PRaise for The Complete Guide to Simulations and Serious Games

• "Yes, this is an encyclopedic overview of the simulations and serious gaming world, but it's far more important than a 'how to' book. Aldrich is signaling the end of the age of Gutenberg. Aldrich takes direct aim at why the R-Ci2 and higher education systems are failing—uncritically trapped in a nine-hundred-year world of 'learning to know' in a twenty-first century world that requires the judgment and skills of 'learning to do.' Aldrich's revolution transforms the way we learn."—JERRY BUSH, program manager, Learning@ Cisco

• "Aldrich has done it again. He provides an intuitive framework for those interested in (and perhaps overwhelmed by) simulations, games, and virtual worlds. Before you're halfway done with this book you'll be looking with a new perspective and set of competencies for creating interactive experiences."—BILL KOVACH, former Washington bureau chief of the New York Times, and former editor of the Atlanta Journal-Constitution

• "Clark Aldrich provides his clear vision of how 'learning to do' will liberate us from our industrial education legacy that has for too long been shaped by outdated, linear, passive instruction. I recommend this book without reservation for anyone interested in the future of learning."—JEFF SANDEFER, founder, the Acton School of Business

• "This exhaustive guide to computer gaming and simulation points the way to a new, more powerful way of learning by doing. It is a must-read—or must-read and study—for those involved in education and journalism."—DENIS SAULNIER, educational technology director, Harvard Business Publishing

• "The Complete Guide sets the standard as the encyclopedia for serious games and simulations. In this comprehensive volume, Aldrich uses hundreds of examples for this new medium. If you want to stay at the forefront of education, this book is a must-have!"—JEFFREY BUSCH, co-founder and executive director, California Academy of Sciences

• "This is an encyclopedic overview of the simulations and serious gaming world, but it's far more important than a 'how to' book. Aldrich is signaling the end of the age of Gutenberg. Aldrich takes direct aim at why the R-Ci2 and higher education systems are failing—uncritically trapped in a nine-hundred-year world of 'learning to know' in a twenty-first century world that requires the judgment and skills of 'learning to do.' Aldrich's revolution transforms the way we learn."—JERRY BUSH, program manager, Learning@ Cisco

• "Aldrich has done it again. He provides an intuitive framework for those interested in (and perhaps overwhelmed by) simulations, games, and virtual worlds. Before you're halfway done with this book you'll be looking with a new perspective and set of competencies for creating interactive experiences."—BILL KOVACH, former Washington bureau chief of the New York Times, and former editor of the Atlanta Journal-Constitution

• "This exhaustive guide to computer gaming and simulation points the way to a new, more powerful way of learning by doing. It is a must-read—or must-read and study—for those involved in education and journalism."—DENIS SAULNIER, educational technology director, Harvard Business Publishing

• "The Complete Guide sets the standard as the encyclopedia for serious games and simulations. In this comprehensive volume, Aldrich uses hundreds of examples for this new medium. If you want to stay at the forefront of education, this book is a must-have!"—JEFFREY BUSCH, co-founder and executive director, California Academy of Sciences

• "This is an encyclopedic overview of the simulations and serious gaming world, but it's far more important than a 'how to' book. Aldrich is signaling the end of the age of Gutenberg. Aldrich takes direct aim at why the R-Ci2 and higher education systems are failing—uncritically trapped in a nine-hundred-year world of 'learning to know' in a twenty-first century world that requires the judgment and skills of 'learning to do.' Aldrich's revolution transforms the way we learn."—JERRY BUSH, program manager, Learning@ Cisco

• "Aldrich has done it again. He provides an intuitive framework for those interested in (and perhaps overwhelmed by) simulations, games, and virtual worlds. Before you're halfway done with this book you'll be looking with a new perspective and set of competencies for creating interactive experiences."—BILL KOVACH, former Washington bureau chief of the New York Times, and former editor of the Atlanta Journal-Constitution
THE COMPLETE GUIDE TO SIMULATIONS AND SERIOUS GAMES
About Pfeiffer

Pfeiffer serves the professional development and hands-on resource needs of training and human resource practitioners and gives them products to do their jobs better. We deliver proven ideas and solutions from experts in HR development and HR management, and we offer effective and customizable tools to improve workplace performance. From novice to seasoned professional, Pfeiffer is the source you can trust to make yourself and your organization more successful.

