

The Addison-Wesley Signature Series



BOOK A
MICK COHN
SIGNATURE
Mike Cohn

AGILE TESTING

A PRACTICAL GUIDE FOR
TESTERS AND AGILE TEAMS

LISA CRISPIN
JANET GREGORY



Forewords by Mike Cohn and Brian Marick

FREE SAMPLE CHAPTER

SHARE WITH OTHERS



Praise for *Agile Testing*

“As Agile methods have entered the mainstream, we’ve learned a lot about how the testing discipline fits into Agile projects. Lisa and Janet give us a solid look at what to do, and what to avoid, in Agile testing.”

—Ron Jeffries, www.XProgramming.com

“An excellent introduction to agile and how it affects the software test community!”

—Gerard Meszaros, Agile Practice Lead and Chief Test Strategist at Solution Frameworks, Inc., an agile coaching and lean software development consultancy

“In sports and music, people know the importance of practicing technique until it becomes a part of the way they do things. This book is about some of the most fundamental techniques in software development—how to build quality into code—techniques that should become second nature to every development team. The book provides both broad and in-depth coverage of how to move testing to the front of the development process, along with a liberal sprinkling of real-life examples that bring the book to life.”

—Mary Poppendieck, Author of *Lean Software Development* and *Implementing Lean Software Development*

“Refreshingly pragmatic. Chock-full of wisdom. Absent of dogma. This book is a game-changer. Every software professional should read it.”

—Uncle Bob Martin, Object Mentor, Inc.

“With *Agile Testing*, Lisa and Janet have used their holistic sensibility of testing to describe a culture shift for testers and teams willing to elevate their test effectiveness. The combination of real-life project experiences and specific techniques provide an excellent way to learn and adapt to continually changing project needs.”

—Adam Geras, M.Sc. Developer-Tester, Ideaca Knowledge Services

“On Agile projects, everyone seems to ask, ‘But, what about testing?’ Is it the development team’s responsibility entirely, the testing team, or a collaborative effort between developers and testers? Or, ‘How much testing should we automate?’ Lisa and Janet have written a book that finally answers these types of questions and more! Whether you’re a tester, developer, or manager, you’ll learn many great examples and stories from the real-world work experiences they’ve shared in this excellent book.”

—Paul Duvall, CTO of Stelligent and co-author of *Continuous Integration: Improving Software Quality and Reducing Risk*

“Finally a book for testers on Agile teams that acknowledges there is not just one right way! *Agile Testing* provides comprehensive coverage of the issues testers face when they move to Agile: from tools and metrics to roles and process. Illustrated with numerous stories and examples from many contributors, it gives a clear picture of what successful Agile testers are doing today.”

—Bret Pettichord, Chief Technical Officer of WatirCraft and Lead Developer of Watir

This page intentionally left blank

AGILE TESTING

The Addison-Wesley Signature Series

Kent Beck, Mike Cohn, and Martin Fowler, Consulting Editors



Visit informit.com/awss for a complete list of available products.

The **Addison-Wesley Signature Series** provides readers with practical and authoritative information on the latest trends in modern technology for computer professionals. The series is based on one simple premise: Great books come from great authors. Books in the series are personally chosen by expert advisors, world-class authors in their own right. These experts are proud to put their signatures on the covers, and their signatures ensure that these thought leaders have worked closely with authors to define topic coverage, book scope, critical content, and overall uniqueness. The expert signatures also symbolize a promise to our readers: You are reading a future classic.



AGILE TESTING

A PRACTICAL GUIDE FOR TESTERS AND AGILE TEAMS

Lisa Crispin
Janet Gregory

◆◆ Addison-Wesley

Upper Saddle River, NJ • Boston • Indianapolis • San Francisco
New York • Toronto • Montreal • London • Munich • Paris • Madrid
Capetown • Sydney • Tokyo • Singapore • Mexico City

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed with initial capital letters or in all capitals.

The authors and publisher have taken care in the preparation of this book, but make no expressed or implied warranty of any kind and assume no responsibility for errors or omissions. No liability is assumed for incidental or consequential damages in connection with or arising out of the use of the information or programs contained herein.

The publisher offers excellent discounts on this book when ordered in quantity for bulk purchases or special sales, which may include electronic versions and/or custom covers and content particular to your business, training goals, marketing focus, and branding interests. For more information, please contact:

U.S. Corporate and Government Sales
(800) 382-3419
corpsales@pearsontechgroup.com

For sales outside the United States, please contact:

International Sales
international@pearson.com

Visit us on the Web: informit.com/aw

Library of Congress Cataloging-in-Publication Data:

Crispin, Lisa.

Agile testing : a practical guide for testers and agile teams /

Lisa Crispin, Janet Gregory. — 1st ed.

p. cm.

Includes bibliographical references and index.

ISBN-13: 978-0-321-53446-0 (pbk. : alk. paper)

ISBN-10: 0-321-53446-8 (pbk. : alk. paper) 1. Computer software—
Testing. 2. Agile software development. I. Gregory, Janet. II. Title.

QA76.76.T48C75 2009
005.1—dc22

2008042444

Copyright © 2009 Pearson Education, Inc.

All rights reserved. Printed in the United States of America. This publication is protected by copyright, and permission must be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permissions, write to:

Pearson Education, Inc.
Rights and Contracts Department
501 Boylston Street, Suite 900
Boston, MA 02116
Fax (617) 671-3447

ISBN-13: 978-0-321-53446-0

ISBN-10: 0-321-53446-8

Text printed in the United States on recycled paper at RR Donnelley in Crawfordsville,
Indiana.

Seventh printing, April 2011

To my husband, Bob Downing—you're the bee's knees!

—Lisa

To Jack, Dana, and Susan, and to all the writers in my family.

—Janet

And to all our favorite donkeys and dragons.

—Lisa and Janet

This page intentionally left blank

CONTENTS

Foreword by Mike Cohn	xxiii
Foreword by Brian Marick	xxv
Preface	xxvii
Acknowledgments	xxxvii
About the Authors	xli

Part I	Introduction	1
---------------	---------------------	----------

Chapter 1	What Is Agile Testing, Anyway?	3
	Agile Values	3
	What Do We Mean by “Agile Testing”?	4
	A Little Context for Roles and Activities on an Agile Team	7
	Customer Team	7
	Developer Team	7
	Interaction between Customer and Developer Teams	8
	How Is Agile Testing Different?	9
	Working on Traditional Teams	9
	Working on Agile Teams	10
	Traditional vs. Agile Testing	12
	Whole-Team Approach	15
	Summary	17
Chapter 2	Ten Principles for Agile Testers	19
	What’s an Agile Tester?	19
	The Agile Testing Mind-Set	20

Applying Agile Principles and Values	21
Provide Continuous Feedback	22
Deliver Value to the Customer	22
Enable Face-to-Face Communication	23
Have Courage	25
Keep It Simple	26
Practice Continuous Improvement	27
Respond to Change	28
Self-Organize	29
Focus on People	30
Enjoy	31
Adding Value	31
Summary	33

Part II Organizational Challenges 35

Chapter 3 Cultural Challenges	37
Organizational Culture	37
Quality Philosophy	38
Sustainable Pace	40
Customer Relationships	41
Organization Size	42
Empower Your Team	44
Barriers to Successful Agile Adoption by Test/QA Teams	44
Loss of Identity	44
Additional Roles	45
Lack of Training	45
Not Understanding Agile Concepts	45
Past Experience/Attitude	48
Cultural Differences among Roles	48
Introducing Change	49
Talk about Fears	49
Give Team Ownership	50
Celebrate Success	50
Management Expectations	52
Cultural Changes for Managers	52
Speaking the Manager's Language	55
Change Doesn't Come Easy	56
Be Patient	56
Let Them Feel Pain	56

Build Your Credibility	57
Work On Your Own Professional Development	57
Beware the Quality Police Mentality	57
Vote with Your Feet	57
Summary	58
Chapter 4 Team Logistics	59
Team Structure	59
Independent QA Teams	60
Integration of Testers into an Agile Project	61
Agile Project Teams	64
Physical Logistics	65
Resources	66
Tester-Developer Ratio	66
Hiring an Agile Tester	67
Building a Team	69
Self-Organizing Team	69
Involving Other Teams	69
Every Team Member Has Equal Value	70
Performance and Rewards	70
What Can You Do?	71
Summary	71
Chapter 5 Transitioning Typical Processes	73
Seeking Lightweight Processes	73
Metrics	74
Lean Measurements	74
Why We Need Metrics	75
What Not to Do with Metrics	77
Communicating Metrics	77
Metrics ROI	78
Defect Tracking	79
Why Should We Use a Defect Tracking System (DTS)?	80
Why Shouldn't We Use a DTS?	82
Defect Tracking Tools	83
Keep Your Focus	85
Test Planning	86
Test Strategy vs. Test Planning	86
Traceability	88

Existing Processes and Models	88
Audits	89
Frameworks, Models, and Standards	90
Summary	93
Part III The Agile Testing Quadrants	95
Chapter 6 The Purpose of Testing	97
The Agile Testing Quadrants	97
Tests that Support the Team	98
Tests that Critique the Product	101
Knowing When a Story Is Done	104
Shared Responsibility	105
Managing Technical Debt	106
Testing in Context	106
Summary	108
Chapter 7 Technology-Facing Tests that Support the Team	109
An Agile Testing Foundation	109
The Purpose of Quadrant 1 Tests	110
Supporting Infrastructure	111
Why Write and Execute These Tests?	112
Lets Us Go Faster and Do More	112
Making Testers' Jobs Easier	114
Designing with Testing in Mind	115
Timely Feedback	118
Where Do Technology-Facing Tests Stop?	119
What If the Team Doesn't Do These Tests?	121
What Can Testers Do?	121
What Can Managers Do?	122
It's a Team Problem	123
Toolkit	123
Source Code Control	123
IDEs	124
Build Tools	126
Build Automation Tools	126
Unit Test Tools	126
Summary	127

Chapter 8	Business-Facing Tests that Support the Team	129
	Driving Development with Business-Facing Tests	129
	The Requirements Quandary	132
	Common Language	134
	Eliciting Requirements	135
	Advance Clarity	140
	Conditions of Satisfaction	142
	Ripple Effects	143
	Thin Slices, Small Chunks	144
	How Do We Know We're Done?	146
	Tests Mitigate Risk	147
	Testability and Automation	149
	Summary	150
Chapter 9	Toolkit for Business-Facing Tests that Support the Team	153
	Business-Facing Test Tool Strategy	153
	Tools to Elicit Examples and Requirements	155
	Checklists	156
	Mind Maps	156
	Spreadsheets	159
	Mock-Ups	160
	Flow Diagrams	160
	Software-Based Tools	163
	Tools for Automating Tests Based on Examples	164
	Tools to Test below the GUI and API Level	165
	Tools for Testing through the GUI	170
	Strategies for Writing Tests	177
	Build Tests Incrementally	178
	Keep the Tests Passing	179
	Use Appropriate Test Design Patterns	179
	Keyword and Data-Driven Tests	182
	Testability	183
	Code Design and Test Design	184
	Automated vs. Manual Quadrant 2 Tests	185
	Test Management	186
	Summary	186
Chapter 10	Business-Facing Tests that Critique the Product	189
	Introduction to Quadrant 3	190
	Demonstrations	191

Scenario Testing	192
Exploratory Testing	195
Session-Based Testing	200
Automation and Exploratory Testing	201
An Exploratory Tester	201
Usability Testing	202
User Needs and Persona Testing	202
Navigation	204
Check Out the Competition	204
Behind the GUI	204
API Testing	205
Web Services	207
Testing Documents and Documentation	207
User Documentation	207
Reports	208
Tools to Assist with Exploratory Testing	210
Test Setup	211
Test Data Generation	212
Monitoring Tools	212
Simulators	213
Emulators	213
Summary	214
Chapter 11 Critiquing the Product Using Technology-Facing Tests	217
Introduction to Quadrant 4	217
Who Does It?	220
When Do You Do It?	222
“ility” Testing	223
Security	223
Maintainability	227
Interoperability	228
Compatibility	229
Reliability	230
Installability	231
“ility” Summary	232
Performance, Load, Stress, and Scalability Testing	233
Scalability	233
Performance and Load Testing	234
Performance and Load-Testing Tools	234
Baseline	235

Test Environments	237
Memory Management	237
Summary	238
Chapter 12 Summary of Testing Quadrants	241
Review of the Testing Quadrants	241
A System Test Example	242
The Application	242
The Team and the Process	243
Tests Driving Development	244
Unit Tests	244
Acceptance Tests	245
Automation	245
The Automated Functional Test Structure	245
Web Services	247
Embedded Testing	248
Critiquing the Product with Business-Facing Tests	248
Exploratory Testing	248
Testing Data Feeds	249
The End-to-End Tests	249
User Acceptance Testing	250
Reliability	250
Documentation	251
Documenting the Test Code	251
Reporting the Test Results	251
Using the Agile Testing Quadrants	252
Summary	253

Part IV Automation 255

Chapter 13 Why We Want to Automate Tests and What Holds Us Back	257
Why Automate?	258
Manual Testing Takes Too Long	258
Manual Processes Are Error Prone	259
Automation Frees People to Do Their Best Work	259
Automated Regression Tests Provide a Safety Net	261
Automated Tests Give Feedback, Early and Often	262
Tests and Examples that Drive Coding Can Do More	262

Tests Are Great Documentation	263
ROI and Payback	264
Barriers to Automation—Things that Get in the Way	264
Bret’s List	264
Our List	265
Programmers’ Attitude—“Why Automate?”	265
The “Hump of Pain” (The Learning Curve)	266
Initial Investment	267
Code that’s Always in Flux	269
Legacy Code	269
Fear	269
Old Habits	270
Can We Overcome These Barriers?	270
Summary	271
Chapter 14 An Agile Test Automation Strategy	273
An Agile Approach to Test Automation	274
Automation Test Categories	274
Test Automation Pyramid	276
What Can We Automate?	279
Continuous Integration, Builds, and Deploys	280
Unit and Component Tests	282
API or Web Services Testing	282
Testing behind the GUI	282
Testing the GUI	282
Load Tests	283
Comparisons	283
Repetitive Tasks	284
Data Creation or Setup	284
What Shouldn’t We Automate?	285
Usability Testing	285
Exploratory Testing	286
Tests that Will Never Fail	286
One-Off Tests	286
What Might Be Hard to Automate?	287
Developing an Automation Strategy—Where Do We Start?	288
Where Does It Hurt the Most?	289
Multi-Layered Approach	290
Think about Test Design and Maintenance	292
Choosing the Right Tools	294

Applying Agile Principles to Test Automation	298
Keep It Simple	298
Iterative Feedback	299
Whole-Team Approach	300
Taking the Time to Do It Right	301
Learn by Doing	303
Apply Agile Coding Practices to Tests	303
Supplying Data for Tests	304
Data Generation Tools	304
Avoid Database Access	306
When Database Access Is Unavoidable or Even Desirable	307
Understand Your Needs	310
Evaluating Automation Tools	311
Identifying Requirements for Your Automation Tool	311
One Tool at a Time	312
Choosing Tools	313
Agile-Friendly Tools	316
Implementing Automation	316
Managing Automated Tests	319
Organizing Tests	319
Organizing Test Results	322
Go Get Started	324
Summary	324

Part V An Iteration in the Life of a Tester 327

Chapter 15 Tester Activities in Release or Theme Planning	329
The Purpose of Release Planning	330
Sizing	332
How to Size Stories	332
The Tester's Role in Sizing Stories	333
An Example of Sizing Stories	334
Prioritizing	338
Why We Prioritize Stories	338
Testing Considerations While Prioritizing	339
What's in Scope?	340
Deadlines and Timelines	340
Focus on Value	341

System-Wide Impact	342
Third-Party Involvement	342
Test Planning	345
Where to Start	345
Why Write a Test Plan?	345
Types of Testing	346
Infrastructure	346
Test Environments	347
Test Data	348
Test Results	349
Test Plan Alternatives	350
Lightweight Test Plans	350
Using a Test Matrix	350
Test Spreadsheet	353
A Whiteboard	353
Automated Test List	354
Preparing for Visibility	354
Tracking Test Tasks and Status	354
Communicating Test Results	357
Release Metrics	358
Summary	366
Chapter 16 Hit the Ground Running	369
Be Proactive	369
Benefits	370
Do You Really Need This?	372
Potential Downsides to Advance Preparation	373
Advance Clarity	373
Customers Speak with One Voice	373
Story Size	375
Geographically Dispersed Teams	376
Examples	378
Test Strategies	380
Prioritize Defects	381
Resources	381
Summary	382
Chapter 17 Iteration Kickoff	383
Iteration Planning	383
Learning the Details	384
Considering All Viewpoints	385

