Software Quality Management in an On-Demand World

Maximizing Efficiencies and Effectiveness with Silk Central
Executive Summary

Because software lives at the core of virtually every business process, corporate performance in today’s competitive world is largely measured by the successful development, deployment and ongoing monitoring of high quality software applications. Time-to-market, customer satisfaction, revenue and support costs are all impacted by the decisions made regarding the strategies and best practices implemented through initiatives to optimize software quality. Quality initiatives—which span requirements management, testing, resource allocation and ultimately release readiness—must be closely monitored and managed throughout all phases of the software application lifecycle.

In this paper, we:

- Discuss the two greatest risks inherent in traditional quality management efforts and identify the multiple points of exposure when quality isn’t well-managed.
- Expose the financial realities of poor software quality management.
- Share best practices for software quality process improvements, including the importance of sound quality management practices.
- Present the benefits of Silk Central™, an integrated, end-to-end software quality management solution from Micro Focus®.

The Trouble with Traditional Quality Management Efforts

There’s a general consensus among application development teams that zero-defect software simply cannot exist for several reasons. First, in today’s on-demand world, every application must evolve along with the needs of its user community, which means constant change. Second, as long as software is designed and developed by human beings it can’t be perfect, by definition. Yet the expectations among executive management toward software performance are dramatically different—software is expected to perform at defined levels in order to meet business objectives. This disconnect between expectation and reality—of supporting the needs of the business versus the traditional software application’s ability to deliver—creates a “gray area” of debate that forces organizations to rethink who is ultimately responsible for software quality and how it should be managed.

In a business world now ridden with risks and exposures at the corporate governance layer, it is simply no longer adequate for quality assurance (QA) to be the sole party responsible for software quality. There must be a corporate commitment that starts with executive management and extends throughout software development, QA, lines of business and information technology (IT) groups.

In fact, industry analysts highlight that 40% of companies are increasingly adopting some form of Agile development, causing the role of today’s testing and quality teams to change. With a shift in focus from QA to management indicating the need to move from tactical thinking to strategic, these forward thinking companies are being proactive and building quality in, as opposed to reacting to issues when they occur.

Focusing on critical success factors and taking a risk-based approach ensures time and effort are spent effectively and prioritized accordingly, whilst clearly understanding the thresholds that will represent acceptable performance and how it will be achieved. This requires asking the right question at the right time, to ensure collaboration and communication within the software development lifecycles. The earlier issues are identified, the lower the cost to resolve will be.

With the adoption of Agile delivery cycles and newer, complex technologies, responsibility for testing is expanding to the development team. Agile breaks down the barriers between test and development, increasingly requiring collaboration in approach and assets. Having a centralized approach on how to control, manage and gain visibility across testing both from functional and non-functional areas becomes critical, especially when you consider that the metrics and analytics provide the traceability and end to end (E2E).

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openness and visibility between the different activities that ultimately reduces the challenges and encourages collaboration.

Within software development, consider the two greatest risks and limitations of traditional quality management efforts that impact an organization’s ability to support business goals:

- **Lack of business alignment.** Being aligned with business goals means being integrated into the overall organization. Siloed project teams become islands of information and risk losing sight of their project’s true business value.

- **Lack of consistent practices and processes.** Each project team or development silo utilizes their own approach to quality, resulting in piecemeal and disconnected practices that foster miscommunication throughout the development effort.

Quality efforts remain the most time-consuming, labor-intensive and costly (as much as 60% of the total cost of development, according to Gartner) part of the development cycle. However, because of the high financial exposure poor quality carries with it, quality also presents an opportunity to produce a large return on investment (ROI) to an organization—if properly managed. It is surprising, then, that most organizations don’t have a standard process for defining, managing and reporting on quality activities.

Without pre-defined consensus, it is impossible to create a standard view through which to measure quality, create repeatable processes and build an ongoing plan for continuous improvement. Even more surprising is the number of organizations that still view quality as a discrete end stage to the development process. In this siloed environment, QA is sandwiched in between development and application release—and usually not enough time is allocated to ensure a high-quality product.

