

Content

1	The Project	1
1.1	Purpose and Contents of This Book	2
1.1.1	The Signs	2
1.1.2	Testing Revisited	3
2	Introduction to Testing	7
2.1	Testing Challenges	7
2.1.1	Business and IT.....	8
2.1.2	The Human Factor	8
2.1.3	Old and New Worlds.....	9
2.1.4	Banking Platform Renewal	11
2.1.5	Complex Testing.....	12
2.1.6	Global Testing.....	13
2.1.7	The Value of Testing.....	14
2.2	The Significance of Requirements.....	15
2.2.1	What is a Requirement?	16
2.2.2	Meeting the Unknown.....	16
2.2.3	Characteristics of Requirements	17
2.2.4	Requirements Elicitation	18
2.2.5	Main Problems with Requirements	19
2.2.6	Risks Associated with Requirements	21
2.2.7	Recommendations.....	22
2.3	The Nonconformity Problem.....	23
2.3.1	How Defects are Born.....	23
2.3.2	Nonconformity to Standards and Rules	25
2.3.3	Aging of Product Components.....	26
2.3.4	Environmental Changes	27
2.3.5	Outdated Tests	27
2.3.6	Conformity Assessment	27
2.3.7	The Costs of the Nonconformity	28

2.3.8	Mission Impossible?	28
2.3.9	Complexity	29
2.4	Test Artifacts	29
2.4.1	Classification of Test Artifacts.....	29
2.4.2	Information Life Cycle.....	30
2.4.3	Data Life Cycle	31
2.5	Testing Predictability.....	31
2.5.1	Business Rules	33
2.5.2	Business Rules Management (BRM)	35
2.5.3	Software Reliability	38
2.5.4	Software Quality Criteria [ISO 9126]	39
2.6	Software Development Methods	40
2.6.1	V-Model.....	41
2.6.2	Agile Software Development.....	43
2.6.3	What is Agility?	44
2.6.4	Iterative Development.....	46
2.6.5	Waterfall and Agile Methods Compared	46
2.6.6	Staged Delivery Method	47
2.6.7	Selection of the Right Development Method.....	47
2.7	The Testing Value Chain (TVC)	50
2.7.1	The SO Organization	51
2.7.2	Quality Gates	52
3	Test Methods and Technology	55
3.1	Different Views of Testing	55
3.1.1	Test Methods – Overview	57
3.2	Dynamic Test Methods.....	59
3.2.1	Structural Testing (White Box).....	59
3.2.2	Functional Testing (Black Box).....	60
3.2.3	Para-Functional Testing	62
3.3	Static Test Methods	64
3.3.1	Inspections	65
3.3.2	Reviews.....	65
3.3.3	Static Analysis (SA).....	68
3.3.4	Design Verification (DV).....	69
3.4	Ways to Test.....	70
3.4.1	Planned Testing (PT)	71
3.4.2	Exploratory Testing (ET).....	71
3.4.3	Performance Testing (PT).....	72
3.4.4	Rapid Testing.....	72
3.4.5	Regression Testing (RT)	73
3.4.6	Extended Random Regression Testing (ERRT).....	76
3.4.7	Scenario Testing.....	76
3.4.8	SOA Testing.....	77
3.4.9	Recommendations.....	81

- 3.5 Test Technology 82
 - 3.5.1 Model-Based Testing (MBT)..... 83
 - 3.5.2 Model-Based Integration and Testing (MBI&T) 93
 - 3.5.3 Model Checking 93
 - 3.5.4 Test Automation..... 95

