

## Getting Strategic About Quality

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Using the Borland Quality Maturity Curve™ to Create a  
Lifecycle Quality Management Plan for Lasting Change

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## Executive Summary

Businesses today increasingly depend on software to run their daily operations and generate revenue, and this dependence has heightened executive awareness about the need to improve software quality. The negative effects of poor quality are well known – and as a result, application development organizations continuously seek out ways to improve the quality, scalability, performance, security, integrity, and reliability of the software they deliver.

But in spite of decades of software development and testing advances, most companies still struggle with the basics. Sometimes it's because quality processes get overlooked in the rush of everyday activities. But in most cases, the root cause of poor quality is failure to develop a clear strategy targeted for their unique needs and priorities. Without a clear path to follow, organizations inadvertently focus their efforts in areas that yield little return. For example, companies make costly software investments, but they don't see expected quality improvements. Or they develop processes that pass CMMI appraisals, but these processes don't yield measurable improvements in delivered software. It's no surprise that for many, investing in quality improvement seems like an endless cycle of unproductive spending.

This paper describes how you can use Borland's Quality Maturity Curve™ (QMC) concept to break this unproductive cycle and achieve your quality objectives in an efficient, step-by-step manner. You'll learn how Borland's approach to lifecycle quality management (LQM) enables you to determine manageable, achievable, and affordable steps to improving the quality of your development processes and delivered products. Borland is the only vendor with integrated tools and process, a "whole lifecycle" approach to quality, and proven best practices to help you achieve all of your quality management goals.

### Why should I read this document?

As an executive or manager, you are measured on your ability to reduce risk and drive value by continuously improving your teams' ability to deliver higher quality projects, even as financial and human resources shrink. This paper overviews how you can use Borland's Quality Maturity Curve to achieve these goals by making real, incremental, and permanent gains in efficiency and effectiveness. After reading this paper, you will understand how the QMC enables you to answer fundamental questions such as:

- How can I build a quality strategy that maps directly to the critical business issues of my organization?
- What are the most common barriers to realizing an effective quality strategy?
- What are the strengths and weaknesses of my team's quality best practices?
- What steps should I take first to make the greatest impact on quality and the teams that are responsible for it?
- How can I learn from others about developing a plan to evolve my team's quality maturity?

## The Push for Better Software Quality

Software testing has always been important, but it's now gaining executive-level attention. Today's organizations face growing pressure to improve the quality of delivered software, as their internal and external customers are no longer willing to put up with software that contains an excessive number of bugs, fails to meet user and business needs, or breaks under high loads. Add to this a growing dependency on software as a direct source of revenue, and it's no surprise that executives at all levels are actively seeking ways to raise the quality of their code.

If your organization is looking to lifecycle quality management (LQM) solutions as a way to achieve its quality objectives, you're not alone. Borland defines LQM solutions as software and best practices that help you to deliver every application with confidence by ensuring that:

- Quality is built into software at the very point of project definition
- Software is tested earlier and more often, and traced throughout every phase of the software delivery lifecycle

To operationalize LQM, you need software tools that link business requirements to code, testing priorities, and activities in an automated and traceable way. This connection helps break down barriers between business, development, and QA teams so IT organizations can have more confidence that the software they deliver meets business requirements, is on-time, and offers correct code with minimal defects. It also requires that you institutionalize a more proactive and preventative approach to software quality than many organizations have in place today.

## Barriers to Improving Quality

But implementing LQM can be challenging for organizations on a number of fronts. As stated previously, development organizations often don't know where to focus their quality management efforts and investments. Because they aren't sure which investments will yield the best results, it can be difficult to gain the budget and executive sponsorship needed to drive successful LQM initiatives. Because of the growing strategic importance of software to businesses today, it's getting easier to gain executive sponsorship – especially from the chief information officer (CIO). But it can still be a considerable challenge to gain and sustain executive commitment.

Organizational barriers and poor communication also hinder quality improvement initiatives. For example, structural barriers between application development and quality assurance (QA) teams – as well as the business and IT – can significantly impact software quality. Too often, development teams take longer than planned and then “dump” code over to testing. When this occurs, either QA teams aren't given enough time to fully test code, or they are seen as the bottleneck holding up production. Similarly, lack of alignment and poor communication between business units and IT leads to requirements that don't reflect what the business or its users really need. As a result, development teams can inadvertently build the wrong software – the worst kind of poor quality.

