

Contents

Part I The Business Challenge of Dynamic Complexity

1	The Growing Business Problem of Dynamic Complexity	3
	A Simple Analogy of a Hill Walker Explains the Hidden	
	Effects Dynamic Complexity.	4
	An Example of How Interactions in an IT System	
	Cause Dynamic Complexity	5
	Is Dynamic Complexity a Modern Problem?	8
	Process, Methods and Mathematics	8
	Definition of Terms	9
	Dynamic Complexity and Its Effects	10
	Dynamic Complexity Analysis: The Foundational Mathematics. . .	10
	Dynamic Complexity Solution: Optimal Business Control	11
	Conclusion	11
2	The Hidden Time Bomb Known as Dynamic Complexity.	13
	Introduction.	13
	Understanding the Ticking Time Bomb	
	(a.k.a. Dynamic Complexity).	14
	Expected Versus Experienced Efficiency-of-Scale	16
	Failing to Identify Hidden Causes of Performance Loss	17
	Conclusion	18
3	The Challenge of Expecting the Unexpected	19
	Introduction.	19
	Framing the Unexpected Challenge	20
	The Challenge of Past-Present-Future.	21
	A Paradigm Shift: The Future Oriented Enterprise.	23
	Implementing a Broader Future-Oriented Planning Perspective	23
	Managing the Multiplier Effect of Dynamic Complexity	25
	Meeting the Challenge	27

	A Short Exercise	27
	Conclusion	28
4	Dynamic Complexity in Action	29
	Introduction.	29
	Setting the Scene	30
	Probability and Uncertainty.	31
	The Speed at Which the Unexpected Happens.	32
	Insight	33
	Conclusion	34
5	Hide and Seek	37
	Introduction to Hidden Effects.	37
	The Law of Unintended Consequences.	37
	Capt. Ed Murphy's (1918–1990) Pronouncement.	39
	Adam Smith Told us Something Relevant a Long Time Ago	39
	Not Every Law is a Physical Law: Good or Bad?	40
	Conclusion	40
6	Predicting the Unexpected	43
	Introduction.	43
	Examining the Pitfalls of Probability	43
	Moving Towards Better Predictability	45
	How Can We Predict What Has Never Been Seen?	45
	Conclusion	46
7	Gaining Perspective on Complexity.	49
	Setting the Scene About Complexity	49
	How Can We Define Complexity?	49
	Who Sees Complexity?	50
	How to Assess Perceived Complexity?	52
	The Perceived Static View is not Enough	52
	Changing Complexity.	53
	Conclusion	54
8	The Wool, the Eyes and the Pulling-Over	55
	The Business Relationship of Complexity and Technology	55
	The Status Quo	56
	Consider a Plane Solution.	57
	Consider a Retail Outlet Solution.	57
	Back to Financial Markets: Consider a Parrot	59
	What About the Future?	60
	Conclusion	61

9	An Engineering and Re-engineering View	63
	Introduction: Scene Setting About Engineering	63
	What's 'Good Engineering'?	64
	Change, Dynamics and Design	64
	Transparency	65
	Two Forms of Analysis	66
	Benchmarking and Dynamic Complexity	67
	Why Technology Still Matters	69
	Conclusion	69
10	How Dynamic Complexity Drags a Business Down	71
	Introduction	71
	Example: The Creeping of Dynamic Complexity Drag	72
	Contain Risks Using Advanced Modeling to Reveal Unknowns	75
	Example: A Telco Prepares for Market Expansion	76
	Conclusion	79

