Contents

Introduction xxiii

Chapter 1  Defining What’s on Your Plate: The Foundation of a Test Project 1

What You Might Test: The Extended Test Effort 2
From Microscope to Telescope: Test Granularity 2
   Structural (White-Box) Tests 2
   Behavioral (Black-Box) Tests 3
   Live Tests 4
The Complementary and Continuous Nature of Test Granularity 4

A Stampede or a March? Test Phases 4
   Unit Testing 5
   Component or Subsystem Testing 5
   Integration or Product Testing 6
   String Testing 7
   System Testing 7
   Acceptance or User-Acceptance Testing 7
   Pilot Testing 8
Why Do I Prefer a Phased Test Approach? 8
   Test-Phase Sequencing 9
First Cut 10

What You Should Test: Considering Quality 10
   Three Blind Men and an Elephant: Can You Define Quality? 11
   The Perils of Divergent Experiences of Quality 12
What to Worry About: How to Analyze Quality Risks 14
   Properties and Benefits of Analytical Risk-Based Testing 15
   Kick-Starting Quality-Risk Analysis with Checklists 17

ix
## Chapter 3  Test System Architecture, Cases, and Coverage

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test System Architecture and Engineering</td>
<td>79</td>
</tr>
<tr>
<td>The Action Components: Definitions</td>
<td>82</td>
</tr>
<tr>
<td>It’s Not Saint Paul’s, But…Principles for Test System Architecture</td>
<td>84</td>
</tr>
<tr>
<td>Not an Objet d’Art: Test System Quality</td>
<td>85</td>
</tr>
<tr>
<td>No Test System Is an Island: Testers and the Test System</td>
<td>89</td>
</tr>
<tr>
<td>Miscellaneous Best Practices and Principles for Quality Test Systems</td>
<td>90</td>
</tr>
<tr>
<td>The Bricks and Mortar of the System: Test Cases</td>
<td>91</td>
</tr>
<tr>
<td>Creating Test Conditions</td>
<td>91</td>
</tr>
<tr>
<td>A Basic Testing Template</td>
<td>92</td>
</tr>
<tr>
<td>A Stress-Test Case for DataRocket</td>
<td>96</td>
</tr>
<tr>
<td>Another Useful Test-Case Template</td>
<td>98</td>
</tr>
<tr>
<td>IEEE 829 Test System Templates</td>
<td>99</td>
</tr>
<tr>
<td>On Test Design and the Smart Use of Templates</td>
<td>104</td>
</tr>
<tr>
<td>How Detailed? The Effects of Precision</td>
<td>105</td>
</tr>
<tr>
<td>Avoiding the Dreaded Test Escape: Coverage and Regression-Test Gaps</td>
<td>109</td>
</tr>
<tr>
<td>Bad Coverage Decisions with the Best Intentions</td>
<td>110</td>
</tr>
<tr>
<td>Are You Testing What Development Is Building?</td>
<td>111</td>
</tr>
<tr>
<td>Relating Quality Risks to Test Cases</td>
<td>112</td>
</tr>
<tr>
<td>Configuration Coverage</td>
<td>113</td>
</tr>
<tr>
<td>Bug Coverage</td>
<td>116</td>
</tr>
<tr>
<td>Regression-Test Gaps</td>
<td>118</td>
</tr>
<tr>
<td>Is Automation a Complete Solution?</td>
<td>120</td>
</tr>
<tr>
<td>Four Ways to Spread Tests Across Cycles</td>
<td>122</td>
</tr>
<tr>
<td>What if I Can’t Repeat All the Tests? Alternative Regression-Risk-Mitigation Strategies</td>
<td>131</td>
</tr>
<tr>
<td>‘There’s a Lesson to Be Learned Here. . .’: Test Case Incremental Improvement</td>
<td>133</td>
</tr>
<tr>
<td>Responding to Failures</td>
<td>133</td>
</tr>
<tr>
<td>Adopting Best Practices</td>
<td>133</td>
</tr>
<tr>
<td>Using Reactive Testing</td>
<td>134</td>
</tr>
<tr>
<td>You Can’t Do It All: Deciding What Not to Do</td>
<td>134</td>
</tr>
<tr>
<td>Case Study</td>
<td>135</td>
</tr>
<tr>
<td>Bonus Case Study</td>
<td>136</td>
</tr>
</tbody>
</table>
xi Contents

