## Contents

<table>
<thead>
<tr>
<th>Preface</th>
<th>xix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience</td>
<td>xxi</td>
</tr>
<tr>
<td>Structure</td>
<td>xxi</td>
</tr>
<tr>
<td>The Web Site</td>
<td>xxv</td>
</tr>
<tr>
<td>References</td>
<td>xxv</td>
</tr>
</tbody>
</table>

**Acknowledgments**  xxvii

### Part I  The Risk-Based Testing Approach  1

1  **Introduction to Risk-Based Testing**  3

- Risky Project Foundations  3
- *Pressures on Testing and Quality Assurance*  5
- *The Tester’s Manifesto*  6
- *Textbook Testing and the Real World*  7
- *The Risks of Early Release*  9
- What Is Risk?  11
- *Are Risks Wrong?*  11
- The Definition of Risk  12
A Definition of Good Testing 49
References 50

4 Risk-Based Test Strategy 51
From Risks to Test Objectives 52
Risks, Test Objectives, and Coverage 54
The W-Model Extends the V-Model of Testing 56
Master Test Planning 60
Failure Mode and Effects Analysis 60
The Risk-Based Test Process Method 61
Stage 1: Risk Identification (Columns 1, 2) 63
Stage 2: Risk Analysis (Columns 1–5) 64
Stage 3: Risk Response (Columns 6–15, etc.) 64
Stage 4: Test Scoping (Columns 1, 2, 8–15, etc.) 67
Stage 5: Test Process Definition (Columns 8–15, etc.) 69
Method Guidance 70
Aren’t the Risk Numbers Meaningless? 70
What If Participants Can’t Agree? 71
What If a Test Objective Is Unachievable? 72
What If the Testing Will Cost Too Much? 73
Shouldn’t We Automatically Include Simple Tests? 73
Don’t Forget Generic Test Objectives 74
Risks and Exploratory Testing 75
Risk- and Benefit–Based Test Reporting 76
References 80

Part II Risk-Based E-Business Testing 83
5 E-Business and the Consequences of Failure 85
E-Business, E-Commerce, and Everything E 85
A Typical Web Experience 86
Web Site Failures and Their Consequences 88
E-Business Maturity and Risk 89
Web Time and Other Challenges to Testers 90
Risky Projects and Testing 92
References 92

6  Types of Web Site Failures 93

Web Site As Retail Store 94
No Second Chances 95

Many of the Risks Are Outside Your Control 96
Unlimited Potential Users 96
Many Potential Points of Failure 96
You Have No Control over Client Platforms 97
You Have No Control over Client Configuration 97
Which Browsers Do You Support? 98
Your Users May Not Have the Required Plug-Ins 99
The Context of Web Transactions Is a Risk Area 99
Cookies Can Be a Problem 100
Network Connections 100
Firewalls May Get in the Way 101
Anyone Can Visit 101
Usability Is Now a Prime Concern 101
Localization 102

The Sequence of Points of Failure in a Web Service 102

7  E-Business Test Strategy 105

Specialized Knowledge and E-Business Testing Techniques 105
Testing Considerations 106
Developer Testing 106
Consider Using Test Drivers 106
Configurations 108
Web Conventions and Accessibility 108

Using a Test Process Framework to Build Your Test Strategy 110
7 Categories of Tests

Essential Testing Priorities

Tests Types Can Be Static or Dynamic

Stages of Testing

Tests Can Be Automated or Manual

Guidelines for Using the Test Process Framework

Postdeployment Monitoring

References

8 From Risk Analysis to a Test Process

Many Focused Stages or Bigger, Broader Test Stages?

Know Your Users

Where Do Nonfunctional Tests Fit?

Build-and-Integration Strategies—an Example

Automated Regression Testing

Further Thoughts on Tools

Reference

Part III E-Business Test Techniques and Tools

9 Static Testing

Overview

Content Checking

HTML Validation

Browsers Can Interpret HTML Differently

Browsers Treat HTML Faults Differently

Browsers Display HTML Differently

Development Tools May Generate Poor HTML

Remote Validation or In-House Tools?

Examples of HTML Validators

Varying the Depth of Testing
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Web Page Integration Testing</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>Overview</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>Link Checking</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Missing Embedded Web Page Objects</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Missing Linked Objects</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Why Do Objects Go Missing?</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Other Return Codes from Web Servers</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>Automated Link Checkers</td>
<td>153</td>
</tr>
<tr>
<td></td>
<td>Object Load and Timing</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>Transaction Verification</td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>HTTP GET</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>HTTP POST</td>
<td>161</td>
</tr>
<tr>
<td></td>
<td>Tools for Web Page Integration Testing</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>164</td>
</tr>
<tr>
<td>11</td>
<td>Functional Testing</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>Overview</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>Architecture and Components</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>Test Types and the Objects Under Test</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>Automated Test Execution</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>Browser Page Testing</td>
<td>173</td>
</tr>
<tr>
<td></td>
<td>Server-Based Component Testing</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td>Transaction Link Testing</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>Application System Testing</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td>Testing When Requirements Are of High Quality</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td>Testing When Requirements Are Poor</td>
<td>180</td>
</tr>
</tbody>
</table>
Contents