**Essential Knowledge**  
Pfeiffer produces insightful, practical, and comprehensive materials on topics that matter the most to training and HR professionals. Our Essential Knowledge resources translate the expertise of seasoned professionals into practical, how-to guidance on critical workplace issues and problems. These resources are supported by case studies, worksheets, and job aids and are frequently supplemented with CD-ROMs, websites, and other means of making the content easier to read, understand, and use.

**Essential Tools**  
Pfeiffer’s Essential Tools resources save time and expense by offering proven, ready-to-use materials—including exercises, activities, games, instruments, and assessments—for use during a training or team-learning event. These resources are frequently offered in looseleaf or CD-ROM format to facilitate copying and customization of the material.

Pfeiffer also recognizes the remarkable power of new technologies in expanding the reach and effectiveness of training. While e-hype has often created whizbang solutions in search of a problem, we are dedicated to bringing convenience and enhancements to proven training solutions. All our e-tools comply with rigorous functionality standards. The most appropriate technology wrapped around essential content yields the perfect solution for today’s on-the-go trainers and human resource professionals.
This book includes premium content that can be accessed from our Web site when you register at www.pfeiffer.com/go/clarkaldrich using the password *professional.*
THE COMPLETE GUIDE TO SIMULATIONS AND SERIOUS GAMES

How the Most Valuable Content Will Be Created in the Age Beyond Gutenberg to Google

Clark Aldrich
To my family

Special Thanks

This book would not have been possible without Drew Davidson, Denis Saulnier, Scott Perrin, Chester Cooke, Mark Biscoe, and The Chewonki Foundation
CONTENTS

Foreword xxi
by Jeff Sandefur

Preface: The Elements of Interactivity xxv

Introduction: Capturing the Wisdom That Has Fallen Through the Cracks of Gutenberg and Google xxvii

The Most Important Skills xxviii

The Campfire and the Veld xxix

How to Use This Book xxxi

The Babel Problem—“Serious Games” or “Educational Simulations” xxxii

A New Science xxxiv

PART ONE: GENRES: SAVIOR OR SABOTEUR FOR LITERACY 2.0? 1

Sim Genres 2

Original Learning-to-Do Genres 3

Experience • Real • Practice Environment • Microcosm
1 Sims: The New Media of “Learning to Do,” Not Just “Learning to Know” 9
   A Spectrum of Scale 10
   Complex Game • Mobile Game
   Conclusion 11

2 Immersive Learning Simulation: Because You Can’t Learn to Ride a Bicycle from a Book 13
   Educational Simulations 14
   Branching Stories • Interactive Spreadsheets • Interactive Diagrams • Virtual Products • Virtual Labs • Practiceware • Virtual Experience Spaces
   Serious Games 26
   Frame Games
   Mini Games—Best of Both Worlds? 28
   The First Examples 29

3 Computer Games 33
   Computer Game Genres 34
   First-Person Shooter • Real-Time Strategy Games • Racing Games • Tycoon Games • Game Shows • Squad Shooters
   Games Appreciation 101 41

4 Traditional Education 43
   Educational Genres, Environments, Activities, and Media 43
   Classrooms • Case Study • Role-Playing • Lab Work • Books • Web Pages • Workbooks

PART TWO: SIMULATION ELEMENTS—ACTIONS AND RESULTS: FRAMING THE MISSING ESSENCE OF RESEARCH AND ANALYSIS 51

   Sweet Spots of Simulations 52
   Dead Reckoning • Understanding of Actions • Awareness of Patterns

5 Basic Actions 55
   Contextual Actions 55
   Cyclical Actions 55
   Actions and Basic Inputs 56
Contents

A Business Analysis Example of Actions, Systems, and Results 106

8 Maps: The Context for Life 107

The Nature of Structuring Maps 108

Layers • Strategy

Different Types of Maps 110

Geography-Based Maps • Conceptual Maps

Specific Map Elements and Related Terms 112

Arena • Attractor • Door • Wall • Firewall • Ecosystem •
Balancing Loop • Global Condition or Capability • Pandemic • Fog of
War • Home • High Value • Increase Surface Area • Market Map •
Maze • Path • Resources • Source • Strength of Position • Table •
Territory • Topography • Value of Proximity • Random Map