Add to the exposure caused by decentralized, non-integrated processes the fact that the majority of organizations still use word processing or spreadsheet software to define requirements and manage test initiatives, and you’ve created a recipe for quality disaster. Storing such information in decentralized files forces multiple points of exposure, including:

- Potential loss of quality-related information.
- The creation of test assets that are not repeatable or reusable.
- A duplication of efforts and different groups focused on disparate quality goals that may not align with corporate business goals.
- A lack of version control.
- The logging and tracking of execution results in disparate locations.

- A lack of visibility into quality-related information, such as test results and overall application quality status.
- An increase in the cost and complexity of quality practices.
- Inadequate information for sound decision-making.

### The Cost of Poor Software Quality Management

As applications become more pervasive, the expense associated with quality-related repairs multiplies exponentially. And traditional, siloed methods of testing and correcting software are no longer adequate to support today’s business models. The fact is, software quality affects business in both measurable and immeasurable ways.

“*The United States software market is a $180 billion industry and defective software costs 1/3 of that $60 billion, every year.*” Software vendors have started to address these problems through the adoption of static analysis and best practices, but these processes often extend only to the code that they themselves author, not the open source they rely on.

Recent data shows that 70% of internally developed software is tested for bugs, but only 35% of third party code is tested.

As software size and complexity increase, reliance on open source third party libraries is becoming common place. Software is no longer all developed from scratch, but is a combination of private and publicly available code.

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Figure 2 represents the costs associated with errors detected in the various stages of the software lifecycle. Based on the total cost of testing and correction efforts, you can determine the average cost per stage and “cost-per-bug” in your own organization.

This graph reflects the fact that defects are found in the following areas:
- Requirements: 15%
- Design: 20%
- Development: 40%
- Testing: 15%
- Production: 10%

While the cumulative totals are staggering, the impact of poor software quality management practices can be a bet-your-business proposition for an individual business of any size. Consider the risks associated with:
- **Lost productivity costs** occur when software under-performs or fails completely.
- **Brand damage** occurs when the user community complains publicly, or worse, changes brands.
- **Liability costs** increase when software fails to perform as committed.

In fact, the exposure caused by flawed software resulting from inadequate software quality management practices is now reaching top-of-mind of company executives who have their own pressures caused by business demands, competitive realities, compliance initiatives or unhappy customers. Regardless of whether software is internally developed for a company’s own use or is to be sold on the open market, the risks associated with poor quality are reaching an all-time high.

As companies scramble to protect themselves from legal and financial exposure, software quality can surface as a weak link in their delivery chain. In today’s economy, a more bulletproof approach to managing software quality is required in order to meet even the most fundamental business goals.

### Effective Quality Management Means Better Software

In an “on-demand” marketplace, time-to-market is critical, often forcing a compression in software release cycles. To be responsive, many forward-thinking organizations are proactively addressing the risks associated with traditional quality management practices, balanced against the rewards of implementing more strategic ways of managing software quality. One example is the center of excellence (CoE) model, which is becoming a way to elevate standardized quality management and quality optimization best practices throughout the organization. The CoE—an internal organization dedicated to optimizing application quality—manages and centralizes toolsets, best practices, expertise and provides leadership for quality processes.

Analysts such as IDC have highlighted an increase in drive for CoE in organizations so as to ensure a marked improvement in practices and procedures. Sr/ISV drives ensure repeatable processes can be delivered across the customer base, along with the ability to then share resources cross projects. Centralization of infrastructure reduces the

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2 “The Economic Impact of Inadequate Infrastructure for Software Testing,” United States Department of Commerce, National Institute of Standards and Technology (NIST), May 2002

3 “Companies Seek to Hold Software Makers Liable for Flaws,” David Bank, Wall Street Journal online, February 24, 2005

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According to one AT&T executive, his company spends approximately $1 million a month just to patch and repair its existing software. Testing and installing a single patch across the network can require as many as 30 people working full-time for several days.

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maintenance and support needs while increasing the collaboration across all projects.

