The Addison Wesley Signature Series

A Mike Cohn Signature Book

More Agile Testing

Learning Journeys for the Whole Team

Janet Gregory
Lisa Crispin

Forewords by Elisabeth Hendrickson and Johanna Rothman

Praise for *More Agile Testing*

"I love this book. It will help to create really great testers. That's a good thing, since anyone who reads this will want to have one on their team."

—Liz Keogh, agile coach, Lunivore Limited

"This book will change your thinking and move your focus from *tests* to *testing*. Yes, it is not about the result, but about the activity!"

—Kenji Hiranabe, cofounder of Astah and CEO, Change Vision, Inc.

"To my mind, agile development is about learning—that one word captures the true spirit of what agile is all about. When I had the chance to read through their new book, I could only say, 'Wow! Janet and Lisa have done themselves proud.' This is not a book about testing; this is a book about learning. Their clear explanations are accompanied by great true stories and an impressive list of books, articles, and other resources. Those of us who like learning, who love to dig for more information, can rejoice! I know you're always looking for something interesting and useful; I can guarantee that you will find it here!"

—Linda Rising, coauthor of Fearless Change: Patterns for Introducing New Ideas

"Janet and Lisa's first book, *Agile Testing*, drew some general principles that are still important today but left me wondering, 'how?' In this second book, they adapt those principles to today's development landscape—with mobile, DevOps, and cloud-based applications delivered in increasingly compressed release cycles. Readers get specific testing tools for the mind along with new practices and commentary to accelerate learning. Read it today."

—Matt Heusser, Managing Principal, Excelon Development

"An excellent guide for your team's agile journey, full of resources to help you with every kind of testing challenge you might meet along the way. Janet and Lisa share a wealth of experience with personal stories about how they helped agile teams figure out how to get value from testing. I really like how the book is filled with techniques explained by leading industry practitioners who've pioneered them in their own organizations."

—Rachel Davies, agile coach, unruly and coauthor of Agile Coaching

"Let me net this out for you: agile quality and testing is hard to get right. It's nuanced, context-based, and not for the faint of heart. In order to effectively balance it, you need hard-earned, pragmatic, real-world advice. This book has it—not only from Janet and Lisa, but also from forty additional expert agile practitioners. Get it and learn how to effectively drive quality into your agile products and across your entire organization."

—Bob Galen, Principal Consultant, R Galen Consulting Group, and Author of Agile Reflections *and* Scrum Product Ownership

“Janet and Lisa have done it again. They’ve combined pragmatic life experience with ample storytelling to help people take their agile testing to the next level.”

—*Jonathan Rasmusson, author of* Agile Samurai: How Masters Deliver Great Software

“In this sequel to their excellent first book, Janet and Lisa have embraced the maturity of agile adoption and the variety of domains in which agile approaches are now being applied. In *More Agile Testing* they have distilled the experiences of experts working in different agile organizations and combined them with their own insights into a set of invaluable lessons for agile practitioners. Structured around a range of essential areas for software professionals to consider, the book examines what we have learned about applying agile, as its popularity has grown, and about software testing in the process. There is something for everyone here, not only software testers, but individuals in any business role or domain with an interest in delivering quality in an agile context.”

—*Adam Knight, Director of QA, RainStor*

“This book has it all: practical advice and stories from the trenches. Whether you’ve never heard of agile or you think you’re an expert, there is something here that will help you out. Jump around in the book and try a few things; I promise you will be a better tester and developer for it.”

—*Samantha Laing, agile coach and trainer, Growing Agile*

“*More Agile Testing* is a great collection of stories and ideas that can help you improve not just how you test, but the products you build and the way you work. What I love most about the book is how easy many of the ideas are to try. If one message is clear, it is that regardless of your context and challenges, there are things you can try to improve. Get started today with something small, and nothing will be impossible.”

—*Karen Greaves, agile coach and trainer, Growing Agile*

“*More Agile Testing* is an extensive compilation of experiences, stories, and examples from practitioners who work with testing in agile environments around the world. It covers a broad spectrum, from organizational and hiring challenges, test techniques and practices, to automation guidance. The diversity of the content makes it a great cookbook for anyone in software development who is passionate about improving their work and wants to produce quality software.”

—*Sigurdur Birgisson, quality assistance engineer, Atlassian*

More Agile Testing

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Learning Journeys for the Whole Team

Janet Gregory
Lisa Crispin

Addison-Wesley

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To my grandchildren, Lauren, Brayden, and Joe, who kept me laughing and playing throughout this past year.

—Janet

To my family, those still here and those sadly gone, and my dear friends who are part of my chosen family.

—Lisa

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Foreword

By Elisabeth Hendrickson

Just ten years ago, agile was still considered radical. Fringe. Weird. The standard approach to delivering software involved phases: analyze, then design, then code, then test. Integration and testing happened only at the end of the cycle. The full development cycle took months or years.

If you have never worked in an organization with long cycles and discrete phases, the idea may seem a little weird now, but it was the standard a decade ago.

Back when phases were the norm and agile was still new, the agile community was mostly programmer-centric. Janet and Lisa and a few others from quality and testing were there. However, many in the agile community felt that QA had become irrelevant. They were wrong, of course. QA changed, reshaped to fit the new context, but it did not go away.

It took people like Janet and Lisa to show how QA could be integrated into agile teams instead of bypassed. Their first book together, *Agile Testing*, carefully explained the whole-team approach to quality. They covered the cultural changes needed to fully integrate testing with development. They explained how to overcome barriers. It's a fantastic book, and I highly recommend it.

However, questions remained. How could the practices be adapted to various contexts? How do you start? What should testers learn in order to be more effective?

This book picks up where *Agile Testing* left off and answers those questions and more.

Even if that were all this book did, it would be an excellent sequel.

It’s more than that, though. Within these pages you will find a theme—one that Janet and Lisa have woven so deftly throughout the text you might not even realize it as you are reading. So I am going to call your attention to it: this is a book about adapting.

Reflect-and-adapt is the one simple trick that can enable your organization to find its way to agile. Experiment, try something different, distill lessons learned, repeat. The next thing you know, your organization will be nimble and flexible, able to shift with market demands and deliver incrementally.

This book teaches you about adapting even as it is teaching you about agile testing.

Part II, “Learning for Better Testing,” isn’t just about how you learn as an individual but also about building a learning culture. Part VII, “What Is Your Context?,” isn’t just about variations in agile tailored to different situations; it’s also a field guide to various types of adaptations.

The world is changing so very quickly. Just a decade ago agile was weird; now it is mainstream. Just five years ago, tablets like iPads weren’t even on the market; now they’re everywhere. Practices, tools, technology, and markets are all changing so fast it’s hard to keep up. It’s not enough to learn one way of doing things; you need to know how to discover new ways. You need to adapt.

This book is a fantastic resource for agile testing. It will also help you learn to adapt and be comfortable with change.

I hope you enjoy it as much as I did.

Foreword

By Johanna Rothman

What do testers do? They provide information about the product under test, to expose risks for the team.

That's exactly what Janet Gregory and Lisa Crispin have done in their new book, *More Agile Testing: Learning Journeys for the Whole Team*. Do you have risks in your agility? There are plenty of ideas to help you understand the value of sustainable pace, creating a learning organization, and your role in testing.

Not sure how to test for a given product, on a single team, or in a program? There's an answer for that, too.

How do you work with people in the next cube, down the hall, and across the world? Janet and Lisa have been there and done that. Their focus on roles and not titles is particularly helpful.

There are plenty of images in this book, so you won't have to wonder, "What do they mean?" They show you, not just tell you.

More Agile Testing: Learning Journeys for the Whole Team is much more than a book about testing. It's a book about how to use testing to help your entire team, and by extension, your organization, and transition to agile in a healthy way.

Isn't that what providing information about the organization under test, exposing risks in the organization, is all about?

If you are a tester or a test manager, you need to read this book. If you integrate testing into your organization, you need to read this book. How else will you know what the testers could be doing?