Triggers 129

Map-Based Triggers • Metrics-Based Triggers

9 Units: How CEOs, Presidents, and Hostile Aliens View Life on Earth 133

Properties of Units 135

Attributes and Stats • Energy • Balanced Inputs • Health • Size • Death
• Accumulator Storage Capacity • Special Unit • Character • Organization
Level • Signature • Masking • Goals • Upgrade • Enhancement •
Affiliation • Regeneration • Handshaking • Mutate • Reproduce •
Rock, Paper, Scissors • Memes

Items (The Stuff of Life) 151

Inventory • Exotic • Loss • Overheat • Overload • Substitute •
Building Block Unit • Strengthen by Using • Weaken by Using

Movement (The Life of Stuff) 157

Cost of Travel • Friction • Momentum • Formation • Teleport • Ergodic
• Emergence

Structure 162

Attributes • Dispenser • Structure (as Process) • Valve • Location, Location,
Location • Structures Within Structures • Structures as Level Design •
Structures as Backdrop

Events in Sims 165

Chain Reaction • Critical Mass • Cluster • Doom Loop •
Equilibrium (Stalemate)
10 Artificial Intelligence Player-Agent: More Patient Than Real People 171

The How 172

Sensors • Al States • Script • Fuzzy Logic • Internal View • Intuition

Making an AI Better Than the AI 175

Cheating for Gameplay • Turning an AI into a Character

Other Uses of AIs 176

The Success of Serious Games 176

11 State-Based Systems and Models: A Shortcut to Simulations 179

Computational Theory Models 180

Element • Link • Hierarchy or Tree • Binary • Knowledge Asset

12 Pure Mathematical System: The Real Stuff 187

Lines and Relationships 187

Primary Variables • Secondary Variables • Equation • All-or-Nothing • Edge

Enhancement • Correlation • Weighting • Zero-Sum • Aggregation •

Delay • Analog • Discrete • Digital • Cap • Random • Probability •

Permutation • Distribution • Explosion • Spike • Peak • Crash •

Decay • Pendulum Cycle • Recursion • Vector

13 Work Process 205

Characteristics of Processes 206

Activity • Consume • Cost • Economies of Scale • Edited, Processed,

Refined, Augmented • Milestone • Procedure • Process Map • Revenue •

Role • Span of Control • Value Chain • Engine

14 Big Skills: The Most Important Twenty-First-Century Skills 219

The Core of Any Curricula 220

Adaptation • Applying Economic, Value, and Governing Models •

Budgeting • Communication • Conceptual Dead Reckoning • Conflict

Management • Cost-Benefit Analysis • Creating and Using Boards and

Advisers • Creating New Tools • Decision Making • Ethics • Presenting

Choices to Users • Innovation • Leadership • Negotiation • Nurturing

and Stewardship • Process Reengineering • Project Management •

Relationship Management • Risk Analysis and Management • Security •

Solutions Sales

Can Schools Teach Leadership? 238
PART FOUR: BUILDING INTERACTIVE ENVIRONMENTS  241

15 Linear Content  243
Linear Content in Sims  244
Anecdote • Appendix • Backdrop • Backstory • Exposition • Bullet
Point • Cut Scene • Epilogue • Flashback • Foreshadowing • Full-Motion
Video • Inner Monologue • Inspirational Example • Lecture and
Lecturer • Montage • Plot • Puzzle • Quote • Story • Story
Arc • Story World • Story Line

What's the Problem with Purely Linear Content?  255

16 Game Elements: A Spoonful of Sugar If You Can Avoid
Hypoglycemic Shock  257
An Alphabatical List of Techniques  259
Advanced Graphics • Award • Beauty • Chase • Cheat • Choosing
Appearance or Voice for an On-Screen Character • Clicking Quickly and
Accurately • Collecting • Colloquialisms • Comics • Competition •
Destroy • Easter Egg • Fantasy • Futuristic • Gambling • Gaming •
Hero • Jeopardy • Mastering an Action • Mystery • New Sets and
Settings • Pet • Poll • Power-Ups • References to Culture • Rubber
Banding • Scores and Grades • Setting • Shopping, Virtual • Timer •
Wish Fulfillment