Furthermore, these analysts continue to predict a further shift towards testing CoE for large enterprise organizations, where the focus remains on developing a more proactive approach to quality assurance, primarily to drive quality improvement and weave it into the fabric of the organization. This approach, however, calls for the need to have adaptable tooling supporting the needs of the organization, along with the capability to bring together disparate tooling, processes and practices. A strong focus falls on tooling, which supports cross browsers with a capability to be deployed within both public and private cloud environments. And last but not least, centralization needs to enable and facilitate collaboration across enterprise organizations with fast and easy access to tooling that's intuitive and easily adoptable by users.

Companies successfully adopting iterative or Agile development processes (where testing must occur at each iteration throughout the lifecycle) are among some of the early adopters of more leading-edge approaches to test management—and with good reason. Competitive pressures and the expense of post-deployment repair make smarter quality management a better way to manage risk and optimize software quality. However, unless an efficient quality infrastructure is in place, testing can become a serious bottleneck to the overall development timeline.

Regardless of what development or quality methodology is followed, if an organization is to leverage return on its application investments, the end goal of any process must be the optimization of software quality. An area of great impact is within quality management. This area includes the adoption of more effective decision support tools to help users make trade-off decisions about quality status, scope, resources, schedule and overall management, including how decisions made in one functional area will impact the quality of another. In addition, quality has to be evaluated based on a set of previously agreed-to metrics that are aligned with the business goals.

Termed Quality Goal Driven Testing is a flexible, straightforward and easy to understand mechanism for defining risk mitigation requirements and the quality goals determined by the business, using its own terminology. It shows the time cost of meeting those goals and helps test planners select a test set efficiently. Reports then show how testing has responded to the risk mitigation and other quality goals, ultimately enabling the go or no go decision on the release readiness of a project.

It is worth bearing in mind, however, that the adaptability of tooling to support different methodologies is key to ensuring organizations are able to leverage their return on their investments. The goal of any process should be the optimization of software quality to ensure the reduction in cost and risk and an increase in agility and quality. Finally, all stakeholders must have access to the same set of quality metrics and quality-related information.

To support the business demands of today's corporate strategists, quality initiatives are most effective when they occur throughout the application development lifecycle, in parallel with development efforts. The benefit to this approach is the leverage of intellectual capital and experience involved in the application design applied to quality strategy design.

An Introduction to Quality Optimization
Quality optimization focuses on how an organization can integrate people, processes and technologies continuously by providing a central test management hub, which delivers an open test management solution that ensures visibility over the software development lifecycle from both a functional and non-functional aspect. Improving control over the quality aspects of the organization can minimize cost and maximize the potential for application success.

By focusing on the business and quality goals of an organization across all aspects of test, you increase business confidence into the quality of software delivered through being able to focus effort according to the prioritization of the different areas.

This ensures early identification of issues and improvements within quality driven customer satisfaction and competitive advantage. Following these principles, quality stakeholders are able to efficiently automate...
and manage the processes associated with defining, measuring, managing and improving software quality.

Consistent with industry standard approaches to software quality such as TMMI, CMM, CMMI and six sigma, the approach promotes communication and collaboration between organizations and, at the same time, adds discipline and structure to the testing process.

Quality optimization encompasses the following four quality processes: define application quality goals and the metrics against which quality will be measured, measure application quality, manage quality holistically throughout the application lifecycle, and improve quality on an ongoing basis.

Define application quality goals and metrics as set out by your organization, which will enable you to measure the success of your testing:

- Determine quality metrics based on business goals and drivers.
- Define desired levels of quality.
- Measure current quality to set a baseline.

Measure application quality status and quality progress, versus the metrics set as quality benchmarks through a single hub of information as provided by dashboard reporting. By defining quality goals from the outset, you'll be better able to map progress against achieving required quality, meeting desired goals and success levels:

- Capture data on previously defined quality metrics.
- Measure and track quality metrics important to varied constituents.
- Determine status of application quality against quality goals.
- Audit trial and evidence to support activities.

Prove an application’s release readiness to support business goals.

Manage all aspects of software quality holistically via new manual execution planning to ensure continuous quality at the “speed of change” and determine what, how, where, who and when you should be testing:

- Integrate people, processes and technology through an architected common quality platform.
- Manage the entire quality process from end-to-end.
- Obtain up-to-the-minute data to enable sound decision making about resource allocation, schedule and overall release readiness.
- Gain visibility of software projects throughout all phases of the software application lifecycle.

