part of this revised edition.

Included in the second edition was a chapter summarizing the entire program/project management process outputs by identifying in a concise manner the ordered outputs from the many process activities. This chapter, as others, was highly regarded and recommended by the students. It brought together the quantitative discussion from applicable chapters into one brief chapter, with reference to other chapters for further understanding.

Lastly, the material had been significantly restructured and reorganized. To better integrate the qualitative and quantitative material, the students felt the new organization presented in the revised second edition supported a greater perceptual flow, which in the end enhanced student understanding and assimilation.

The third edition of Project and Program Management: A Competency-Based Approach expanded on the second edition in every chapter, bringing fresh and updated insight gained from the continuation of

teaching and research. Additionally, the third edition delved deeper into the qualitative nature of program/project management. It opened the aperture further than previous editions by following paths of logic relative to the new student learner and in particular professional working adult learners in the multifaceted discipline of program/project management.

This fourth edition has been again significantly revised, with every chapter being impacted. When we discuss the qualitative nature of program/project management—that is, the art form of the discipline—the literature proliferates at an unparalleled pace. Our understanding of generational cohorts continues to evolve in real-time with extensive research from numerous credible institutions and organizations. Further, our understanding of the connectedness of our one world sheds nearly daily light on our international interactions—socially, politically, technologically, and in every other way. Each of these many changes, coupled with advances in PM technologies and real-world applications, provides a rich basis for furthering our understanding of the complexities when managing our many programs and projects. This fourth edition considers the magnitude of these many changes and their impact on each of the chapters of this book. Not forgotten are the many inputs from the numerous students who continue to bring to the forefront their current real-world practices; this across their many represented businesses, industries, and disciplines. These are perhaps the most important of considerations when comparing previous material to current-day realities.

Chapter 1

Program/Project Management Competencies

Every discipline, to be a discipline, must have competencies. Competencies define the behaviors indicative of what is required to be successful in the respective discipline. Competencies, then, allow us to judge ourselves in terms of how much we know about a given competency, which, in turn, allows us to pursue a better understanding of a given competency through training and education. In other words, since competencies are nothing more than manifested behaviors, which we can form through training, competencies are things we can develop in ourselves and others. The question to be asked, however, is what are the agreed-to competencies of a given discipline?

The answer to the question "what are the required program/project management competencies for success in practice?" is not uniformly agreed upon. In fact, looking through the proliferation of literature, it appears there is not a single set of program/project management competencies agreed to by all. What we can do, however, is to pull from the many already defined competencies a set that we can then apply our own experience to create an acceptable set. Certainly, without question, we can define the basic competencies. So, to this end, this book defines the basic competencies and a few others oriented around successful leaders and leadership that is proposed to form a complete set of program/project management competencies.

J. Davidson Frame, in his 1999 book entitled *Building Project Management Competence,* defines eleven competencies program/project managers must possess to ensure at least some facsimile of, or opportunity for, success. These eleven competencies are:

- ❑ Be results oriented
- ❑ Have a head for details
- ❑ Possess a strong commitment to the project
- ❑ Be aware of the organization's goals
- ❑ Be politically savvy
- ❑ Be cost-conscious
- ❑ Understand business basics
- ❑ Be capable of addressing needs of staff, customers, and management
- ❑ Be capable of dealing with ambiguity, setbacks, and disappointments
- ❑ Possess good negotiation skills
- ❑ Possess the appropriate technical skills to do the job

Frame goes on to separate competencies into three categories: knowledge-based, socially rooted, and business-judgment.

According to Frame, knowledge-based competencies are objective knowledge that individuals are expected to possess in order to carry out their jobs effectively. An Ada programmer should know something about Ada as a programming language; a restaurant owner should know something about running a restaurant; and a builder should know something about building a house.

Socially rooted competencies are more subjective as defined by Frame. He writes, "They focus on abilities such as good judgment and human relations skills. Task leaders who are able to mediate conflicts on their teams possess some measure of socially rooted competence, as do project managers who can motivate borrowed resources to put in needed extra hours of work and technical workers who display sensitivity to their customers need" (p. 6).

The last category of program/project management competencies are business-judgment competencies. These are "tied to the ability of individuals to make decisions to consistently serve the best business interest of the organization. People who are strong in this area are able to assess the risks and rewards associated with decisions they are about to make. They look beyond the immediate impact of their decisions and understand their opportunity costs. Although they recognize the importance of establishing and following good methods and procedures for the effective functioning of the organization, they do not behave like mindless bureaucrats. When they see an opportunity to improve the business performance, they seize it, even when it lies outside the realm of business procedures" (p. 6).