- 4 The Test Domain..... 109**
 - 4.1 Topology of the Test Domain..... 109
 - 4.1.1 Environmental Factors 110
 - 4.1.2 Business Pressure on IT 110
 - 4.1.3 IT Technology..... 111
 - 4.1.4 Mainframe as the Foundation
of the IT Infrastructure 112
 - 4.1.5 A Complex Network 114
 - 4.1.6 Multi-Tier Architecture..... 116
 - 4.1.7 Backward and Lateral Compatibility 117
 - 4.1.8 Multi-Layered Test Domain..... 117
 - 4.1.9 SOA 118
 - 4.2 Data and Time Aspects..... 121
 - 4.2.1 Master Data Management (MDM)..... 121
 - 4.2.2 Business Data Categorization 123
 - 4.2.3 Business Data Growth..... 126
 - 4.2.4 Test Data Management (TDM)..... 126
 - 4.2.5 Business Rules Management (BRM) 133
 - 4.2.6 Business Data Lifecycle..... 133
 - 4.2.7 Bi-Temporality..... 134
 - 4.2.8 Causality Violation 138
 - 4.2.9 Other Time Aspects 139
 - 4.3 Table-Driven Systems (TDS) 143
 - 4.3.1 Tabular Representation of Data 143
 - 4.3.2 Characteristics of Tables 146
 - 4.3.3 Usage of Tables..... 146
 - 4.3.4 Specification Tables 148
 - 4.3.5 Transient Tables and Data..... 148
 - 4.3.6 Relational Databases 148
 - 4.3.7 TDS Testing 150
 - 4.4 Critical Technical Parameters..... 152
 - 4.4.1 Definition 152
 - 4.4.2 Examples of CTPs..... 153

- 5 Test Processes..... 155**
 - 5.1 The Testing Network – Process Technology 155
 - 5.1.1 What is a Process? 155
 - 5.1.2 Process Networks..... 157
 - 5.1.3 Test Process Landscape 159

5.2	Core Testing Processes	159
5.2.1	Overview	159
5.2.2	Test Strategy Elaboration	160
5.2.3	Test Planning	161
5.2.4	Test Objectives Definition	162
5.2.5	Test Design Techniques	162
5.2.6	Test Artifacts Management	163
5.2.7	TC Design	164
5.2.8	TC Review	173
5.2.9	TC Implementation	176
5.2.10	TC Archiving	178
5.2.11	Test Set Build	178
5.2.12	Test Runs	180
5.2.13	Test Results Analysis	181
5.2.14	Incident and Problem Management (IPM)	183
5.2.15	Incident Tracking and Channeling (ITC)	185
5.2.16	Compliance Testing Process (CTP)	190
5.2.17	Distributed Testing	192
5.3	Test Support Processes	196
5.3.1	Document Management	196
5.3.2	Information Channeling	198
5.3.3	Training/Skills Improvement	202
5.3.4	Software Testing Certification	204
5.4	Test Neighbor Processes	205
5.4.1	Specifications Review	205
5.4.2	Software Package Build	205
5.4.3	Software Build Manager Role	206
5.4.4	Software Package Installation	209
5.4.5	Release Management	209
5.4.6	Test Data Management	209
5.4.7	Risk Management	210
6	Test Platforms and Tools	211
6.1	The Integrated Test Platform	211
6.1.1	Benefits of an ITP	212
6.1.2	Test Platform Management	214
6.2	TD for QC	217
6.2.1	TD Staffing	219
6.2.2	TD Administration	219
6.2.3	TD Modules	222
6.2.4	Requirements Module	222
6.2.5	TestPlan Module	224
6.2.6	TestLab Module	225
6.2.7	Defect Module	225
6.2.8	Analysis Function	226

- 6.2.9 Export Function 226
- 6.2.10 Traceability Function 226
- 6.2.11 Email and Workflow 227
- 6.2.12 Document Generator 228
- 6.2.13 Other Functions 229
- 6.2.14 Dashboard 229
- 6.3 The Leading Commercial SA Tools 230
- 6.4 The Leading Commercial Testing Tools 232