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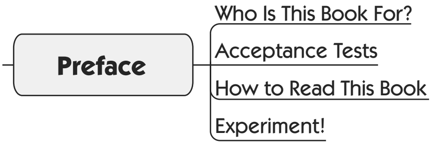
Preface



This book carries on where our first book, *Agile Testing: A Practical Guide for Testers and Agile Teams*, left off. We avoid repeating what we covered in our first book but give enough context so it stands alone if you have not read *Agile Testing*. We refer to the first book as *Agile Testing* when we think it might be helpful for the reader to explore basic concepts in more detail.

Who Is This Book For?

We assume that you, the reader, are not a beginner in the world of agile testing, that you have some agile and testing experience and now you're looking for help in the areas beyond where *Agile Testing* goes. If you feel that you would like an introduction to agile development that includes some basics of testing in agile before you read this book, *The Agile Samurai* (Rasmussen, 2010) is an excellent place to start.

This book is aimed at anyone who is interested in testing activities on an agile team. In our experience, this includes not only testers and test managers, but programmers, product owners, business analysts, DevOps practitioners, line managers—pretty much everyone.

Acceptance Tests

In addition to sharing what we've learned over the past several years, we wanted to make this book as useful to our readers as the first one. We wanted to know what readers of the first book still needed to know after reading it, so we asked practitioners from the *Agile Testing* mailing list to send us their "acceptance tests" for this second book. We distilled those responses to this list of acceptance tests for *More Agile Testing* and did our best to satisfy these as we wrote the book.

You'll note that we've used a style used in behavior-driven development (BDD), which we'll talk more about in Chapter 11, "Getting Examples":

> Given <precondition>,
>
> When <trigger, action>,
>
> Then <the expected result>.

- Given that I am an agile tester or manager, when I hire new testers with no agile experience, then I'll learn how to bring them up to speed and avoid throwing them into the deep end without a life jacket.
- Given that I am a team member on an agile team, when I finish this book, then I expect to know how to fit exploratory testing in with automated tests and to get a picture of the overall test coverage, without resorting to heavyweight tools.
- Given that I am an experienced agile test manager, when I finish this book, then I will understand how to approach agile testing techniques with multiple teams to allow my successful agile organization to grow.
- Given that I am an experienced agile test manager, when I finish reading this book, then I should have ideas about how to coordinate test automation activities across iterations and teams, with ideas on how to improve.
- Given that I am an experienced agile manager, when I've read this book, then I will understand how other teams have adapted agile testing practices to suit their own context and will have ideas about how to apply them to mine.
- Given that I am an agile team member who is interested in testing, when I finish this book, then I expect to have examples of what tests should and should not look like and how I can design tests effectively.

- Given that I am an experienced agile tester, when I find an interesting topic in this book about which I'd like to learn more, then I can easily find references to web resources or other books.
- Given that I am an experienced agile coach or manager who is reading the book, when I see a concept that would help my team, then I have enough information to be able to devise a strategy to get the team to try an experiment.
- Given that I am an agile team member who is concerned about testing and keeping the customers informed, when I have read this book, then I'll understand good ways to communicate with customer team members about testing activities.
- Given that I am an experienced agile test manager, when I have read this book, then I will know how mainstream adoption of agile is being done, and I will understand the working context of testers from other organizations when they apply for jobs on my team. (*Note:* This acceptance test is not part of this release, but we think some of the examples and stories in the book will help to achieve it.)

How to Read This Book

Though we've organized this book in a way that we feel flows best, you don't have to start with Chapter 1 and keep going. As with *Agile Testing*, you can begin with whatever topics are most useful to you. We try to cover each topic in detail only once, but because so many of these concepts, practices, and principles are interrelated, you'll find that we refer to some ideas in more than one chapter.

Part I: Introduction

Read this part to understand where testing started in agile teams and how it has evolved to become the cornerstone of agile development and continuous delivery of products. Part of successful agile development is an organization's ability to learn what's most critical for long-range success with agile testing.

- Chapter 1, "How Agile Testing Has Evolved"
- Chapter 2, "The Importance of Organizational Culture"

Part II: Learning for Better Testing

Both technology and the craft of testing are continually evolving, and lines between different disciplines are becoming more blurred. Even experienced practitioners have to keep growing their skills. This part includes examples of what testers and other disciplines such as business analysis and coding need to know to meet more difficult testing challenges. We explain the benefits of generalizing specialists and list some of the intangible thinking skills and specific technical testing skills that help testers and teams improve. Different aspects of what and how to learn are covered in the following chapters:

- Chapter 3, "Roles and Competencies"
- Chapter 4, "Thinking Skills for Testing"
- Chapter 5, "Technical Awareness"
- Chapter 6, "How to Learn"

Part III: Planning—So You Don't Forget the Big Picture

Planning "just enough" is a balancing act. While we need to work in small increments, we have to keep an eye on the larger feature set and the entire system. This part covers different aspects of test planning, from the release level down to the task level. It also explores different models such as the agile testing quadrants and some of the adaptations people have suggested.

- Chapter 7, "Levels of Precision for Planning"
- Chapter 8, "Using Models to Help Plan"

Part IV: Testing Business Value

If, like so many agile teams, you deliver robust code in a timely manner, only to find it isn't what the customers wanted after all, the information in this part will help. We cover tools and practices, particularly those from the agile business analysis profession, to help you test ideas and assumptions early and ensure that everyone knows what to deliver. We address other overlapping disciplines and expanding mindsets. This is a big area, so there are several chapters:

- Chapter 9, "Are We Building the Right Thing?"
- Chapter 10, "The Expanding Tester's Mindset: Is This *My* Job?"
- Chapter 11, "Getting Examples"

Part V: Investigative Testing

The programmers have delivered some code to test. Where do you start? If you or your team lacks experience with exploratory testing, you'll find some help here. We outline several exploratory testing techniques such as using personas and tours to help generate test charter ideas, as well as managing charters with session-based test management and thread-based test management.

Along with all those different ways to do exploratory testing, we look at other ways to verify that delivered code meets a wide range of business and user needs. This part covers ways to mitigate risks and generate useful information in several different types of testing that present challenges to agile teams. The investigative testing chapters are

- Chapter 12, "Exploratory Testing"
- Chapter 13, "Other Types of Testing"

Part VI: Test Automation

We see more and more teams finding ways to succeed with test automation. However, for many teams, automated tests produce sporadic failures that are expensive to investigate. The time (cost) spent on each failure may be more than the test is worth. There are plenty of pitfalls in automating tests. In this part we give examples of ways to make technical debt in testing visible. We look at different ways to use the agile testing pyramid effectively to help you think about how to plan your automation. We've introduced a few alternative pyramid models to approach automation from different perspectives. You'll learn ways to design automated tests for optimum reliability and ease of maintenance. This part also includes examples of scaling test automation in a large enterprise company.

The chapters in Part VI are

- Chapter 14, "Technical Debt in Testing"
- Chapter 15, "Pyramids of Automation"
- Chapter 16, "Test Automation Design Patterns and Approaches"
- Chapter 17, "Selecting Test Automation Solutions"

Part VII: What Is Your Context?

Your approach to agile testing will naturally depend on your context. Do you work with large enterprise systems? Maybe you're newly tasked with testing mobile apps or embedded software. Perhaps your team is challenged with finding good ways to test data that helps businesses make decisions. Have you wondered how agile can work in testing regulated software? Finally, we look at the synergies between testing and the DevOps movement. The chapters in this part cover a variety of areas, so we have included a number of stories from people who are currently working in those situations. Some of these chapters may not apply to your working environment today, but tomorrow—who knows?

- Chapter 18, "Agile Testing in the Enterprise"
- Chapter 19, "Agile Testing on Distributed Teams"
- Chapter 20, "Agile Testing for Mobile and Embedded Systems"
- Chapter 21, "Agile Testing in Regulated Environments"
- Chapter 22, "Agile Testing for Data Warehouses and Business Intelligence Systems"
- Chapter 23, "Testing and DevOps"

Part VIII: Agile Testing in Practice

We wrap up the book with a look at how teams can visualize quality and testing, and a summary of agile testing practices that will give your team confidence as you make release decisions. Creating a shared vision for your team is critical to success, and we share a model to help bring testing activities to the whole team. If you're feeling a bit overwhelmed right now and aren't sure where to start, read these chapters first:

- Chapter 24, "Visualize Your Testing"
- Chapter 25, "Putting It All Together"

The book also includes two appendixes: Appendix A, "Page Objects in Practice: Examples," and Appendix B, "Provocation Starters."

