

---

# Project Management in New Product Development

**Bruce T. Barkley, Sr.**



New York Chicago San Francisco Lisbon London Madrid  
Mexico City Milan New Delhi San Juan Seoul  
Singapore Sydney Toronto

# Contents

Acknowledgments	xix
Introduction	xxi
<b>Chapter 1. Create a Culture of Ideas</b>	<b>1</b>
The Soul of Innovation and Creativity	1
The Story of <i>Quikmate</i> <sup>®</sup> : Introduction of Sonoco Products Co. Plastic Grocery Sacks	1
New Organizational Structure for New Products	5
New Products and Outsourcing	5
Organizational Learning	5
Seven Key Strategies	6
State that new product development is the business	6
Remove barriers	6
Promote return on creativity	6
Providing information and feedback	7
Creating a virtual place for new ideas	7
Generating a filtering process	7
Demonstrating successful ideas	8
Organizational Agility	8
Creative intelligence and new products	8
Risk and New Product Development	9
Risk: The organizational culture issue	9
A culture of risk management competence	10
Link corporate and new product planning	10
Training and development in risk	11
Project experience	11
Learning organization	11
Functional managers	11
Building the Culture	12
Keane's risk process	12
Risk analysis and mitigation	13
Addressing risk with scenarios	14
Performance incentives	14
The Johari Window	14
Personal, Project, and Organizational Risks	16
The New Product Risk Framework	17
Another Case in (No) New Product Development: The Schneider Program	19
Another Story of New Product Development	23

<b>Chapter 2. Strategic Alignment and the New Product Portfolio</b>	<b>29</b>
New Product Portfolio	29
New project process	29
The Eastern Case	30
Commitment and partnership	32
Stakeholder relations	32
Eight strategies	33
Overview on integration issues	34
Strengths, weaknesses, opportunities, and threats	35
Eastern's Strategic Plan	37
Underlying Elements of the Risk-Based Strategic Plan	38
Mission	38
Commitment and partnership	38
Driving force: Production capability	38
Core competencies and risk contingencies	38
Eight Key Strategies	39
Strategy 1—Secure economically priced power	39
Strategy 2—Secure other resources at reasonable costs	40
Strategy 3—Cultivate customer awareness and promote customer satisfaction	40
Strategy 4—Create a safe working environment	42
Strategy 5—Build a responsible and knowledgeable workforce	43
Strategy 6—Improve technology and plant equipment to produce new products more efficiently	44
Strategy 7—Improve Eastern's impact on the environment	44
Strategy 8—Reduce waste and non-value-added costs	46
Communicating Strategy and Risk	47
Programs and New Product Ideas: Generation of a New Product Portfolio to Implement Eastern Strategies No. 3 and 6	47
Designing programs of new product ideas	47
Strategy 3: Cultivate customer awareness and promote customer satisfaction	48
Strategy 6: Improve technology and plant equipment to produce products more efficiently	48
Postscript to the Strategic Plan	49
Acquisition and merger	49
Integration in Global and International Projects	50
Postscript on Integration and the Eastern Case	50
Analyzing a New Product Portfolio—General Lessons from Other Cases	50
Weighted scoring model and net present value	50
Risk matrix sample	52
Funding New Product Projects	53
The New Product Development Pipeline	54
<b>Chapter 3. Project Integration and Setup</b>	<b>57</b>
Project Management System	57
Integration as a Leadership Function	59
Integration as a Wide Ranging Quality and Process Improvement Standard	59
Tools in Building an Integrated Project Management System	60
Organizationwide project management system	61
Program/portfolio planning and development system	62
Resource management system	63
Program information technology system	64