Context Testing 182
Cookies 183
Hidden Fields 184
Loss of Connection 184
Other Situations to Consider 185
Localization Testing 185
Configuration Testing 186
We Haven’t the Time—Is There an Alternative? 188
Tools for Functional Testing 189
References 190

12 Service Testing 191
Overview 191
What Is Performance Testing? 195
An Analogy 195
Performance Testing Objectives 198
Prerequisites for Performance Testing 199
Quantitative, Relevant, Measurable, Realistic, and Achievable Requirements 200
A Stable System 200
A Realistic Test Environment 200
A Controlled Test Environment 201
The Performance Testing Toolkit 201
Performance Requirements 202
Response Time Requirements 203
Load Profiles 204
Requirements Realism 204
Database Volumes 206
The Performance Test Process 206
Incremental Test Development 207
Test Execution 208
Results Analysis and Reporting 209
### 14 Security Testing 245

- Overview 245
- Hackers, Crackers, Whackers, and Script Kiddies 249
- The Attacker's Methodology 250
- Denial of Service Attacks 250
- Security Vulnerabilities 252
- Security Assessment 253
- Choosing a Security Consultant 253
- Security Vulnerabilities 254
- Security Scanning Tools 254
- Penetration Testing 256
- Terms of Reference 256
- Penetration Test Goals 257
- Attack Methodology 258
- The Value of Penetration Testing 259
- Tools for Security Testing 260
- References 261
- Further Reading 262

### 15 Large-Scale Integration Testing 263

- Overview 263
- Integration Knowledge Is Critical to Success 266
- An Example of LSI 266
- Integration Analysis 267
- Inventories 268
- Transaction Analysis 268
- Business Object Definition 272
- SIT 275
- BIT 276
- Challenges 278
- References 280
**16  Postdeployment Monitoring**  
- Remote Monitoring Services 282
- Types of Monitoring 282
- *Link and Page Download Speed Checking* 282
- *Availability and Performance Monitoring* 283
- Security Monitoring 285
- Remote Monitoring Services and Tool Web Sites 287

**17  Tools for E-Business Testing**  
- Proprietary Test Execution Tools 292
  - *Justifying Automation* 295
- How Test Execution Tools Work 295
- *Capturing Test Scripts* 296
- *Customizing Test Scripts to Make Them Data-Driven* 298
- *Replaying Test Scripts* 298
- *Tools with Built-In Browsers* 300
- *Selecting Tests to Automate* 301
- Proprietary, Shareware, and Freeware Tools 301
  - *Proprietary Tools* 303
  - *Shareware Tools* 303
  - *Freeware Tools* 303
- Sources of Tool Information 304
- References 305
- Further Reading 305

**Part IV  Making E-Business Testing Happen**  
**18  The Context of E-Business Testing**  
- Methods and Requirements Formats 310
  - *XP* 311
  - *UML and Unified Process* 313
Architectures, Objects, Components, and Middleware 315
Coping with Iterative and Incremental Methods 316
References 319

19 **E-Business Test Organization, Planning, and Specification** 321

Testing’s Place in the Project 322
Independent or Codependent? 322
*Testing Manager as a Role* 323
*QM and CM* 323

Organization and Control 323
Credibility of Testing 325
Explaining Testing to Other Managers 327
Estimation in a Vacuum 328
Inversion of the Tester’s Role 332

Testing Stages, Teams, and Environments 333
Getting, Organizing, and Keeping Resources 334
*Environments* 334
*Staffing* 336
*Retention* 338

Specifying Tests 339
*Stage Test Plans* 340
*Test Design* 341
*Expected Results* 341

Stage-Specific Considerations 342
*Testing Interfaces with Other Systems* 342
*Acceptance Testing Viewpoints* 343

References 345
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Business Test Execution</td>
<td>347</td>
</tr>
<tr>
<td>Incident Management</td>
<td>349</td>
</tr>
<tr>
<td>Testing in a Live Environment</td>
<td>351</td>
</tr>
<tr>
<td>Prelive Testing</td>
<td>352</td>
</tr>
<tr>
<td>Pseudolive Testing</td>
<td>352</td>
</tr>
<tr>
<td>Pilot</td>
<td>352</td>
</tr>
<tr>
<td>Managing the End Game</td>
<td>353</td>
</tr>
<tr>
<td>References</td>
<td>354</td>
</tr>
<tr>
<td>Further Reading</td>
<td>354</td>
</tr>
<tr>
<td>Appendix A: Essential Web Technologies for Testers</td>
<td>355</td>
</tr>
<tr>
<td>Appendix B: Web Testing Using Home-Brew Tools</td>
<td>359</td>
</tr>
<tr>
<td>Using Dummy HTML Forms To Test Components</td>
<td>359</td>
</tr>
<tr>
<td>Using Test Drivers To Test Components</td>
<td>361</td>
</tr>
<tr>
<td>The Simplest of Test Drivers</td>
<td>363</td>
</tr>
<tr>
<td>Reference</td>
<td>367</td>
</tr>
<tr>
<td>Further Reading</td>
<td>367</td>
</tr>
<tr>
<td>List of Acronyms and Abbreviations</td>
<td>369</td>
</tr>
<tr>
<td>Glossary</td>
<td>373</td>
</tr>
<tr>
<td>About the Authors</td>
<td>385</td>
</tr>
<tr>
<td>Index</td>
<td>387</td>
</tr>
</tbody>
</table>