

Smart Simple Design/Reloaded

Contents

List of Figures and Illustrations	xiii
Foreword by Richard J. Schonberger	xviii
Foreword by Bruce E. Hamilton	xix
Acknowledgements	xxiii

vii

Part I | The Cost Of Complexity

Introduction	3
Chapter 1 The Consuming Age: Relentless Pressures of a Voracious Marketplace	7
The Age Of Disinflation Has Arrived	9
The Challenge	10
The Iceberg Effect: Hidden Danger	11
Variety Effectiveness	12
About This Book: Chapter By Chapter	14
Chapter 2 On the Horns of the Dilemma	17
PUI: Exponential Growth/Less Profit	17
Visual Evidence of a Problem	18
What Went Wrong?	20
The Improvement Revolution	21
The Push for New Products	25
Expanding Choices—Collapsing Cycles	27

Exploding Variety: One New Part	28
Too Much of Too Much	29
The Eight Runaway By-Products of One New Part	31
Rethinking the 95:5 Ratio—Death by 10,000 Cuts	33
New England Farmhouse Effect	35
PUI: When Variety is Negative	36
VEP: The Alternative	37
The Rewards	38
What is Variety Effectiveness	40
X-Type Company	41
VEP's Multi-Dimensional Approach To Effective Variety	42
1. Comprehensive View of Cause	43
2. In-Depth Analysis of Complexity	44
3. Insight-Rich, Team-Based Approach to Improvement	45
4. Unraveling Complexity through Engineering Based Tools	45
5. Prevention-Based Transformation	46
VEP: Not Magic—Work!	46

Chapter 3 True Cost: Product Proliferation & the Bottom Line	49
A Case In Point: Accounting Gone Awry	50
The Traditional Cost Approach: History and Logic Of GAAP	52
From Tracking the Past to Tracking Complexity	54
Flaws In Traditional Cost Accounting Assumptions	56
Flawed Assumptions About Cost	56
Flawed Assumptions About Price	57
The Allocation Of True Cost: A New Cost Perspective	59
The Origins of Organizational Complexity	59
Cost Adhere to Parts: The Part as First Cause	60
Measuring Product and Organizational Complexity	62
The VEP Parts Index: Universal Measure of Complexity	63
Not an Exact Measure—But an Exacting One	68
The Index as an Improvement Driver	69
The VEP Tri-Cost Model: The Three Dimensions Of True Cost	69
Dimension 1: Functions Costs	70
Dimension 2: Variety Costs	72
Dimension 3: Control Costs	73
The VEP Cost Pie	74
Control Points and ABC Accounting	75
Awareness is Everything	76

Chapter 4	Negative Variety and Its Policy Triggers	77
	Variety Explosion: Unintended Consequences	78
	Negative vs. Positive Variety	79
	The Balance Point: Effective Variety	81
	The Policy Roots Of Negative Variety	81
	A. Negative Triggers in Accounting Policies	84
	1. Supplier Base Selection	84
	2. Make vs. Buy Decisions (Cost per Part)	85
	3. Overhead Cost Allocation	86
	B. Negative Triggers in Marketing and Sales Policies	87
	4. Response to Customer Requests	88
	5. Margins, Product Pricing, and Discounting	89
	6. New Product Market Requirements	90
	7. Cost Targeting/Cost Reductions	91
	C. Negative Triggers in Product Development Policies	92
	8. Product Diversification Approach	92
	9. Products as Separate Entities	95
	10. Long Lapses between Products	95
	11. Different Designers/Different Design Concepts	95
	12. Cost Targeting in New Product Development	96
	13. Technical Solutions	96
	14. Product Life-Cycle Decisions	97
	D. Negative Triggers in IT/Data Systems Policies	99
	15. Product Documentation, Classification Systems, and Computer Support	99
	E. Negative Triggers in Operations Policies	100
	16. Lot Sizing	100
	17. Capital Equipment and Process Improvement Justification	101
	Stem The Tide	102
Chapter 5	Hot Products: Design for Overall Cost	111
	CAD: A Double-Edged Sword	112
	Over-Designing: Overusing Your Strengths	112
	Revising The Mind-Set: Design For Overall Cost	113
	Design from the Outside In—Put Value Near the User	114
	Know When Average is Good Enough	116
	Use Fewer Parts—Use Shared Parts	116
	Get Sales Involved—From the Get-Go	117

Barriers To Moving Forward	118
Six Barriers to Effective Variety	120
A New Role To Play	122