- 7 The Analysis of Defect Root Causes 235**
 - 7.1 The Methodological Approach 236
 - 7.1.1 Defect Classification Schemes 236
 - 7.1.2 Orthogonal Default Classification (ODC)..... 238
 - 7.1.3 Situational Analysis 242
 - 7.1.4 Ishikawa Diagram 242
 - 7.1.5 Limitations of Cause and Effect Models..... 243
 - 7.2 Causal Chains Explained 244
 - 7.2.1 Identifying Problem Sources..... 244
 - 7.2.2 Test Perimeter 246
 - 7.2.3 Causal Chain Examples 248
 - 7.3 Data-Dependent Testing 262
 - 7.3.1 Database Testing 262
 - 7.3.2 SQL Tuning Sets (STSs)..... 266
 - 7.3.3 Bi-temporality Issues 271
 - 7.3.4 Business Rules Management (BRM) 271
 - 7.3.5 Data State 271
 - 7.3.6 Data Life Cycle 273
 - 7.3.7 Causality Violation 273
 - 7.4 Frequent Causes of Problems 274
 - 7.4.1 Deadlock 274
 - 7.4.2 Fixes 275
 - 7.4.3 Interfaces 276
 - 7.4.4 Memory Leaks 276
 - 7.4.5 Metadata..... 277
 - 7.4.6 Network-Centric Applications 277
 - 7.4.7 Network problems..... 278
 - 7.4.8 SW Package Build 283
 - 7.4.9 Wrong Parameters..... 284
 - 7.5 Software Aging..... 287
 - 7.5.1 Causes of Software Decay 288
 - 7.5.2 Symptoms of Code Decay..... 288
 - 7.5.3 Risk factors Related to Software Aging..... 289
 - 7.5.4 The Cost of Software Aging 289
 - 7.5.5 An Analysis Tool for Aging Software 290

7.6	The Investigation of a Technical Problem.....	293
7.6.1	Technical Processes (TPs)	294
8	Measuring Test Efforts	297
8.1	Overall Project Progress Measurement.....	297
8.1.1	EVA's Power	297
8.1.2	EVA's Benefits	297
8.2	Test Progress Reporting (TPR).....	299
8.2.1	Technical Measurement	300
8.2.2	Test Monitoring	303
8.2.3	Implementing TPR.....	304
8.2.4	Test Quality Measurement	305
8.2.5	Test Progress Measurement	305
8.2.6	Test Progress Horizon.....	306
8.2.7	Test Progress Prediction.....	306
8.2.8	Test Progress Reporting with TD/QC	308
8.2.9	Central Reporting with TD/QC.....	311
9	Test Issues	323
9.1	Risk Management.....	323
9.1.1	Risk Management in the Enterprise IT Project	323
9.1.2	The Scope of IT Risk Management	324
9.1.3	Risk-Based Testing	325
9.1.4	Limitations on Risk Management	327
9.1.5	Risks Related to Compliance	328
9.1.6	Implementing Sarbanes-Oxley in TestDirector.....	333
9.1.7	The Impact of International Regulations on IT	335
9.1.8	Recommended Lectures	338
9.2	IPC Management	339
9.2.1	Detecting Danger Areas in the Project.....	339
9.2.2	IPC Management	341
9.2.3	Crisis Management	341
	Conclusion	343

Appendices

A	Useful Aids	347
A.1	Templates	347
A.1.1	Data Profile	347
A.1.2	Project Status	348
A.1.3	Release Flash	350
A.1.4	Top-Down Process Modelling	351
A.1.5	Software Test Documentation (IEEE Standard)	351

- A.2 Checklists 353
 - A.2.1 Cause-Effect Checklist..... 353
 - A.2.2 Code Review Checklist..... 353
 - A.2.3 Functionality Checklist 354
 - A.2.4 How to Create Component Test Cases..... 355
 - A.2.5 Investigation of a Technical Problem..... 355
 - A.2.6 ODC Triggers Usage..... 356
 - A.2.7 Process Design Parameters 356
 - A.2.8 Requirements Definition 358
 - A.2.9 Test Case Conformity Checklist 359
 - A.2.10 Test Case Review Checklist..... 360
 - A.2.11 Test Findings..... 361

- B Sarbanes-Oxley Compliance 363**

- C Test Platforms and Tool Providers..... 367**

- D Acronyms..... 373**

- Glossary 381**

- Bibliography 417**

- Links 421**

- Index 427**

- Acknowledgements 435**

- Copyrights and Trademarks..... 437**