Bonus Case Study 138
  Example of Test Specification Levels of Detail 139
    Level 1 139
    Level 2 139
    Level 3 140
    Level 4 141
    Level 5 142
  Exercises 142

Chapter 4 An Exciting Career in Entomology Awaits You: A Bug-Tracking Database 145
  Why Bother? The Case for a Formal Bug-Tracking System 146
  So, What Seems to Be the Problem? The Failure Description 148
    More Like Hemingway than Faulkner 150
    Ten Steps to Better Bug Reports 152
  Flexible Reporting: Beginning to Construct a Database 154
  The Vital Few and the Trivial Many: Ranking Importance 156
  Putting the Tracking in Bug Tracking: Adding Dynamic Information 158
    Using States to Manage Bug Life Cycles 158
    Emphasizing Ownership and Accountability 160
    One Key Handoff: Isolation to Debugging 161
    Guiding the Bug Life Cycle: The Bug-Triage Process 163
    Putting the Dynamic Fields in Place 165
  Finishing Touches: Capturing Bug Data for Analysis 167
    What the Bug Relates To: Subsystem, Configuration, and Quality Risks 167
    Where the Bug Came From: Resolution and Root Cause 169
      Functional 171
      System 172
      Process 172
      Data 172
      Code 172
      Documentation 172
      Standards 173
    Other 173
    Duplicate 173
    NAP 173
    Bad Unit 173
    RCN 173
    Unknown 173
    How Long Was the Bug Around? Close Date and the Injection, Detection, and Removal Phases 174
    The Finalized Bug-Tracking Database 175
    The IEEE 829 Standard 176
Extracting Metrics from the Bug-Tracking Database 179
  How Defect Removal Proceeds: The Opened/Closed Chart 179
  Why Bugs Happen: The Root-Cause Chart 184
  How Development Responds: The Closure-Period Chart 184
  What Was Broken: The Subsystem Chart 186
  An After-the-Fact Metric: Defect-Detection Percentage 188
  A Note on Metrics and Charts 189
Managing Bug Tracking 190
  Politics and Misuse of Bug Data 190
    Don’t Fail to Build Trust 190
    Don’t Be a Backseat Driver 191
    Don’t Make Individuals Look Bad 192
  Sticky Wickets 192
    Bug or Feature? 192
    Irreproducible Bug 193
    Deferring Trivia or Creating Test Escapes? 193
Case Study 194
Exercises 195

Chapter 5 Managing Test Cases: The Test-Tracking Spreadsheet 199
Building a Minimalist Test-Tracking Spreadsheet 200
  The Basic Spreadsheet 200
Using the Test-Tracking Spreadsheet on Test Projects 203
Making Enhancements 205
  Assigning Identifiers and Testers to Test Suites and Cases 205
  Adding Date and Hours Information: Plan versus Actual 207
  Understanding How Long Tests Run 208
  Increasing the Precision of a Test-Case State 208
  Prioritizing Test Suites and Cases 212
  Scrutinizing the Roll Up Columns 213
  Other Ways to Summarize and Group Data 214
  Extending the Spreadsheet by Including Test-Case Details 215
Tracking Coverage 216
Putting the Test-Tracking System in Motion 217
  Little Trouble 217
  Big Trouble 218
  No Problem! 221
The IEEE 829 Test Log 221
Extracting Metrics from the Test-Tracking Spreadsheet 223
  Can We Get Any Work Done? Charting Test Progress 224
  Are We Getting as Much Work Done as Planned? Charting Planned Test Fulfillment 225
  Are We Testing What We Promised? Charting Test and Bug Coverage 226
## Chapter 6  Tips and Tools for Crunch Mode: Managing the Dynamic  257