Other Elements

Since teams use such a wide variety of agile practices and approaches, we've tried to keep our terminology as generic as possible. To make sure we have a common language with you, we've included a glossary of the terms we use.

You'll find icons in the margins throughout the book where we'd like to draw your attention to a specific practice. You'll find all six icons in Chapter 1, "How Agile Testing Has Evolved," and Chapter 25, "Putting It All Together." An example of the icon for learning can be seen next to following paragraph.

We hope you'll want to learn more about some of the practices, techniques, and tools that we cover. Please check the bibliography for references to books, websites, articles, and blogs. We've sorted it by part so you can find more information easily when you're reading. Sources that are mentioned directly in the book are listed alphabetically in the reference list for easy lookup.

The mind map overview from *Agile Testing* is included on the book website, www.agiletester.com, so that you can get a feel for what was covered there if you haven't already read it.

EXPERIMENT!

Linda Rising encouraged us years ago to try small experiments, evaluate the results, and keep iterating to chip away at problems and achieve goals. If you read something in this book that sounds as if it might be useful for you or your team, give it a try for an iteration or two. Use your retrospectives to see if it's helping, and tweak as necessary. If it doesn't work, you learned something, and you can try something different.

We hope you will find many experiments to try in these pages.

Acknowledgments

This book has been a group effort. Please learn about all the wonderful practitioners who shared their stories as sidebars in "About the Contributors." Many are success stories, some describe lessons learned the hard way, but we know all will benefit you, the reader.

We're extremely grateful to Jennifer Sinclair for her wonderful illustrations. She came up with such creative ideas to help us get across some important concepts.

We referenced the ideas of so many other people who have taken ideas from *Agile Testing*, adapted them to meet their needs, and were willing to share with the world—thank you.

Our tireless reviewers helped us shape the book and cover the right topics. We're especially grateful to Mike Talks, Bernice Niel Ruhland, and Sherry Heinze, who slogged through every chapter, in some cases multiple times. Thanks to Augusto Evangelisti, Gojko Adzic, Adam Knight, Steve Rogalsky, Aldo Rall, Sharon Robson, James Lyndsay, JeanAnn Harrison, Ken Rubin, Geoff Meyer, Adam Yuret, and Mike Cohn for their valuable feedback. Each of our story contributors also helped review the chapters that included their stories.

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We are both fortunate to have worked alongside so many amazing people over the years who taught us so much about delivering valuable software. They are too numerous to name here, but we refer to some in the text and the bibliography. We're lucky to be part of a generous global software community.

Finally, a thank-you to our wonderful, supportive family and friends.

Janet's personal thanks:
Thank you to my husband, Jack, for all the contracts reviewed, suppers prepared, and errands run, and for letting me work long into the evenings. I know I pretty much ignored you again for as long as it took to write this book. Your encouragement kept me going.

Lisa, we complement each other in our writing styles, and I think that is what makes us a great team. Thank you for providing a great place for reviewing our first draft and a chance to meet your donkeys.

And finally, I want to acknowledge the power of wireless capability and the Internet. While writing this book, I traveled north to Helsinki, Finland, and camped in Grande Prairie, Canada. I was south to Johannesburg in South Africa and camped in Botswana and Zimbabwe, writing between watching lions and elephants. As well I was in Australia, although I did not test wireless in the outback there. I even was as high as 3,000 meters (~10,000 feet) in Peru. There were only a few places where I could not connect at all. This writing was truly a distributed team effort.

Lisa's personal thanks:
Thanks to my husband, Bob Downing, without whose support I could never write or present anything. He never guessed that one day he'd be out mucking a donkey pen while I slaved over a keyboard. He has kept me and all our pets well fed and well loved. You're still the bee's knees, my dear!

Thank you, Janet, for keeping us on track and doing so much of the heavy lifting to get us organized, writing, and coming up with so many great visuals. Working with you is always a privilege, a learning experience, and a lot of fun. And I also thank Janet's husband, Jack, for his help with the fine print and for enabling Janet to share all this fun and hard work with me!

If readers learn a fraction of what I've learned while writing this book, I'll consider it a success!

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About the Authors

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Matt Barcomb is passionate about cultivating sustainably adaptive organizations, enjoys being out-of-doors, loves puns, and thrives on guiding companies toward more rewarding and productive self-organizing cultures. Matt has done this in his roles as a product development executive, organizational design consultant, agile coach, development team manager, and programmer. He believes that evolving companies to customer-focused humanistic systems is the biggest challenge facing businesses today. As such, he has dedicated an inordinate amount of his time and energy to finding ways of helping organizations become better places to work.

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Jon Hagar is an independent consultant working in software product integrity, verification, and validation testing at Grand Software Testing. Jon publishes regularly, including a book on mobile/embedded software testing: *Software Test Attacks to Break Mobile and Embedded Devices* (Hagar, 2013). His interests include agile, mobile, embedded, QA, skill building, and lifelong learning.

Parimala Hariprasad spent her youth studying people and philosophy. By the time she got to work, she was able to use those learnings to create awesome testers. She has worked as a tester for over ten years for domains such as customer relationship management, security, e-commerce, and health care. Her specialty is coaching and creating great teams—teams that ultimately fired her because she wasn't needed anymore. She has experienced the transition from web to mobile and emphasizes the need for design thinking in testing. She frequently rants on her blog, Curious Tester (http://curioustester.blogspot.com). She tweets at @CuriousTester and can be found on LinkedIn at http://in.linkedin.com/in/parimalahariprasad.

JeanAnn Harrison has been in the software testing and quality assurance field for over fifteen years, including seven years working within a regulatory environment and eight years performing mobile software testing. Her niche is system integration testing with a focus on multitiered system environments involving client/server, web application, and stand-alone software applications. JeanAnn is a regular speaker at many software testing conferences and other events and is a Weekend Testing Americas facilitator. She is always looking to gain inspiration from fellow testers throughout the software testing community and continues to combine her practical experiences with interacting on software quality and testing forums, attending training classes, and remaining active on social media sites.

Mike Heinrich has been working as a tester for over a decade, working in logistics, banking, telecommunications, travel, and utilities. Throughout his career, Mike has focused on data and integration testing. His passion for data and delivering customer value has afforded him the opportunity to present to a number of North American organizations on agile data warehousing and data testing. In his free time, Mike enjoys traveling the world, playing volleyball, and coaching basketball.

Sherry Heinze is a test strategist, tester, QA analyst, and trainer with a broad background in analysis, design, testing, training, implementation, documentation, and user support. For the last 17 years, Sherry has focused on testing from analysis and design forward, sometimes on cross-functional teams, sometimes with teams of testers, sometimes alone. Sherry has extensive experience working in various methodologies with both users and technical staff to identify and test requirements, design, create, test, implement, and support systems.

Matthew Heusser has spent his adult life developing, testing, and managing software projects. Along the way Matt served as a contributing editor for *Software Test & Quality Assurance* magazine, organized the Agile Alliance Sponsored Workshop on Technical Debt, and served on the board of directors for the Association for Software Testing. Perhaps best known for his writing, Matt was the lead editor for *How to Reduce the Cost of Software Testing* (Heusser, 2011) and is currently serving as managing editor for Stickyminds.com. As the managing consultant at Excelon Development, Matt manages key accounts for the company while also doing consulting and writing. You can read more about Matt at the Excelon website, www.xndev.com, or follow him on Twitter: @ heusser.

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Stephan Kämper studied physics, wrote his diploma thesis about holography, and then joined the oceanography group at the University of Bremen. In 2001 he started in software development by joining the test team for an object-oriented database system. He never left software testing and specialized in automated software tests and agile methods. He worked on topics as diverse as precision navigation systems, payment platforms, health care systems, telecommunication, and social networks. Working in these different fields helped him recognize common patterns, which he found useful in software testing. His languages are (in alphabetical order) English, German, and Ruby. Follow him on Twitter at @S_2K, and see his website: www.seasidetesting.com.

Trish Khoo has worked in test engineering and test management for companies such as Google, Campaign Monitor, and Microsoft. She maintains a blog at www.trishkhoo.com and a podcast at testcast.net, enjoys speaking at conferences, and writes articles for technical publications. When she's not doing all of that, she's busy traveling the world, sketching robots, or maybe just sleeping until noon. Trish earned a bachelor's degree in information technology from the University of Queensland, where she graduated with honors.