Part II Dynamic Complexity Analysis
the Foundation for the Solution

11	How Do We Spot the Un-spottable?	83
	Introduction to Patterns, Dynamic Patterns	
	and Compound Patterns	83
	The Origin of Patterns	84
	How Might We Use Patterns?	85
	How We Might Understand Patterns?	86
	Dynamic Patterns: Emulative Deconstruction	87
	How Perturbation Theory Helps Us	91
	Computation Uses Dynamic Signature Characteristics	92
	Practical Use of Dynamic Patterns in Predicting	
	Future Architecture	93
	Insight	94
12	Predictive Modeling	95
	Introduction	95
	Mechanisms to Help Solve the Problem	95
	Perturbed Service Process: Analytical Solution	97
	Small Divisors and Their Effects Can Cause Chaos	98
	System Dynamics Theories	99
	Small Divisor Problems in Partial Differential	
	Equations (PDE's): The Perturbed Solution	100

13	A Theory of Causal Deconstruction	103
	Introduction	103
	A Complex System Under Optimal Control	103
	Hierarchic Perturbation Model	105
	The New Method: Causal Deconstruction Method	110
	Stage 1: Establish Base Dynamics	111
	Stage 2: Deconstruct Complexity	112
	Stage 3: Construct Emulator	114
	Stage 4: Predict Singularities	116
	Stage 5: Compare to Actual	118
	Stage 6: Define Improvement	120
	Stage 7: Monitor Execution	121
	Example 1: Causal Deconstruction of a Complex IT System	122
	Example 2: Causal Deconstruction of a Complex System	123
	Example 3: High Technology Production Line Factory	125
	Conclusion	125
14	Causal Deconstruction: The Beautiful Problem Provides the Smart Solution	127
	Introduction	127
	The Early Days	127
	Deeper into the Solution	128
	Examples of Dynamic Complexity (View from the Causal Deconstruction)	132
	The Importance of Hierarchic Predictive Emulation within Causal Deconstruction Theory	136
	Mathematical Predictive Emulation of Dynamic Complexity	139
	Step 1: Define and Collect Information	139
	Step 2: Deconstruct and Prepare the Input to the Mathematical Emulation	140
	Step 3: Emulate the System and Its Dynamic Complexity	140
	Step 4: Use the Mathematical Predictive Analytics to Diagnose, Discover Limit and Identify Remediation	141
	Conclusion	141
15	A Mathematical Treatise of Dynamic Complexity	143
	Introduction	143
	The Origin of Perturbation Theory	143
	Solving a Problem Using Perturbation Theory	145
	Perturbation Orders	145
	Why Use Perturbation Theory Versus Numerical or Statistical Methods?	146

Exposing the Unknown Using Mathematics	146
Mathematical Hierarchy	148
8-Level Hierarchy	148
N Level Hierarchy: Postal Services	149
Perturbation Theory Mathematical Solution.	152
The Envelop or the Exact Solution.	152
The Mathematical Solution (Patents in Reference).	152
Lower-Level Mathematical Emulation Examples	155
Example 1 Space-Time: The Case of Relational Data Model (Direct and Indirect Perturbation).	155
Example 2: Human Service (Direct and Indirect Perturbation).	160
Example 3 Space-Time: Postal Sorting Machine or Robot in Automotive Production Workshop	161
Example 4: Economic Instruments.	161
The Mathematical Method	163
Validation and Calibration (As the World is not Perfect)	163
16 Emulative Deconstruction for Mathematical Prediction	165
Introduction.	165
Definition of Emulative Deconstruction Theory	166
Why Is Emulative Deconstruction Necessary?	167
Understanding Corporate Performance: Influencers and Impacting Factors	167
Examples of Corporate Performance Influencers and Impacting Factors	168
Extended Predictive Space	168
Common Predictive Platform for Existing and Future Enterprise	168
Dynamic Maneuverability Metric.	170
17 Singularity and Chaos Theory.	175
Introduction.	175
Why Singularity and Chaos Point Is Important to Discover and Predict	175
The Chaos Theory	176
The Singularity Theory.	178
Single Singularity	178
Multiple Singularities: Singularity Resurgence.	180
Areas Covered by Mathematical Predictive Analytics.	180
Conclusion	182