Part II | **VEP: The Methodology**

Chapter 6 The VEP Methodology	
Stage 1: Getting Ready to Launch	127
Deciding On Scope	127
The Discrete Approach	128
The Deep Dive Approach	129
Overview Of The VEP Method	129
Details Of Stage 1: Prepare For An Effective Implementation	132
VEP Teams	133
VEP Leadership Teams	134
VEP Analysis Teams	135
VEP Support Teams	138
Select Your Starting Point: The Targeted Series	144
The Qualifying Procedure	144
Next In VEP's Stage 1	148
Chapter 7 Creating a VEP-Capable Classification System	149
Venerable Chair Company	149
Juanita Hicks to the Rescue	150
Taking On The Job	151
A Case In Point: A Bulging, Bungling, Blundering Data System	152
Where Group Technology Fits In	158
Making The Data System VEP-Capable	159
Begin with Nomenclature	159
Second: Define Attribute Templates	161
Third: Tackle the Class Codes	163
Chapter 8 The Six VAT Tools	165
The Six VATS: Tools Of Inquiry	165
VAT-1: Unique vs. Shared	166
The Benefits of Sharing	168

VAT-2: Modularity	170
Three Modular Styles	172
V-Costs and the First Two VATs	174
VAT-3: Multi-Functionality & Synthesis	174
VAT-4: Ease Of Assembly	177
VAT-5: Range	179
Other Applications of Range	182
VAT-6: Trend	183
The Power of the Six VATS	185
Chapter 9 The 3-View Analysis	187
Why Three Views?	187
Do We Really Need this Difference?	189
View One: Market Analysis	190
Your Nomenclature: The Groundwork	191
PUI's Product Hierarchy	191
Calculating the Combination Magnitude	193
Comparing Product Attributes	194
Implications: Market Analysis Process	197
Spreading Out the Reduction Net	197
View Two: Product Structure Analysis	198
Key Elements of the Product Analysis Procedure	198
Implications: Product Structure Analysis	203
View Three: Parts Type Analysis	203
Parts Type Analysis at PUI	206
Implications: Parts Type Analysis	209
Systemic Problem—Systematic Approach	212
Chapter 10 Reducing Downstream Complexity	213
Negative Variety In Processes	215
Reducing Processes at PUI	215
First: Standardize the Nomenclature	216
Second: Reduce Processes	219
Negative Variety In Control Points	220
The Search for Control Points at PUI	222
The Control Points Reduction Team and Its Tasks	223
Downstream Is Where The Silt Piles Up	227

Chapter 11	Implementing VEP Improvements	229
Stage 1 Review: Prepare		229
Stage 2 Review: Analyze By Applying The Six Vats		231
Stages 3 And 4		231
Stage 3: Prioritize and Schedule		231
Stage 4: Implement and Prevent		234
Making The Change: Some High-Level Implementation Issues		236

Part III	The Bottom Line
-----------------	------------------------

Chapter 12	Designing for the Bottom Line	243
Variety Effectiveness: A Unified Approach		247
The Goal Is To Make More Profit		249
Resources		251
Glossary		253
Visual Thinking Inc. & The Visual-Lean® Institute Resource Page		261
Index		263
About the Author		271

List of Figures

CHAPTER 1

Figure 1.1.	Danger! The Real Problem Remains Hidden	11
-------------	---	----

CHAPTER 2

Figure 2.1.	The Seven Deadly Wastes + One (Non-Value-Adding Activity)	22
Figure 2.2.	Rocks in the River: The Flow of Production	23
Figure 2.3.	Value-Adding Activity vs. Non-Value-Adding Activity	24
Figure 2.4.	The Eight Runaway By-Products of New Product Expansion	32
Figure 2.5.	The Seven Deadly Wastes of Production: Equivalents in New Product Development	33
Figure 2.6.	95:5 Ratio in Runaway By-Products Hidden in New Product Activity	34
Figure 2.7.	Blocks in the Production Flow: Rocks Revisited	34
Figure 2.8.	New England Farmhouse Effect to New Product Introduction	35
Figure 2.9.	The Y-Type Trajectory: Profile of a Company in Trouble	36
Figure 2.10.	VEP Outcomes: A Chain of Rewards	40
Figure 2.11.	The X-Type Curve: Profile of a Company Succeeding	41
Figure 2.12.	The Five Power Points of the VEP Approach	43