Adam Knight has been testing data storage and analysis software for ten years, with seven of those spent working in an agile team. Adam is an enthusiastic exponent of exploratory testing approaches backed by discerning use of automation. He is a great believer in creating multi-skilled teams based on rich and unique individual skill sets. At his current employer, RainStor, Adam has overseen the testing and technical support of a large-scale data storage system from its initial release through successful adoption in some of the largest telecommunication and financial services companies in the world. He writes at www.a-sisyphean-task.com.

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Drew McKinney is a user experience designer with Pivotal Tracker and Pivotal Labs. Before Pivotal, Drew ran Bloomingsoft, a mobile design and development consultancy. In the past Drew has worked with companies such as Disney Animation Studios, Audi USA, Cook Medical, and Deloitte Consulting. He is an active member of the design community and has spoken about design at numerous Indiana and Colorado technology events.

Geoff Meyer, a test architect in the Dell Enterprise Solutions Group, has over twenty-eight years of software industry experience as a developer, manager, business analyst, and test architect. Since 2010, a secondary focus of Geoff's has been fostering the agile-based software development and test practices of more than eight hundred development, test, and user experience engineers across four global design centers. Geoff is an active member and contributor to the Agile Austin community.

Jeff "Cheezy" Morgan, chief technology officer and a cofounder of LeanDog, has been teaching classes and coaching teams on agile and lean techniques since early 2004. Most of his work has focused on the engineering practices used by developers and testers. For the past few years he has experienced great success and recognition for his work focused on helping teams adopt acceptance-test-driven development using Cucumber. He has authored several popular Ruby gems used by software testers and is the author of the book *Cucumber & Cheese—A Testers Workshop* (Morgan, 2013).

Claire Moss became the first discrete mathematics business graduate from the Georgia Institute of Technology in 2003 and immediately jumped into software testing. She has been following this calling ever since, working with agile product teams as a testing teacher, unit and integration test adviser, exploratory tester, and test automator. Although she'll always go back to scrapbooking, her dominant hobby in recent years has been writing, speaking, and nerding about testing. Claire has always had a passion for writing, and she continues to use her evil powers for good on the job and on her blog at http://aclairefication.com.

Aldo Rall started off in testing as a junior programmer at the start of the Y2K bubble. Since then, working in South Africa and the UK, he gained practical experience in testing across a plethora of titles, assignments, and projects. His greatest passion lies in the "people" dimension and how that translates into successful products, teams, and testers. Through this background, he enjoys opportunities to develop, grow, and mature testing, testers, and teams.

Sharon Robson is the software testing practice lead for Software Education. A passionate tester and a natural-born trainer, Sharon delivers and develops courses at all levels of software testing from introductory to advanced. Sharon also focuses on agile and spends a significant amount of her time working with teams (training, coaching, and mentoring) to assist them in their transitions. Sharon is currently researching and writing about agile test approaches in various business domains. She presents at both local and international conferences and contributes to the testing and agile community via blogs, tweets, conference involvement, and mentoring.

Steve Rogalsky, recognizing that software development culture, management, and process can be frustrating and inhibiting, has invested significantly in finding ways to overcome and counteract those effects. He's found that valuing simplicity, respect for people, continuous improvement, and short feedback loops are powerful tools for addressing these shortcomings. Since software development doesn't own those frustrations, he's also been translating what he's learned into other areas of the organization, family life, community groups, and coaching. He speaks regularly at conferences in Canada and the United States, has been featured on InfoQ, cofounded the Winnipeg Agile User Group, and works at Protegra. You can read more about what he's learned at http://WinnipegAgilist.Blogspot.com.

Bernice Niel Ruhland, with over twenty years of professional experience encompassing a variety of technical disciplines, currently serves as the director of quality management programs for ValueCentric LLC. Applying her proficiencies in software programming, testing, assessment, and implementation, Bernice leads the company's software testing department. As the driving force behind ValueCentric's company-wide quality programs, she draws upon practices in the context-driven and agile theories and methodologies to guide foundational efforts. When not working, she maintains a successful blog, www.TheTestersEdge.com, a collection of her observations related to a variety of technical topics including software testing, leadership, and career development.

Huib Schoots is a tester, consultant, and people lover. He shares his passion for testing through coaching, training, and giving presentations on a variety of test subjects. Curious and passionate, he is an agile and context-driven tester who attempts to read everything ever published on software testing. He's also a member of TestNet, AST, and ISST; a black belt in the Miagi-Do School of Software Testing; and coauthor of a book about the future of software testing. Huib maintains a blog on www.magnificant.com and tweets as @huibschoots.

Paul Shannon and **Chris O'Dell** joined the 7digital team in 2010 and 2011 respectively, both starting in the team responsible for the 7digital API. They worked on improving the quality of the testing in the API, and Chris now leads that team, concentrating on improving the platform for continuous delivery, resilience, and scaling. Paul works across all teams in the 7digital technology team that are geared toward continuous improvement and quality-driven software development practices. The team follows a test-first approach with a highly collaborative and visible workflow, and all absolutely love technology and testing.

Jennifer Sinclair has been an artist, art instructor, and educator since 1995. During that time, she has lived in Canada, Japan, and the United States and has worked to improve art exploration for children and adults of all ages and abilities. She has designed and illustrated images for the Alberta Teachers' Association Early Childhood Education Council and the Alberta Education Council in Canada. She is currently working on developing art lessons that integrate easily into the core subjects of elementary education. As a homemaker, freelance artist, and volunteer art instructor, she is passionate about continuing to develop her skills and knowledge and share them with as many people as possible. You can reach her at jvaagesinclair@live.com.

Toby Sinclair joined the software testing business as a university graduate in 2007 and hasn't looked back. He has worked for various software testing consultancies in the UK and is currently working with J. P. Morgan to advance its testing capabilities to support the transition to agile. Toby is an active member of the testing community and can be found on Twitter: @TobyTheTester.

Tony Sweets is a 20-year veteran of the software industry, currently working as an information technology architect. For the past 13 years he has been working on Java enterprise web applications in the financial sector. Tony possesses a wide range of skills but likes to work mostly on Java applications and the tools that make the development process better. Tony holds a bachelor's degree in computer science from the University of Wyoming.

Mike Talks was 26 when he first gave IT "a go" as a career. Before that, he'd been a teacher, research scientist, and data analyst, and his parents worried he'd never "get a proper job." Although originally a programmer, it was in testing where he flourished. He originally worked on long, requirements-rich military waterfall projects in the UK, but since moving to New Zealand he's found himself increasingly working on projects with companies such as Assurity, Kiwibank, and Datacom, where timely delivery is a key factor.

Eveliina Vuolli acts currently as operational development manager in Nokia Solutions and Networks. She has been working with the network management system R&D development team for 15 years, acting in different kinds of roles in the global, multinational organization: integration and verification process owner, project manager and trainer in various areas, and also coach. In addition, she has been involved in the agile transformation in her own product area.

Pete Walen has been in software development for over twenty-five years. He has worked in a variety of roles including developer, business analyst, and project manager. He is an independent consulting contractor who works with test teams over extended periods, coaching them and working to improve their testing techniques and practices. Pete describes himself as a "Software Anthropologist and Tester," which encompasses the examination of how software and people relate and interact. He has worked in a variety of shops using a variety of development methodologies and has adopted an attitude of "do what makes sense" for the organization and the project.

Mary Walshe helps teams deliver successful solutions to business problems and plays a major role in striving for a kaizen culture in these teams. Mary was the driving force behind the introduction of acceptance-test-driven development in her department. She has been working in the industry for four years, and currently she works on a team in Paddy Power as an agile tester. Her team is using kanban to help them measure their experiments and in order to continually improve. In her spare time Mary runs adventure races, mountain bikes, and just recently found a new love for skiing.

Christin Wiedemann, after finishing her Ph.D. in physics at Stockholm University in 2007, began working as a software developer. Christin soon discovered that she found testing to be more challenging and creative, and she joined the testing company AddQ Consulting. There, she worked as a tester, test lead, and trainer, giving courses on agile testing, test design, and exploratory testing. In late 2011, Christin moved to Vancouver, Canada, joining Professional Quality Assurance. In her roles as tester, test lead, trainer, and speaker, Christin uses her scientific background and pedagogic abilities to continually develop her own skills and those of others.