Harold Kerzner, in his 2009, tenth edition book entitled *Project Management: A Systems Approach to Planning, Scheduling and Controlling,* defines ten skills he believes project managers must possess to be effective in their pursuits. These ten skills are:

- ❑ Team building
- ❑ Leadership
- ❑ Conflict resolution
- ❑ Technical expertise
- ❑ Planning
- ❑ Organization
- ❑ Entrepreneurship
- ❑ Administration
- ❑ Management support
- ❑ Resource allocation

Kerzner goes on to say that "it is important the personal management style underlying these skills facilitate the integration of multidisciplinary program resources for synergistic operation. The days of the manager who gets by with technical expertise alone or pure administrative skills are gone" (p. 905).

Others, and there are many, have separated a program/project manager's competencies into two categories of leadership and those specific to program/project management, although there seems to be much confusion on a common set of defined competencies. Others have added the following competencies, some derived from the Project Management Institute's (PMI's) definitions:

- ❑ Strategic thinking
- ❑ Customer focus
- ❑ Business alignment
- ❑ Domain knowledge
- ❑ Decision making
- ❑ Ethical behavior
- ❑ Self-management
- ❑ Global awareness
- ❑ Risk and opportunity management
- ❑ Program planning and execution

Over the last thirty-plus years of teaching program/project management, professional working adult learners have been asked to build competency models in much the same manner as is being described here. They were asked to visit online organizations, download their respective competency model for program/project managers, and then compare and contrast their findings. Ultimately, they have been asked to create

their own version of a "good" competency model from their research findings and their own personal experiences. Below are the guidelines provided to students for these many papers.

Student PM Competency Model Paper Guidelines

1. Research and document three program/project management-oriented competency models. These can generally be found on the internet.
2. From the above three researched models, create your own (fourth) perspective of what behaviors, and skills per behavior, are most important, or, alternatively, you can use your current company competency model as this fourth model; your choice.
3. You should have three to five behaviors and three to five skills per behavior in your fourth model.
4. You should define three (3) levels of program/project manager; example, Level 1, Level 2, Level 3. For each level of PM define:
    a. Experience required
    b. Education required or desired
    c. Size of programs responsible for; value ($$), complexity, etc.
    d. Type of program responsible for; component, subsystem, system, platform, etc.
5. You will deliver one (1) item; a Word document—if you wish to send me an Excel file from which you cut and pasted into your master Word document you may do that as well, but I will only be looking at and grading the Word file. Summarizing, submit:
    a. A complete Microsoft Word document that documents your three researched models found (placing one researched model per appendix for three total appendices), and your chosen (fourth model) specific model behaviors and skills, where your fourth model behaviors and skills are **mapped** to your three levels of PM. Again, in an effort to keep the body of the Word document to a minimum, please place the three researched models in separate appendices (Appendix A, Appendix B, Appendix C) at the end of your Word document. To be specific:
        i. Word document with three total appendices; one each for the three models researched.
        ii. Your fourth model should be **in the body** of the Word document, **not** an appendix.
    b. Potentially, an additional Microsoft Excel document, if you used one to cut and paste into your Word document from. The information in this file needs to be cut and pasted into your Word document, therefore forming a complete, all-encompassing Word paper. I do not necessarily need the Excel file, but I must have a complete Word file.
6. Name both files (Word required, Excel if you wish) as: Lname, Fname, Paper (e.g., Doe, Jane, Paper). The .docx and .xlsx postfixes will differentiate the files, therefore allowing the same name on each file.
7. Your name should be on the paper (.docx) title page.
8. Make sure to include page numbers in your Word document.
9. You must have a Table of Contents in your Word document.
10. Single-space the paper.
11. There is no page limit.

The result of this student research has been over 3,000 references to hundreds of unique companies. Within those hundreds of unique companies, there are a significant number of behaviors identified. Across those many behaviors, there are hundreds of attendant skills, where each behavior has three or more skills, and on average around four skills per behavior. Figure 1.1 depicts the top 20 of those predominantly identified behaviors of the many companies researched.

Behaviors	# of occurrences
Managerial/Leadership	72
Communication	61
Personal Effectiveness / Skills	43
Risk Management	29
Planning & Project Management	28
Impact and Influence	27
Problem Solving	27
Team Development	27
Customer Focus	25
Technological Savvy	24
Shape the Future/Vision	20
Time Management	20
Organization	17
Decision Making	16
Human Resources	15
Achievement and Action	12
Business / Corporate	12
Trust and Respect	11
Cognitive	10
Goal Oriented	9

Figure 1.1. Most Identified Behaviors across Companies

Something most interesting in figure 1.1 is that qualitative behaviors outnumber quantitative behaviors significantly. In fact, depending on how one wishes to argue it, there appears to be 17 qualitative behaviors to just three quantitative ones; in other words, 85 percent of the behaviors of the top researched companies believe qualitative behaviors are at least as important as quantitative, and from the data, more so.