CHAPTER 3

Figure 3.1.	True Total Cost: Which Product Costs More? (Comparison of Series 11 and 8 Products)	52
Figure 3.2.	GAAP vs. VEP	55
Figure 3.3.	Consequences of Adding Just One New Product with Just One New Part	61
Figure 3.4.	Parts List: Model J-191/Blue Pen	62

Figure 3.5.	Parts List: Model J-192/Red Pen	63
Figure 3.6.	VEP Parts Index for Models J-191/Blue and J-192/Red	64
Figure 3.7.	VEP Parts Index for Models J-191, 192, 193, 194	65
Figure 3.8.	VEP Parts Index: Partial BOM for 3 of 51 PUI Models	66
Figure 3.9.	Three Dimensions of True Cost Defined	71
Figure 3.10.	The VEP Cost Pie	74

CHAPTER 4

Figure 4.1.	Effective Variety: An Ever-Shifting Balance Point	82
Figure 4.2.	Negative Variety: 17 Policy Triggers	83
Figure 4.3.	Improved Policies for Trigger 1: Supplier Base Selection	85
Figure 4.4.	Improved Policies for Trigger 2: Make vs. Buy Decisions	86
Figure 4.5.	Improved Policies for Trigger 3: Overhead Cost Allocation	87
Figure 4.6.	Improved Policies for Trigger 4: Response to Customer Requests	88
Figure 4.7.	Improved Policies for Trigger 5: Margins, Product Pricing, and Discounting	90
Figure 4.8.	Improved Policies for Trigger 6: New Product Market Requirements	91
Figure 4.9.	Improved Policies for Trigger 7: Cost Targeting and Cost Reductions	92
Figure 4.10.	Improved Policies for Triggers 8 to 14: Product Development	98
Figure 4.11.	Improved Policies for Trigger 15: IT and Data Systems	100
Figure 4.12.	Improved Policies for Trigger 16: Lot Sizing	101
Figure 4.13.	Improved Policies for Trigger 17: Purchase Justification	102
Figure 4.14.	Summary: All Policy Triggers of Negative Variety	103

CHAPTER 6

Figure 6.1.	VEP Methodology: Stage 1	131
Figure 6.2.	Memo: Company Commitment to VEP	132
Figure 6.3.	VEP Teams for a Deep-Dive Implementation	133
Figure 6.4.	The Chuck Wagon: Early Victories Team	139

Figure 6.5.	Sample: VEP Team Configuration, with Time Commitments	141
Figure 6.6.	Modified Relations Diagram	146
Figure 6.7.	PUI's Top Five Series: Score Sheet for Pre-set Qualifying Criteria	147

CHAPTER 7

Figure 7.1.	Before VEP: PUI Active Class Codes (104 Total Codes)	154
Figure 7.2.	Before VEP: Report of Active Screw Part Numbers (Partial List)	156
Figure 7.3.	Before VEP: Examples of PUI's 30-Character Codes	157
Figure 7.4.	After VEP: Active Class Codes at PUI (Reduced from 104 to 74 Class Codes)	159
Figure 7.5.	After VEP: PUI's Attribute Template for Active Screws	161
Figure 7.6.	Class Code Guidelines for Parts	163

CHAPTER 8

Figure 8.1.	Unique vs. Shared Parts Index: Series Level	169
Figure 8.2.	Summary of VAT-1: Unique vs. Shared	170
Figure 8.3.	VAT-1 and VAT-2: Two Perspectives on the Same Parts	172
Figure 8.4.	Summary of VAT-2: Modularity	173
Figure 8.5.	VAT-3: Multi-Functionality & Synthesis - Bracket (Before/After)	175
Figure 8.6.	VAT-3: Multi-Functionality & Synthesis - Plunger (Before/After)	176
Figure 8.7.	Summary of VAT-3: Multi-Functionality & Synthesis	176
Figure 8.8.	VAT-4: Ease of Assembly - Spring (Self-Aligning and Self-Locating Parts)	177
Figure 8.9.	VAT-4: Ease of Assembly - Pin (Parts Cannot Be Installed Incorrectly)	178
Figure 8.10.	VAT-4: Ease of Assembly - Housing (Adequate Access/Unrestricted Vision)	178
Figure 8.11.	Summary of VAT-4: Ease of Assembly	179
Figure 8.12.	VAT-5: Range - O.D. Values in a Scatter Diagram	180
Figure 8.13.	VAT-5: Range - O.D. Values in a Histogram	181
Figure 8.14.	Summary of VAT-5: Range	182
Figure 8.15.	VAT-6: Trend in Requests for Miniaturization (Six-Month Intervals)	184
Figure 8.16.	Summary of VAT-6: Trend	184