Do Sweat the Details: Staying on Top of Everything  257
Moving Forward While Getting All the Facts: The Desire for Certainty, the Imperative of Progress  258
Dependencies, Schedules, and Reminders: The Importance of Follow-Up  258
It Won’t Deliver Itself: Revisions and Release Processes  259
It Won’t Install Itself, Either: Configuring the Test Environment  260
“The Hobgoblin of Small Minds” Is Your Friend: Auditing and Updating Test Results  261
Defining a Test-Execution Process  263
Test-Result Misinterpretation: Minimizing False Positives and False Negatives  263
“I Wish You a Merry Dragon-Boat Festival…”: When Crunch Time, Holidays, and Cultures Collide  266
A Spider’s Web of Connections: Managing Test Hardware- and Software-Configuration Logistics  267
The Pieces and How They Connect: An Entity-Relationship Diagram  268
From Diagram to Schemas: Implementing the Logistics Database  271
Budgeting and Planning: Using the Logistics Database Ahead of Time  271
The Work, Who Does It, and Where It Happens: The People Side  272
### Chapter 7 Stocking and Managing a Test Lab

- **Do You Need a Test Lab?** 294
- **Selecting and Planning a Lab Area** 295
- **The Test-Lab Inventory** 299
  - A Sample Inventory Template
    - Software 300
    - Hardware 300
    - Consumables 301
    - Furnishings 302
    - Tools 302
    - Reference Materials 302
  - Using Risk Analysis to Pick the Right Inventory 303
  - Further Thoughts on Stocking Your Lab 304
- **Security and Tracking Concerns** 305
- **Managing Equipment and Configurations** 306
- **Keeping the Test Environment Clean** 309
- **Human Factors** 310
  - A Safe Lab Is a Productive Lab 310
  - Damage to Lab Equipment 312
  - Productivity in the Lab 313
- **Case Study** 314
- **Exercises** 317

### Chapter 8 Staffing and Managing a Test Team

- **The Right Person for the Job: What Kind of People Make Good Test Engineers** 320
  - Professional Pessimism 320
  - Balanced Curiosity 321
  - Focus: No Space Cadets 322
  - Avoid the Aspiring Hero 323
  - Shun the Sloth 324
  - Reject Casper Milquetoast 324
- **Defining the Test Team: How Many Whos Do What?** 325
  - Size 325
  - Skills 327
Education, Training, and Certification 331
Positions, Experience, and Goals 336
Specialists or Project Resources? Organizational Models 338
Hiring Testers 341
  Defining the Job 341
  Gathering and Screening Résumés 345
  On-Site Interviews 347
  Making the Hiring Decision 350
  Avoiding—and Undoing—Hiring Mistakes 351
  Bringing the New Tester on Board 352
Giving a Damn: Motivating Your Test Team 353
  Be On Your Team’s Side 354
  Support a Reasonable Workstyle 356
  Foster Career Development for Each Tester 359
  Don’t Offer Bonuses Based on Meeting a Schedule 360
  Don’t Buy Bugs Like Sacks of Rice 360
  Expecting Thanks for Saturday Night’s Pizza 360
  Promoting an Us-versus-Them Mentality 361
  So, What Are People Actually Doing? 361
Extending Your Talent: Using Temporary Experts and Implementers 362
  The Roles Temporary Workers Play 362
  Long-Term Temporary Workers 364
  Hiring Contractors 368
  Bringing on the Experts 372
Case Study 374
Exercises 375

Chapter 9  The Triumph of Politics: Organizational Challenges for Test Managers 377
Don Quixote, Champion of Quality: What’s Your Job, Anyhow? 377
  Test Missions and Test Policies 378
  Test Team and Manager Titles 381
Where You Fit: The Test Group in the Organization 383
What Else Fits? Adding Other Functions to Test 386
Working with Other Managers: Directions of Test Management 388
  Managing Upward 389
    Bringing Management to Your Reality: Communicating Clearly 390
    “How about a Third Shift, and Weekends, and…’’: The Effects of Lateness on Test 393
  Managing Outward 395
Contents xvii

Your Partners in Building Quality Systems: Development Peers 395
The Supporting Cast: Internal Service Providers 397
Help Desk, Customer Support, or Technical Support: Often Overlooked 397
Business Analysts, Sales, and Marketing: Vital Allies 398
Testing in the Dark: Should You Proceed without Documentation? 400
Pink Slips: Layoffs and Liquidation 403
Presenting the Results: The Right Message, Delivered Properly 404
Good Ways to Deliver Bad News 405
Institutionalizing a Test Dashboard 406
The Importance of Accuracy and Audience 407
“You Can Tell the Pioneers...”: The Effect of Early Adoption on Test 409
Exercises 412