17 Pedagogical Elements: Learn Faster and Better  285
The Role of Pedagogy in Sims  286
Sound Cue • Mentor, Supervisor, or Guide • Abstraction • Simplified Interfaces •
Noise • Acrostic • Auto-Journal • Difficulty Adjustment • Speed-
Up or Slow-Down Switch • Alert • Exaggerated Response • Bread
Crumb • Mouse-Over • Libraries of Plays • Mixed Scales • List of
Tasks • Virtual Adviser • Redo • Replay Option • Save • Removal of
Scaffolding • Slow Motion Replay • Taxonomies • Time Line • Time to Core
Gameplay or First Decision • Trail • Venn Diagram • Walk-Through •
Pace Setter • Juxtaposition • Forced Moments of Reflection • Graph •
Highlight • Illustration • In-Game Tips and Directions • Fourth Wall •
Superstition • Forcing Different Approaches

Sims and the Nature of Math  315

18 Tasks and Levels  317
Inter-Level Structure  317
Entice Mode • Background Material • Briefing • Black Box •
Objective • Strategic Decision, or Load Out • Load-Up Screen Tips •
Core Gameplay • Action Gates • Save Points • Autosave Trigger •
Save Blackouts • End of Level • Boss • After Action Review
Sim Structure 326
Technology Test Page  •  Goals and Objectives of the Program  •  Training Level  •  First Level  •  Accidental Success  •  Practice Level  •  Final Level  •  Conclusion

Campaign 331
Linear Campaign  •  Open-Ended Campaign  •  Career Mode  •  Open-Ended Level or Game  •  Instant Action  •  Sandbox Level  •  Demonstration Level

Other Task and Level Definitions 337
Initial Value  •  Front Loading  •  Back Loading  •  Task  •  Failure  •  Task-Redundant, Extraneous Details  •  Task-Relevant  •  Level Length  •  Chunking Levels

Menu Structure 342
Producer Splash Screen  •  Developer Splash Screen  •  Main Menu or Start Screen  •  Random Access  •  Sound Options  •  Configure

“Washing Out” Technology Incompetents Before They Judge Your Sim 345

19 Display 347
Simulation Elements 348
Context  •  Inputs  •  Pedagogy  •  Cut Scenes  •  Briefings or Debriefings  •  Avatar  •  Body Language  •  Motion Capture

Point of View 351
First-Person  •  Overhead  •  Isometric View  •  Third-Person  •  Fisheye  •  Zoom In  •  Zoom Out  •  Complete View  •  Partial View  •  Obstructed

Cinematic Views 360
Establishing Shot  •  Reveal  •  Fade In  •  Fade Out  •  Ripple Dissolve

Pedagogy 362
Augmented View  •  Player Comparison Panel  •  Radar or Mini-Map  •  You Are Here  •  Compass  •  Progress Bar, Navigation Bar, Progress Meter  •  Subtitles  •  Energy Bar, or Health Bar

Interface 367
Heads-Up Display  •  Situational Awareness  •  Icon  •  Filter  •  Allocation Triangle  •  Cursor

Basics 372
Real Estate  •  Green  •  Red  •  Yellow  •  Polygon  •  Frames
Per Second  •  Set  •  Graphic Element
PART FIVE: FORMAL LEARNING PROGRAM  421

22 Learning Goals : Learning to Be, Learning to Do, Learning to Know  423

Social Networks and Communities—Learning to Be  424
Educational Simulation and Microcosms—Learning to Do 424
Books and Lectures—Learning to Know 425
From Simple to Complex 425
Awareness • Explicit Knowledge • Application of New Content • Procedural Knowledge • Coping Without Choking • Implicit Knowledge • Muscle Memory • Understanding Complex Systems • Conviction • Mastery Level • Increased Professional Value • Actualization
Combining the Three Goals 431

23 Program Goals 433
Basic Program Goals 433
Asynchronous Versus Synchronous • Increased Access • Certification • Compliance • One Contact Point • Reducing the Cost of Formal Learning • Costs, and Budgeting Costs for Simulation
Increasing Cost 438
Credit • Customize • Ease of Deployment • Runs in the Students’ Environment • Engagement • Increased Number of Opportunities • Measurable Results • Time Commitment