CHAPTER 9

Figure 9.1.	VEP Methodology: Stage 2/The 3-View Analysis	188
Figure 9.2.	PUI's Top 20	192

Figure 9.3.	PUI's Product Hierarchy: Nomenclature of Levels	192
Figure 9.4.	Example: Combination Magnitude on Three of PUI's Top 20 Product Series	194
Figure 9.5.	Market Attribute Matrix (Partial): Series Level	195
Figure 9.6.	PUI Market Analysis Team: Reduction Recommendations (First Pass)	196
Figure 9.7.	Visual Layout of BOM	199
Figure 9.8.	Partial BOM: One of the 02 Models	200
Figure 9.9.	VEP Parts Index: Partial BOM for 02 Models in Series 7, 8, 11, 33, and 97	201
Figure 9.10.	Model 02 Reduction Recommendations (Partial List)	202
Figure 9.11.	Sample: VEP Parts Profile Work Sheet	205
Figure 9.12.	Part Types in Series 7 (Partial List)	206
Figure 9.13.	VAT-5: Range - Springs Re-Visited by the Parts Type Team	207
Figure 9.14.	Parts Type Reduction Recommendations: Screws and Brackets	208
Figure 9.15.	VEP Team Meeting Form: Market Analysis	210

CHAPTER 10

Figure 10.1.	VEP Methodology: Stage 2/ Reduction Analysis for Processes and Control Points	214
Figure 10.2.	Before VEP: Names for PUI Production Processes	217
Figure 10.3.	After VEP: Names for PUI Production Processes (Grouped by Category)	218
Figure 10.4.	PUI Process Attribute Template: Welding	219
Figure 10.5.	A Part Sprouting Control Points	220
Figure 10.6.	Control Points: What Really Happens	221
Figure 10.7.	Control Points: Associated with XJ-889 Sub-Assembly	222
Figure 10.8.	VEP Control Points Index: Accounting Forms	225
Figure 10.9.	Sample: VEP Improvement Work Sheet for Forms	226
Figure 10.10.	Actual Control Point Reduction Results (Partial)	227

CHAPTER 11

Figure 11.1.	VEP Methodology: Stages 3 and 4	230
Figure 11.2.	Sample: VEP Proposal Impact Worksheet	233
Figure 11.3.	Sample: 15-month Implementation Timeline	237

to many chapters. Martin Hinckley, nuclear engineer and friend, for his help on trending concepts. Manny “Ed” Velosa, member of UE’s original 3-View Analysis Team, for his help in decoding ancient class code abbreviations for SSD/Reloaded. Daniel Forest and Roxane Vezina of Venmar Ventilation of Canada.

Professor Sir Michael Gregory, CBE, head of the Institute for Manufacturing at Cambridge University, whose dedicated sponsorship of additive manufacturing is changing the face of complexity—and its costs.

Michael Philpott, of Value Driven Design in the UK, for his on-going commitment to VEP deployment. And Jon Tudor, of True North Excellence in the UK, for his support of all of my work and many of my dreams.

My esteemed, high-spirited colleagues at Visual Thinking Inc.—Cindy Lyndin, Horatio Fairburn, Patty De’ak, Heidi Houston, Kelly McNiece, and Harald Hope: You make so much of my work have greater meaning.

My brother, Gary Galsworth, who simply loves me and wants to see my dreams come true—nothing more is needed because, in a brother, that is everything. And my nieces and nephew, Ondine Galsworth, Stacy Joyce, Karen Cathcart, and Daniel Galsworth, whose lives are shining reminders of the beauty of expression.

Every writer knows that dealing with the content portion of a book is only half the story. The other half is keeping one’s spirit whole and body functioning. For their extraordinary help in this, I am deeply grateful to Mataare, Carolyn Hawkins, Barbara Paster, Dawn Bothie, Erick Wander, Clark Shea, and Merlin, my Cat.

And to Swami Chetanananda, with a lifetime of gratitude, ever and always.

Finally, my eternal thankfulness to S. N. Bear, Ambrosius Merlin, and Philip Hylos for their creative encouragement, heartfelt support, and unwavering guidance. It is their song I sing.

Gwendolyn D. Galsworth

Portland, Oregon
September 2014