



CD-ROM included

# PROJECT MANAGEMENT

**WILEY**  
**INTERNATIONAL**  
**EDITION**  
**RESTRICTED!**  
**NOT FOR SALE IN**  
**NORTH AMERICA**

## TOOLS AND TRADE-OFFS



## TED KLASTORIN

# BRIEF CONTENTS

*PREFACE*    **xiii**

---

*ABOUT THE AUTHOR*    **xvii**

---

**CHAPTER 1**    *INTRODUCTION TO PROJECT MANAGEMENT*    **1**

---

**CHAPTER 2**    *PROJECT INITIATION, SELECTION, AND PLANNING*    **23**

---

**CHAPTER 3**    *PROJECT TEAMS AND ORGANIZATIONAL RELATIONSHIPS*    **62**

---

**CHAPTER 4**    *PRECEDENCE NETWORKS AND THE CRITICAL PATH METHOD (CPM)*    **83**

---

**CHAPTER 5**    *PLANNING TO MINIMIZE COSTS*    **107**

---

**CHAPTER 6**    *PLANNING WITH UNCERTAINTY*    **135**

---

**CHAPTER 7**    *RISK MANAGEMENT*    **165**

---

**CHAPTER 8**    *RESOURCE MANAGEMENT*    **175**

---

**CHAPTER 9**    *MONITORING AND CONTROL*    **205**

---

**CHAPTER 10**    *MANAGING MULTIPLE PROJECTS*    **218**

---

*EPILOGUE*    **225**

---

**APPENDIX**    *COPILOT PORTABLE MARINE RADAR PROJECT*    **227**

---

*INDEX*    **237**

---

---

# CONTENTS

PREFACE   xiii

---

ABOUT THE AUTHOR   xvii

---

**CHAPTER 1   INTRODUCTION TO PROJECT MANAGEMENT   1**

---

What Defines a Project?	3
<i>Not All Projects Are the Same</i>	4
Measures of Project Success/Failure	7
<i>Information Technology Project Outcomes</i>	10
<i>When to "Pull the Plug" on a Project</i>	11
Project Life Cycle	12
Project Management Trade-offs	13
Scope of This Book	16
Managing Project Risks	16
History of Project Management	17
Project Management Software	18
Project Management Institute	18
Project Management Maturity Models	18
Appendix 1A. Medicare Transactions: A \$50 Million Lesson in Project Management	19
Study Problems	21
References	21

**CHAPTER 2   PROJECT INITIATION, SELECTION, AND PLANNING   23**

---

Project Initiation and Selection	24
<i>Numerical Measures</i>	25
<i>Real Options Approach</i>	33
<i>Scoring and Ranking Methods</i>	34
Evaluating Project Portfolios	37
Project Planning	41
<i>Work Breakdown Structure (WBS)</i>	43
<i>Estimating Task Costs and Durations</i>	46
<i>Dealing with Uncertainty</i>	48
Conclusions	53
Study Problems	54
References	58
Appendix 2A. Christopher Columbus, Inc. Voyage to Discover Trade Routes to Asia	59



**CHAPTER 3**     *PROJECT TEAMS AND ORGANIZATIONAL RELATIONSHIPS*     **62**

---

Roles and Responsibilities of the Project Manager and Project Team	<b>62</b>
<i>Characteristics of an Effective Project Team</i>	<b>67</b>
<i>Diversity of Project Teams</i>	<b>68</b>
<i>Project Teams and Incentives</i>	<b>69</b>
<i>Forming Project Teams</i>	<b>69</b>
<i>Extreme Programming</i>	<b>72</b>
Organizational Structure and Project Management	<b>72</b>
Subcontracting and Partnerships	<b>76</b>
<i>Partnerships and Alliances</i>	<b>80</b>
Conclusions	<b>80</b>
Study Problems	<b>80</b>
References	<b>81</b>

**CHAPTER 4**     *PRECEDENCE NETWORKS AND THE CRITICAL PATH METHOD (CPM)*     **83**

---

Precedence Networks Defined	<b>83</b>
<i>Activity-on-Node (AON) Precedence Networks</i>	<b>84</b>
<i>Activity-on-Arc (AOA) Precedence Networks</i>	<b>84</b>
<i>Comparison of AOA versus AON Networks</i>	<b>85</b>
Critical Path Method (CPM): Concepts and Calculations	<b>86</b>
<i>Spreadsheet Calculations</i>	<b>90</b>
<i>Slacks (Floats) Defined</i>	<b>91</b>
<i>Linear Programming Formulations</i>	<b>93</b>
Project Scheduling and Gantt Charts	<b>95</b>
CPM Calculations for AOA Networks	<b>97</b>
<i>Mathematical Programming Formulation for AOA Networks</i>	<b>99</b>
Conclusions	<b>100</b>
Study Problems	<b>100</b>
Appendix 4A. Drawing a Gantt Chart Using MS-Excel	<b>103</b>
Appendix 4B. Alternative Precedence Relationships	<b>104</b>