24 Target Audiences and Corresponding Learning and Program Goals 445
A Contrast of Two Target Audiences 446
Newcomers • High Potentials

25 When to Use Sims: Meeting Both Learning and Program Goals 449
Where the Use of the Content Is Critical 449
Improved Access Needed • Seeking Increased Engagement • Dynamic Content • Depth of Knowledge Required
Availability of Sims 452
Commercial Off-the-Shelf Games • Free Foundation-, Cause-, or Corporation-Sponsored Sims • Off-the-Shelf Educational Simulations • Internal Development House • Professor-Created Simulations • Otherwise Free Simulations

26 Educational Simulation Creation and Milestones Part 1: An Overview of Key Steps 457
Development Steps 457
Define Current Formal Learning Processes and Shortcomings • Identify Best Practices and Subject-Matter Experts • Interview Subject-Matter Experts •
xxviii Contents

Assess Participant Technology and Knowledge • Finding Employees to Fill Serious Games Positions • Define the Game • Design Document • Play Testing • Instructor Manual • Patch

A Natural Process of Going From Educational Simulation to Game 475

27 Educational Simulation Creation and Milestones Part 2: Calibrating Skill Cones and Designing the Different Layers of Feedback 477

Skill Building and Feedback 478
Emergent Learning • Constructivism • Feedback

On Practice 482

28 The Necessary Student Experience of Frustration and Resolution 485

Frustration-Resolution Pair 485
Threshold to Quit • Student Revolt

Student Contract and Performance Expectations 489
The Bottom 20 Percent • Failing a Participant

The Role of Honesty 490

29 Evaluation Strategies and the Analysis of Learning 493

Evaluating the Student 495
Tests and Quizzes • Community Activity • Journals • Written Reports

Evaluating the Program 496
Glint in the Eye • Anecdote • 360-Degree Measurements • Student Promotion • Staff and Sponsor Promotion • Click Throughs • What Went into the Simulation

Both Evaluating the Student and Evaluating the Program 500
Observation of Active Behavior • Standardized Test Results • Success as Success • Completion Rate

A Higher Standard 504

30 Conclusion: Banishing Today’s Classrooms, Curricula, Term Papers, Training Programs, Business Plans, and Linear Analysis to the Intellectual Slums and Backwaters to Which They So Richly Belong 505

If Books Liberated Us from Kings, Can Sims Liberate Us from CEO’s? 506
Appendix: Simulation Case Studies: Do Sims Work Better Than Traditional Instruction? 509

A Sim Develops Emotional Intelligence 510
Process • Implications

Executives in Class—From “Recalling” to “Applying” New Knowledge 512
Process • Results • Summary

Fortune 100 Company: An Extra Day Every Week of Work 514
Process • Results • Summary

U.S. Military Academy—Self-Paced Practiceware Deployment Beats Traditional Approach 516
Process • Results • Summary

Index 519

About the Author 533
Don’t let the title *The Complete Guide to Simulations and Serious Games* fool you. Yes, this is an encyclopedic overview of the simulations and serious gaming world, a complete lexicon for those who want to build the next generation of simulations for advanced learning. But it’s far more important than a comprehensive “how to” book about simulations.

Clark Aldrich makes his call to action clear. *The Complete Guide to Simulations and Serious Games* is “nothing less than a manifesto intended to overthrow the intellectual legacy of civilization to date.” Aldrich is signaling the end of the age of Gutenberg, a time of great learning, no doubt, but of linear learning—learning “how to know” rather than “how to do” or “how to be” in a complex, interactive world.

Why should you care? If you are an education reformer, Aldrich’s revolution could transform the way we learn. If you are a CEO, this is the way the next generation will want to be addressed. And if you are an entrepreneur, the intersection of serious games and simulations may signal one of the greatest investment opportunities in a generation.

For far too long there’s been a divide between the gaming community and educators. The gamers have dismissed educational simulations as boring and irrelevant; the educators have dismissed gaming as trivial. Both have a point, but in their squabbling over turf, both have missed how serious games and engaging simulations can change the world of education.