Writing Task Cards	389
Deciding on Workload	393
Testable Stories	393
Collaborate with Customers	396
High-Level Tests and Examples	397
Reviewing with Customers	400
Reviewing with Programmers	400
Test Cases as Documentation	402
Summary	403
Chapter 18 Coding and Testing	405
Driving Development	406
Start Simple	406
Add Complexity	407
Assess Risk	407
Coding and Testing Progress Together	409
Identify Variations	410
Power of Three	411
Focus on One Story	411
Tests that Critique the Product	412
Collaborate with Programmers	413
Pair Testing	413
“Show Me”	413
Talk to Customers	414
Show Customers	414
Understand the Business	415
Completing Testing Tasks	415
Dealing with Bugs	416
Is It a Defect or Is It a Feature?	417
Technical Debt	418
Zero Bug Tolerance	418
It’s All about Choices	419
Decide Which Bugs to Log	420
Choose When to Fix Your Bugs	421
Choose the Media You Should Use to Log a Bug	423
Alternatives and Suggestions for Dealing with Bugs	424
Start Simple	428
Facilitate Communication	429
Testers Facilitate Communication	429
Distributed Teams	431

Regression Tests	432
Keep the Build “Green”	433
Keep the Build Quick	433
Building a Regression Suite	434
Checking the “Big Picture”	434
Resources	434
Iteration Metrics	435
Measuring Progress	435
Defect Metrics	437
Summary	440
Chapter 19 Wrap Up the Iteration	443
Iteration Demo	443
Retrospectives	444
Start, Stop, and Continue	445
Ideas for Improvements	447
Celebrate Successes	449
Summary	451
Chapter 20 Successful Delivery	453
What Makes a Product?	453
Planning Enough Time for Testing	455
The End Game	456
Testing the Release Candidate	458
Test on a Staging Environment	458
Final Nonfunctional Testing	458
Integration with External Applications	459
Data Conversion and Database Updates	459
Installation Testing	461
Communication	462
What If It’s Not Ready?	463
Customer Testing	464
UAT	464
Alpha/Beta Testing	466
Post-Development Testing Cycles	467
Deliverables	468
Releasing the Product	470
Release Acceptance Criteria	470
Release Management	474
Packaging	474

Customer Expectations	475
Production Support	475
Understand Impact to Business	475
Summary	476

Part VI Summary 479

Chapter 21 Key Success Factors	481
Success Factor 1: Use the Whole-Team Approach	482
Success Factor 2: Adopt an Agile Testing Mind-Set	482
Success Factor 3: Automate Regression Testing	484
Success Factor 4: Provide and Obtain Feedback	484
Success Factor 5: Build a Foundation of Core Practices	486
Continuous Integration	486
Test Environments	487
Manage Technical Debt	487
Working Incrementally	488
Coding and Testing Are Part of One Process	488
Synergy between Practices	489
Success Factor 6: Collaborate with Customers	489
Success Factor 7: Look at the Big Picture	490
Summary	491
Glossary	493
Bibliography	501
Index	509

This page intentionally left blank

FOREWORD

By Mike Cohn

“Quality is baked in,” the programmers kept telling me. As part of a proposed acquisition, my boss had asked me to perform some final due diligence on the development team and its product. We’d already established that the company’s recently launched product was doing well in the market, but I was to make sure we were not about to buy more trouble than benefit. So I spent my time with the development team. I was looking for problems that might arise from having rushed the product into release. I wondered, “Was the code clean? Were there modules that could only be worked on by one developer? Were there hundreds or thousands of defects waiting to be discovered?” And when I asked about the team’s approach to testing, “Quality is baked in” was the answer I got.

Because this rather unusual colloquialism could have meant just about anything, I pressed further. What I found was that this was the company founder’s shorthand for expressing one of quality pioneer W. Edwards Deming’s famous fourteen points: Build quality into the product rather than trying to test it in later.

The idea of building quality into their products is at the heart of how agile teams work. Agile teams work in short iterations in part to ensure that the application remains at a known state of quality. Agile teams are highly cross-functional, with programmers, testers, and others working side by side throughout each iteration so that quality can be baked into products through techniques such as acceptance-test driven development, a heavy emphasis on automated testing, and whole-team thinking. Good agile teams bake quality in by building their products continuously, integrating new work within minutes of its being completed. Agile teams utilize techniques such as refactoring and a preference for simplicity in order to prevent technical debt from accumulating.

Learning how to do these things is difficult, and especially so for testers, whose role has been given scant attention in previous books. Fortunately, the book you now hold in your hands answers questions on the mind of every tester who's beginning to work on an agile project, such as:

- What are my roles and responsibilities?
- How do I work more closely with programmers?
- How much do we automate, and how do we start automating?

The experience of Lisa and Janet shines through on every page of the book. However, this book is not just their story. Within this book, they incorporate dozens of stories from real-world agile testers. These stories form the heart of the book and are what makes it so unique. It's one thing to shout from the ivory tower, "Here's how to do agile testing." It's another to tell the stories of the teams that have struggled and then emerged agile and victorious over challenges such as usability testing, legacy code that resists automation, transitioning testers used to traditional phase-gate development, testing that "keeps up" with short iterations, and knowing when a feature is "done."

Lisa and Janet were there at the beginning, learning how to do agile testing back when the prevailing wisdom was that agile teams didn't need testers and that programmers could bake quality in by themselves. Over the years and through articles, conference presentations, and working with their clients and teams, Lisa and Janet have helped us see the rich role to be filled by testers on agile projects. In this book, Lisa and Janet use a test automation pyramid, the agile testing quadrants of Brian Marick (himself another world-class agile tester), and other techniques to show how much was missing from a mind-set that said testing is necessary but testers aren't.

If you want to learn how to bake quality into your products or are an aspiring agile tester seeking to understand your role, I can think of no better guides than Lisa and Janet.

FOREWORD

By **Brian Marick**

Imagine yourself skimming over a landscape thousands of years ago, looking at the people below. They're barely scraping out a living in a hostile territory, doing some hunting, some fishing, and a little planting. Off in the distance, you see the glitter of a glacier. Moving closer, you see that it's melting fast and that it's barely damming a huge lake. As you watch, the lake breaks through, sweeping down a riverbed, carving it deeper, splashing up against cliffs on the far side of the landscape—some of which collapse.

As you watch, the dazed inhabitants begin to explore the opening. On the other side, there's a lush landscape, teeming with bigger animals than they've ever seen before, some grazing on grass with huge seed heads, some squabbling over mounds of fallen fruit.

People move in. Almost immediately, they begin to live better. But as the years fly past, you see them adapt. They begin to use nets to fish in the fast-running streams. They learn the teamwork needed to bring down the larger animals, though not without a few deaths along the way. They find ever-better ways to cultivate this new grass they've come to call "wheat."

As you watch, the mad burst of innovation gives way to a stable solution, a good way to live in this new land, a way that's taught to each new generation. Although just over there, you spy someone inventing the wheel . . .

■ ■ ■

In the early years of this century, the adoption of Agile methods sometimes seemed like a vast dam breaking, opening up a way to a better—more productive, more joyful—way of developing software. Many early adopters saw benefits right away, even though they barely knew what they were doing.

Some had an easier time of it than others. Programmers were like the hunters in the fable above. Yes, they had to learn new skills in order to hunt bison, but they knew how to hunt rabbits, more or less, and there were plenty of rabbits around. Testers were more like spear-fishers in a land where spear-fishing wouldn't work. Going from spear-fishing to net-fishing is a much bigger conceptual jump than going from rabbit to bison. And, while some of the skills—cleaning fish, for example—were the same in the new land, the testers had to invent new skills of net-weaving before they could truly pull their weight.

So testing lagged behind. Fortunately, we had early adopters like Lisa and Janet, people who dove right in alongside the programmers, testers who were not jealous of their role or their independence, downright *pleasant* people who could figure out the biggest change of all in Agile testing: the tester's new social role.

As a result, we have this book. It's the stable solution, the good way for testers to live in this new Agile land of ours. It's not the final word—we *could* use the wheel, and I myself am eager for someone to invent antibiotics—but what's taught here will serve you well until someone, perhaps Lisa and Janet, brings the next big change.

PREFACE

We were early adopters of Extreme Programming (XP), testing on XP teams that weren't at all sure where testers or their brand of testing fit in. At the time, there wasn't much in the agile (which wasn't called agile yet) literature about acceptance testing, or how professional testers might contribute. We learned not only from our own experiences but from others in the small agile community. In 2002, Lisa co-wrote *Testing Extreme Programming* with Tip House, with lots of help from Janet. Since then, agile development has evolved, and the agile testing community has flourished. With so many people contributing ideas, we've learned a whole lot more about agile testing.

Individually and together, we've helped teams transition to agile, helped testers learn how to contribute on agile teams, and worked with others in the agile community to explore ways that agile teams can be more successful at testing. Our experiences differ. Lisa has spent most of her time as an agile tester on stable teams working for years at a time on web applications in the retail, telephony, and financial industries. Janet has worked with software organizations developing enterprise systems in a variety of industries. These agile projects have included developing a message-handling system, an environmental-tracking system, a remote data management system (including an embedded application, with a communication network as well as the application), an oil and gas production accounting application, and applications in the airline transportation industry. She has played different roles—sometimes tester, sometimes coach—but has always worked to better integrate the testers with the rest of the team. She has been with teams from as little as six months to as long as one-and-a-half years.

With these different points of view, we have learned to work together and complement each other's skill sets, and we have given many presentations and tutorials together.

WHY WE WROTE THIS BOOK

Several excellent books oriented toward agile development on testing and test patterns have been published (see our bibliography). These books are generally focused on helping the developer. We decided to write a book aimed at helping agile teams be more successful at delivering business value using tests that the business can understand. We want to help testers and quality assurance (QA) professionals who have worked in more traditional development methodologies make the transition to agile development.

We've figured out how to apply—on a practical, day-to-day level—the fruits of our own experience working with teams of all sizes and a variety of ideas from other agile practitioners. We've put all this together in this book to help testers, quality assurance managers, developers, development managers, product owners, and anyone else with a stake in effective testing on agile projects to deliver the software their customers need. However, we've focused on the role of the tester, a role that may be adopted by a variety of professionals.

Agile testing practices aren't limited to members of agile teams. They can be used to improve testing on projects using traditional development methodologies as well. This book is also intended to help testers working on projects using any type of development methodology.

Agile development isn't the only way to successfully deliver software. However, all of the successful teams we've been on, agile or waterfall, have had several critical commonalities. The programmers write and automate unit and integration tests that provide good code coverage. They are disciplined in the use of source code control and code integration. Skilled testers are involved from the start of the development cycle and are given time and resources to do an adequate job of all necessary forms of testing. An automated regression suite that covers the system functionality at a higher level is run and checked regularly. The development team understands the customers' jobs and their needs, and works closely together with the business experts.

People, not methodologies or tools, make projects successful. We enjoy agile development because its values, principles, and core practices enable people to do their best work, and testing and quality are central to agile development. In this book, we explain how to apply agile values and principles to your unique testing situation and enable your teams to succeed. We have more about that in Chapter 1, "What Is Agile Testing, Anyway?" and in Chapter 2, "Ten Principles for Agile Testers."

HOW WE WROTE THIS BOOK

Having experienced the benefits of agile development, we used agile practices to produce this book. As we began work on the book, we talked to agile testers and teams from around the globe to find out what problems they encountered and how they addressed them. We planned how we would cover these areas in the book.

We made a release plan based on two-week iterations. Every two weeks, we delivered two rough-draft chapters to our book website. Because we aren't co-located, we found tools to use to communicate, provide "source code control" for our chapters, deliver the product to our customers, and get their feedback. We couldn't "pair" much real-time, but we traded chapters back and forth for review and revision, and had informal "stand-ups" daily via instant message.

Our "customers" were the generous people in the agile community who volunteered to review draft chapters. They provided feedback by email or (if we were lucky) in person. We used the feedback to guide us as we continued writing and revising. After all the rough drafts were done, we made a new plan to complete the revisions, incorporating all the helpful ideas from our "customers."

Our most important tool was mind maps. We started out by creating a mind map of how we envisioned the whole book. We then created mind maps for each section of the book. Before writing each chapter, we brainstormed with a mind map. As we revised, we revisited the mind maps, which helped us think of ideas we may have missed.

Because we think the mind maps added so much value, we've included the mind map as part of the opening of each chapter. We hope they'll help you get an overview of all the information included in the chapter, and inspire you to try using mind maps yourself.

OUR AUDIENCE

This book will help you if you've ever asked any of the following excellent questions, which we've heard many times:

- If developers are writing tests, what do the testers do?
- I'm a QA manager, and our company is implementing agile development (Scrum, XP, DSDM, name your flavor). What's my role now?

- I've worked as a tester on a traditional waterfall team, and I'm really excited by what I've read about agile. What do I need to know to work on an agile team?
- What's an "agile tester"?
- I'm a developer on an agile team. We're writing code test-first, but our customers still aren't happy with what we deliver. What are we missing?
- I'm a developer on an agile team. We're writing our code test-first. We make sure we have tests for all our code. Why do we need testers?
- I coach an agile development team. Our QA team can't keep up with us, and testing always lags behind. Should we just plan to test an iteration behind development?
- I'm a software development manager. We recently transitioned to agile, but all our testers quit. Why?
- I'm a tester on a team that's going agile. I don't have any programming or automation skills. Is there any place for me on an agile team?
- How can testing possibly keep up with two-week iterations?
- What about load testing, performance testing, usability testing, all the other "ilities"? Where do these fit in?
- We have audit requirements. How does agile development and testing address these?

If you have similar questions and you're looking for practical advice about how testers contribute to agile teams and how agile teams can do an effective job of testing, you've picked up the right book.

There are many "flavors" of agile development, but they all have much in common. We support the Agile Manifesto, which we explain in Chapter 1, "What Is Agile Testing, Anyway?" Whether you're practicing Scrum, Extreme Programming, Crystal, DSDM, or your own variation of agile development, you'll find information here to help with your testing efforts.

A User Story for an Agile Testing Book

When Robin Dymond, a managing consultant and trainer who has helped many teams adopt lean and agile, heard we were writing this book, he sent us the user story he'd like to have fulfilled. It encapsulates many of the requirements we planned to deliver.



Book Story 1

As a QA professional, I can understand the main difference between traditional QA professionals and agile team members with a QA background, so that I can begin internalizing my new responsibilities and deliver value to the customer sooner and with less difficulty.

Acceptance conditions:

- My concerns and fears about losing control of testing are addressed.
- My concerns and fears about having to write code (never done it) are addressed.
- As a tester I understand my new value to the team.
- As a tester new to Agile, I can easily read about things that are most important to my new role.
- As a tester new to Agile, I can easily ignore things that are less important to my new role.
- As a tester new to Agile, I can easily get further detail about agile testing that is important to MY context.

Were I to suggest a solution to this problem, I think of Scrum versus XP. With Scrum you get a simple view that enables people to quickly adopt Agile. However, Scrum is the tip of the iceberg for successful agile teams. For testers who are new, I would love to see agile testing ideas expressed in layers of detail. What do I need to know today, what should I know tomorrow, and what context-sensitive things should I consider for continuous improvement?

We've tried to provide these layers of detail in this book. We'll approach agile testing from a few different perspectives: transitioning into agile development, using an agile testing matrix to guide testing efforts, and explaining all the different testing activities that take place throughout the agile development cycle.

HOW TO USE THIS BOOK

If you aren't sure where to start in this book, or you just want a quick overview, we suggest you read the last chapter, Chapter 21, "Key Success Factors," and follow wherever it leads you.

Part I: Introduction

If you want quick answers to questions such as "Is agile testing different than testing on waterfall projects?" or "What's the difference between a tester on a traditional team and an agile tester?," start with Part I, which includes the following chapters:

- Chapter 1: What Is Agile Testing, Anyway?
- Chapter 2: Ten Principles for Agile Testers

These chapters are the "tip of the iceberg" that Robin requested in his user story. They include an overview of how agile differs from a traditional phased approach and explore the "whole team" approach to quality and testing.