Many companies also lack measurement maturity and visibility into quality-related processes. Only the minority of software development organizations today are using fully integrated requirements and test management software to understand quality throughout their entire development processes – the key to heading off problems early. When used properly, these tools give you access to key figures you can talk about, such as test coverage, defect trends, and requirements stability. They also enable IT to talk with business departments in a language that all parties understand: quantitative data. Armed with hard data, QA teams

can accurately answer questions about how long they will need to test a particular piece of code, how late-stage requirement changes will impact testing schedules and costs, and more, which enables business executives and project managers to plan accordingly.

Many organizations also have weak risk management practices that hinder quality improvement initiatives. Application development teams dislike thinking about risks, are often unwilling to monitor them, and fail to plan ahead for them. And when risks materialize as problems, development teams tend to hide them. LQM initiatives are needed to help organizations anticipate and plan ahead for risks, complete with mitigation and resolution plans, so they can deal with them quickly and efficiently.

### **How Successful Organizations Overcome Barriers to Change**

- Put quality on your top 10 list of IT initiatives. When QA is made a top priority by the IT department, it makes quality more visible to key decision makers and helps them they understand why there's a need to make investments in QA. You are more likely to secure budget and executive support needed to achieve lasting change.
- Develop and articulate a clear strategy. The most successful companies develop a clear strategy to achieve their quality objectives and communicate it across the business at all levels. Most seek insight from an independent standpoint to help them move their organization ahead in a sensible and practical manner that is aligned with their critical business issues (CBIs) and takes into account organizational readiness.
- Empower senior QA managers by arming them with up-to-date information. The old adage that you can only manage what you measure is highly relevant to software quality. QA managers need easy access to accurate, objective information that quantifies the effectiveness and maturity of their QA processes. Armed with this information, they can better identify when and where QA problems are occurring, provide executive management with metrics to expose latent “pain,” and track and report on QA initiatives.
- Identify critical business issues (CBIs) around QA and focus on changes that will directly affect them. The most successful companies only invest in QA activities that align directly with their CBIs, such as customer satisfaction, cost reduction, and agility to respond quickly to market changes. In other words, they tie QA activities to the company's CBIs. This keeps QA top of mind, reinforces the business case for continued investment, and prevents your company from falling off the proverbial “QA wagon.”
- Determine organizational readiness before engaging in a new QA initiative or change. If you lack adequate readiness or support for a particular initiative or change, move on and come back to it later. Focus on the next initiative that you're confident you can accomplish – and then revisit unaddressed issues when you have the departmental – or cross-departmental – cooperation needed to ensure success.
- Improve quality using step-by-step solutions that deliver incremental business value. Companies that succeed with their QA initiatives rarely invest in complex, million-dollar solutions that are time consuming and costly to implement. Instead, they invest in smaller solutions, tool sets, and best practices that they can implement over time as part of a larger, integrated solution. Each step should yield specific, measurable benefits.

## The Borland Quality Maturity Curve: Defining a Clear Path to Quality Improvement

Borland is leading the charge in helping businesses like yours to evolve their quality management processes efficiently, effectively, and in a way that's tailored to their needs. The techniques, tools, processes and services that are embodied within Borland's LQM methodology provide a structured and cost-effective framework for helping you achieve your QA goals.

At the heart of Borland's LQM methodology is the Quality Maturity Curve (QMC), which enables you to identify the most critical steps to improving quality for your business. It empowers you to make process and automation choices that deliver the most appropriate and impactful benefits based on a careful analysis of your organization's unique needs.

The Quality Maturity Curve was developed leveraging Borland's extensive experience improving software development and testing processes for our customers – and our internal teams – and the expertise of our customer-facing Capability Maturity Model Integration (CMMI) experts. It reflects hundreds of person-years delivering world-class quality and development products, innumerable customer engagements, and Borland's own journey along the maturity curve as we've iterated on and implemented LQM best practices as a commercial software vendor.

### The Five Stages of Maturity

As illustrated in Figure 1, the Borland Quality Maturity Curve includes five stages that provide a template for gradual quality improvement.

#### Borland's Quality Maturity Curve



Figure 1: Borland's QMC – A High-Level View

#### IDENTIFYING THE QUALITY STANDARDS MOST RELEVANT TO YOUR BUSINESS

Borland's approach to LQM is flexible and recognizes that you have a finite amount of time, resources, and budget to dedicate to software quality improvement. We've taken lessons learned from real-world CMMI expertise and created a practical set of best practices more focused on quality. Rather than prescribing that all facets of each stage must be met to move ahead, we help you focus on those QA best practices that will have the greatest impact on your critical business issues. As a result, Borland's approach complements any CMMI or similar efforts underway at your company by helping you address QA at a more granular, detailed level. The Quality Maturity Curve enables you to map your quality strategy to non-specific CMMI and similar standards to identify those most immediately relevant to your organization. The end result is a clear, but tailored, path to LQM initiatives that will yield the greatest benefits to your business.