Aldrich takes direct aim at why the K–12 and higher education systems are failing, myopically trapped in a nineteenth-century world of “learning by knowing” in a twenty-first-century world that requires the judgment and skills of “learning by doing” and the individualized attention to “learning by being.”
If this doesn’t strike a nerve—if you are satisfied with the antiquated assembly-line process that passes for education in the United States—then you really need to read this book. Particularly if you are a parent.

So why listen to Clark Aldrich? Because he is the Tiger Woods and Michael Jordan of the serious gaming and simulation world, all rolled into one. He’s one of the few people who not only see the big picture of how simulations and gaming will transform education and can walk you step-by-step through what does and does not work in simulation design, but he also can create leading-edge games and write first-rate code.

Not many people in any industry can see where future trends are leading and get the details right. In *The Complete Guide to Simulations and Serious Games*, Aldrich moves from genres—the ways you classify games—through the elements that separate the great simulations from those that don’t work. He explains why the “big skills”—those that really count, like leadership, negotiation, and stewardship—and the “middle skills” like directing people, probing, and procurement cannot be learned from a book or lecture, but only through simulations, or through the much more difficult school of hard knocks in real life.

Then, having clearly established why linear content (meaning books) is the “white bread” of learning, and why the academic intelligentsia have failed us, Aldrich shows how formal learning programs, properly understood, can use simulations and serious games to create real learning, and how formal learning programs in the hands of educrats or corporate learning officers can destroy them.

So why am I so sure that Aldrich is right that today’s “classrooms, curricula, term papers, corporate training programs, business plans, and linear analysis should be banished to the intellectual slums and backwaters”? Because I have seen the future firsthand, or at least a glimpse of it.

As a pilot, I’ve experienced how the most sophisticated flight simulators instill the skills, judgment, and coolness under pressure needed to safely land a crippled Airbus on the Hudson River.

As a parent, I’ve watched my six-, seven-, and twelve-year-old children have fun playing *Zoo Tycoon* and *Sim City*, while absorbing sophisticated business pattern recognition skills that took me years to learn at Harvard Business School.

Finally, as an education reformer at the award-winning Acton School of Business, I’ve spent over a million dollars of my own money designing six interactive Sims on customer acquisition, production processes, pricing, working capital, and bootstrapping. Our games aren’t perfect, but they are engaging
enough that my children want to play them, and challenging enough that an
Acton, Harvard, or Stanford MBA cannot master them.

Yes, I’ve seen firsthand how much more powerful—and engaging—serious
games and simulations can be than books and lectures. By the end of this book,
I’m confident you’ll not only have a glimpse of the future too, but even better,
a blueprint for how you can get started creating that future.

About the Foreword Author

Jeff Sandefer runs an energy investment firm, Sandefer Capital Partners, that
holds over a $1 billion in assets. For the last sixteen years, he has also taught
trepreneurship at the graduate level. Four years ago Sandefer and a band of
successful entrepreneurs left a nationally recognized program they had built
at the University of Texas to start the Acton School of Business. For two con-
secutive years, Acton was rated among the top MBA programs in the country
by the Princeton Review, which called its students the “most competitive” MBAs
in America and rated the faculty in the top three in the nation. While at the
University of Texas, Sandefer was voted by the students as UT’s Outstanding
Teacher five separate times and was named by Business Week as one of the top
trepreneurship professors in the United States. He has served for over a decade
on Harvard University’s visiting committee and as chair of the university’s
academic research committee. He is a director of National Review magazine, for-
merly served as chairman of the Acton Institute of Religion and Liberty, and
was a member of Texas Governor Rick Perry’s 21st Century Commission on
Higher Education.
PREFACE: THE ELEMENTS OF INTERACTIVITY

This book, with its definitions of the structures of simulations and serious games, presents itself as a helpful guide for Sim authors and sponsors who wish to better ply their craft in both stand-alone environments and in virtual worlds. I hope, incidentally, that it is.

But underneath that pleasant veneer, this book is a challenge to everyone in all of the educational and knowledge industries, from instructors to publishers to business analysts. Identifying successful design patterns from computer games, academic study, business analysis, and military and corporate learning programs, this book is nothing less than a manifesto intended to cast off the intellectual chains of civilization to date.

These elements of interactivity challenge all the traditional linear content models, putting a new focus on actions, systems, and results. The book recommends augmenting or even replacing the traditional passive presentation of content with an active “learning by doing” approach. Having said that, here are some caveats.