In this part of the book we define the "agile testing mind-set" and what makes testers successful on agile teams. We explain how testers apply agile values and principles to contribute their particular expertise.

Part II: Organizational Challenges

If you're a tester or manager on a traditional QA team, or you're coaching a team that's moving to agile, Part II will help you with the organizational challenges faced by teams in transition. The "whole team" attitude represents a lot of cultural changes to team members, but it helps overcome the fear testers have when they wonder how much control they'll have or whether they'll be expected to write code.

Some of the questions answered in Part II are:

- How can we engage the QA team?
- What about management's expectations?
- How should we structure our agile team, and where do the testers fit?
- What do we look for when hiring an agile tester?
- How do we cope with a team distributed across the globe?

Part II also introduces some topics we don't always enjoy talking about. We explore ideas about how to transition processes and models, such as audits or SOX compliance, that are common in traditional environments.

Metrics and how they're applied can be a controversial issue, but there are positive ways to use them to benefit the team. Defect tracking easily becomes a point of contention for teams, with questions such as "Do we use a defect-tracking system?" or "When do we log bugs?"

Two common questions about agile testing from people with traditional test team experience are "What about test plans?" and "Is it true there's no documentation on agile projects?" Part II clears up these mysteries.

The chapters in Part II are as follows:

- Chapter 3: Cultural Challenges
- Chapter 4: Team Logistics
- Chapter 5: Transitioning Typical Processes

Part III: The Agile Testing Quadrants

Do you want more details on what types of testing are done on agile projects? Are you wondering who does what testing? How do you know whether you've done all the testing that's needed? How do you decide what practices, techniques, and tools fit your particular situation? If these are your concerns, check out Part III.

We use Brian Marick's Agile Testing Quadrants to explain the purpose of testing. The quadrants help you define all the different areas your testing should address, from unit level tests to reliability and other "ilities," and everything in between. This is where we get down into the nitty-gritty of how to deliver a high-quality product. We explain techniques that can help you to communicate well with your customers and better understand their requirements. This part of the book shows how tests drive development at multiple levels. It also provides tools for your toolkit that can help you to effectively define, design, and execute tests that support the team and critique the product. The chapters include the following:

- Chapter 6: The Purpose of Testing
- Chapter 7: Technology-Facing Tests that Support the Team

- Chapter 8: Business-Facing Tests that Support the Team
- Chapter 9: Toolkit for Business-Facing Tests that Support the Team
- Chapter 10: Business-Facing Tests that Critique the Product
- Chapter 11: Critiquing the Product Using Technology-Facing Tests
- Chapter 12: Summary of Testing Quadrants

Part IV: Automation

Test automation is a central focus of successful agile teams, and it's a scary topic for lots of people (we know, because it's had us running scared before!). How do you squeeze test automation into short iterations and still get all the stories completed?

Part IV gets into the details of when and why to automate, how to overcome barriers to test automation, and how to develop and implement a test automation strategy that works for your team. Because test automation tools change and evolve so rapidly, our aim is not to explain how to use specific tools, but to help you select and use the right tools for your situation. Our agile test automation tips will help you with difficult challenges such as testing legacy code.

The chapters are as follows:

- Chapter 13: Why We Want to Automate Tests and What Holds Us Back
- Chapter 14: An Agile Test Automation Strategy

Part V: An Iteration in the Life of a Tester

If you just want to get a feel for what testers do throughout the agile development cycle, or you need help putting together all the information in this book, go to Part V. Here we chronicle an iteration, and more, in the life of an agile tester. Testers contribute enormous value throughout the agile software development cycles. In Part V, we explain the activities that testers do on a daily basis. We start with planning releases and iterations to get each iteration off to a good start, and move through the iteration—collaborating with the customer and development teams, testing, and writing code. We end the iteration by delivering new features and finding ways for the team to improve the process.

The chapters break down this way:

- Chapter 15: Tester Activities in Release or Theme Planning
- Chapter 16: Hit the Ground Running

- Chapter 17: Iteration Kickoff
- Chapter 18: Coding and Testing
- Chapter 19: Wrap Up the Iteration
- Chapter 20: Successful Delivery

Part VI: Summary

In Chapter 21, “Key Success Factors,” we present seven key factors agile teams can use for successful testing. If you’re having trouble deciding where to start with agile testing, or how to work on improving what you’re doing now, these success factors will give you some direction.

Other Elements

We’ve also included a glossary we hope you will find useful, as well as references to books, articles, websites, and blogs in the bibliography.

JUST START DOING IT—TODAY!

Agile development is all about doing your best work. Every team has unique challenges. We’ve tried to present all the information that we think may help agile testers, their teams, managers, and customers. Apply the techniques that you think are appropriate for your situation. Experiment constantly, evaluate the results, and come back to this book to see what might help you improve. Our goal is to help testers and agile teams enjoy delivering the best and most valuable product they can.

When we asked Dierk König, founder and project manager of Canoo Web-Test, what he thought was the number one success factor for agile testing, he answered: “Start doing it—today!” You can take a baby step to improve your team’s testing right now. Go get started!

This page intentionally left blank

ACKNOWLEDGMENTS

So many people have helped us with this book that it's hard to know whom to thank first. Chris Guzikowski gave us the opportunity to write this book and kept encouraging us along the way. When we were deciding whether to take on such a mammoth task, Mike Cohn gave us the sage advice that the best reason to write a book is that you have something to say. We sure have lots to say about agile testing. Fortunately, so do lots of other people who were willing to lend us a hand.

Many thanks to Brian Marick and Mike Cohn for writing such kind forewords. We're honored that Mike selected our book for his signature series. We're grateful for the many ideas and observations of his that are included in this book.

Brian Marick's "Agile Testing Matrix" has guided both of us in our agile projects for several years, and it provides the core of Part III. Thank you, Brian, for thinking up the quadrants (and so many other contributions to agile testing) and letting us use them here.

We made constant use of the agile value of feedback. Many thanks to our official reviewers: Jennitta Andrea, Gerard Meszaros, Ron Jeffries, and Paul Duvall. Each one had unique and insightful comments that helped us greatly improve the book. Gerard also helped us be more consistent and correct in our testing terminology, and contributed some agile testing success stories.

Special thanks to two reviewers and top-notch agile testers who read every word we wrote and spent hours discussing the draft chapters with us in person: Pierre Veragen and Paul Rogers. Many of the good ideas in this book are theirs.

We interviewed several teams to learn what advice they would give new agile teams and testers, and solicited success stories and “lessons learned” from colleagues in the agile testing community. Heartfelt thanks to our many contributors of sidebars and quotes, as well as providers of helpful feedback, including (in no particular order) Robin Dymond, Bret Pettichord, Tae Chang, Bob Galen, Erika Boyer, Grig Gheorghiu, Erik Bos, Mark Benander, Jonathan Rasmusson, Andy Pols, Dierk König, Rafael Santos, Jason Holzer, Christophe Louvion, David Reed, John Voris, Chris McMahan, Declan Whelan, Michael Bolton, Elisabeth Hendrickson, Joe Yakich, Andrew Glover, Alessandro Collino, Coni Tartaglia, Markus Gärtner, Megan Sumrell, Nathan Silberman, Mike Thomas, Mike Busse, Steve Perkins, Joseph King, Jakub Oleszkiewicz, Pierre Veragen (again), Paul Rogers (again), Jon Hagar, Antony Marcano, Patrick Wilson-Welsh, Patrick Fleisch, Apurva Chandra, Ken De Souza, and Carol Vaage.

Many thanks also to the rest of our community of unofficial reviewers who read chapters, gave feedback and ideas, and let us bounce ideas off of them, including Tom Poppendieck, Jun Bueno, Kevin Lawrence, Hannu Kokko, Titus Brown, Wim van de Goor, Lucas Campos, Kay Johansen, Adrian Howard, Henrik Kniberg, Shelly Park, Robert Small, Senaka Suriyaachchi, and Erik Petersen. And if we’ve neglected to list you here, it’s not that we value your contribution any less, it’s just that we didn’t keep good enough notes! We hope you will see how your time and effort paid off in the finished book.

We appreciate the groundwork laid by the agile pioneers who have helped us and our teams succeed with agile. You’ll find some of their works in the bibliography. We are grateful for the agile teams that have given us so many open source test tools that help all of our teams deliver so much value. Some of those tools are also listed in the bibliography.

Thanks to Mike Thomas for taking many of the action photos of an agile team that appear in this book. We hope these photos show those of you new to agile testing and development that there’s no big mystery—it’s just good people getting together to discuss, demo, and draw pictures.

Thanks so much to our Addison-Wesley editorial and production team who patiently answered many questions and turned this into the professional-looking book you see here, including Raina Chrobak, Chris Zahn, John Fuller, Sally Gregg, Bonnie Granat, Diane Freed, Jack Lewis, and Kim Arney.

Lisa's Story

I'm eternally grateful to Janet for agreeing to write this book with me. She kept us organized and on track so we could juggle book writing with our full-time jobs and personal lives. I'm fortunate to have a writing partner whose experience is complementary to mine. Like any successful agile project, this is a true team effort. This has been hard work, but thanks to Janet it has been a lot of fun, too.

I'd like to thank the members of my current team at ePlan Services Inc. (formerly known as Fast401k), which I joined (thanks to Mike Cohn, our first leader) in 2003. All of us learned so much working for Mike that first year, and it's a testament to his leadership that we continue to improve and help the business grow. Thanks to my awesome teammates who have each helped me become a better tester and agile team member, and who were all good sports while Mike Thomas took action photos of us: Nanda Lankapalli, Tony Sweets, Jeff Thuss, Lisa Owens, Mike Thomas, Vince Palumbo, Mike Busse, Nehru Kaja, Trevor Sterritt, Steve Kives, and former but still beloved team members Joe Yakich, Jason Kay, Jennifer Riefenberg, Matt Tierney, and Charles LeRose. I also have been lucky enough to work with the best customer team anywhere. They are too numerous to mention here, but many thanks to them, and in particular to Steve Perkins, Anne Olguin, and Zachary Shannon, who help us focus on delivering value. Thanks also to Mark and Dan Gutrich, founders and leaders of ePlan Services, for giving us all the opportunity to succeed with agile development.

Thanks to Kay and Zhon Johansen for teaching me about mind maps at Agile 2006. I hope we have put this skill to good use in creating this book.

Much gratitude to all my friends and family, whom I neglected terribly during the many months spent writing this book, and who nevertheless supported me constantly. There are too many to mention, but I must specially thank Anna Blake for her constant understanding and provision of donkey therapy. Chester and Ernest, the donkeys of my heart, have kept pulling me along. Dodger didn't make the whole book-writing journey in this world, but his memory continues to lift me up. My little poodle and muse Tango was by my side every minute that I worked on this book at home, joined occasionally by Bruno, Bubba, Olive, Squiggy, Starsky, Bobcat, and Patty. Thanks to my parents for being proud of me and not complaining about my neglect of them during this book-writing time.

I know that my husband, Bob Downing, took a deep breath when I exclaimed, "I have the chance to write another book about agile testing," but he nevertheless encouraged me constantly and made it possible for me to find the time to write. He kept the "no-kill shelter" running, kept our lives rolling, kept my spirits up, and sustained me with many fabulous meals. He is the light of my life.

—Lisa

Janet's Story

Lisa and I made a great team; each of us had our own strengths. When one of us faltered and took some time to recoup, the other picked up the slack. I learned so much from Lisa (thanks go to her for giving me this opportunity), but I also found I learned a lot from myself. Just the process of articulating my thoughts helped to clarify things that had been rumbling around in my brain for a long time. The mindmaps helped immensely, so thanks to Kenji Hiranabe, who gave a workshop at Agile 2007 and made me realize what a powerful yet simple tool mind maps can be.

This book-writing journey was an amazing experience. Thanks to the people on all the teams I worked with who provided so many of the examples in this book.

It's been a pretty special year all the way around. During the year (or so) it took to write this book, my family increased in size. My two daughters, Dana and Susan, each gave me a grandson—those were some of the times Lisa picked up the slack. I would like to thank my granddaughter Lauren (currently three) for making me leave my computer and play. It kept me sane. Thanks to my sister Colleen who gave me long-distance encouragement many mornings using instant messenger when I was feeling overwhelmed with the sheer number of hours I was putting in.

And a very special thanks to Jack, my husband, who moved his office downstairs when I took over the existing one. There were times when I am sure he felt neglected and wondered if he even had a wife as he spend many long hours alone. However, he was there with me the whole way, encouraging and supporting me in this endeavor.

—Janet

ABOUT THE AUTHORS

Lisa Crispin is an agile testing practitioner and coach. She specializes in showing testers and agile teams how testers can add value and how to guide development with business-facing tests. Her mission is to bring agile joy to the software testing world and testing joy to the agile development world. Lisa joined her first agile team in 2000, having enjoyed many years working as a programmer, analyst, tester, and QA director. Since 2003, she's been a tester on a Scrum/XP team at ePlan Services, Inc. She frequently leads tutorials and workshops on agile testing at conferences in North America and Europe. Lisa regularly contributes articles about agile testing to publications such as *Better Software* magazine, *IEEE Software*, and *Methods and Tools*. Lisa also co-authored *Testing Extreme Programming* (Addison-Wesley, 2002) with Tip House.

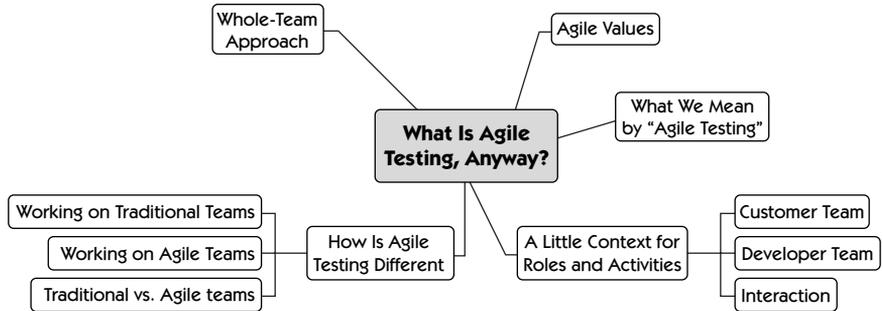
For more about Lisa's work, visit her websites, www.lisacrispin.com and www.agiletester.ca, or email her at lisa@agiletester.ca.

Janet Gregory is the founder of DragonFire Inc., an agile quality process consultancy and training firm. Her passion is helping teams build quality systems. For the past ten years, she has worked as a coach and tester, introducing agile practices into both large and small companies. Her focus is working with business users and testers to understand their role in agile projects. Janet's programming background is a definite plus when she partners with developers on her agile teams to implement innovative agile test automation solutions. Janet is a frequent speaker at agile and testing software conferences, and she is a major contributor to the North American agile testing community.

For more about Janet's work, visit her websites at www.janetgregory.ca, www.janetgregory.blogspot.com, and www.agiletester.ca, or you can email her at janet@agiletester.ca.

This page intentionally left blank

WHAT IS AGILE TESTING, ANYWAY?



Like a lot of terminology, “agile development” and “agile testing” mean different things to different people. In this chapter, we explain our view of agile, which reflects the Agile Manifesto and general principles and values shared by different agile methods. We want to share a common language with you, the reader, so we’ll go over some of our vocabulary. We compare and contrast agile development and testing with the more traditional phased approach. The “whole team” approach promoted by agile development is central to our attitude toward quality and testing, so we also talk about that here.

AGILE VALUES

“Agile” is a buzzword that will probably fall out of use someday and make this book seem obsolete. It’s loaded with different meanings that apply in different circumstances. One way to define “agile development” is to look at the Agile Manifesto (see Figure 1-1).

Using the values from the Manifesto to guide us, we strive to deliver small chunks of business value in extremely short release cycles.