Each stage has distinct characteristics and benefits, as summarized in the following table.

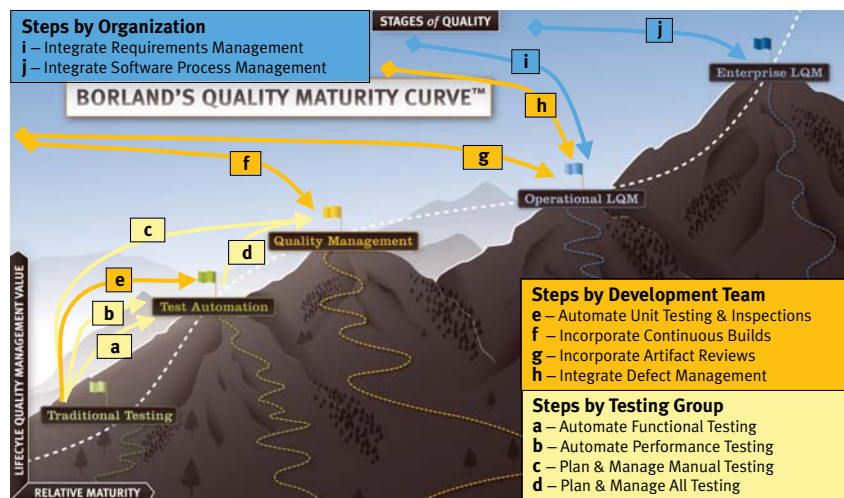
| STAGE               | CHARACTERISTICS  | BENEFITS  |
|---------------------|--|---|
| Traditional Testing | <ul style="list-style-type: none"> <li>• Reactive and “ad hoc”</li> <li>• Few formal test processes and unpredictable outcomes</li> <li>• Manual testing prevails and Quality Assurance (QA) teams are small, with minimal budgets for tools</li> </ul>  | <ul style="list-style-type: none"> <li>• Benefits only impact individual projects (no repeatability or opportunity to reuse resources or processes across projects)</li> <li>• Ability to find the most obvious or egregious issues in code</li> <li>• Limited resources and poor processes increase likelihood of major bugs and potential business failure</li> </ul>   |
| Test Automation     | <ul style="list-style-type: none"> <li>• Testing is managed using a few automated procedures</li> <li>• Tests are repeatable and predictable</li> <li>• Regression and load/performance testing are routinely performed</li> <li>• Little focus on process; improvement initiatives are on a task-by-task basis</li> </ul>   | <ul style="list-style-type: none"> <li>• Improved effectiveness of teams and increased test coverage</li> <li>• Well-known ROI and time-to-value</li> <li>• Skills are better utilized</li> <li>• Fewer repetitive tasks; teams focus on creating re-usable tests and frameworks</li> <li>• Ability to test more code quickly and effectively</li> </ul>  |
| Quality Management  | <ul style="list-style-type: none"> <li>• Test process management improves testing efficiency and control</li> <li>• Managers have visibility into results</li> <li>• QA has a project or team focus and responds effectively to change</li> <li>• Consolidation of test tools and achievement of a specific return on investment (ROI) on new tools</li> </ul>   | <ul style="list-style-type: none"> <li>• Multiplication of team improvements across multiple teams and projects – so the benefits increase exponentially</li> <li>• Better requirements creation and management assures that teams test what matters to the business</li> <li>• Manual testing becomes a predictable, managed process</li> <li>• Team skills are shared</li> <li>• Measurable improvement in bug find-and-fix time</li> </ul>   |
| Operational LQM     | <ul style="list-style-type: none"> <li>• Principles of LQM are applied to cross-project and cross-departmental programs</li> <li>• Executive commitment to quality</li> <li>• Cross-organizational initiatives, such as requirements-based testing, ensures testing supports business objectives</li> <li>• Some integration with Application Lifecycle Management (ALM)</li> <li>• Processes support the sharing of best practices across geographically distributed teams</li> <li>• Process re-engineering makes software development and testing more effective</li> </ul> | <ul style="list-style-type: none"> <li>• Organizational consistency around quality – across projects, across teams, across processes</li> <li>• Benefits realized at earlier stages are multiplied again</li> <li>• Test teams have more time to test application areas not addressed before</li> <li>• Lower organizational costs thanks to tool and training consolidation</li> <li>• New levels of cross-functional team collaboration so less time is spent debating and passing blame and more time is spent delivering high-quality projects</li> </ul> |
| Enterprise LQM      | <ul style="list-style-type: none"> <li>• Testing is tightly integrated with lifecycle functions, including ALM</li> <li>• Systemic approach to lowering costs and risk</li> <li>• CIO/CXO-driven programs drive continuous improvement through initiatives such as standardization of testing processes and technology, virtualization of resource sharing, and establishment of a center of excellence for QA</li> </ul>  | <ul style="list-style-type: none"> <li>• Global economization</li> <li>• Centralization lowers infrastructure costs, enables implementation of charge-backs for services rendered, and maximizes the use of human resources</li> <li>• Redundant testing and development activities are eliminated</li> <li>• Technology and processes are aligned to enable “quality factories” that are completely focused on the business</li> </ul>   |