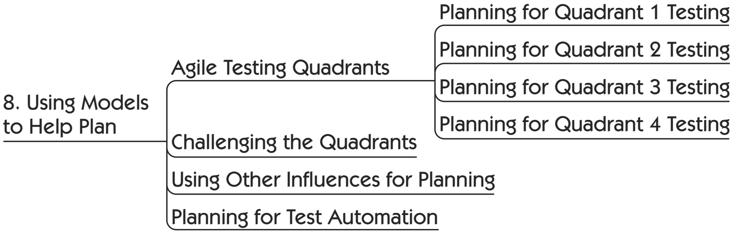
Lynn Winterboer, with a proven background in a variety of data projects and agile practices, teaches and coaches data warehouse/business intelligence teams on how to effectively apply agile principles and practices to their work. For more than fifteen years, Lynn has served in numerous roles within the analytics, business intelligence, and data warehousing space. She very well understands the unique set of challenges faced by teams in this area that want to benefit from the incremental style of agile development; Lynn leverages her experience and training to help deliver practical solutions for her clients and students. Lynn can be reached at www.LynnWinterboer.com.

Cirilo Wortel is an independent tester and trainer from the Netherlands. In 2006 Cirilo first got involved in agile software development. He has worked with several enterprise companies, coaching and helping to implement test automation during their agile adoption. Cirilo cohosted, with Janet Gregory, a master class in agile testing for several years in the Netherlands. He has contributed back to the community by founding the Federation of Agile Testers, the largest agile testing user group in the Netherlands, and is a frequent speaker at international conferences. With several colleagues at Xebia, Cirilo developed Xebium, an automation tool for web applications.

Alexei Zheglov is dedicated to discovering and practicing new methods of managing and leading the improvement of modern, complex, knowledge-intensive work. He came to this after a long software engineering career, during which he learned to see and to solve many problems in software delivery. Alexei presents his findings frequently at conferences in Canada and abroad. He is recognized as a Kanban Coaching Professional and an Accredited Kanban Trainer. Alexei lives in Waterloo, Ontario, Canada. His blog can be found at http://connected-knowledge.com.

Chapter 8

Using Models to Help Plan


8. Using Models to Help Plan
Agile Testing Quadrants
Planning for Quadrant 1 Testing
Planning for Quadrant 2 Testing
Planning for Quadrant 3 Testing
Planning for Quadrant 4 Testing
Challenging the Quadrants
Using Other Influences for Planning
Planning for Test Automation

As agile development becomes increasingly mainstream, there are established techniques that experienced practitioners use to help plan testing activities in agile projects, although less experienced teams sometimes misunderstand or misuse these useful approaches. Also, the advances in test tools and frameworks have somewhat altered the original models that applied back in the early 2000s. Models help us view testing from different perspectives. Let's look at some foundations of agile test planning and how they are evolving.

Agile Testing Quadrants

The agile testing quadrants (the Quadrants) are based on a matrix Brian Marick developed in 2003 to describe types of tests used in Extreme Programming (XP) projects (Marick, 2003). We've found the Quadrants to be quite handy over the years as we plan at different levels of precision. Some people have misunderstood the purpose of the Quadrants. For example, they may see them as sequential activities instead of a taxonomy of testing types. Other people disagree about which testing activities belong in which quadrant and avoid using the Quadrants altogether. We'd like to clear up these misconceptions.

Figure 8-1 is the picture we currently use to explain this model. You'll notice we've changed some of the wording since we presented it in *Agile*

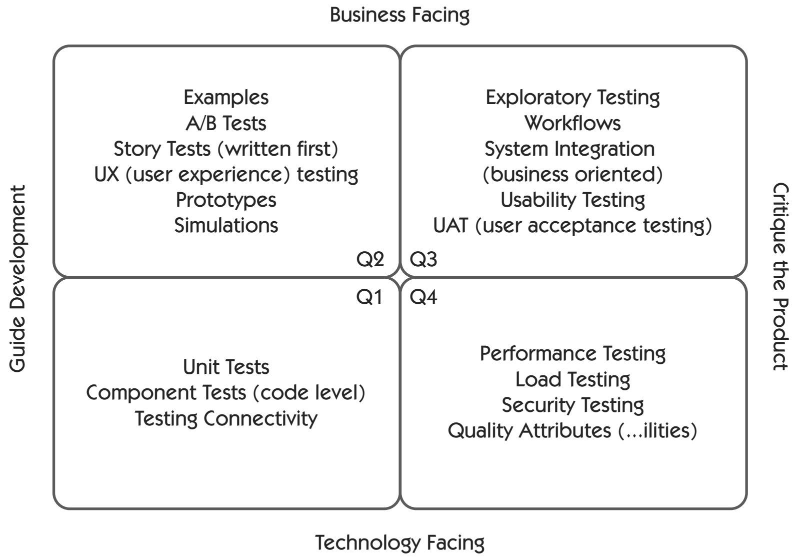


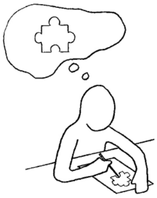
Figure 8-1 Agile testing quadrants

Testing. For example, we now say "guide development" instead of "support development." We hope this makes it clearer.

It's important to understand the purpose behind the Quadrants and the terminology used to convey their concepts. The quadrant numbering system does *not* imply any order. You don't work through the quadrants from 1 to 4, in a sequential manner. It's an arbitrary numbering system so that when we talk about the Quadrants, we can say "Q1" instead of "technology-facing tests that guide development." The quadrants are

- **Q1:** technology-facing tests that guide development
- **Q2:** business-facing tests that guide development
- **Q3:** business-facing tests that critique (evaluate) the product
- **Q4:** technology-facing tests that critique (evaluate) the product

The left side of the quadrant matrix is about preventing defects before and during coding. The right side is about finding defects and discovering missing features, but with the understanding that we want to find them as fast as possible. The top half is about exposing tests to the business, and the bottom half is about tests that are more internal to the team but equally important to the success of the software product. “Facing” simply refers to the language of the tests—for example, performance tests satisfy a business need, but the business would not be able to read the tests; they are concerned with the results.



Most agile teams would start with specifying Q2 tests, because those are where you get the examples that turn into specifications and tests that guide coding. In his 2003 blog posts about the matrix, Brian called Q2 and Q1 tests “checked examples.” He had originally called them “guiding” or “coaching” examples and credits Ward Cunningham for the adjective “checked.” Team members would construct an example of what the code needs to do, check that it doesn’t do it yet, make the code do it, and check that the example is now true (Marick, 2003). We include prototypes and simulations in Q2 because they are small experiments to help us understand an idea or concept.

In some cases it makes more sense to start testing for a new feature using tests from a different quadrant. Lisa has worked on projects where her team used performance tests for a spike for determination of the architecture, because that was the most important quality attribute for the feature. Those tests fall into Q4. If your customers are uncertain about their requirements, you might even do an investigation story and start with exploratory testing (Q3). Consider where the highest risk might be and where testing can add the most value.

Most teams concurrently use testing techniques from all of the quadrants, working in small increments. Write a test (or check) for a small chunk of a story, write the code, and once the test is passing, perhaps automate more tests for it. Once the tests (automated checks) are passing, use exploratory testing to see what was missed. Perform security or load testing, and then add the next small chunk and go through the whole process again.