Product/service development process	64
Interface management	65
Portfolio management	65
Program monitoring and control system	66
Change management system	66
Program evaluation system	66
Limitations of Integration Systems	67
The Critical Chain Concept	67
PMI OPM (Organizational Project Management) 3	67
Balanced Scorecard	68
eProcurement	68
Integration: Concepts and Models	69
Understanding integration	70
Integration model	71
Project Integration Management: Organizational Issues	72
Prepare the Organization	73
Develop systems of integration	73
Develop integration skills	73
Recognize integration success	73
Integrate with the customer	74
More Detail on the PMI PMBOK Standard for Project Integration	74
Develop Project Charter	77
Develop project charter: Inputs	79
Organizational Process Assets	80
Develop project charter: Tools and techniques	81
Develop project charter: Outputs	82
Develop Preliminary Project Scope Statement	83
Develop preliminary project scope statement: Tools and techniques	84
Develop project management plan	84
Develop project management plan: Inputs	86
Develop project management plan: Tools and techniques	86
Develop project management plan: Outputs	87
Direct and Manage Project Execution	87
Direct and manage project execution: Inputs	88
Direct and manage project execution: Tools and techniques	89
Direct and manage project execution: Outputs	89
Monitor and Control Project Work	90
Monitor and control project work: Inputs	90
Integrated Change Control	91
Integrated change control:Inputs	93
Integrated change control: Tools and techniques	93
Integrated change control: Outputs	94
Close Project	94
Close project: Inputs	95
Close project: Tools and techniques	95
Close project: Outputs	96
Case Study of PMBOK Implementation: Integrated Transportation System	97
Integration gateway 1: Global interface	97
Integration gateway 2: Business planning	105
Integration gateway 3: Organizational development	106
Integration gateway 4: Global team composition and development	106
Integration gateway 5: Support systems audit	107
Integration gateway 6: Portfolio development and management	108

Integration gateway 7: Market and customer interface	109
Integration gateway 8: Project integration management	110
Integration gateway 9: Systems safety and reliability	110
Integration gateway 10: Chassis, mechanical, and electronics design and development	111
Integration gateway 11: Software design and development	111
Integration gateway 12: Test equipment and testing	111
Integration gateway 13: Integration of software and hardware	111
Another Case Application: Integration Issues in Portfolio and Project Planning Life Cycles	112
The Case: QUICK-TECH building systems	112
Business and Strategic Planning	112
Business and strategic planning integration issues	113
The portfolio: Procedures in development	113
Definition: Work breakdown structure	115
Plan tasks for earned value	117
Integrated monitoring	122
“Reading” the project as an integrated whole	123
Integration of cost, schedule, risk, and quality	123
Steps in the cost/schedule/risk/quality integration process	125
Integration Skills of the Program and Project Manager	125
Single project management	126
Program (or multiproject) management	127
BuildIt: A Sample Integrated Program Structure	127
Organization	128
Strategic statement	128
One- to five-year strategic objectives	128
Program of projects	128
Project cost accounting systems (PCAS)	129
A program management manual for integrated project management	129
Program management principles	129
Meet customer requirements	130
Follow integrated, generic WBS—Product development process	130
Standard work breakdown structure	130
Teamwork	130
Define and communicate the scope of work and assignments clearly	131
Collaboration across the organization	131
Work will be quality and schedule driven	131
Ensure timely procurement of product components	131
Change will be managed	131
Program progress will be tracked periodically reviewed	132
Program management: Roles and responsibilities	132
Program management office (PMO)	132
Program manager role	132
Departmental manager roles in the matrix	133
Role of the program administrator/planner	134
Program planning, scheduling, and resource management	134
Five-step scheduling process	137
Schedule control	137
Baselining the schedule	139
Baseline procedures	140
Managing schedules on the network	140
Resource planning and control	141
Tracking and program review	141
Schedule update procedures	141
Analyzing variance	142
Program close-out and lessons learned	143

Concept definition	144
Project setup for control	144
Structure, science, and research	146
Preliminary project plan	146
Project charter	147
Financial analysis	148
Project Scope Statement	150
Schedule	151
Resource plan	151
Budget	151
Configuration Management System	151
Change control system	152
Application to new product development	152
ORANGE-AID: New Product Development Case	153
Early/Late Start and Finish Analysis	154
PERT analysis	160
Decision Trees and Uncertainty	164
Decision tree example	164
Decision tree theory	165
Expected value	165
Pat's decision example using decision trees	166
Target cost analysis	168
<b>Chapter 4. Product Concept Definition</b>	<b>171</b>
The Product Concept Phase	171
Entering the Concept Definition Process	171
Controlling premature product <i>lock-in</i>	172
Concept Definition Phase	172
Schedule Template	172
Setup for Project Review: <i>Go or No-Go</i> Decision	174
Project review: Go or no-go time	174
Going from Idea to Concept to Product	175
New Product Concept Proposal	175
Need, Form, and Technology	176
Project Value Assessment	176
Estimating Product Value in New Systems or Process Concepts	177
Concept Risk Assessment	178
External analysis: Public policy analysis	179
Intellectual property analysis	179
Market demand and other impacts	180
Product Functional Specifications	180
Commercialization Analysis	181
Competitive Analysis	181
Finding drivers of competition	182
Working Out Customer/Client/User Expectations, Needs, Wants, and Requirements	183
Quality Function Deployment (QFD)	184
Plan for the Development Phase	185
Focus on product life cycle	185
Equipment and logistics plan	186
Business Case	186
Final Project Review	186