## Enabling Steps Along the Journey

As illustrated in Figure 2, the Borland Quality Maturity Curve helps you develop a clear path for lasting change by providing ten well-defined steps that address every aspect of QA. These steps are further supported by a set of detailed best practices developed by Borland based on our own experience, our engagements with successful customers, and CMMI standards.

Figure 2 groups these ten steps into three different boxes, as different steps must be completed by different departments, or with cross-departmental collaboration:

### Borland Enables the Steps on the Journey



- The test team implements steps *a* through *d*
- The development team must implement steps *e* through *f*
- Steps *i* and *j* are a cross-departmental, or organizational effort

Figure 2: The Critical Steps to Lifecycle Quality

While these steps are well known as core components of successful, modern development practices, many companies do not approach them all in a practical manner as part of a holistic quality strategy. Additionally, defining and following best practices is often overlooked, which leads to inconsistency. Borland's Quality Maturity Curve helps you locate where you have strengths or gaps related to a series of best practices associated with each step, and how and why you should focus on improvements based on how those improvements impact your CBIs. Examples of best practices – and their associated key steps – are summarized in the following table.

### Examples of Best Practices Supporting the Ten Steps Encompassed within Borland Quality Management

| KEY STEP                              | EXAMPLE OF A SUPPORTING BEST PRACTICE                                |
|---------------------------------------|--|
| Plan and manage all testing           | Software tools are used to manage and report on testing activities.  |
| Plan and manage manual testing        | The test plan explicitly identifies the required testing resources.  |
| Automate unit testing and inspections | Software tools are used to automate unit testing.                    |
| Automate functional testing           | Formal techniques are used to define test cases.                     |
| Automate performance testing          | Test cases are developed for performance requirements.               |
| Incorporate artifact reviews          | Intermediate artifacts are routinely reviewed by peers.              |
| Incorporate continuous builds         | Software builds occur regularly.                                     |
| Integrate defect management           | Intermediate artifacts are corrected when defects are detected.      |
| Integrate requirements management     | Test cases are linked to specific requirements.                      |
| Integrate software process management | Test procedures are analyzed and optimized to increase productivity. |

### Tailoring a Quality Management Path for Your Organization

There's no one-size-fits-all approach to improving quality management for software. For example, when chasms exist between departments that hinder collaboration, it's essential that you take this into account when developing your LQM plan. Requirements Based Testing (RBT), for instance, is a well-known means of achieving higher quality, and it's a requirement for Operational LQM. But it requires tight alignment and agreement between business analysts, development, and test teams. If your company isn't organizationally ready to implement this step, prioritize other steps first – steps that don't require that organizational chasms be crossed in order to achieve them. The right time for RBT will come down the road, when overall maturity has improved.

It's also important to note that some of these steps may or may not be mutually exclusive. For example, it is possible to implement more than one step at once. And in some cases, there are pre-requisite steps. Additionally, you do not need to implement steps in sequence. For instance, your first step may be to tackle step c: plan and manage manual testing. Your testing teams may be fully manual but lack a clear, managed test process, so this step may make more sense than moving right into functional or performance automation. However, another organization may be facing severe performance issues, in which case the most critical and logical step to take is to implement a load testing solution. As these examples suggest, each organization is different, and these differences must be taken into careful consideration when developing priorities and plans. The goal is to tailor a plan for your business that will deliver the greatest business benefits.

Because of this complexity, many organizations choose to have an independent third party assess their current situation. By doing so, you gain an objective perspective on your organization's strengths, weaknesses, and gaps – as well as what specific steps and investments to make, and in what priority, so that you only invest in areas where you are weak. For example, when

consultants work with customers to assess the maturity of their quality processes, they can generate a number of reports and analyses that benchmark the customer against industry averages and “ideals,” or maximum targets (see Figure 3). Spider diagrams, such as the one shown below, help customers prioritize what matters most to your business, as well as track progress over time.