Michael Hüttermann adds “outside-in, barrier-free, collaborative” to the middle of the quadrants (see Figure 8-2). He uses behavior-driven development (BDD) as an example of barrier-free testing. These tests are written in a natural, ubiquitous “given_when_then” language that’s accessible to customers as well as developers and invites conversation

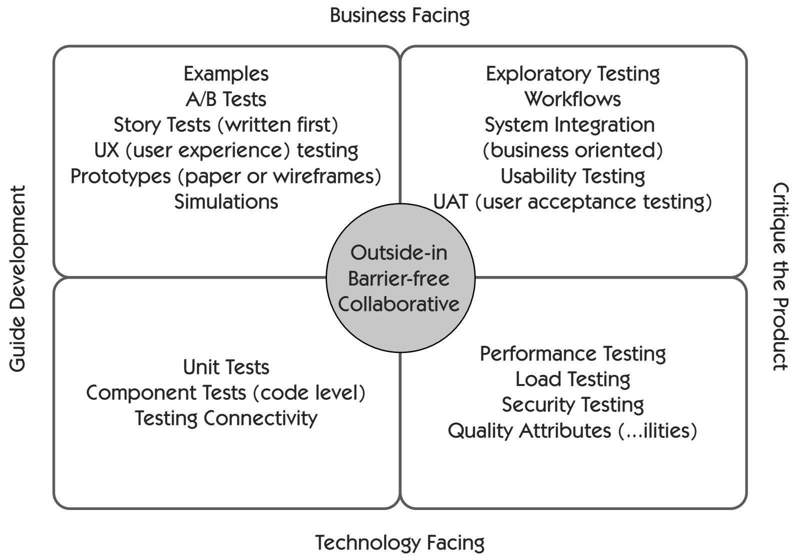


Figure 8-2 Agile testing quadrants (with Michael Hüttermann's adaptation)

between the business and the delivery team. This format can be used for both Q1 and Q2 checking. See Michael's *Agile Record* article (Hüttermann, 2011b) or his book *Agile ALM* (Hüttermann, 2011a) for more ideas on how to augment the Quadrants.

The Quadrants are merely a taxonomy or model to help teams plan their testing and make sure they have all the resources they need to accomplish it. There are no hard-and-fast rules about what goes in which quadrant. Adapt the Quadrants model to show what tests your team needs to consider. Make the testing visible so that your team thinks about testing first as you do your release, feature, and story planning. This visibility exposes the types of tests that are currently being done and the number of people involved. Use it to provoke discussions about testing and which areas you may want to spend more time on.

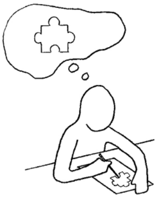
When discussing the Quadrants, you may realize there are necessary tests your team hasn't considered or that you lack certain skills or resources to be able to do all the necessary testing. For example, a team that Lisa worked on realized that they were so focused on turning business-facing examples into Q2 tests that guide development that they were completely ignoring the need to do performance and security testing. They added in user stories to research what training and tools they would need and then budgeted time to do those Q4 tests.

Planning for Quadrant 1 Testing

Back in the early 1990s, Lisa worked on a waterfall team whose programmers were required to write unit test plans. Unit test plans were definitely overkill, but thinking about the unit tests early and automating all of them were a big part of the reason that critical bugs were never called in to the support center. Agile teams don't plan Q1 tests separately. In test-driven development (TDD), also called test-driven design, testing is an inseparable part of coding. A programmer pair might sit and discuss some of the tests they want to write, but the details evolve as the code evolves. These unit tests guide development but also support the team in the sense that a programmer runs them prior to checking in his or her code, and they are run in the CI on every single check-in of code.

There are other types of technical testing that may be considered as guiding development. They might not be obvious, but they can be critical to keeping the process working. For example, let's say you can't do your testing because there is a problem with connectivity. Create a test script that can be run before your smoke test to make sure that there are no technical issues. Another test programmers might write is one to check the default configuration. Many times these issues aren't known until you start deploying and testing.

Planning for Quadrant 2 Testing



Q2 tests help with planning at the feature or story level. Part IV, "Testing Business Value," will explore guiding development with more detailed business-facing tests. These tests or checked examples are derived from collaboration and conversations about what is important to the feature or story. Having the right people in a room to answer questions and give specific examples helps us plan the tests we need. Think about the levels of precision discussed in the preceding chapter; the questions and the examples get more precise as we get into details about the stories. The process of eliciting examples and creating tests from them fosters collaboration across roles and may identify defects in the form of hidden assumptions or misunderstandings before any code is written.

Show everyone, even the business owners, what you plan to test; see if you're standing on anything sacred, or if they're worried you're missing something that has value to them.

Creating Q2 tests doesn't stop when coding begins. Lisa's teams have found it works well to start with happy path tests. As coding gets under way and the happy path tests start passing, testers and programmers flesh out the tests to encompass boundary conditions, negative tests, edge cases, and more complicated scenarios.

Planning for Quadrant 3 Testing

Testing has always been central to agile development, and guiding development with customer-facing Q2 tests caught on early with agile teams. As agile teams have matured, they've also embraced Q3 testing, exploratory testing in particular. More teams are hiring expert exploratory testing practitioners, and testers on agile teams are spending time expanding their exploratory skills.

Planning for Q3 tests can be a challenge. We can start defining test charters before there is completed code to explore. As Elisabeth Hendrickson explains in her book *Explore It!* (Hendrickson, 2013), charters let us define where to explore, what resources to bring with us, and what information we hope to find. To be effective, some exploratory testing might require completion of multiple small user stories, or waiting until the feature is complete. You may also need to budget time to create the user personas that you might need for testing, although these may already have been created in story-mapping or other feature-planning exercises. Defining exploratory testing charters is not always easy, but it is a great way to share testing ideas with the team and to be able to track what testing was completed. We will give examples of such charters in Chapter 12, "Exploratory Testing," where we discuss different exploratory testing techniques.

One strategy to build in time for exploratory testing is writing stories to explore different areas of a feature or different personas. Another strategy, which Janet prefers, is having a task for exploratory testing for each story, as well as one or more for testing the feature. If your team uses a definition of "done," conducting adequate exploratory testing might be part of that. You can size individual stories with the assumption that you'll spend a significant amount of time doing exploratory testing. Be aware that unless time is specifically allocated during task creation, exploratory testing often gets ignored.

Q3 also includes user acceptance testing (UAT). Planning for UAT needs to happen during release planning or as soon as possible. Include your customers in the planning to decide the best way to proceed. Can they come into the office to test each new feature? Perhaps they are in a different country and you need to arrange computer sharing. Work to get the most frequent and fastest feedback possible from all of your stakeholders.

Planning for Quadrant 4 Testing

Quadrant 4 tests may be the easiest to overlook in planning, and many teams tend to focus on tests to guide development. Quadrant 3 activities such as UAT and exploratory testing may be easier to visualize and are often more familiar to most testers than Quadrant 4 tests. For example, more teams need to support their application globally, so testing in the internationalization and localization space has become important. Agile teams have struggled with how to do this; we include some ideas in Chapter 13, "Other Types of Testing."

Some teams talk about quality attributes with acceptance criteria on each story of a feature. We prefer to use the word *constraints*. In *Discover to Deliver* (Gottesdiener and Gorman, 2012), Ellen Gottesdiener and Mary Gorman recommend using Tom and Kai Gilb's Planguage (their planning language; see the bibliography for Part III, "Planning—So You Don't Forget the Big Picture," for links) to talk about these constraints in a very definite way (Gilb, 2013).

If your product has a constraint such as "Every screen must respond in less than three seconds," that criterion doesn't need to be repeated for every single story. Find a mechanism to remind your team when you are discussing the story that this constraint needs to be built in and must be tested. Liz Keogh describes a technique to write tests about how capabilities such as system performance can be monitored (Keogh, 2014a). Organizations usually know which operating systems or browsers they are supporting at the beginning of a release, so add them as constraints and include them in your testing estimations. These types of quality attributes are often good candidates for testing at a feature level, but if it makes sense to test them at the story level, do so there; think, "Test early." Chapter 13, "Other Types of Testing," will cover a few different testing types that you may have been struggling with.

Challenging the Quadrants

Over the years, many people have challenged the validity of the Quadrants or adjusted them slightly to be more meaningful to them. We decided to share a couple of these stories because we think it is valuable to continuously challenge what we "know" to be true. That is how we learn and evolve to improve and meet changing demands.

Gojko's Challenge to the Quadrants

> **Gojko Adzic**, *an author and strategic software delivery consultant, challenges the validity of the Quadrants in the current software delivery era.*

The agile testing quadrants model is probably the one thing that everyone remembers about the original *Agile Testing* book. It was an incredibly useful thinking tool for the software delivery world then—2008. It helped me facilitate many useful discussions on the big picture missing from typical programmers' view of quality, and it helped many testers figure out what to focus on. The world now, as of 2014, looks significantly different. There has been a surge in the popularity of continuous delivery, DevOps, Big Data analytics, lean startup delivery, and exploratory testing. The Quadrants model is due for a serious update.