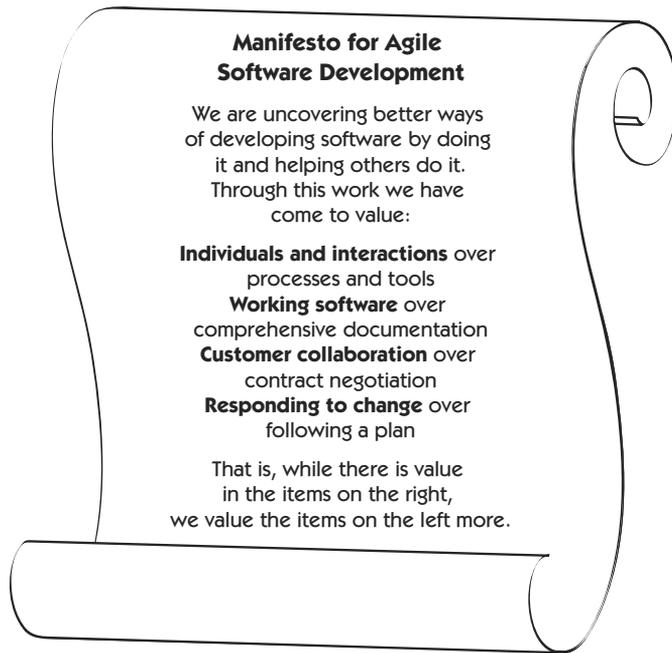


Figure 1-1 Agile Manifesto

Chapter 21, “Key Success Factors,” lists key success factors for agile testing.

We use the word “agile” in this book in a broad sense. Whether your team is practicing a particular agile method, such as Scrum, XP, Crystal, DSDM, or FDD, to name a few, or just adopting whatever principles and practices make sense for your situation, you should be able to apply the ideas in this book. If you’re delivering value to the business in a timely manner with high-quality software, and your team continually strives to improve, you’ll find useful information here. At the same time, there are particular agile practices we feel are crucial to any team’s success. We’ll talk about these throughout the book.

WHAT DO WE MEAN BY “AGILE TESTING”?

You might have noticed that we use the term “tester” to describe a person whose main activities revolve around testing and quality assurance. You’ll also see that we often use the word “programmer” to describe a person whose main activities revolve around writing production code. We don’t intend that these terms sound narrow or insignificant. Programmers do more than turn a specification into a program. We don’t call them “developers,” because ev-

everyone involved in delivering software is a developer. Testers do more than perform “testing tasks.” Each agile team member is focused on delivering a high-quality product that provides business value. Agile testers work to ensure that their team delivers the quality their customers need. We use the terms “programmer” and “tester” for convenience.

Several core practices used by agile teams relate to testing. Agile programmers use test-driven development (TDD), also called test-driven design, to write quality production code. With TDD, the programmer writes a test for a tiny bit of functionality, sees it fail, writes the code that makes it pass, and then moves on to the next tiny bit of functionality. Programmers also write code integration tests to make sure the small units of code work together as intended. This essential practice has been adopted by many teams, even those that don’t call themselves “agile,” because it’s just a smart way to think through your software design and prevent defects. Figure 1-2 shows a sample unit test result that a programmer might see.

This book isn’t about unit-level or component-level testing, but these types of tests are critical to a successful project. Brian Marick [2003] describes these types of tests as “supporting the team,” helping the programmers know what code to write next. Brian also coined the term “technology-facing tests,” tests that fall into the programmer’s domain and are described using programmer terms and jargon. In Part II, we introduce the Agile Testing Quadrants and examine the different categories of agile testing. If you want to learn more about writing unit and component tests, and TDD, the bibliography will steer you to some good resources.

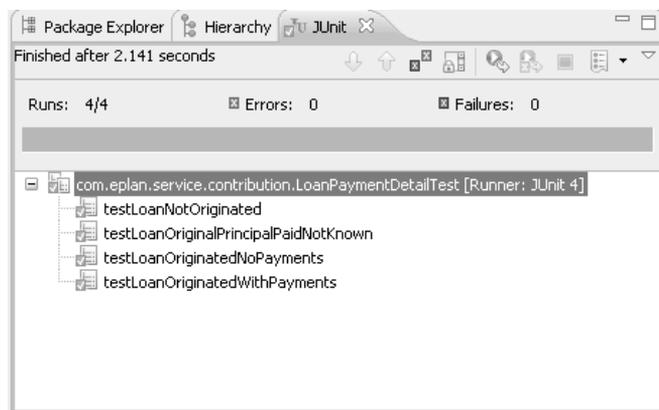


Figure 1-2 Sample unit test output

If you want to know how agile values, principles, and practices applied to testing can help you, as a tester, do your best work, and help your team deliver more business value, please keep reading. If you've bothered to pick up this book, you're probably the kind of professional who continually strives to grow and learn. You're likely to have the mind-set that a good agile team needs to succeed. This book will show you ways to improve your organization's product, provide the most value possible to your team, and enjoy your job.

Lisa's Story

During a break from working on this chapter, I talked to a friend who works in quality assurance for a large company. It was a busy time of year, and management expected everyone to work extra hours. He said, "If I thought working 100 extra hours would solve our problems, I'd work 'til 7 every night until that was done. But the truth was, it might take 4,000 extra hours to solve our problems, so working extra feels pointless." Does this sound familiar?

—Lisa

If you've worked in the software industry long, you've probably had the opportunity to feel like Lisa's friend. Working harder and longer doesn't help when your task is impossible to achieve. Agile development acknowledges the reality that we only have so many good productive hours in a day or week, and that we can't plan away the inevitability of change.

Agile development encourages us to solve our problems as a team. Business people, programmers, testers, analysts—everyone involved in software development—decides together how best to improve their product. Best of all, as testers, we're working together with a team of people who all feel responsible for delivering the best possible quality, and who are all focused on testing. We love doing this work, and you will too.

When we say "agile testing" in this book, we're usually talking about business-facing tests, tests that define the business experts' desired features and functionality. We consider "customer-facing" a synonym for "business-facing." "Testing" in this book also includes tests that critique the product and focus on discovering what might be lacking in the finished product so that we can improve it. It includes just about everything beyond unit and component level testing: functional, system, load, performance, security, stress, usability, exploratory, end-to-end, and user acceptance. All these types of tests might be appropriate to any given project, whether it's an agile project or one using more traditional methodologies.

Agile testing doesn't just mean testing on an agile project. Some testing approaches, such as exploratory testing, are inherently agile, whether it's done on an agile project or not. Testing an application with a plan to learn about it as you go, and letting that information guide your testing, is in line with valuing working software and responding to change. Later chapters discuss agile forms of testing as well as "agile testing" practices.

A LITTLE CONTEXT FOR ROLES AND ACTIVITIES ON AN AGILE TEAM

We'll talk a lot in this book about the "customer team" and the "developer team." The difference between them is the skills they bring to delivering a product.

Customer Team

The customer team includes business experts, product owners, domain experts, product managers, business analysts, subject matter experts—everyone on the "business" side of a project. The customer team writes the stories or feature sets that the developer team delivers. They provide the examples that will drive coding in the form of business-facing tests. They communicate and collaborate with the developer team throughout each iteration, answering questions, drawing examples on the whiteboard, and reviewing finished stories or parts of stories.

Testers are integral members of the customer team, helping elicit requirements and examples and helping the customers express their requirements as tests.

Developer Team

Everyone involved with delivering code is a developer, and is part of the developer team. Agile principles encourage team members to take on multiple activities; any team member can take on any type of task. Many agile practitioners discourage specialized roles on teams and encourage all team members to transfer their skills to others as much as possible. Nevertheless, each team needs to decide what expertise their projects require. Programmers, system administrators, architects, database administrators, technical writers, security specialists, and people who wear more than one of these hats might be part of the team, physically or virtually.

Testers are also on the developer team, because testing is a central component of agile software development. Testers advocate for quality on behalf of the customer and assist the development team in delivering the maximum business value.

Interaction between Customer and Developer Teams

The customer and developer teams work closely together at all times. Ideally, they're just one team with a common goal. That goal is to deliver value to the organization. Agile projects progress in iterations, which are small development cycles that typically last from one to four weeks. The customer team, with input from the developers, will prioritize stories to be developed, and the developer team will determine how much work they can take on. They'll work together to define requirements with tests and examples, and write the code that makes the tests pass. Testers have a foot in each world, understanding the customer viewpoint as well as the complexities of the technical implementation (see Figure 1-3).

Some agile teams don't have any members who define themselves as "testers." However, they all need someone to help the customer team write business-facing tests for the iteration's stories, make sure the tests pass, and make sure that adequate regression tests are automated. Even if a team does have testers, the entire agile team is responsible for these testing tasks. Our experience with agile teams has shown that testing skills and experience are vital to project success and that testers do add value to agile teams.

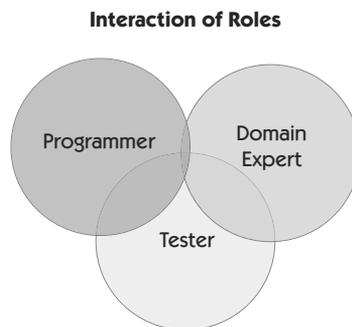


Figure 1-3 Interaction of roles

HOW IS AGILE TESTING DIFFERENT?

We both started working on agile teams at the turn of the millennium. Like a lot of testers who are new to agile, we didn't know what to expect at first. Together with our respective agile teams, we've worked on we've learned a lot about testing on agile projects. We've also implemented ideas and practices suggested by other agile testers and teams. Over the years, we've shared our experiences with other agile testers as well. We've facilitated workshops and led tutorials at agile and testing conferences, talked with local user groups, and joined countless discussions on agile testing mailing lists. Through these experiences, we've identified differences between testing on agile teams and testing on traditional waterfall development projects. Agile development has transformed the testing profession in many ways.

Working on Traditional Teams

Neither working closely with programmers nor getting involved with a project from the earliest phases was new to us. However, we were used to strictly enforced gated phases of a narrowly defined software development life cycle, starting with release planning and requirements definition and usually ending with a rushed testing phase and a delayed release. In fact, we often were thrust into a gatekeeper role, telling business managers, "Sorry, the requirements are frozen; we can add that feature in the next release."

As leaders of quality assurance teams, we were also often expected to act as gatekeepers of quality. We couldn't control how the code was written, or even if any programmers tested their code, other than by our personal efforts at collaboration. Our post-development testing phases were expected to boost quality after code was complete. We had the illusion of control. We usually had the keys to production, and sometimes we had the power to postpone releases or stop them from going forward. Lisa even had the title of "Quality Boss," when in fact she was merely the manager of the QA team.

Our development cycles were generally long. Projects at a company that produced database software might last for a year. The six-month release cycles Lisa experienced at an Internet start-up seemed short at the time, although it was still a long time to have frozen requirements. In spite of much process and discipline, diligently completing one phase before moving on to the next, it was plenty of time for the competition to come out ahead, and the applications were not always what the customers expected.

Traditional teams are focused on making sure all the specified requirements are delivered in the final product. If everything isn't ready by the original target release date, the release is usually postponed. The development teams don't usually have input about what features are in the release, or how they should work. Individual programmers tend to specialize in a particular area of the code. Testers study the requirements documents to write their test plans, and then they wait for work to be delivered to them for testing.

Working on Agile Teams

Transitioning to the short iterations of an agile project might produce initial shock and awe. How can we possibly define requirements and then test and deliver production-ready code in one, two, three, or four weeks? This is particularly tough for larger organizations with separate teams for different functions and even harder for teams that are geographically dispersed. Where do all these various programmers, testers, analysts, project managers, and countless specialties fit in a new agile project? How can we possibly code and test so quickly? Where would we find time for difficult efforts such as automating tests? What control do we have over bad code getting delivered to production?

We'll share our stories from our first agile experiences to show you that everyone has to start somewhere.

Lisa's Story

My first agile team embraced Extreme Programming (XP), not without some "learning experiences." Serving as the only professional tester on a team of eight programmers who hadn't learned how to automate unit tests was disheartening. The first two-week iteration felt like jumping off a cliff.

Fortunately, we had a good coach, excellent training, a supportive community of agile practitioners with ideas to share, and time to learn. Together we figured out some ins and outs of how to integrate testing into an agile project—indeed, how to drive the project with tests. I learned how I could use my testing skills and experience to add real value to an agile team.

The toughest thing for me (the former Quality Boss) to learn was that the customers, not I, decided on quality criteria for the product. I was horrified after the first iteration to find that the code crashed easily when two users logged in concurrently. My coach patiently explained, over my strident objections, that our customer, a start-up company, wanted to be able to show features to potential customers. Reliability and robustness were not yet the issue.

I learned that my job was to help the customers tell us what was valuable to them during each iteration, and to write tests to ensure that's what they got.

—Lisa

Janet's Story

My first foray into the agile world was also an Extreme Programming (XP) engagement. I had just come from an organization that practiced waterfall with some extremely bad practices, including giving the test team a day or so to test six months of code. In my next job as QA manager, the development manager and I were both learning what XP really meant. We successfully created a team that worked well together and managed to automate most of the tests for the functionality. When the organization downsized during the dot-com bust, I found myself in a new position at another organization as the lone tester with about ten developers on an XP project.

On my first day of the project, Jonathan Rasmusson, one of the developers, came up to me and asked me why I was there. The team was practicing XP, and the programmers were practicing test-first and automating all their own tests. Participating in that was a challenge I couldn't resist. The team didn't know what value I could add, but I knew I had unique abilities that could help the team. That experience changed my life forever, because I gained an understanding of the nuances of an agile project and determined then that my life's work was to make the tester role a more fulfilling one.

—Janet

Read Jonathan's Story

Jonathan Rasmusson, now an Agile Coach at Rasmusson Software Consulting, but Janet's coworker on her second agile team, explains how he learned how agile testers add value.

So there I was, a young hotshot J2EE developer excited and pumped to be developing software the way it should be developed—using XP. Until one day, in walks a new team member—a tester. It seems management thought it would be good to have a QA resource on the team.

That's fine. Then it occurred to me that this poor tester would have nothing to do. I mean, as a developer on an XP project, I was writing the tests. There was no role for QA here as far as I could see.

So of course I went up and introduced myself and asked quite pointedly what she was going to do on the project, because the developers were writing all the tests. While I can't remember exactly how Janet responded, the next six months made it very clear what testers can do on agile projects.

With the automation of the tedious, low-level boundary condition test cases, Janet as a tester was now free to focus on much greater value-add areas like exploratory testing, usability, and testing the app in ways developers hadn't originally anticipated. She worked with the

customer to help write test cases that defined success for upcoming stories. She paired with developers looking for gaps in tests.

But perhaps most importantly, she helped reinforce an ethos of quality and culture, dispensing happy-face stickers to those developers who had done an exceptional job (these became much sought-after badges of honor displayed prominently on laptops).

Working with Janet taught me a great deal about the role testers play on agile projects, and their importance to the team.

Agile teams work closely with the business and have a detailed understanding of the requirements. They're focused on the value they can deliver, and they might have a great deal of input into prioritizing features. Testers don't sit and wait for work; they get up and look for ways to contribute throughout the development cycle and beyond.

If testing on an agile project felt just like testing on a traditional project, we wouldn't feel the need to write a book. Let's compare and contrast these testing methods.

Traditional vs. Agile Testing

It helps to start by looking at similarities between agile testing and testing in traditional software development. Consider Figure 1-4.

In the phased approach diagram, it is clear that testing happens at the end, right before release. The diagram is idealistic, because it gives the impression there is as much time for testing as there is for coding. In many projects, this is not the case. The testing gets "squished" because coding takes longer than expected, and because teams get into a code-and-fix cycle at the end.

Agile is iterative and incremental. This means that the testers test each increment of coding as soon as it is finished. An iteration might be as short as one week, or as long as a month. The team builds and tests a little bit of code, making sure it works correctly, and then moves on to next piece that needs to be built. Programmers never get ahead of the testers, because a story is not "done" until it has been tested. We'll talk much more about this throughout the book.

There's tremendous variety in the approaches to projects that agile teams take. One team might be dedicated to a single project or might be part of another

business or domain expert and a tester, analyst, or some other development team member. Detailed functional test cases, ideally based on examples provided by business experts, flesh out the requirements. Testers will conduct manual exploratory testing to find important bugs that defined test cases might miss. Testers might pair with other developers to automate and execute test cases as coding on each story proceeds. Automated functional tests are added to the regression test suite. When tests demonstrating minimum functionality are complete, the team can consider the story finished.

If you attended agile conferences and seminars in the early part of this decade, you heard a lot about TDD and acceptance testing but not so much about other critical types of testing, such as load, performance, security, usability, and other “ility” testing. As testers, we thought that was a little weird, because all these types of testing are just as vital on agile projects as they are on projects using any other development methodology. The real difference is that we like to do these tests as early in the development process as we can so that they can also drive design and coding.