When most of us become program/project managers, we are given key training on the tools and techniques that enable us to monitor our cost, schedule, and technical performance baseline. In other words, we are taught about: (1) scheduling techniques; the differences between Gantt charts and network diagrams, (2) earned value; how to compare a program's actual cost to credit earned for work performed and baseline cost, and perhaps (3) we may be indoctrinated into the organization's departmental budgeting process. Most all of these, as one would notice, are quantitative measures, which while essential, are arguably not the entirety of what is required for successful program/project management.

To provide an example premised on the findings from the above research, I'd like to share a story. Earlier in my career, I was working on a program as the software engineering manager. We were a subcontractor to a larger prime contractor located in the southern United States. At this particular point in our relationship with this prime contractor, the program manager, contracts manager, marketing manager, and I (the software engineering manager) were flying down to see our prime for what is termed fact finding. Fact finding is the process a prime contractor goes through with a subcontractor to determine appropriateness of the subcontractor's cost basis for the subcontractor's bid to do their portion of the job.

After some number of hours and numerous discussions on the many line items that formed the basis of our bid, we stumbled onto a particular document that we felt would take five months of a single person's time to complete. The prime, our customer, felt it should only take two months to complete. After what appeared to be a standstill, their contract manager stood up and said, "We don't think you are negotiating in

good faith. We would like you to leave." As my colleagues began to pack, I sat dumbfounded. On seeing this, my contracts manager said, "Let's go. Pack your briefcase. We're leaving." Now the hallway out of this facility was quite long. In fact, it was probably about two city blocks from the building we were in to the exit. The silence was deafening. Nobody spoke a single word. Once outside I asked our contracts manager what we were going to do, as I had never been asked to leave a negotiation session before. He simply replied that we would go back to our hotel and see what developed that evening.

After a nice meal (you always eat well when traveling with marketing people), we went back to the hotel only to receive a phone call from our prime, who asked that we return the next day to continue our discussions.

As requested, the next day we returned. Again we were escorted down the long hallway toward our meeting room. It was amazing how everyone appeared so jolly. People were laughing and joking like nothing had happened. There was great food and drinks for us, and all seemed well. We again began to discuss line items that made up our cost proposal. Again, as in the previous day, we came to that one line item that we disagreed upon.

What happened next is funny now, but back then I was floored. Our contracts manager, not theirs, stood up and said, "We don't think you are negotiating in good faith. We are leaving." I was dumbfounded, a second time! I couldn't believe it. I sat motionless and watched. Again, my contracts manager looked over at me and said, "Let's go. Pack your briefcase."

As we were escorted down the long hallway, my contract manager looked over at me and apparently recognized my puzzlement. He said, "Don't worry, I've been thrown out of better places than this before." My feeling was that I had never been asked to leave a negotiation, and I had never walked out of a negotiation, and above all else, I had never had both of them occur in the same trip!

After returning home, our business area manager was brought up to speed on the turn of events. He made one telephone call to his peer at our prime's organization. I heard them talk. Our manager said, "What do you think, Bob? I heard our boys had some minor difficulty working together. What do you say we split the difference?" The other manager must have said OK, because the next thing I knew our manager was hanging the telephone up and saying, "It's all OK guys, you can get back to work now." I incredulously wondered what had just happened. I thought, "You mean we flew four people to the southern United States, spent time in hotels, ate meals, and then met with up to six of their people for two days, only to have our V.P. spend three minutes on the telephone with their V.P., and all is well?"

As I reflected on this, I wondered, where in my quantitative training did I miss the part about contracts, contract negotiations, politics, and dealing with people? The answer: I didn't! It wasn't covered in my scheduling class, or my cost class, or even my training on reading end of the month budget summaries. It wasn't covered, period.

And this is what this text provides. This text is a look at the breadth of behaviors that make up program/project management as a whole, not simply the quantitative aspects of planning.

So given this, it comes as no surprise that qualitative behaviors and skills are paramount to program/project management success, and are reflected in the data as the top behaviors from the top companies researched.

So, where are we? We're left with the task of extracting and formulating a set of program/project management behaviors that most generally encapsulate the predominance of those we deem to be applicable to managing successful programs and projects.

Our list then, of program/project management behaviors, will separate the qualitative from the quantitative behaviors, and it looks like the following:

- Qualitative behaviors
  - Understanding the global environment—seeing the bigger picture
  - Understanding leadership
  - Understanding team dynamics and individual personalities—team building and team development