Chapter 10 Involving Other Players: Distributed Testing, outsourcing, and related topics 421
Choosing Your Partners 422
Your Vendors 424
Testing Service Providers 428
Sales Offices 431
Users and User-Surrogates 432
Planning a Distributed Test Effort 433
Assessing Capabilities 434
Understanding the Cost 435
Collating, Coordinating, and Partitioning the Test Program 436
Organizing Logistics 437
Dealing with Mapping Issues 439
Managing a Distributed Test Effort 442
Monitoring Test Execution 442
Communicating Status and Changing Direction 443
Handling Political Considerations 444
Being Sensitive to Culture Clashes 445
Building and Maintaining Trust 446
How Outsourcing Affects Testing 448
Increased Need for Organization 450
Selecting the Right Test Team 452
Planning and Preparing for Testing in Outsourced Projects 455
Maintaining Focus During Test Execution 459
Conclusions about Outsourcing and Testing 460
Case Study 1 460
# Contents

Case Study 2 461
- Key Differences between Testing Service Providers and In-House Test Teams 461
- Test Tasks Appropriate for Testing Service Providers 463
- Test Tasks Appropriate for In-House Test Teams 465
- Organizational Challenges 466
- Processes for Effective Use of Testing Service Providers 469
- Bonus Case Study: People Are Not Widgets! Judy Mckay 469
- Conclusion 472
- Exercises 473

## Chapter 11 Economics of Testing: Fiscal Context 475
- Is Quality Free? The Economic Justification for the Testing Investment 477
  - What Does Testing Really Cost? 477
  - A SpeedyWriter Case Study 478
  - Management Obstacles to Test Funding 481
    - Test-Manager Budgeting Faux Pas: Obstacles the Test Manager Creates 481
    - Regrettable Necessity: Obstacles the Testing Reality Creates 482
    - Communication Breakdowns: Management Blind Spots and the Difficulty of Education 484
    - Surmounting the Obstacles . . . Then Doing What We Can 485
- Case Study 487
- Exercises 488

## Chapter 12 Testing Implications of Project and Process: Situational Context 497
- Where Testing Fits into the Project Life Cycle 498
  - Common Life-Cycle Themes 498
  - The V Model and Sequential Projects 501
  - The Spiral Model 504
  - Evolutionary, Incremental, or Agile Models 506
  - Code and Fix 508
  - Testing Maintenance Releases 509
    - System, Subsystem, Commercial Off-the-Shelf Software, and Component Integration 512
    - Hardware/Software Systems 513
- Process Improvement 514
  - “But We’re Different . . .”: The Commonality of Solutions 514
  - The Test Team Is Not an Island: External Effects on Your Productivity 517
    - Process Gas Pedals 518
Contents

Required release date 570
Description of requirements 570
General technical requirements 570
Welcome 570
Payment 570
Internet Browser 571
Performance 571
Localization 571
Content Control 571
Session Termination 571
Confidentiality 572
Administration 572
Software Updates 572
View Kiosks 572
View Users 573
Modify User 573
Terminate User 573

Appendix C Omninet: The Internet Everywhere System Requirements Document 575
Functionality System Requirements 576
Reliability System Requirements 580
Usability System Requirements 581
Efficiency System Requirements 582
Maintainability System Requirements 583
Portability System Requirements 584
Design Models 585
Omninet System Architecture 585
Payment Processing Decision Table 586
Kiosk Module Flow 586
Kiosk State-Transition Diagram 588
Kiosk State-Transition Table 588
Kiosk OS/Browser/Connection Speed Configuration Orthogonal Array 588

Appendix D Bibliography, Related Readings, and Other Resources 591
Bibliography and Related Readings 591
Online and Hard-Copy Publications 595
Contacting RBCS 595
Our Value 596
Our People 596
Our Clients 596
Consulting 597
Assessments 597
Jump-Starts 598
Contents xxi

Project Test Services 598
Test Recruiting, Staff Augmentation, and Outsourcing 599
Training and Certification 599
The Bottom Line 599

Glossary 601
Index 613