One of the problems with the original Quadrants model is that it was easily misunderstood as a sequence of test types—especially that there is some kind of division between things before and things after development.

This problem is even worse now than in 2008. With the surge in popularity of continuous delivery, the dividing line is getting more blurred and is disappearing. With shorter iterations and continuous delivery, it's generally difficult to draw the line between activities that support the team and those that critique the product. Why would performance tests not be aimed at supporting the team? Why are functional tests not critiquing the product? Why is UAT separate from functional testing? I always found the horizontal dimension of the Quadrants difficult to justify, because critiquing the product can support the team quite effectively if it is done in a timely way. For example, specification by example helps teams to completely merge functional tests and UAT into something that is continuously checked during development. Many teams I worked with recently run performance tests during development, primarily not to mess things up with frequent changes. These are just two examples where things on the right side of the Quadrants are now used more to support the team than anything else. With lean startup methods, products get a lot of critiquing even before a single line of production code is written.

Dividing tests into those that support development and those that evaluate the product does not really help to facilitate useful discussions anymore, so we need a different model—in particular, one that helps to address the eternal issue of so-called nonfunctional requirements, which for many people actually means, “It’s going to be a difficult discussion, so let’s not have it.” The old Quadrants model puts “ilities” into a largely forgotten quadrant of technical tests after development. But things like security, performance, scalability, and so on are not really technical; they imply quite a lot of business expectations, such as compliance, meeting service-levels agreements, handling expected peak loads, and so on. They are also not really nonfunctional, as they imply quite a lot of functionality such as encryption, caching, and work distribution. This of course is complicated by the fact that some expectations in those areas are not that easy to define or test for—especially the unknown unknowns. If we treat these as purely technical concerns, the business expectations are often not explicitly stated or verified. Instead of nonfunctional, these concerns are often dysfunctional. And although many “ilities” are difficult to prove before the software is actually in contact with its real users, the emergence of A/B split testing techniques over the last five years has made it relatively easy, cheap, and low risk to verify those things in production.

Another aspect of testing not really captured well by the first book’s Quadrants is the surge in popularity and importance of exploratory testing. In the old model, exploratory testing is something that happens from the business perspective in order to evaluate the product (often misunderstood as after development). In many contexts, well documented in Elisabeth Hendrickson’s book on exploratory testing (Hendrickson, 2013) and James Whittaker’s book *How Google Tests Software* (Whittaker et al., 2012), exploratory testing can be incredibly useful for the technical perspective as well and, more importantly, is something that should be done during development.

The third aspect that is not captured well by the early Quadrants is the possibility to quantify and measure software changes through usage analytics in production. The surge in popularity of Big Data analytics, especially combined with lean startup and continuous delivery models, enables teams to test relatively cheaply things that were very expensive to test ten years ago—for example, true performance impacts. When the original *Agile Testing* book came out, serious performance testing often meant having a complete hardware copy of the production system. These days, many teams de-risk those issues with smaller, less risky continuous changes, whose impact is measured directly on a subset of the production environment. Many teams also look at their production log trends to spot unexpected and previously unknown problems quickly.

We need to change the model (Figure 8-3) to facilitate all those discussions, and I think that the current horizontal division isn't helping anymore. The context-driven testing community argues very forcefully that looking for expected results isn't really testing; instead, they call that checking. Without getting into an argument about what is or isn't testing, I found the division to be quite useful for many recent discussions with clients. Perhaps that is a more useful second axis for the model: the difference between looking for expected outcomes and analyzing unknowns, aspects without a definite yes/no answer, where results require skillful analytic interpretation. Most of the innovation these days seems to happen in the second part anyway. Checking for expected results, from both a technical and business perspective, is now pretty much a solved problem.

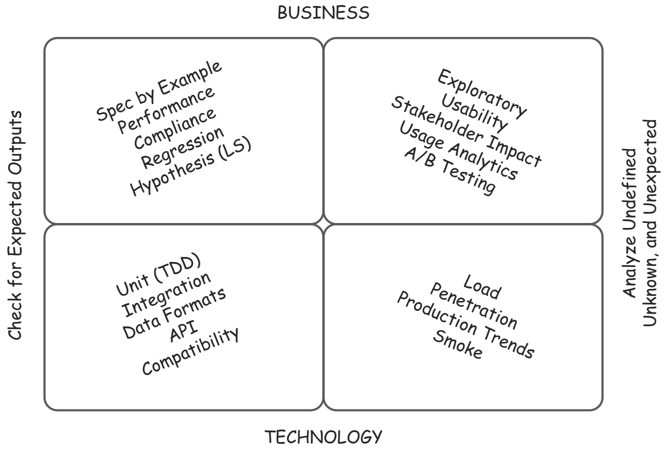


Figure 8-3 Gojko Adzic's version of the agile testing quadrants

Thinking about checking expected outcomes versus analyzing outcomes that weren't predefined helps to explain several important issues facing software delivery teams today:

Security concerns could be split easily into functional tests for compliance such as encryption, data protection, authentication, and so on (essentially all checking for predefined expected results), and penetration/investigations (not predefined). This will help to engage the delivery team and business sponsors in a more useful discussion about describing the functional part of security up front.

Performance concerns could be divided into running business scenarios to prove agreed-upon service levels and capacity, continuous delivery style (predefined), and load tests (where will it break?). This will help to engage the delivery team and business in defining performance expectations and prevent people from treating performance as a purely technical concern. By avoiding the support the team/evaluate the product divisions, we allow a discussion of executing performance tests in different environments and at different times.

Exploration would become much more visible and could be clearly divided between technical and business-oriented exploratory tests. This can support a discussion of technical exploratory tests that developers should perform or that testers can execute by reusing existing automation frameworks. It can also support an overall discussion of what should go into business-oriented exploratory tests.

Build-measure-learn product tests would fit into the model nicely, and the model would facilitate a meaningful discussion of how those tests require a defined hypothesis and how that is different from just pushing things out to see what happens through usage analytics.

We can facilitate a conversation on how to spot unknown problems by monitoring production logs as a way of continuously testing technical concerns that are difficult to check and expensive to automate before deployment, but still useful to support the team. By moving the discussion away from supporting development or evaluating the product toward checking expectations or inspecting the unknown, we would also have a nice way of differentiating those tests from business-oriented production usage analytics.

Most importantly, by using a different horizontal axis, we can raise awareness about a whole category of things that don't fit into typical test plans or test reports but are still incredibly valuable. The early Quadrants were useful because they raised awareness about a whole category of things in the upper-left corner that most teams weren't really thinking of but are now taken as common sense. The 2010s Quadrants need to help us raise awareness about some more important issues for today.

	✓ CONFIRM	INVESTIGATE
BUSINESS	BUSINESS-FACING EXPECTATIONS	RISKS TO EXTERNAL QUALITY ATTRIBUTES
TECHNOLOGY	TECHNOLOGY-FACING EXPECTATIONS	RISKS TO INTERNAL QUALITY ATTRIBUTES

Figure 8-4 Elisabeth Hendrickson's version of the agile testing quadrants

Elisabeth Hendrickson also presented an alternative to the existing Quadrants in her talk about "The Thinking Tester" (Hendrickson, 2012). It is similar to Gojko's version but has a different look. You can see in Figure 8-4 that she relabeled the vertical columns to "confirm" and "investigate," while the horizontal rows still represent business and technology.

The top left quadrant represents the expectations of the business, which could be in the form of executable (automated) specifications. Others might be represented by paper prototypes or wireframes. At the top right are tests that help investigate risks concerning the external quality of the product. It is very much like the original quadrant's idea of exploratory testing, scenarios, or usability testing. Like Gojko's model, the bottom right quadrant highlights the risks of the internal working of the system.