This book is not complete. I have attempted to include enough terms in each of the various categories not to exhaust a topic but to define it. But many individual entries refer to subject areas whose full treatment would fill entire books.

Second, as any good Sim designer would hope, this book is as nonlinear as a book can be. It is organized as a virtual world might be, meticulously, logically,
but not assuming any prescribed path. You can go through it from beginning to end, but you can also bounce around. When you get sick of a section, skip to the next. Or dig into a term and its context that interests you, following the references to related topics. Or go to the index at the back. You can scan or dig in, zoom out or zoom in. I have tried to create the best of both worlds, but some people, when reading this, will be frustrated by the lack of traditional structure. This book is about learning by practicing, which will involve reexamining the same content, often from different perspectives, not just learning by seeing how much ground is covered. You might return to the same entry several times, each time seeing more in the same words. In this regard, using this book is similar in part to the user experience in a simulation. This book will reward your effort, not displace it. Your role is participant, not audience.

Finally, this book deals with concepts and constructs, not programming. This is because many different technologies are available, and while the constructs are universal, the implementation changes dramatically from one toolset to another. People might use this approach in video editing, Adobe Flash, a PlayStation 3 game, a research paper, an iPhone app, or an island in Second Life. The technical techniques are different, and fast moving. The philosophy is the same, and I suspect timeless.
INTRODUCTION

Capturing the Wisdom That Has Fallen Through the Cracks of Gutenberg and Google

Imagine you and I are by the pool at a nice hotel in Lyon, France. We are negotiating some business deal, perhaps the creation of a new company or a piece of intellectual property.

Now imagine that a twenty-five-year veteran of hospitality management walked by. What would she see? Maybe that our coffee is old, and that the table’s umbrella should be positioned to block the sun. She might notice the water in the pool is a little green, suggesting not enough chlorine. She might wonder, because we are people of business, how to pitch the new virtual conference service. She might note that we need new towels.

In contrast, what if an expert in negotiation saw us? He might read my body language as tense, yours as relaxed. He might notice that we are on the verge of coming to agreement, and we are both committed to success.

How about a nutritionist? He might look with disgust at the white bread in our rolls, and the processed sugars in our jams. He might approve of your orange juice, but not my Coke, and then look for any pallor in our faces. He might look around for the buffet table and evaluate the contents. Or maybe even look for a snack machine, and see whether there are any peanuts or other protein sources.

How about a lawyer? She might look at the documents on the table. She might try to find a nondisclosure agreement. She might be curious to see exactly what notes I am taking. How binding is what we are saying? Are we each revealing too much at this stage of the conversation?
The big point here: People at the top of their game see things when they encounter a situation that others do not.

For example:

- What did George Washington see as he walked through colonial Boston that was different from what the majority saw?
- What did Louisa May Alcott see when her house was filled with people?
- What did President Jimmy Carter see when he looked at a map of the world in 1978? Or Jack Welch in 2001? Or Barack Obama in 2009?

These are all issues of situational awareness. Let me define the term formally:

**Situational awareness:** The ability to filter out certain details and highlight and extrapolate others, to better understand and control the outcome. Different people with different domain expertise bring different situational awareness to the same situation.

Seeing the world as experts do is the hallmark of any domain expertise, and makes problems and appropriate actions more obvious. Given that, how is situational awareness developed in an individual? How is multiple situational awareness developed and then balanced?

In most formal learning programs to date, using classrooms and traditional media such as books and movies, situational awareness has not been rigorously developed in students. This is for two pretty big reasons. First, it has not been documented and analyzed from the point of view of many experts, including historical leaders and contemporary experts, in any meaningful way. Second, and almost inevitably given the first reason, few environments have been designed to help students and other interested parties learn the skills.

**The Most Important Skills**

Situational awareness is a good example of content that has fallen through the cracks of linear structures. Other major instances include awareness of patterns, use of actions, and many other types of knowledge. But there are even simpler and broader examples to understand how big our blind spots really are.

Let me ask you, what are the most important skills a person can have, across professions or ages and even in technical fields such as engineering or medicine? Many people would at least consider that the list of “big skills” would include leadership, project management, stewardship, relationship management, innovation, security, and many others. But your own list may be better.