If the team actually releases each iteration, as Lisa’s team does, the last day or two of each iteration is the “end game,” the time when user acceptance testing, training, bug fixing, and deployments to staging environments can occur. Other teams, such as Janet’s, release every few iterations, and might even have an entire iteration’s worth of “end game” activities to verify release readiness. The difference here is that all the testing is not left until the end.

As a tester on an agile team, you’re a key player in releasing code to production, just as you might have been in a more traditional environment. You might run scripts or do manual testing to verify all elements of a release, such as database update scripts, are in place. All team members participate in retrospectives or other process improvement activities that might occur for every iteration or every release. The whole team brainstorms ways to solve problems and improve processes and practices.

Agile projects have a variety of flavors. Is your team starting with a clean slate, in a greenfield (new) development project? If so, you might have fewer challenges than a team faced with rewriting or building on a legacy system that has no automated regression suite. Working with a third party brings additional testing challenges to any team.

Whatever flavor of development you’re using, pretty much the same elements of a software development life cycle need to happen. The difference

with agile is that time frames are greatly shortened, and activities happen concurrently. Participants, tests, and tools need to be adaptive.

The most critical difference for testers in an agile project is the quick feedback from testing. It drives the project forward, and there are no gatekeepers ready to block project progress if certain milestones aren't met.

We've encountered testers who resist the transition to agile development, fearing that "agile development" equates with chaos, lack of discipline, lack of documentation, and an environment that is hostile to testers. While some teams do seem to use the "agile" buzzword to justify simply doing whatever they want, true agile teams are all about repeatable quality as well as efficiency. In our experience, an agile team is a wonderful place to be a tester.

WHOLE-TEAM APPROACH

One of the biggest differences in agile development versus traditional development is the agile "whole-team" approach. With agile, it's not only the testers or a quality assurance team who feel responsible for quality. We don't think of "departments," we just think of the skills and resources we need to deliver the best possible product. The focus of agile development is producing high-quality software in a time frame that maximizes its value to the business. This is the job of the whole team, not just testers or designated quality assurance professionals. Everyone on an agile team gets "test-infected." Tests, from the unit level on up, drive the coding, help the team learn how the application should work, and let us know when we're "done" with a task or story.

An agile team must possess all the skills needed to produce quality code that delivers the features required by the organization. While this might mean including specialists on the team, such as expert testers, it doesn't limit particular tasks to particular team members. Any task might be completed by any team member, or a pair of team members. This means that the team takes responsibility for all kinds of testing tasks, such as automating tests and manual exploratory testing. It also means that the whole team thinks constantly about designing code for testability.

The whole-team approach involves constant collaboration. Testers collaborate with programmers, the customer team, and other team specialists—and not just for testing tasks, but other tasks related to testing, such as building infrastructure and designing for testability. Figure 1-5 shows a developer reviewing reports with two customers and a tester (not pictured).



Figure 1-5 A developer discusses an issue with customers

The whole-team approach means everyone takes responsibility for testing tasks. It means team members have a range of skill sets and experience to employ in attacking challenges such as designing for testability by turning examples into tests and into code to make those tests pass. These diverse viewpoints can only mean better tests and test coverage.

Most importantly, on an agile team, anyone can ask for and receive help. The team commits to providing the highest possible business value as a team, and the team does whatever is needed to deliver it. Some folks who are new to agile perceive it as all about speed. The fact is, it's all about quality—and if it's not, we question whether it's really an “agile” team.

Your situation is unique. That's why you need to be aware of the potential testing obstacles your team might face and how you can apply agile values and principles to overcome them.

SUMMARY

Understanding the activities that testers perform on agile teams helps you show your own team the value that testers can add. Learning the core practices of agile testing will help your team deliver software that delights your customers.

In this chapter, we've explained what we mean when we use the term "agile testing."

- We showed how the Agile Manifesto relates to testing, with its emphasis on individuals and interactions, working software, customer collaboration, and responding to change.
- We provided some context for this book, including some other terms we use such as "tester," "programmer," "customer," and related terms so that we can speak a common language.
- We explained how agile testing, with its focus on business value and delivering the quality customers require, is different from traditional testing, which focuses on conformance to requirements.
- We introduced the "whole-team" approach to agile testing, which means that everyone involved with delivering software is responsible for delivering high-quality software.
- We advised taking a practical approach by applying agile values and principles to overcome agile testing obstacles that arise in your unique situation.

This page intentionally left blank

INDEX

A

- Abbot GUI test tool, 127
- Acceptance tests. *See also* Business-facing tests
 - definition, 501
 - Remote Data Monitoring system example, 245
 - UAT (user acceptance testing) compared with, 130
- Ad hoc testing, 198
- Adaptability, skills and, 39–40
- ADEPT (AS400 Displays for External Prototyping and Testing), 117–118
- Advance clarity
 - customers speaking with one voice, 373–374
 - determining story size, 375–376
 - gathering all viewpoints regarding requirements, 374–375
 - overview of, 140–142, 373
- Advance preparation
 - downside of, 373
 - how much needed, 372–373
- Agile development
 - Agile manifesto and, 3–4
 - barriers to. *See* Barriers to adopting agile development
 - team orientation of, 6
- Agile Estimating and Planning* (Cohn), 331, 332
- Agile manifesto
 - people focus, 30
 - statement of, 4
 - value statements in, 21
- Agile principles. *See* Principles, for agile testers
- Agile testers. *See also* Testers
 - agile testing mind-set, 482–483
 - definition, 4
 - giving all team members equal weight, 31
 - hiring, 67–69
 - what they are, 19–20
- Agile testing
 - definition, 6
 - as mind-set, 20–21
 - what we mean, 4–7
- Agile values, 3–4
- Alcea's FIT IssueTrack, 84
- Alpha tests, 466–467
- ant, 284
 - as build tool, 126
 - continual builds and, 175, 291
- AnthillPro, 126
- ANTS Profiler Pro, 234
- Apache JMeter. *See* JMeter
- API-layer functional test tools, 168–170
 - Fit and FitNesse, 168–170
 - overview of, 168
 - testing web Services, 170
- API testing
 - automating, 282
 - overview of, 205–206
- APIs (application programming interfaces), 501
- Appleton, Brad, 124
- Application under test (AUT), 246

Applications

- integration testing with external applications, 459
- Remote Data Monitoring system example, 242–243

Architecture

- incremental approach to testing, 114
- layered, 116
- Quadrant 1 tests and, 99
- scalability and, 104, 221
- testable, 30, 115, 182, 184, 267

AS400 Displays for External Prototyping and Testing (ADEPT), 117–118

Assumptions, hidden

- agile testers response to, 25
- failure to detect, 32
- questions that uncover, 136
- worst-case scenarios and, 334

Attitude

- agile testing mind-set, 482–483
- barriers to adopting agile development, 48 vs. skills, 20

Audits, compliance with audit requirements, 89–90

AUT (application under test), 143, 225, 246, 317

Authorization, security testing and, 224

Automated regression testing

- key success factors, 484
- release candidates and, 458
- as a safety net, 261–262

Automated test lists, test plan alternatives, 353–354

Automation

- code flux and, 269
- of deployment, 232
- driving development with, 262–263
- of exploratory testing, 201
- fear of, 269–270
- feedback from, 262
- freeing people for other work, 259–261
- of functional test structure, 245–247
- home-brewed test, 175
- investment required, 267–268

learning curve, 266–267

legacy code and, 269

maintainability and, 227–228

manual testing vs., 258–259

obstacles to, 264–265

old habits and, 270

overview of, 255

programmers' attitude regarding, 265–266

reasons for, 257–258

responding to change and, 29

ROI and, 264

task cards and, 394–395

testability and, 149–150

tests as documentation, 263–264

Automation strategy

agile coding practices and, 303–304

applying one tool at a time, 312–313

data generation tools, 304–305

database access and, 306–310

design and maintenance and, 292–294

developing, 288–289

identifying tool requirements, 311–312

implementing, 316–319

iterative approach, 299–300

keep it simple, 298–299

learning by doing, 303

managing automated tests, 319

multi-layered approach to, 290–292

organizing test results, 322–324

organizing tests, 319–322

overview of, 273

principles, 298

record/playback tools and, 294, 296–297

starting with area of greatest pain, 289–290

taking time to do it right, 301–303

test automation pyramid, 276–279

test categories, 274–276

tool selection, 294–298, 313–316

understanding purpose of tests and, 310–311

what can be automated, 279–285

what might be difficult to automate, 287–288

- what should not be automated, 285–287
 - whole team approach, 300–301
- Automation tools, 164–177
- API-layer functional test tools, 168–170
 - builds and, 126
 - GUI test tools, 170–176
 - overview of, 164–165
 - unit-level test tools, 165–168
 - web services test tool, 170
- B**
- Bach, James, 195, 200, 212
- Bach, Jonathan, 201
- Back-end testing
- behind the GUI, 282
 - non-UI testing, 204–205
- Bamboo, 126
- Barriers to adopting agile development, 44–49
- conflicting or multiple roles, 45
 - cultural differences among roles, 48–49
 - lack of training, 45
 - lack of understanding of agile concepts, 45–48
 - loss of identity, 44–45
 - overview of, 44
 - past experience and attitudes, 48
- Baselines
- break-test baseline technique, 363
 - performance, 235–237
- Batch
- files, 251
 - processing, 345
 - scheduling process, 182
- BDD (Behavior-driven development)
- easyb tool, 166–168
 - tools for Quadrant 1 tests, 127
- Beck, Kent, 26, 99
- Benander, Mark, 51
- Benchmarking, 237
- Berczuk, Stephen, 124
- Beta testing, 466–467
- Big picture
- agile testers focus on, 23
 - high-level tests and examples, 397–402
 - key success factors, 490–491
 - peril of forgetting, 148
 - regression tests and, 434
- Bolton, Michael, 195
- Bos, Erik, 114
- Boundary conditions
- API testing and, 205
 - automation and, 11
 - data generation tools and, 304
 - identifying test variations, 410
 - writing test cases for, 137
- Boyer, Erika, 140, 163, 372, 432
- Brainstorming
- automation giving testers better work, 260
 - prior to iteration, 370, 381
 - quadrants as framework for, 253
 - taking time for, 301
 - testers, 121
- Break-test baseline technique, 363
- Browsers, compatibility testing and, 230
- Budget limits, 55
- Bug tracking. *See* Defect tracking
- Bugs. *See* Defects
- Build
- automating, 280–282
 - challenging release candidate builds, 473
 - definition, 501
 - incremental, 178–179
 - speeding up, 118–119
- Build automation tools, 126, 282
- Build/Operate/Check pattern, 180
- Build tools, 126
- BuildBeat, 126
- Business analysts, 374
- Business expert role
- agreement regarding requirements, 428, 430
 - common language and, 134, 291, 414
 - on customer team, 6–7
 - iteration demo and, 443
 - language of, 291
 - Power of Three and, 482
 - tools geared to, 134

- Business-facing tests
 - agile testing as, 6
 - Quadrants 2 & 3, 97–98
 - technology-facing tests compared with, 120
 - Business-facing tests, critiquing the product (Quadrant 3), 189–215
 - acceptance tests, 245
 - API testing, 205–206
 - demonstrations, 191–192
 - emulator tools, 213–214
 - end-to-end tests, 249–250
 - exploratory testing, 195–202, 248–249
 - generating test data, 212
 - GUI testing, 204
 - monitoring tools, 212–213
 - overview of, 189–191
 - reports, 208–210
 - scenario testing, 192–195
 - session-based testing, 200–201
 - setting up tests, 211–212
 - simulator tools, 213
 - tools for exploratory testing, 210–211
 - usability testing, 202–204
 - user acceptance testing, 250
 - user documentation, 207–208
 - web services testing, 207
 - Business-facing tests, supporting team (Quadrant 2), 129–151
 - advance clarity, 140–142
 - automating functional tests, 245–247
 - common language and, 134–135
 - conditions of satisfaction and, 142–143
 - doneness, 146–147
 - driving development with, 129–132
 - eliciting requirements, 135–140
 - embedded testing, 248
 - incremental approach, 144–146
 - requirements quandary and, 132–134
 - ripple effects, 143–144
 - risk mitigation and, 147–149
 - testability and automation, 149–150
 - toolkit for. *See* Toolkit (Quadrant 2)
 - web services testing, 247–248
 - Business impact, 475–476
 - Business value
 - adding value, 31–33
 - as goal of agile development, 5–8, 69, 454
 - metrics and, 75
 - release cycles and, 3
 - role, function, business value pattern, 155
 - team approach and, 16
 - Busse, Mike, 106, 235, 284, 313
 - Buwalda, Hans, 193
- ## C
- Canonical data, automating databases and, 308–309
 - Canoo WebTest
 - automating GUI tests, 184, 186
 - GUI regression test suite, 291
 - GUI smoke tests, 300
 - GUI test tools, 174–175
 - organizing tests and, 320
 - scripts and, 320
 - XML Editor for, 125
 - Capability Maturity Model Integration (CMMI), 90–91
 - Capture-playback tool, 267
 - Celebrating successes
 - change implementation and, 50–52
 - iteration wrap up and, 449–451
 - Chandra, Apurva, 377
 - Chang, Tae, 53–54
 - Change
 - celebrating successes, 50–52
 - giving team ownership, 50
 - introducing, 49
 - not coming easy, 56–57
 - responsiveness to, 28–29
 - talking about fears, 49–50
 - Checklists
 - release readiness, 474
 - tools for eliciting examples and requirements, 156
 - CI. *See* Continuous integration (CI)
 - CI Factory, 126
 - CMMI (Capability Maturity Model Integration), 90–91

- Co-location, team logistics and, 65–66
- Coaches
 - adjusting to agile culture and, 40
 - learning curve and, 266
 - providing encouragement, 69
 - skill development and, 122
 - training and, 45–46
- Cockburn, Alistair, 115
- Code
 - automation and code flux, 269
 - automation and legacy code, 269
 - automation strategy and, 303–304
 - documentation of, 251
 - standards, 227
 - writing testable, 115
- Code coverage, release metrics, 360–364
- Coding and testing, 405–441
 - adding complexity, 407
 - alternatives for dealing with bugs, 424–428
 - choosing when to fix bugs, 421–423
 - collaborating with programmers, 413–414
 - dealing with bugs, 416–419
 - deciding which bugs to log, 420–421
 - driving development and, 406
 - facilitating communication, 429–432
 - focusing on one story, 411–412
 - identifying variations, 410
 - iteration metrics, 435–440
 - media for logging bugs, 423–424
 - overview of, 405
 - Power of Three for resolving differences in viewpoint, 411
 - regression testing and, 432–434
 - resources, 434–435
 - risk assessment, 407–409
 - as simultaneous process, 409–410, 488–489
 - starting simple, 406, 428–429
 - talking to customers, 414–415
 - tests that critique the product, 412–413
- Cohn, Mike, 50, 155, 276, 296, 331, 332
- Collaboration
 - with customers, 396–397
 - key success factors, 489–490
 - with programmers, 413–414
 - whole team approach, 15–16
- Collino, Alessandro, 103, 363
- Communication
 - common language and, 134–135
 - with customer, 140, 396–397
 - DTS (Defect Tracking System) and, 83
 - facilitating, 23–25, 429–432
 - product delivery and, 462–463
 - size as challenge to, 42–43
 - between teams, 69–70
 - test results, 357–358
- Comparisons, automating, 283
- Compatibility testing, 229–230
- Component tests
 - automating, 282
 - definition, 501
 - supporting function of, 5
- Conditions of satisfaction
 - business-facing tests and, 142–143
 - definition, 501–502
- Context-driven testing
 - definition, 502
 - quadrants and, 106–107
- Continuous build process
 - failure notification and, 112
 - feedback and, 119
 - FitNesse tests and, 357
 - implementing, 114
 - integrating tools with, 175, 311
 - source code control and, 124
 - what testers can do, 121
- Continuous feedback principle, 22
- Continuous improvement principle, 27–28
- Continuous integration (CI)
 - automating, 280–282
 - as core practice, 486–487
 - installability and, 231–232
 - Remote Data Monitoring system example, 244
 - running tests and, 111–112
- Conversion, data migration and, 460–461
- Core practices
 - coding and testing as one process, 488–489
 - continuous integration, 486–487