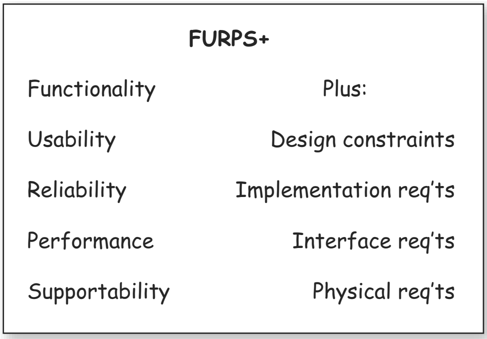
Both of these alternative models provide value. We think there is room for multiple variations to accommodate a spectrum of needs. For example, organizations that are able to adopt continuous delivery are able to think in this space, but many organizations are years from accomplishing that. Check the bibliography for Part III for links to additional testing quadrant models. Use them to help make sure your team covers all the different types of tests you need in order to deliver the right value for your customers.

Using Other Influences for Planning

There are many useful models and ideas for helping us in our test planning, and we shouldn't throw them away. As Tim Ottinger and Jeff Langr have said (Ottinger and Langr, 2009b), a mnemonic for thinking about what are called nonfunctional requirements is still useful. The FURPS model (see Figure 8-5) was developed at Hewlett-Packard and was first publicly elaborated by Grady and Caswell (Wikipedia, 2014f); it is now widely used in the software industry. The + was later added to the model after various campaigns at HP to extend the acronym to emphasize various attributes.

James Whittaker developed a methodology he calls the Attribute Component Capability (ACC) matrix (Whittaker, 2011) to help define what to test based on risk. ACC consists of three different parts that define the system under test: Attributes, Components, and Capabilities. He defines these as:

- **Attributes** (adjectives of the system) are qualities and characteristics that promote the product and distinguish it from the competition; examples are "Fast," "Secure," "Stable," and "Elegant."
- **Component**s (nouns of the system) are building blocks that together constitute the system in question. Some examples of



FURPS+

Functionality

Usability

Reliability

Performance

Supportability

Plus:

Design constraints

Implementation req'ts

Interface req'ts

Physical req'ts

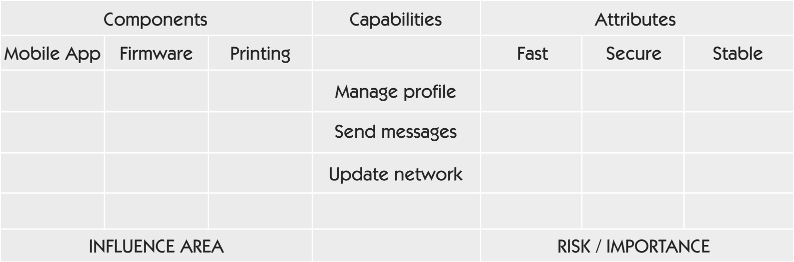
Figure 8-5 FURPS+ flash card (Ottinger and Langr, 2011)

Components are "Firmware," "Printing," and "File System" for an operating system project, or "Database," "Cart," and "Product Browser" for an online shopping site.

- **Capabilitie**s (verbs of the system) describe the abilities of a particular Component to satisfy the Attributes of the system. An example Capability for a shopping site could be "Processes monetary transactions using HTTPS." You can see that this could be a Capability of the "Cart" component when trying to meet the "Secure" Attribute. The most important aspect of Capabilities is that they are testable.

Creating a high-level matrix using this model can be a simple way to visualize your system. Figure 8-6 shows an example of what such a matrix might look like. Gojko Adzic agrees that exposing system characteristics and providing more visibility is definitely a good idea (Adzic, 2010a), though he cautions that while we can learn from other fields, we should be careful about using them as a metaphor for software development.

Use heuristics such as Elisabeth Hendrickson's "Test Heuristics Cheat Sheet" (Hendrickson, 2011) or tried-and-true techniques such as state diagrams or truth tables to think of new ideas for attributes. Combine these ideas with models like the Quadrants so that the conversations about the system constraints or usability can extract clear examples. Using all the tools in your toolbox can only help increase the quality of the product.



Components			Capabilities	Attributes		
Mobile App	Firmware	Printing		Fast	Secure	Stable
			Manage profile			
			Send messages			
			Update network			
INFLUENCE AREA				RISK / IMPORTANCE		

Figure 8-6 ACC example

Planning for Test Automation

Since Mike Cohn came up with his test automation pyramid in 2003, many teams have found it a useful model to plan their test automation. To take advantage of fast feedback, we need to consider at what level our automation tests should be. When we look at the standard pyramid, Figure 8-7, we see three levels.

The lowest level is the base—the unit tests. When we consider testing, we should try to push the tests as low as they can go for the highest return on investment (ROI) and the quickest feedback.

However, when we have business logic where tests need to be visible to the business, we should use collaborative tools that create tests at the service layer (the API) to specify them in a way that documents system behavior. See Chapter 16, "Test Automation Design Patterns and Approaches," for

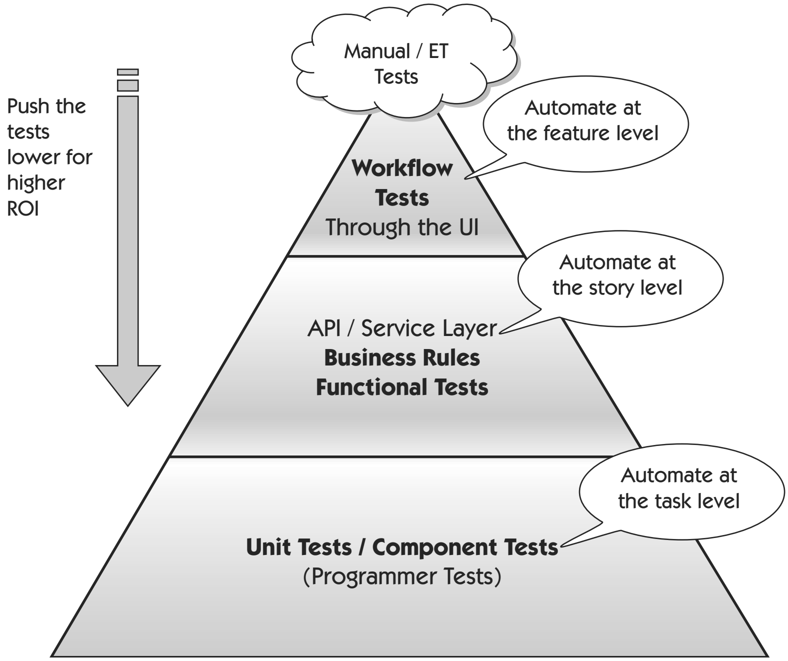

Manual / ET Tests
Push the tests lower for higher ROI
Automate at the feature level
Workflow Tests Through the UI
Automate at the story level
API / Service Layer Business Rules Functional Tests
Automate at the task level
Unit Tests / Component Tests (Programmer Tests)

Figure 8-7 Automation pyramid

more details. It is at this layer that we can automate at the story level so that testing and automation can keep up with the coding.

The top layer of the pyramid consists of the workflow tests through the user interface (UI). If we have a high degree of confidence in the unit tests and the service-level or API-level tests, we can keep these slower, more brittle automated tests to a minimum. See Chapter 15, "Pyramids of Automation," for more detail on alternative pyramid models.

Practices such as guiding development with examples can help define what the best level for the test is. A team's cadence can be set by how well they plan and execute their automation and how well they understand the level of detail they need. Consider also how to make your automation test runs visible, whether displayed in the continuous integration environment or on a monitor that is in the open.

Summary

Models are a useful tool for planning. In this chapter, we covered the following points:

- The agile testing quadrants provide a model for thinking about testing in an agile world.
  - The Quadrants help to emphasize the whole-team responsibility for testing.
  - They provide a visible mechanism for talking about the testing needed.
  - The left side is about guiding development, learning what to build, and preventing defects—testing early.
  - The right side is about critiquing the product, finding defects, and learning what capabilities are still missing.
- Gojko Adzic provides an alternative way to think about the Quadrants if you are in a lean startup or continuous delivery environment.
- We also introduced an alternative quadrant diagram from Elisabeth Hendrickson that highlights confirmatory checks versus investigative testing.

- There are already many tools in our agile testing toolbox, and we can combine them with other models such as the Quadrants to make our testing as effective as possible.
- FURPS and ACC are additional examples of models you can use to help plan based on risk and a variety of quality characteristics.
- The automation pyramid is a reminder to think about automation and to plan for it at the different levels.

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