**CHAPTER 5**     *PLANNING TO MINIMIZE COSTS*     **107**

---

Project Budgeting	<b>108</b>
<i>Budget Uncertainties</i>	<b>109</b>
<i>Budget Example</i>	<b>110</b>
Managing Cash Flows	<b>112</b>
Project Compression: Time-Cost Trade-offs	<b>115</b>
<i>Linear Time-Cost Trade-offs</i>	<b>117</b>
<i>Nonlinear Time-Cost Trade-offs</i>	<b>121</b>
<i>Discrete Time-Cost Trade-offs</i>	<b>123</b>
<i>Time-Cost Trade-offs with Coordination and Communication Considerations</i>	<b>125</b>
Material and Inventory Costs	<b>126</b>
Study Problems	<b>129</b>

References	132
Appendix 5A. The Relationship between Net Present Value and Dollar-Months	133

---

## CHAPTER 6 *PLANNING WITH UNCERTAINTY* 135

---

Classic PERT Defined	135
<i>Limitations of the Classic PERT Model</i>	139
Monte-Carlo Simulation Models	143
<i>Monte Carlo Simulation with Discrete Probability Distributions</i>	145
<i>New Product Development Example: Cycling in Precedence Networks</i>	146
The Theory of Constraints and the Project Buffer	149
Other Implications of Project Uncertainty	152
<i>Worker Behavior and Expected Project Duration</i>	153
<i>Task Variation and Expected Project Duration</i>	155
Project Compression with Uncertain Task Durations	156
Conclusions	158
Study Problems	158
References	162
Appendix 6A. Standard Normal Distribution Table (Positive Values of $z$ )	163
Appendix 6A (cont'd). Standard Normal Distribution Table (Negative Values of $z$ )	164

---

## CHAPTER 7 *RISK MANAGEMENT* 165

---

Tools for Analyzing Project Risk	166
Contract Types and Relative Risk	168
Risk Management Case Study	170
<i>Using a Cost Model to Assess and Manage Risks</i>	171
Risks in New Product Development Projects	173
Study Problems	173
References	174

---

## CHAPTER 8 *RESOURCE MANAGEMENT* 175

---

The Resource Leveling Problem	175
The Resource Allocation Problem	180
Finding Feasible Solutions for the Renewable Resource Allocation Problem	185
Heuristic Algorithms for the Renewable Resource Allocation Problem	187
<i>Task-Based Algorithms (Serial Heuristics)</i>	188
<i>Time-Based Algorithms (Parallel Heuristics)</i>	188
An Easily Solvable Renewable Resource Allocation Problem	190
Resource Allocation and the Critical Chain	192
Resource Allocation Capabilities of Commercial Software Packages	193
Nonrenewable Resource Allocation Problems	195
Resource Allocation Problems with Random Task Durations	198
Conclusions	202
Study Problems	202
References	204

---

**CHAPTER 9     MONITORING AND CONTROL     205**

---

Designing an Effective Monitoring System	<b>205</b>
Earned Value Approach	<b>207</b>
<i>Earned Value Approach: Example 2</i>	<b>210</b>
Updating Cost and Schedule Estimates	<b>213</b>
Conclusions	<b>214</b>
Study Problems	<b>215</b>
References	<b>217</b>

---

**CHAPTER 10     MANAGING MULTIPLE PROJECTS     218**

---

Multitasking with Multiple Projects	<b>218</b>
<i>K&amp;B Clip Game</i>	<b>219</b>
Project Teams and Incentives	<b>220</b>
Allocating Resources and Setting Due Dates in a Dynamic Multiproject Environment	<b>221</b>
Conclusions	<b>223</b>
References	<b>223</b>
Appendix 10A. Pete Moss: Tax Accountant	<b>223</b>

---

**EPILOGUE     225**

---



---

**APPENDIX     COPILOT PORTABLE MARINE RADAR PROJECT     227**

---

Background	<b>227</b>
Labor	<b>227</b>
<i>Technicians</i>	<b>229</b>
<i>Programmers</i>	<b>229</b>
<i>Assembly Line Workers</i>	<b>229</b>
<i>Senior Design Engineers</i>	<b>229</b>
Finance	<b>230</b>
The Game	<b>230</b>
<i>The Board</i>	<b>230</b>
<i>Monitoring Game Play</i>	<b>230</b>
<i>Starting the Game</i>	<b>230</b>
<i>Secure Venture Financing (Long-Term Loan)</i>	<b>230</b>
<i>Playing the Game</i>	<b>231</b>
<i>Mergers and Acquisitions</i>	<b>231</b>
<i>Licensing Technology</i>	<b>231</b>
<i>Ending the Game</i>	<b>231</b>
Activity Requirements Sheet	<b>232</b>
<i>Lease Office/Manufacturing Space</i>	<b>232</b>
<i>Order Lab Equipment</i>	<b>232</b>
<i>Press Release</i>	<b>232</b>
<i>Setup Manufacturing/Office Space</i>	<b>233</b>
<i>Design of Physical Unit</i>	<b>233</b>
<i>Design of Electronics and Circuits</i>	<b>233</b>

<i>Programming</i>	<b>234</b>
<i>Assembly Prototype Unit</i>	<b>234</b>
<i>Beta Test of Prototype</i>	<b>234</b>
<i>Market Test</i>	<b>234</b>
<i>Set Up Manufacturing Facility</i>	<b>234</b>
<i>Obtain FCC Approval</i>	<b>235</b>
<i>Obtain UL (Underwriters Laboratory) Approval</i>	<b>235</b>
<i>Production and Sales</i>	<b>235</b>

<i>INDEX</i>	<b>237</b>
--------------	------------

---