- Core practices, *continued*
 - incremental approach, 488
 - overview of, 486
 - synergy between practices, 489
 - technical debt management, 487–488
 - test environments, 487
 - Courage, principles, 25–26, 71
 - Credibility, building, 57
 - Critiquing the product
 - business facing tests. *See* Business-facing tests, critiquing the product (Quadrant 3)
 - technology-facing tests. *See* Technology-facing tests, critiquing the product (Quadrant 4)
 - CrossCheck, testing Web Services, 170
 - CruiseControl, 126, 244, 291
 - Cultural change, 37. *See also* Organizations
 - Cunningham, Ward, 106, 168, 506
 - Customer expectations
 - business impact and, 475–476
 - production support, 475
 - Customer-facing test. *See* Business-facing tests
 - Customer support, DTS (Defect Tracking System) and, 82
 - Customer team
 - definition, 502
 - interaction between customer and developer teams, 8
 - overview of, 7
 - Customer testing
 - Alpha/Beta testing, 466–467
 - definition, 502
 - overview of, 464
 - UAT (user acceptance testing), 464–466
 - Customers
 - collaborating with, 396–397, 489–490
 - considering all viewpoints during iteration planning, 388–389
 - delivering value to, 22–23
 - importance of communicating with, 140, 414–415, 444
 - iteration demo, 191–192, 443–444
 - participation in iteration planning, 384–385
 - relationship with, 41–42
 - reviewing high-level tests with, 400
 - speaking with one voice, 373–374
 - CVS, source code control and, 124
- D**
- Data
 - automating creation or setup, 284–285
 - cleanup, 461
 - conversion, 459–461
 - release planning and, 348
 - writing task cards and, 392
 - Data-driven tests, 182–183
 - Data feeds, testing, 249
 - Data generation tools, 304–305
 - Data migration, automating, 310, 460
 - Databases
 - avoiding access when running tests, 306–310
 - canonical data and automation, 308–309
 - maintainability and, 228
 - product delivery and updates, 459–461
 - production-like data and automation, 309–310
 - setting up/tearing down data for each automated test, 307–308
 - testing data migration, 310
 - De Souza, Ken, 223
 - Deadlines, scope and, 340–341
 - Defect metrics
 - overview of, 437–440
 - release metrics, 364–366
 - Defect tracking, 79–86
 - DTS (Defect Tracking System), 79–83
 - keeping focus and, 85–86
 - overview of, 79
 - reasons for, 79
 - tools for, 83–85
 - Defect Tracking System. *See* DTS (Defect Tracking System)
 - Defects
 - alternatives for dealing with bugs, 424–428
 - choosing when to fix bugs, 421–423

- dealing with bugs, 416–419
 - deciding which bugs to log, 420–421
 - media for logging bugs, 423–424
 - metrics and, 79
 - TDD (test-driven development) and, 490
 - writing task cards and, 391–392
 - zero bug tolerance, 79, 418–419
- Deliverables
- “fit and finish” deliverables, 454
 - nonsoftware, 470
 - overview of, 468–470
- Delivering product
- Alpha/Beta testing, 466–467
 - business impact and, 475–476
 - communication and, 462–463
 - customer expectations, 475
 - customer testing, 464
 - data conversion and database updates, 459–461
 - deliverables, 468–470
 - end game, 456–457
 - installation testing, 461–462
 - integration with external applications, 459
 - nonfunctional testing and, 458–459
 - overview of, 453
 - packaging, 474–475
 - planning time for testing, 455–456
 - post-development testing cycles, 467–468
 - production support, 475
 - release acceptance criteria, 470–473
 - release management, 470, 474
 - releasing product, 470
 - staging environment and, 458
 - testing release candidates, 458
 - UAT (user acceptance testing), 464–466
 - what if it is not ready, 463–464
 - what makes a product, 453–455
- Demos/demonstrations
- of an iteration, 443–444
 - value to customers, 191–192
- Deployment, automating, 280–282
- Design
- automation strategy and, 292–294
 - designing with testing in mind, 115–118
- Detailed test cases
- art and science of writing, 178
 - big picture approach and, 148–149
 - designing with, 401
- Developer team
- interaction between customer and developer teams, 8
 - overview of, 7–8
- Development
- agile development, 3–4, 6
 - automated tests driving, 262–263
 - business-facing tests driving, 129–132
 - coding driving, 406
 - post-development testing cycles, 467–468
- Development spikes, 381
- Development team, 502
- diff tool, 283
- Distributed teams, 431–432
- defect tracing systems, and, 82
 - physical logistics, 66
 - online high level tests for, 399
 - online story board for, 357
 - responding to change, 29
 - software-based tools to elicit examples and requirements, and, 163–164
- Documentation
- automated tests as source of, 263–264
 - problems and fixes, 417
 - reports, 208–210
 - of test code, 251
 - tests as, 402
 - user documentation, 207–208
- Doneness
- knowing when a story is done, 104–105
 - multitiered, 471–472
- Driving development with tests. *See* TDD (test-driven development)
- DTS (Defect Tracking System), 80–83
- benefits of, 80–82
 - choosing media for logging bugs, 424
 - documenting problems and fixes, 417

- DTS (Defect Tracking System), *continued*
 logging bugs and, 420
 reason for not using, 82–83
- Dymond, Robin, xxx
- Dynamic analysis, security testing tools, 225
- E**
- easyb behavior-driven development tool, 165–168
- EasyMock, 127
- Eclipse, 125, 316
- Edge cases
 identifying variations, 410
 not having time for, 112
 starting simple and then adding complexity, 406–407
 test cases for, 137
- Embedded system, Remote Data Monitoring example, 248
- Empowerment, of teams, 44
- Emulator tools, 213–214
- End game
 Agile testing, 91
 iteration, 14
 product delivery and, 456–457
 release and, 327
- End-to-end tests, 249–250
- Enjoyment, principle of, 31
- Environment, test environment, 347–348
- Epic. *See also* Themes
 definition, 502
 features becoming, 502
 iterations in, 76, 329
 planning, 252
- ePlan Services, Inc., xli, 267
- Errors, manual testing and, 259
- Estimating story size, 332–338
- eValid, 234
- Event-based patterns, test design patterns, 181
- Everyday Scripting with Ruby for Teams, Testers, and You* (Marick), 297, 303
- Example-driven development, 378–380
- Examples
 for eliciting requirements, 136–137
 tools for eliciting examples and requirements, 155–156
- Executable tests, 406
- Exploratory testing (ET)
 activities, characteristics, and skills (Hagar), 198–200
 attributes of exploratory tester, 201–202
 automation of, 201
 definition, 502–503
 end game and, 457
 explained (Bolton), 195–198
 manual testing and, 280
 monitoring tools, 212
 overview of, 26, 195
 Remote Data Monitoring system example, 248–249
 session-based testing and, 200–201
 setup, 211–212
 simulators and emulators, 212–213
 tests that critique the product, 412–413
 tools for, 210–212
 tools for generating test data, 212
 what should not be automated, 286
- External quality, business facing tests defining, 99, 131
- External teams, 43, 457
- Extreme Programming. *See* XP (Extreme Programming)
- Extreme Programming Explained* (Beck), 26
- F**
- Face-to-face communication, 23–25
- Failover tests, 232
- Failure, courage to learn from, 25
- Fake objects, 115, 118, 306, 502–503
- Fault tolerance, product delivery and, 459
- Fear
 barriers to automation, 269–270
 change and, 49–50
- Fearless Change* (Manns and Rising), 121
- Feathers, Michael, 117, 288
- Features
 defects vs., 417–418
 definition, 502–503
 focusing on value, 341

Feedback

- automated tests providing, 262
 - continuous feedback principle, 22
 - iterative approach and, 299–300
 - key success factors, 484–486
 - managing tests for, 323–324
 - Quadrant 1 tests and, 118–119
- “Fit and finish” deliverables, 454
- Fit (Framework for Integrated Test), 134–135
- API-layer functional test tools, 168–169
 - automation test pyramid and, 278
- FIT IssueTrack, Alcea, 83–84
- FitNesse
- advantages of, 163
 - API-layer functional test tools, 169–170
 - automating functional tests with, 30, 145
 - business-facing tests with, 154, 178
 - collaboration and, 164
 - continual builds and, 119, 357
 - data verification with, 287
 - doneness and, 472
 - encouraging use of, 122
 - examples and, 136, 169
 - feedback and, 323–324
 - file parsing rules illustrated with, 205
 - functional testing behind the GUI, 291, 300
 - home-grown scripts and, 305
 - JUnit compared with, 299
 - keywords or actions words for automating tests, 182–183
 - manual vs. automated testing, 210
 - memory demands of, 306
 - organizing tests and, 319–320
 - overview of, 168–170
 - remote testing and, 432
 - “start, stop, continue” list, 446
 - support for source code control tools, 320
 - test automation pyramid and, 278
 - test cards and, 389–390
 - test cases as documentation, 402
 - test design and maintenance, 292

- testing database layer with, 284
 - testing stories, 395
 - traceability requirements and, 88
 - user acceptance testing, 295
 - wikis and, 186
- Fleisch, Patrick, 377, 440
- Flow diagrams
- scenario testing and, 194–195
 - tools for eliciting examples and requirements, 160–163
- Fowler, Martin, 117
- Framework for Integrated Test. *See* Fit (Framework for Integrated Test)
- Frameworks, 90–93
- ftptt, 234
- Functional analysts, 386
- Functional testing
- compatibility issues and, 230
 - definition, 502–503
 - end-to-end tests, 249–250
 - layers, 246
 - nonfunctional tests compared with, 225
 - Remote Data Monitoring system example, 245–247

G

- Galen, Bob, 455–456, 471
- Gärtner, Markus, 395, 476
- Geographically dispersed teams
- coping with, 376–378
 - facilitating communication and, 431–432
- Gheorghiu, Grig, 225–226, 234
- Glover, Andrew, 166
- Greenfield projects
- code testing and, 116
 - definition, 502–503
- GUI (graphical user interface)
- automation strategy and, 293
 - code flux and, 269
 - standards, 227
- GUI smoke tests
- Canoo WebTest and, 300
 - continual builds and, 119
 - defect metrics, 437

- GUI test tools, 170–176
 - Canoo Web Test, 174–175
 - “home-brewed” test automation tools, 175
 - open source test tools, 172
 - overview of, 170–171
 - record/playback tools, 171–172
 - Ruby with Watir, 172–174
 - Selenium, 174
- GUI testing
 - API testing, 205–206
 - automating, 282–283, 295–296
 - automation test pyramid and, 278
 - GUI smoke tests, 119, 300, 437
 - overview of, 204
 - Web service testing, 207
- H**
- Hagar, Jon, 198
- Hardware
 - compatibility and, 229
 - cost of test environments, 487
 - functional testing and, 230
 - investing in automation and, 267
 - production environment and, 310
 - scalability and, 233
 - test infrastructure, 319
 - testing product installation, 462
- Hendrickson, Elisabeth, 203, 315–316
- High-level test cases, 397–402
 - mockups, 398–399
 - overview of, 397–398
 - reviewing with customers, 400
 - reviewing with programmers, 400–401
 - test cases as documentation, 402
- Hiring a tester, 67–69
- Holzer, Jason, 220, 448
- Home-grown test tool
 - automation tools, 314
 - GUI test tools, 175
 - test results, 323
- httpperf, 234
- Hudson, 126
- I**
- IBM Rational ClearCase, 124
- IDEs (Integrated Development Environments)
 - definition, 502–503
 - log analysis tools, 212
 - tools for Quadrant 1 tests, 124–126
- “ility” testing
 - compatibility testing, 229–230
 - installability testing, 231–232
 - interoperability testing, 228–229
 - maintainability testing, 227–228
 - reliability testing, 230–231, 250–251
 - security testing, 223–227
- Impact, system-wide, 342
- Implementing Lean Software Development: From Concept to Cash* (Poppendieck), 74, 416
- Improvement
 - approach to process improvement, 448–449
 - continuous improvement principle, 27–28
 - ideas for improvement from retrospectives, 447–449
- Incremental development
 - building tests incrementally, 178–179
 - as core practice, 488
 - “ilities” tests and, 232
 - thin slices, small chunks, 144–146
 - traditional vs. agile testing, 12–13
- Index cards, logging bugs on, 423
- Infrastructure
 - Quadrant 1 tests, 111–112
 - test infrastructure, 319
 - test plans and, 346–347
- Installability testing, 231–232
- Installation testing, 461–462
- Integrated Development Environments. *See* IDEs (Integrated Development Environments)
- Integration testing
 - interoperability and, 229
 - product and external applications, 459
- IntelliJ IDEA, 125
- Internal quality
 - measuring internal quality of code, 99
 - meeting team standards, 366

- Quadrant 1 tests and, 111
 - speed and, 112
- Interoperability testing, 228–229
- Investment, automation requiring, 267–268
- Iteration
- automation strategy and, 299–300
 - definition, 502–503
 - demo, 443–444
 - life of a tester and, 327
 - pre-iteration activities. *See* Pre-iteration activities
 - prioritizing stories and, 338
 - review, 415, 435–437
 - traditional vs. agile testing, 12–13
- Iteration kickoff, 383–403
- collaboration with customers, 396–397
 - considering all viewpoints, 385–389
 - controlling workload, 393
 - high-level tests and examples, 397–402
 - iteration planning, 383–384
 - learning project details, 384–385
 - overview of, 383
 - testable stories, 393–396
 - writing task cards, 389–392
- Iteration metrics, 435–440
- defect metrics, 437–440
 - measuring progress with, 435–437
 - overview of, 435
 - usefulness of, 439–440
- Iteration planning
- considering all viewpoints, 385–389
 - controlling workload, 393
 - learning project details, 384–385
 - overview of, 383–384
 - writing task cards, 389–392
- Iteration review meeting, 415
- Iteration wrap up, 443–451
- celebrating successes, 449–451
 - demo of iteration, 443–444
 - ideas for improvement, 447–449
 - retrospectives, 444–445
 - “start, stop, continue” exercise for retrospectives, 445–447
- ITIL (Information Technology Infrastructure Library), 90–91
- ## J
- JBehave, 165
- JConsole, 234
- JMeter
- performance baseline tests, 235
 - performance testing, 223, 234, 313
- JMS (Java Messaging Service)
- definition, 502–503
 - integration with external applications and, 243
 - testing data feeds and, 249
- JProfiler, 234
- JUnit
- FitNesse as alternative for TDD, 299
 - functional testing, 176
 - load testing tools, 234–235
 - unit test tools, 126, 165, 291
- JUnitPerf, 234
- Just in time development, 369. *See also* Pre-iteration activities
- ## K
- Key success factors
- agile testing mind-set, 482–483
 - automating regression testing, 484
 - big picture approach, 490–491
 - coding and testing as one process, 488–489
 - collaboration with customers, 489–490
 - continuous integration (CI), 486–487
 - feedback, 484–486
 - foundation of core practices, 486
 - incremental approach (thin slices, small chunks), 488
 - overview of, 481
 - synergy between practices, 489
 - technical debt management, 487–488
 - test environments, 487
 - whole team approach, 482
- Keyword-driven tests, 182–183
- King, Joseph, 176
- Knowledge base, DTS, 80–81