<b>Chapter 5. Full Product Development and Marketing</b>	<b>189</b>
Development and Marketing	189
Project Setup and Management	189
Prototype development	193
Reliability	194
Build and production transition plan	195
Safety and regulatory review	195
Preliminary equipment and component review	195
Configuration management	196
Validate functional requirements	196
Confirmation of Final Product Design	197
Confirm Functional Requirements	198
Confirmation of Product Specifications	198
Conforming requirements to customer need	199
Preliminary Design Review	199
Reliability Planning	201
Setting reliability objectives	201
Prepare reliability plan	202
Confirmation of Reliability Requirements	202
Pre-prototype design review	203
Detailed product and component design review	204
System-level design review	204
Prepare test protocols and facilities	205
Service, logistics, and maintenance plan	205
Final test plan	205
Special project management issue: Test space and equipment	205
Prototype development and testing process	206
Conduct Prototype Test	206
Select commercial partner	207
Selection of supplier partner	207
Steps in partner selection	207
Prepare Product Component Support Document	208
Risk Assessment	209
Intellectual Property Strategy	211
Develop Preliminary Market Launch Plan	211
Field Support to Market Launch	212
Create Production Process and Plan	212
Create preliminary production plan	212
Quality control review	212
Produce test units	213
Develop field test protocol	213
Develop field test implementation plan	214
Update service and logistics plan	215
Update Business Plan	215
Update market definition	216
Locking in product design	216
Final Regulatory Approval	217
Final production transition and scheduling	218
Reconfirm Final Business Case	218
Supply chain strategy	218
Update market assessment	219
First Article Review	219
Prepare manufacturing operations plan	219

Produce first article	219
Final financial performance analysis	219
Final Logistics Plan for Market Launch	220
Prepare listing of infrastructure and support needs	220
Prepare checklist for each market location	221
Market Launch Plan	221
Market positioning	222
Manage product marketing	222
Service and product	222
Market launch planning	222
A different project team	222
A Marketing Launch Plan	223
Key Role of Experienced People	223
Market Scheduling	223
Risk-Based Scheduling	225
Procedure	225
A Note on Microsoft Project PERT and Risk Matrix Terminology	226
<b>Chapter 6. New Product Development in Consumer Products and Electronic Instrumentation</b>	<b>229</b>
Special Challenges in Electronic and Computer-Based New Product Development	229
Missing the forest for the trees	230
Top management support	230
Organizational mismanagement	231
Misalignment with business plans	231
Keeping marketing out	231
Project management by accident	231
Focus on task durations	231
Too many projects in the pipeline	232
Project Risk Management	232
The product development process and risk	232
Risk management in product development: Embedded verification and validation	233
Stages in Product Development in Electronic Instrumentation	233
Steps in Product Development	234
Step 1: Requirements definition	234
Step 2: Detailed design	234
Step 3: Prototype development	235
Step 4: Design validation	235
Step 5: Production transition	236
Risks in Organizational and Technical Interfaces	236
Design changes	236
Design review and risk	237
Risk reviews	237
Preliminary design risk review (PDRR)	238
Critical design risk review (CDRR)	238
Production readiness risk review (PRRR)	238
System design risk review (SDRR)	238
Test readiness risk review (TRRR)	239
Task-level requirements risk review (TLRRR)	239
Task-level design risk review (TLDRR)	239



General Responsibilities	239
System-level reviews	240
Task-level reviews	240
Function of task-level reviews	240
Preliminary design risk review (PDRR)	240
Critical design risk review (CDRR)	242
System design risk review (SDRR)	242
Test readiness risk review (TRRR)	243
Task-level requirements review (TLRR)	243
New Product Software Development Risk	244
<b>Chapter 7. Quality, Six Sigma, and New Product Development</b>	<b>247</b>
Quality and Process Improvement	247
Customer-Driven Risk Management	248
Illustration of New Product Risk Management—The Defense	
Risk Program	249
Six Sigma quality template	249
DoD outline for quality	249
Timeline	251
New Product Portfolio Management	252
Value of Customer-Driven, New Product Risk Management	252
Risks in Customer Expectation, Need, and Requirements	253
Customer expectations	253
Customer needs	253
Customer requirements	253
Risk Lessons Learned and Project Risk Audit	253
Project audits	254
Contingency actions	256
A postscript to lessons learned	257
Project Audit	257
Scheduling Contingencies and Improvements	258
Quality Tools and Techniques	259
Quality function deployment (QFD)	261
Statistical process control (SPC)	261
Pareto analysis	261
Cost of quality	262
Quality assurance (QA)	262
Earned value	262
Project review	263
Documentation	263
Scheduling as Team Motivator	263
Quality Must be Translated to Scheduled Tasks	264
Front-end customer process analysis	266
Concept development	267
Generation of alternative candidate projects	268
Scope of work	268
Schedule	269
Budgeting and earned value	269
Quality assurance	270
Project metrics	270
Prototyping	270