### Industry Comparison

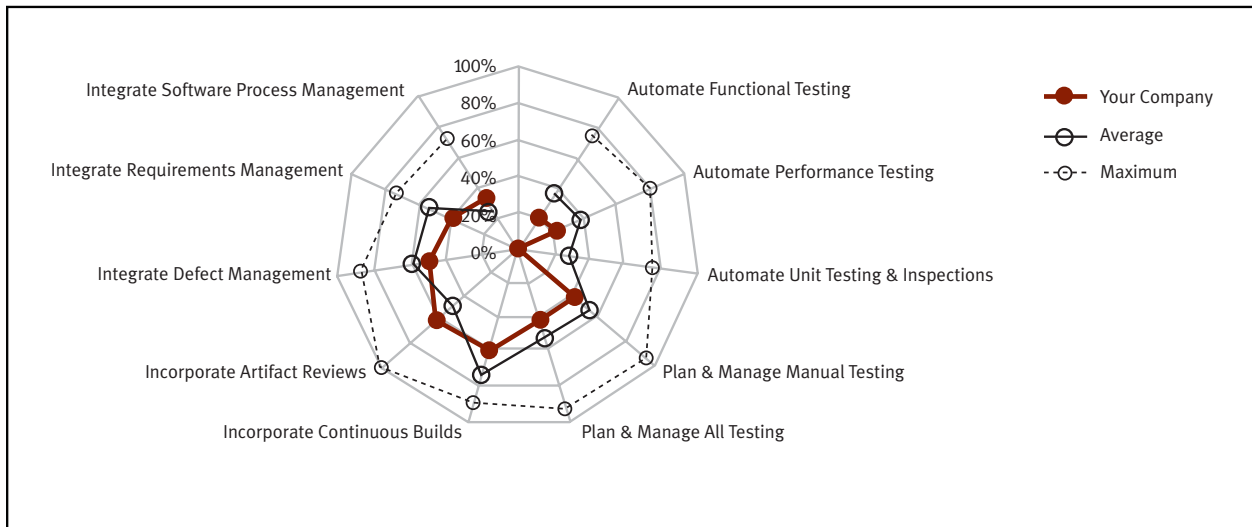


Figure 3: A Spider Diagram Created for a Borland Customer Summarizing Quality Maturity

## Executing on Your Plan

Once you have mapped out where you want to get to, and by when, you need to plan the implementation, devise the solution, and roll it out across your organization. After completion of each major part of the program, Borland recommends that you perform another LQM assessment to determine your organization’s new level of capability. This also enables you to keep track of progress and verify that the required improvements have been made.

When you leverage the Borland QMC to develop a strategy, you can avoid common pitfalls associated with LQM, such as:

- The pit of perpetual testing: It’s easy to test over and over again, which duplicates test efforts, increases costs, and results in disconnected testing. To avoid this, invest in test automation solutions that enable you to proactively manage testing and leverage team skills.
- The wasteland of over-spending: Don’t be persuaded by software vendors to buy too much or invest in test automation software that costs too much – and end up over-burdened with software you can’t use. To avoid this, adopt good test management practices and tools so that you have the skills and processes to make good use of investments.
- Misalignment landslides: Management should help test teams get better at testing. But when there’s not proper alignment with development and no clear connection between business requirements and testing, things can get rocky. To avoid this, re-engineer your processes and eliminate cross-team debates. Cross-functional alignment is the key to success.
- The razor’s edge of inconsistency: Mature organizations need to share best practices, tools, and skills. If they don’t, some teams will have great results with reduced costs and high quality, while others will experience failure. To avoid this,

centralize your skills and tools. Share licenses and infrastructure. Maximize test coverage and standardize processes and technology globally.

## For More Information

The Quality Maturity Curve offers you a way to address your QA challenges in a controlled and manageable way. There's no need to make a huge investment. Borland has found that organizations achieve more and lasting change by identifying small steps with largest impact – and executing them with confidence.

To find out more about Borland's Quality Maturity Curve and our supporting services and solutions, visit the QMC Resource center online where you can sign up for a free profile, gain expert advice and industry insights, and more.

VISIT THE RESOURCE CENTER at <http://www.borland.com/us/rc/lifecycle-quality-management/quality-maturity-curve.html>

Borland is the leading vendor of Open Application Lifecycle Management (ALM) solutions - open to customers' processes, tools and platforms – providing the flexibility to manage, measure and improve the software delivery process.