Kohl, Jonathan, 201, 204, 211

König, Dierk, 320

L

Language, need for common, 134–135

Layered architecture, 116

Lean measurements, metrics, 74–75

Learning

automation strategy and, 303

continuous improvement principle, 27

Learning curve, automation and, 266–267, 303

Legacy code, 269

Legacy code rescue (Feathers), 117

Legacy systems

ccde, 269

definition, 502–503

logging bugs and, 421

testing, 117

Lessons Learned in Software Testing (Pettichord), 485

Lessons learned sessions, 383. *See also*
Retrospectives

Lightweight processes, 73–74

Lightweight test plans, 350

Load testing. *See* Performance and load testing

LoadRunner, 234

LoadTest, 234

Logistics, physical, 65–66

LogWatch tool, 212

Loss of identity, QA teams fearing, 44–45

Louvion, Christophe, 63

M

Maintainability testing, 227–228

Management, 52–55

advance clarity and, 373–374

cultural change and, 52–54

overview of, 52

providing metrics to, 440

Managers

cultural changes for, 52–54

how to influence testing, 122–123

speaking manager's language, 55

Manns, Mary Lynn, 121–122

Manual testing

automation vs., 258–259

peril of, 289

Marcano, Antony, 83, 426

Marick, Brian, 5, 24, 97, 134, 170, 203, 303

Martin, Micah, 169

Martin, Robert C., 169

Matrices

high-level tests and, 398–399

text matrices, 350–353

Maven, 126

McMahon, Chris, 260

Mean time between failure, reliability testing, 230

Mean time to failure, reliability testing, 230

Media, for logging bugs, 423–424

Meetings

demonstrations, 71, 192

geographically dispersed, 376

iteration kickoff, 372

iteration planning, 23–24, 244, 331, 384, 389

iteration review, 71, 415

pre-planning, 370–372

release planning, 338, 345

retrospective, 447

scheduling, 70

sizing process and, 336–337

standup, 177, 429, 462

team participation and, 32

test planning, 263

Memory leaks, 237–238

Memory management testing, 237–238

Meszaros, Gerald, 99, 111, 113, 138, 146, 182, 204, 291, 296, 430

Metrics, 74–79

code coverage, 360–364

communication of, 77–78

defect metrics, 364–366, 437–440

iteration metrics, 435–440

justifying investment in automation, 268

lean measurements, 74–75

overview of, 74

passing tests, 358–360

reasons for tracking defects, 52, 75–77, 82

- release metrics, 358
 - ROI and, 78–79
 - what not to do with, 77
 - XP radar charts, 47–48
- Milestones, celebrating successes, 449–450
- MIME (Multipurpose Internet Mail Extensions)
- definition, 504
 - testing data feeds and, 249
- Mind maps, 156–158
- Mind-set
- agile testing as, 20–21
 - key success factors, 482–483
 - pro-active, 369–370
- “Mini-waterfall” phenomenon, 46–47
- Mock objects
- definition, 504
 - risk alleviation and, 459
 - tools for implementing, 127
 - unit tests and, 114
- Mock-ups
- facilitating communication and, 430
 - high-level tests and, 398–399
 - stories and, 380
 - tools for eliciting examples and requirements, 160
- Model-driven development, 398
- Models
- quality models, 90–93
 - UI modeling example, 399
- Monitoring tools, 212–213, 235
- Multi-layered approach, automation strategy, 290–292
- Multipurpose Internet Mail Extensions (MIME)
- definition, 504
 - testing data feeds and, 249
- N**
- Naming conventions, 227
- Nant, 126
- Navigation, usability testing and, 204
- NBehave, 165
- NeoLoad, 234
- Nessus, vulnerability scanner, 226
- .NET Memory Profiler, 234
- NetBeans, 125
- NetScout, 235
- Non-functional testing. *See also*
- Technology-facing tests, critiquing the product (Quadrant 4)
 - delivering product and, 458–459
 - functional testing compared with, 225
 - requirements, 218–219
 - when to perform, 222
- North, Dan, 165
- NSpec, 165
- NUnit, 126, 165
- O**
- Oleszkiewicz, Jakub, 418
- One-off tests, 286–287
- Open source tools
- agile open source test tools, 172–175
 - automation and, 314–315
 - GUI test tools, 172
 - IDEs, 124–125
- OpenWebLoad, 234
- Operating systems (OSs), compatibility testing and, 230
- Organizations, 37–44
- challenges of agile development, 35
 - conflicting cultures, 43
 - customer relationships and, 41–42
 - overview of, 37–38
 - quality philosophy, 38–40
 - size and, 42–43
 - sustainable pace of testing and, 40–41
 - team empowerment, 44
- OSs (operating systems), compatibility testing and, 230
- Ownership, giving team ownership, 50
- P**
- Packaging, product delivery and, 474–475
- Pair programming
- code review and, 227
 - developers trained in, 61

- Pair programming, *continued*
 - IDEs and, 125
 - team approach and, 244
- Pair testing, 413
- Passing tests, release metrics, 358–360
- PerfMon, 235
- Perforce, 124
- Performance and load testing
 - automating, 283
 - baselines, 235–237
 - memory management testing, 237–238
 - overview of, 234
 - product delivery and, 458
 - scalability testing, 233–234
 - test environment, 237
 - tools for, 234–235
 - when to perform, 223
 - who performs the test, 220–221
- Performance, rewards and, 70–71
- Perils
 - forgetting the big picture, 148
 - quality police mentality, 39
 - the testing crunch, 416
 - waiting for Tuesday's build, 280
 - you're not really part of the team, 32
- Perkins, Steve, 156, 159, 373
- PerlClip
 - data generation tools, 305
 - tools for generating test data, 212
- Persona testing, 202–204
- Pettichord, Bret, 175, 264, 485
- Phased and gated development, 73–74, 129
- Physical logistics, 65–66
- Planning
 - advance, 43
 - iteration. *See* Iteration planning
 - release/theme planning. *See* Release planning
 - testing. *See* Test planning
- PMO (Project Management Office), 440
- Pols, Andy, 134
- Ports and Adapters pattern (Cockburn), 115
- Post-development testing, 467–468
- Post-iteration bugs, 421
- Pounder, 234
- Power of Three
 - business expert and, 482
 - finding a common language, 430
 - good communication and, 33, 490
 - problem solving and, 24
 - resolving differences in viewpoint, 401, 411
 - whole team approach and, 482
- Pragmatic Project Automation*, 260
- Pre-iteration activities, 369–382
 - advance clarity, 373
 - benefits of working on stories in advance, 370–372
 - customers speaking with one voice, 373–374
 - determining story size, 375–376
 - evaluating amount of advance preparation needed, 372–373
 - examples, 378–380
 - gathering all viewpoints regarding requirements, 374–375
 - geographically dispersed team and, 376–378
 - overview of, 369
 - prioritizing defects, 381
 - pro-active mindset, 369–370
 - resources, 381
 - test strategies and, 380–381
- Pre-planning meeting, 370–372
- Principles, automation
 - agile coding practices, 303–304
 - iterative approach, 299–300
 - keep it simple, 298–299
 - learning by doing, 303
 - overview of, 298
 - taking time to do it right, 301–303
 - whole team approach, 300–301
- Principles, for agile testers
 - continuous feedback, 22
 - continuous improvement, 27–28
 - courage, 25–26
 - delivering value to customer, 22–23
 - enjoyment, 31
 - face-to-face communication, 23–25
 - keeping it simple, 26–27
 - overview of, 21–22

- people focus, 30
 - responsive to change, 28–29
 - self-organizing, 29–30
- Prioritizing defects, 381
- Prioritizing stories, 338–340
- Pro-active mindset, 369–370
- Product
- business value, 31–33
 - delivery. *See* Delivering product
 - tests that critique (Q3 & Q4), 101–104
 - what makes a product, 453–455
- Product owner
- considering all viewpoints during iteration
 - planning, 386–389
 - definition, 504
 - iteration planning and, 384
 - Scrum roles, 141, 373
 - tools geared to, 134
- Production
- logging bugs and, 421
 - support, 475
- Production code
- automation test pyramid and, 277–278
 - definition, 504
 - delivering value to, 70
 - programmers writing, 48
 - source code control and, 434
 - synchronization with testing, 322
 - test-first development and, 113
 - tests supporting, 303–304
- Production-like data, automating databases and, 309–310
- Professional development, 57
- Profiling tools, 234
- Programmers
- attitude regarding automation, 265–266
 - big picture tests, 397
 - collaboration with, 413–414
 - considering all viewpoints during iteration
 - planning, 387–389
 - facilitating communication and, 429–430
 - reviewing high-level tests with, 400–401
 - tester-developer ratio, 66–67
 - testers compared with, 4, 5
 - training, 61
 - writing task cards and, 391
- Project Management Office (PMO), 440
- Projects, PAS example, 176–177
- Prototypes
- accessible as common language, 134
 - mock-ups and, 160
 - paper, 22, 138–139, 380, 400, 414
 - paper vs. Wizard of Oz type, 275
 - UI (user interface), 107
- Pulse, 126
- PyUnit unit test tool for Python, 126
- ## Q
- QA (quality assurance)
- definition, 504
 - in job titles, 31
 - independent QA team, 60
 - interchangeable with “test,” 59
 - whole team approach, 39
 - working on traditional teams, 9
- Quadrant 1. *See* Technology-facing tests, supporting team (Quadrant 1)
- Quadrant 2. *See* Business-facing tests, supporting team (Quadrant 2)
- Quadrant 3. *See* Business-facing tests, critiquing the product (Quadrant 3)
- Quadrant 4. *See* Technology-facing tests, critiquing the product (Quadrant 4)
- Quadrants
- automation test categories, 274–276
 - business facing (Q2 & Q3), 97–98
 - context-driven testing and, 106–108
 - critiquing the product (Q3 & Q4), 104
 - managing technical debt, 106
 - overview of, 97–98
 - as planning guide, 490
 - purpose of testing and, 97
 - Quadrant 1 summary, 99
 - Quadrant 2 summary, 99–100
 - Quadrant 3 summary, 101–102
 - Quadrant 4 summary, 102–104
 - shared responsibility and, 105–106
 - story completion and, 104–105

Quadrants, *continued*

- supporting the team (Q1 & Q2), 100–101
- technology facing (Q1 & Q4), 97–98

Quality

- customer role in setting quality standards, 26
- models, 90–93
- organizational philosophy regarding, 38–40

Quality assurance. *See* QA (quality assurance)

Quality police mentality, 57

Questions, for eliciting requirements, 135–136

R

Radar charts, XP, 47–48

Rasmusson, Jonathan, 11

Record/playback tools

- automation strategy and, 294, 296–297
- GUI test tools, 171–172

Recovery testing, 459

Redundancy tests, 232

Reed, David, 171, 377

Refactoring

- definition, 504
- IDEs supporting, 124–126

Regression suite, 434

Regression tests, 432–434

- automated regression tests as a safety net, 261–262
- automating as success factor, 484
- checking big picture, 434
- definition, 504
- exploratory testing and, 212
- keeping the build “green,” 433
- keeping the build quick, 433–434
- logging bugs and, 420
- regression suite and, 434
- release candidates and, 458

Release

- acceptance criteria, 470–473
- end game, 327, 456–457
- management, 474
- product delivery, 470
- what if it is not ready, 463–464

Release candidates

- challenging release candidate builds, 473
- definition, 505
- testing, 458

Release metrics

- code coverage, 360–364
- defect metrics, 364–366
- overview of, 358
- passing tests, 358–360

Release notes, 474

Release planning, 329–367

- overview of, 329
- prioritizing and, 338–340
- purpose of, 330–331
- scope, 340–344
- sizing and, 332–337
- test plan alternatives, 350–354
- test planning, 345–350
- visibility and, 354–366

Reliability testing

- overview of, 230–231
- Remote Data Monitoring system example, 250–251

Remote Data Monitoring system example

- acceptance tests, 245
- application, 242–243
- applying test quadrants, 252–253
- automated functional test structure, 245–247

- documenting test code, 251
- embedded testing, 248
- end-to-end tests, 249–250
- exploratory testing, 248–249
- overview of, 242
- reliability testing, 250–251
- reporting test results, 251
- team and process, 243–244
- testing data feeds, 249
- unit tests, 244–245
- user acceptance testing, 250
- web services, 247–248

Remote team member. *See* Geographically dispersed teams

- Repetitive tasks, automating, 284
- Reports
 - documentation and, 208–210
 - Remote Data Monitoring system example, 251
- Repository, 124
- Requirements
 - business-facing tests addressing, 130
 - documentation of, 402
 - gathering all viewpoints regarding requirements, 374–375
 - how to elicit, 135–140
 - nonfunctional, 218–219
 - quandary, 132–134
 - tools for eliciting examples and requirements, 155–156
- Resources
 - completing stories and, 381
 - hiring agile tester, 67–69
 - overview of, 66
 - tester-developer ratio, 66–67
 - testing and, 434–435
- Response time
 - API, 411
 - load testing and, 234–235
 - measurable goals and, 76
 - web services and, 207
- Retrospectives
 - continuous improvement and, 28
 - ideas for improvement, 447–449
 - iteration planning and, 383
 - overview of, 444–445
 - process improvement and, 90
 - “start, stop, and continue” exercise, 445–447
- Return on investment. *See* ROI (return on investment)
- Rewards, performance and, 70–71
- Rich-client unit testing tools, 127
- Rising, Linda, 121–122
- Risk
 - risk analysis, 198, 286, 290, 345–346
 - risk assessment, 407–409
 - test mitigating, 147–149
- Rogers, Paul, 242, 310, 388, 398
- ROI (return on investment)
 - automation and, 264
 - definition, 505
 - lean measurement and, 75
 - metrics and, 78–79
 - speaking manager’s language, 55
- Role, function, business value pattern, 155
- Roles
 - conflicting or multiple roles, 45
 - cultural differences among, 48–49
 - customer team, 7
 - developer team, 7–8
 - interaction of, 8
- RPGUnit, 118
- RSpec, 165, 318
- Ruby Test::Unit, 170
- Ruby with Watir
 - functional testing, 247
 - GUI testing, 285
 - identifying defects with, 212
 - keywords or actions words for automating tests, 182
 - overview of, 172–174
 - test automation with, 186
- RubyMock, 127
- Rules, managing bugs and, 425
- S**
- Safety tests, 232
- Santos, Rafael, 448
- Satisfaction conditions. *See* Conditions of satisfaction
- Scalability testing, 233–234
- Scenario testing, 192–193
 - flow diagrams and, 194–195
 - overview of, 192–195
 - soap opera tests, 193
- Scope, 340–344
 - business-facing tests defining, 134
 - deadlines and timelines and, 340–341
 - focusing on value, 341–342
 - overview of, 340
 - system-wide impact, 342

- Scope, *continued*
 - test plans and, 345
 - third-party involvement and, 342–344
- Scope creep, 385, 412
- Scripts
 - automating comparisons, 283
 - as automation tools, 297
 - conversion scripts, 461
 - data generation tools, 305
 - exploratory testing and, 211–212
- Scrum
 - product owner role, 141, 373
 - Remote Data Monitoring system example, 244
 - sprint reviews, 444
- ScrumMaster
 - approach to process improvement, 448–449
 - sizing stories and, 336–337
 - writing task cards and, 391
- SDD (story test-driven development)
 - identifying variations, 410
 - overview of, 262–263
 - test-first development and, 263
 - testing web services and, 170
- Security testing
 - outside-in approach of attackers, 225
 - overview of, 223–227
 - specialized knowledge required for, 220
- Selenium
 - GUI test tools, 174–175
 - implementing automation, 316–318
 - open source tools, 163
 - test automation with, 186, 316
- Self-organization
 - principles, 29–30
 - self-organizing teams, 69
- Session-based testing, 200–201
- Setup
 - automating, 284–285
 - exploratory testing, 211–212
- Shared resources
 - access to, 43
 - specialists as, 301
 - writing tasks and, 390
- Shared responsibility, 105–106
- Shout-Out Shoebox, 450
- “Show me,” collaboration with programmers, 413–414
- Simplicity
 - automation and, 298–299
 - coding, 406
 - logging bugs and, 428–429
 - principle of “keeping it simple,” 26–27
- Simulator tools
 - embedded testing and, 248
 - overview of, 213
- Size, organizational, 42–43
- Sizing stories, 332–337
 - example of, 334–337
 - how to, 332–333
 - overview of, 332
 - tester’s role in, 333–334
- Skills
 - adaptability and, 39–40
 - vs. attitude, 20
 - continuous improvement principle, 27
 - who performs tests and, 220–221
- Small chunks, incremental development, 144–146
- SOAP
 - definition, 505
 - performance tests and, 223, 234
- Soap opera tests, 193
- soapUI
 - definition, 505
 - performance tests and, 223, 234
 - testing Web Services, 170–171
- SOATest, 234
- Software-based tools, 163
- Software Configuration Management Patterns: Effective Teamwork, Practical Integrations* (Berczuk and Appleton), 124
- Software Endgames* (Galen), 471
- Source code control
 - benefits of, 255
 - overview of, 123–124
 - tools for, 124, 320