Quality audit	271
Transform customer expectations to requirements	271
Follow a defined development process and work breakdown structure	271
Schedule customer and quality early	272
Customer-driven teamwork	272
Define and communicate the scope of work and assignments clearly	273
Collaboration across the organization	273
Work will be quality and schedule driven	273
Ensure timely procurement of product components	274
Change is managed	274
Program progress will be tracked and periodically reviewed	274
Involve the customer in designing the management support system	274
Quality as Driver	275
Reviewing Program Progress and Resolving Conflicts	275
Project planning	276
Departmental manager roles	277
Project team roles	277
Role of a project management office (PMO)	278
Scheduling	278
Baselining the schedule: A quality management action	280
Schedules on a network	280
Resource Planning	281
Long-Term Staff Planning	281
Preparing Staffing Policy and Plans	282
Step 1—Determine staffing levels and assignments	283
Step 2—Develop staffing standards	283
Step 3—Forecast future requirements	284
Step 4—Develop department staffing requirements	284
Step 5—Develop department staffing patterns	284
Step 6—Prepare staffing plan	284
Program Review	285
Development of Customer-Driven Program Manager Competencies	285
Agile Project Management	286
<b>Chapter 8. Measuring New Product Development</b>	<b>291</b>
Tools and Techniques	291
Design to Quality	291
Design to Six Sigma	292
Design to Cost	292
Design to Process	292
More Tools	293
System Development/Improvement	293
Concurrent Engineering	294
Robust Design	295
Loss Function	296
Robust Design Phases	296
Statistical Process Control	296
Cost of Poor Quality	297

Other Measurement Tools	297
Just-in-time	297
Total production maintenance	297
Mistake-proofing	297
Enterprise and manufacturing resource planning	298
Computer-aided design, computer-aided engineering, and computer-aided manufacturing	298
Total integrated logistics	298
System Development/Improvement Methodologies within the DoD	298
Computer-aided acquisition and logistics support	299
In-plant quality evaluation program	299
R&M 2000	299
Value engineering	299
Measuring the Success of New Product Development Mainstreaming	300
Measuring New Product Workmanship	300
<b>Chapter 9. Project Management and Teamwork</b>	<b>303</b>
Team Dynamics	303
Customer and User Diversity	304
Personal Growth in New Product Development	304
Growth to New Products Program Manager Role	304
Single Project Management	305
Program (or Multiproject) Management	306
Gender and Minority Diversity in New Product Development	307
Individual Responsibility as a New Product Team Member	308
Do it right	310
Be a leader	310
Serve the team	310
Develop yourself	311
Doing Your Own Performance Appraisal	314
Step 1. Envision personal improvement	315
Step 2. Enable personal improvement	316
Step 3. Focus on improvement	316
Step 4. Improve the job	316
Step 5. Improve yourself	317
Step 6. Help others improve	317
Step 7. Evaluate your improvement progress	317
Empowerment	317
Improved quality of work life	318
Professional and personal development	318
Rewards and recognition	319
New job opportunities	319
Increased latitude in decision making	319
Preserving the <i>Wonder</i> in Project Management	320
Integrated Product Development Teams	320
Leading New Product Development	321
Using the Critical Chain Concept in New Product Development Teams	322
Project Team Charter	322
Team Training	322
Cautionary Note on New Product Teams	323

<b>Chapter 10. Putting It All Together</b>	<b>325</b>
Principles for Working in the Real World	325
Seven Principles of Project Success	325
Principle #1 Develop key processes	326
Principle #2 Open upto new ideas	326
Principle #3 Define measures to select	327
Principle #4 Use project reviews to stop bad products	328
Principle #5 Choose technical project managers	328
Principle #6 Build team accountability	329
Principle #7 Ad hoc it when necessary	329
<b>Appendix A. Generic New Product Development Work Breakdown Structure</b>	<b>331</b>
<b>Appendix B. Managing New Product Development Projects: Course Outline</b>	<b>339</b>
<b>Appendix C. Issues for Discussion</b>	<b>341</b>
Bibliography	375
Index	376