Part III The Application of Optimal Business Control

18 Improving Business Outcomes with Optimal Business Control	185
Introduction.	185
The Applicability of OBC.	185
Examples of Business Processes	186
Examples of National Processes.	186
Examples of International/Global Processes.	186
The Definition of OBC.	187
Translation of Performance Goals into Computerized Formats.	187
Consolidation of Historic Patterns and Predicted Metric Information.	188
Operational Performance Analysis and Identification of Correctional Actions.	189
Interventions Made by Management in Light of the Predictive Information Reported.	190
The Theory of Optimal Business Control (OBC):	
Process Control, Optimal Control.	190
Risk Daunting Managers.	191
The Vital Solution	193
Optimal Business Control Theory	194
How It Works	195
Optimal Business Control Is a Global Framework	197
Example of Corporate Revival.	197
Conclusion	201
19 The Role of Business Architecture: A Case Study	203
Introduction.	203
Architecture Determination	203
A Case Study: Using Model-Based Architecture Methodology and X-Act Predictive Tooling to Transform Architecture	204
Target Architecture Development and Modeling Approach	204
Summary of Approach	205
Target Architecture: Guideline Principles	206
To Gain Fluidity, Scalability and Predictability	206
The Target Architecture Characteristics	207
Conclusion	208
20 Strategic Transformation of Industries: Predictive Management of Postal Services Case Study	209
Introduction.	209
A Case Study	209
Static Versus Dynamic Complexity in Postal Services	210

Addressing the Problem	210
Postal Services Challenges and Proposed Predictive Technology Roadmap.	215
Towards Robust Service Delivery	217
Service Planning, Control and Monitoring Through the Predictive Emulation.	218
Further Role of Predictive Emulator: Towards Optimal Control.	220
21 Using Predictive Analytics to Mature IT Production	221
Introduction.	221
Perspective	221
What's Wrong with Current IT Production Practices?	222
Testing Is a Burden	223
Difficult Budget, Time and Quality Trade-Offs	223
Unpredictable Results.	223
How 'Dynamic Complexity' Threatens IT Production Goals.	224
Too Many Variants	224
Risk Exist in Gaps Between Domains	224
Common IT Testing Challenges and Solutions	225
Reinventing IT Production with Predictive Analytics	226
Use Predictive Analytics in All SDLC Stages	227
Become Future-Oriented	228
Understand NFRs.	228
Monitor NFRs as They Evolve	229
Use OBC to Support Strategic SDLC.	229
Expand Testing Capabilities	229
Adopt a Holistic Approach	230
Achieve 100 % Testing Coverage	230
Map Business Requirements to Technical Specifications.	231
Diagnose and Improve	232
Getting Started with Predictive Model-Based Testing.	232
Establishing a Test Factory to Advance System Testing Maturity	232
What Problems Does a Test Factory Solve?	233
Test Factory Benefits	234
Conclusion	235
22 Prescriptive Production: A Case Study	237
Introduction.	237
Background.	237
How 'Dynamic Complexity' Threatens Production Goals	238
Dynamic Complexity Causes Performance Loss	238
Instinctive Decision-Making Is No Longer Sufficient.	238
Overcoming Production Management Challenge	239

Predictive Analytics Provide Insights into the Future 239

 Pairing Human + Machine 240

 Reinventing Production Management 240

How Prescriptive Production Works 241

Maximize ROI with an Analytics Center of Excellence 242

Getting Started with a Phased Approach 243

Conclusion 244

23 The Economic Environment: A Prospective Case. 247

 Introduction. 247

 The Components and Characteristics of a Broader Solution 247

 Is the Next Economic Bubble Showing Its Early Shoots? 249

 Conclusions. 251

Epilog: Defining the Way Forward 253

Appendix: Exploring the Pitfalls of Traditional Risk

Analysis in Financial Industries 261

Key Concepts 267

Glossary 269

Bibliography 273

Index 279