- SOX compliance, 469
- Speak with one voice, customers, 373–374
- Specialization, 220–221
- Speed as a goal, 112
- Spikes, development and test, 381
- Spreadsheets
 - test spreadsheets, 353
 - tools for eliciting examples and requirements, 159
- Sprint reviews, 444. *See also* Demos/
demonstrations
- SQL*Loader, 460
- Stability testing, 28
- Staging environment, 458
- Stand-up meetings, 177, 429, 462
- Standards
 - maintainability and, 227
 - quality models and, 90–93
- “Start, stop, continue” exercise, retrospectives, 445–447
- Static analysis, security testing tools, 225
- Steel thread, incremental development, 144, 338, 345
- Stories. *See also* Business-facing tests
 - benefits of working on in advance of iterations, 370–372
 - briefness of, 129–130
 - business-facing tests as, 130
 - determining story size, 375–376
 - focusing on one story when coding, 411–412
 - identifying variations, 410
 - knowing when a story is done, 104–105
 - logging bugs and, 420–421
 - mock-ups and, 380
 - prioritizing, 338–340
 - resources and, 381
 - scope and, 340
 - sizing. *See* Sizing stories
 - starting simple, 133, 406
 - story tests defined, 505
 - system-wide impact of, 342
 - test plans and, 345
 - test strategies and, 380–381
 - testable, 393–396
 - treating bugs as, 425
- Story boards
 - burndown charts, 429
 - definition, 505–506
 - examples, 356–357
 - online, 357, 384
 - physical, 356
 - stickers and, 355
 - tasks, 222, 355, 436
 - virtual, 357, 384, 393
 - work in progress, 390
- Story cards
 - audits and, 89
 - dealing with bugs and, 424–425
 - iteration planning and, 244
 - story narrative on, 409
- Story test-driven development. *See* SDD
(story test-driven development)
- Strangler application (Fowler), 116–117
- Strategy
 - automation. *See* Automation strategy
 - test planning vs. test strategy, 86–87
 - test strategies, 380–381
- Strategy, for writing tests
 - building tests incrementally, 178–179
 - iteration planning and, 372
 - keep the tests passing, 179
 - overview of, 177–178
 - test design patterns, 179–183
 - testability and, 183–185
- Stress testing. *See* Load testing
- Subversion (SVN), 124, 320
- Success factors. *See* Key success factors
- Successes, celebrating
 - change implementation and, 50–52
 - iteration wrap up and, 449–451
- Sumrell, Megan, 365, 450
- Sustainable pace, of testing, 40–41, 303
- SVN (Subversion), 124, 320
- SWTBot GUI test tool, 127
- Synergy, between practices, 489
- System, system-wide impact of story, 342

- T**
- tail-f, 212
 - Tartaglia, Coni, 439, 454, 470, 473
 - Task boards. *See* Story boards
 - Task cards
 - automating testing and, 394–395
 - iteration planning and, 389–392
 - product delivery and, 462–463
 - Tasks
 - completing testing tasks, 415–416
 - definition, 505–506
 - TDD (test-driven development)
 - automated tests driving, 262–263
 - defects and, 490
 - definition, 506
 - overview of, 5
 - Test-First Development compared with, 113–114
 - unit tests and, 111, 244–245
 - Team City, 126
 - Team structure, 59–65
 - agile project teams, 64–65
 - independent QA team, 60
 - integration of testers into agile project, 61–63
 - overview of, 59
 - traditional functional structure vs agile structure, 64
 - Teams
 - automation as team effort, 484
 - building, 69–71
 - celebrating success, 50–52
 - co-located, 65–66
 - controlling workload and, 393
 - customer, 7
 - developer, 7–8
 - empowerment of, 44
 - facilitating communication and, 429–432
 - geographically dispersed, 376–378, 431–432
 - giving all team members equal weight, 31
 - giving ownership to, 50
 - hiring agile tester for, 67–69
 - interaction between customer and developer teams, 8
 - iteration planning and, 384–385
 - logistics, 59
 - problem solving and, 123
 - Remote Data Monitoring system example, 243–244
 - shared responsibility and, 105–106
 - traditional, 9–10
 - using tests to support Quadrants 1 and 2, 100–101
 - whole team approach. *See* Whole team approach
 - working on agile teams, 10–12
 - Teardown, for tests, 307–308
 - Technical debt
 - defects as, 418
 - definition, 506
 - managing, 106, 487–488
 - Technology-facing tests
 - overview of, 5
 - Quadrants 1 & 4, 97–98
 - Technology-facing tests, critiquing the product (Quadrant 4), 217–239
 - baselines, 235–237
 - coding and testing and, 412–413
 - compatibility testing, 229–230
 - installability testing, 231–232
 - interoperability testing, 228–229
 - maintainability testing, 227–228
 - memory management testing, 237–238
 - overview of, 217–219
 - performance and load testing, 234
 - performance and load testing tools, 234–235
 - reliability testing, 230–231, 250–251
 - scalability testing, 233–234
 - security testing, 223–227
 - test environment and, 237
 - when to use, 222–223
 - who performs the test, 220–222
 - Technology-facing tests, supporting team (Quadrant 1)
 - build tools, 126
 - designing with testing in mind, 115–118
 - ease of accomplishing tasks, 114–115
 - IDEs for, 124–126
 - infrastructure supporting, 111–112

- overview of, 109–110
 - purpose of, 110–111
 - source code control, 123–124
 - speed as benefit of, 112–114
 - timely feedback, 118–119
 - toolkit for, 123
 - unit test tools, 126–127
 - unit tests, 244–245
 - what to do if team doesn't perform these tests, 121–123
 - where/when to stop, 119–121
- Test automation pyramid
- multi-layered approach to automation and, 290–291
 - overview of, 276–279
 - three little pigs metaphor, 278
- Test behind UI, 282
- Test cases
- adding complexity, 407
 - as documentation, 402
 - example-driven development, 379
 - identifying variations, 410
 - starting simple, 406
- Test coverage (and/or code coverage), 360–364
- Test design patterns, 179–183
- Build/Operate/Check pattern, 180
 - data-driven and keyword-driven tests, 182–183
 - overview of, 179
 - test genesis patterns (Veragen), 179
 - time-based, activity, and event patterns, 181
- Test doubles
- definition, 506
 - layered architectures and, 116
- Test-driven development. *See* TDD (test-driven development)
- Test environments, 237, 487
- Test-First Development
- definition, 506
 - TDD (test-driven development) compared with, 113–114
- Test management, 186
- Test management toolkit (Quadrant 2), 186
- Test plan alternatives, 350–354
- Test planning, 345–350
- automated test lists, test plan alternatives, 353–354
 - infrastructure and, 346–347
 - overview of, 86, 345
 - reasons for writing, 345–346
 - test environment and, 347–348
 - test plan alternatives, 350–354
 - test plans, lightweight 350
 - test plan sample, 351
 - test strategy vs., 86–88
 - traceability and, 88
 - types of tests and, 346
 - where to start, 345
- Test results
- communicating, 357–358
 - organizing, 322–324
 - release planning and, 349–350
- Test skills. *See* Skills
- Test spikes, 381
- Test spreadsheets, 353
- Test strategy
- iterations, pre-iteration activities and, 380–381
 - test plan vs., 86–88
- Test stubs
- definition, 506
 - integration with external applications and, 459
 - unit tests and, 127
- Test teams, 506–507. *See also* Teams
- Test tools. *See also* Toolkits
- API-layer functional, 168–170
 - exploratory testing, 210–211
 - generating test data with, 212
 - GUI tests, 170–176
 - home-brewed, 175
 - home-grown, 314
 - IDEs, 124–126
 - performance testing, 234–235
 - security testing, 225
 - unit-level tests, 126–127, 165–168
 - web service tests, 170

Test types

- alpha/beta, 466–467
- exploratory. *See* Exploratory testing (ET)
- functional. *See* Functional testing
- GUI. *See* GUI testing
- integration, 229, 459
- load. *See* Load testing
- performance. *See* Performance and load testing
- reliability, 230–231, 250–251
- security, 220, 223–227
- stress. *See* Load testing
- unit. *See* Unit testing
- usability. *See* Usability testing
- user acceptance testing. *See* UAT (user acceptance testing)

Test writing strategy. *See* Strategy, for writing tests

Testability, 183–185

- automated vs. manual Quadrant 2 tests, 185
- automation and, 149–150
- code design and test design and, 184–185
- overview of, 183
- of stories, 393–396

Testers

- adding value, 12
- agile testers, 4, 19–20
- agile testing mindset, 20–21
- automation allowing focus on more important work, 260
- collaboration with customers, 396–397
- considering all viewpoints during iteration planning, 386–389
- controlling workload and, 393
- definition, 507
- facilitating communication, 429–430
- feedback and, 486
- hiring agile tester, 67–69
- how to influence testing, 121–122
- integration of testers into agile project, 61–63
- iterations and, 327
- making job easier, 114–115
- sizing stories, 333–334

tester-developer ratio, 66–67

writing task cards and, 391

Tester's bill of rights, 49–50

Testing

- coding and testing simultaneously, 409–410
- completing testing tasks, 415–416
- identifying variations, 410
- managing, 320–322
- organizing test results, 322–324
- organizing tests, 319–322
- planning time for, 455–456
- post-development cycles, 467–468
- quadrants. *See* Quadrants
- release candidates, 458
- risk assessment and, 407–409
- sustainable pace of, 40–41
- traditional vs. agile, 12–15
- transparency of tests, 321–322

Testing in context

- context-driven testing and, 106–108
- definition, 502

TestNG GUI test tool, 127

Tests that never fail, 286

Text matrices, 350–353

The Grinder, 234

Themes. *See also* Release planning

- definition, 507
- prioritizing stories and, 339
- writing task cards and, 392

Thin slices, incremental development and, 338

Third parties

- compatibility testing and, 230
- release planning and, 342–344
- software, 163

Tholfsen, Mike, 203

Thomas, Mike, 116, 194

Three little pigs metaphor, 278

Timelines, scope and, 340–341

Toolkit (Quadrant 1)

- build tools, 126
- IDEs, 124–126
- overview of, 123
- source code control, 123–124
- unit test tools, 126–127

Toolkit (Quadrant 2)

- API-layer functional test tools, 168–170
- automation tools, 164–165
- building tests incrementally, 178–179
- checklists, 156
- flow diagrams, 160–163
- GUI test tools, 170–176
- keep the tests passing, 179
- mind maps, 156–158
- mock-ups, 160
- software-based tools, 163
- spreadsheets, 159
- strategies for writing tests, 177–178
- test design patterns, 179–183
- test management, 186
- testability and, 183–185
- tool strategy, 153–155
- tools for eliciting examples and requirements, 155–156
- unit-level test tools, 165–168
- Web service test tool, 170

Toolkit (Quadrant 3)

- emulator tools, 213–214
- monitoring tools, 212–213
- simulator tools, 213
- user acceptance testing, 250

Toolkit (Quadrant 4)

- baselines, 235–237
- performance and load testing tools, 234–235

Tools

- API-layer functional test tools, 168–170
- automation, 164–165
- data generation, 304–305
- defect tracking, 83–85
- eliciting examples and requirements, 155–156, 159–163
- emulator tools, 213–214
- exploratory testing, 210–211
- generating test data, 212
- GUI test tools, 170–176
- home-brewed, 175
- home-grown, 314
- IDEs, 124–126
- load testing, 234–235

monitoring, 212–213

open source, 172, 314–315

performance testing, 234–235

for product owners and business experts, 134

security testing, 225

simulators, 213

software-based, 163

unit-level tests, 126–127, 165–168

vendor/commercial, 315–316

web service test tool, 170

Tools, automation

agile-friendly, 316

applying one tool at a time, 312–313

home-brewed, 175

home-grown, 314

identifying tool requirements, 311–312

open source, 314–315

selecting, 294–298

vendors, 315–316

Traceability

DTS and, 82

matrices, 86

test planning and, 88

Tracking, test tasks and status, 354–357**Traditional processes, transitioning. *See***

Transitioning traditional processes to agile

Traditional teams, 9–10**Traditional vs. agile testing, 12–15****Training**

as deliverable, 469

lack of, 45

Transitioning traditional processes to agile, 73–93

defect tracking. *See* Defect tracking

existing process and, 88–92

lean measurements, 74–75

lightweight processes and, 73–74

metrics and, 74–79

overview of, 73

test planning. *See* Test planning

U**UAT (user acceptance testing)**

post-development testing cycles, 467–468

product delivery and, 464–466

- UAT (user acceptance testing), *continued*
 - in Quadrant 3, 102
 - release planning for, 331, 346
 - Remote Data Monitoring system example, 250
 - in test plan, 351
 - trying out new features and, 102
 - writing at iteration kickoff meeting, 372
- UI (user interface). *See also* GUI (graphical user interface)
 - automation strategy and, 293
 - modeling and, 399
- Unit test tools, 165–168. *See also* by individual unit tools
 - behavior-driven development tools, 166–168
 - list of, 126–127
 - overview of, 165
- Unit testing
 - automating, 282
 - BDD (Behavior-driven development), 165–168
 - definition, 507
 - metrics and, 76
 - supporting function of, 5
 - TDD (test-driven development) and, 111
 - technology-facing tests, 120
 - tools for Quadrant 1 tests, 126–127
- Usability testing, 202–204
 - checking out applications of competitors, 204
 - navigation and, 204
 - overview of, 202
 - users needs and persona testing, 202–204
 - what should not be automated, 285–286
- Use cases, 398
- User acceptance testing. *See* UAT (user acceptance testing)
- User documentation, 207–208
- User interface (UI). *See also* GUI (graphical user interface)
 - automation strategy and, 293
 - modeling and, 399
 - User story. *See* Story
 - User story card. *See* Story card
- User Stories Applied for Agile Software Development* (Cohn), 155
- V**
- Vaage, Carol, 330
- Value
 - adding, 31–33
 - delivering to customer, 22–23
 - focusing on, 341–342
 - testers adding, 12
- Values, agile, 3–4. *See also* Principles, for agile testers
- Variations, coding and testing and, 410
- Velocity
 - automation and, 255, 484
 - burnout rate and, 79
 - database impact on, 228
 - defects and, 487
 - definition, 507
 - maximizing, 370
 - sustainable pace of testing and, 41
 - taking time to do it right, 301
 - technical debt and, 106, 313, 418, 506
- Vendors
 - automation tools, 315–316
 - capture-playback tool, 267
 - IDEs, 125
 - planning and, 342–344
 - source code control tools, 124
 - working with, 142, 349
- Veragen, Pierre, 76, 163, 179, 295, 363, 372, 444
- Version control, 123–124, 186. *See also* Source Code Control
- Viewpoints. *See also* Big picture
 - considering all viewpoints during iteration planning, 385–389
 - gathering all viewpoints regarding requirements, 374–375
 - Power of Three and, 411
 - using multiple viewpoints in eliciting requirement, 137–138
- Visibility, 354–366
 - code coverage, 360–364
 - communicating test results, 357–358
 - defect metrics, 364–366
 - number of passing tests, 358–360

overview of, 354
release metrics, 358
tracking test tasks and status, 354–357

Visual Studio, 125

Voris, John, 117

W

Waterfall approach, to development
agile development compared with, 12–13
mini-waterfall phenomenon, 46–47
successes of, 112
test plans and, 346

Watir (Web Application Testing in Ruby), 163,
172–174, 320. *See also* Ruby with Watir

Web Services Description Language (WSDL),
507

Web service testing
automating, 282
overview of, 207
Remote Data Monitoring system example,
247–248
tools for, 170–171

WebLoad, 234

Whelan, Declan, 321

Whiteboards
example-driven development, 379
facilitating communication, 430
modeling, 399
planning diagram, 371
reviewing high-level tests with programmers,
400–401

test plan alternatives, 353–354

Whole team approach, 325
advantages of, 26
agile vs. traditional development, 15–16
automation strategy and, 300–301
budget limits and, 55
finding enjoyment in work and, 31
key success factors, 482, 491
pairing testers with programmers, 279

shared responsibility and, 105–106
team building and, 69
team structure and, 59–62
to test automation, 270
test management and, 322
traditional cross-functional team compared
with, 64
value of team members and, 70

Wiki

as communication tool, 164
graphical documentation of examples,
398–399

mockups, 160, 380
requirements, 402
story checklists and, 156
test cases, 372
traceability and, 88

Wilson-Welsh, Patrick, 278

Wizard of Oz Testing, 138–139

Workflow diagrams, 398

Working Effectively With Legacy Code (Feathers),
117, 288

Workload, 393

Worst-case scenarios, 136, 334

Writing tests, strategy for. *See* Strategy, for
writing tests

WSDL (Web Services Description Language),
507

X

XP (Extreme Programming)
agile team embracing, 10–11
courage as core value in, 25
xUnit, 126–127

Y

Yakich, Joe, 316

Z

Zero bug tolerance, 79, 418–419