- Dynamically adapt to meet changing business situations, emerging technologies and new regulatory challenges.

Improve development efforts as you gain knowledge. The use of improved quality practices needs to be re-introduced into the process for potential benefits to be realized. Silk Central will enable you to bring together tooling from different sources and provide visibility, metrics and management across entire process (see Table 1: Micro Focus Product Suite Integrations on page 7) ensuring Continuous Integration Test capabilities for both functional and not functional testing:

- Continuously improve the release process, extending quality to encompass previously uncovered areas.
- Meet time-to-market goals by introducing new efficiencies into the quality process.
- Reuse existing test assets, leveraging resources and producing ever-higher quality software.
- Grow the commitment to quality systemically, throughout the corporate culture.

An organization that focuses on improving software quality will ensure that the needs of both the business and the development activities and needs are integrated within core business activities, thereby maximizing its ability to attain stated business objectives. The supporting centralized infrastructure eliminates multiple points of exposure and fosters repeatable, reusable quality assets.

![Diagram](image-url)

**Figure 4.** Application Quality Management should focus on four key processes to optimize software quality delivery.
Silk Central answers the need for a more efficient and effective way of managing quality-related activities. An integrated, end-to-end global quality management solution, Silk Central serves as the foundation of Micro Focus’s quality optimization platform for pre-deployment quality activities and enables organizations to have complete, up-to-the-minute information for effective decision-making as to the quality status, schedule, resources and overall release readiness of an application. It’s the intelligent way to manage the risks associated with application development and deployment.

Silk Central maps quality management activities to the four quality optimization processes—define, measure, manage and improve—as follows:

**Define**
Silk Central does not enforce a specific definition of quality. Customers can define quality according to their own corporate business goals and then track the metrics necessary to achieve the specified quality levels. By centralizing the definition of quality and tracking associated metrics within Silk Central, all stakeholders across the organization are aligned around the same quality goals and metrics. Furthermore, application release readiness decisions are supported based on attainment of the pre-established quality metrics.
Measure
Measurement activities take place at a detailed level through the tracking of individual test results (whether from manual, unit, functional, regression or load tests) from within Silk Central, and they are also aggregated into a higher-level dashboard view of overall application quality status.

Manage
Silk Central provides a central point of control from which to manage all quality activities. All stakeholders have access to the same quality information, providing a consistent and up-to-the-minute view of application quality status. Because all quality assets are maintained in Silk Central’s central repository, users have early visibility into potential application quality issues and can manage them proactively. Silk Central’s quality dashboard and extensive reporting capabilities provide strong decision support for the inevitable decisions that need to be made regarding resource allocation, scope, schedule and, ultimately, application release readiness.

Improve
Silk Central can help an organization improve quality on an on-going basis. Since all test assets (actual requirements, test plans, test scripts, test results, coverage and quality metrics) are maintained in a central repository, assets can be easily reused from one build to the next and from release to release. All of the test assets, together, serve as a quality baseline for the next iteration. Because tests can be reused and leveraged throughout the software application lifecycle—even when changes are made to the application—quality can be extended to cover more areas of the application, instead of efforts spent recreating the same tests. And with all stakeholders centrally accessing the same data appropriate decisions can be made about quality priorities from release to release.

Throughout each phase of the software application lifecycle, Silk Central captures key information about an application, such as its business requirements, functional and technical specifications, test plans, quality metrics and test results, whether from manual or automated testing activities. A centralized database stores all information and is accessible via the web to facilitate collaboration with everyone involved in the application lifecycle and to provide decision support. A centralized repository provides significant advantages over less efficient, decentralized methods of tracking information:

- **Improved data protection and management.** By centralizing information, Silk Central provides visibility, prevents data loss and dramatically improves the ability to manage distributed and outsourced testing activities.

- **Single data entry.** Each piece of quality-related data is entered only once, yet accessible to all quality stakeholders. When a record is modified, records linked to it are automatically updated.

- **Reporting and collaboration.** Each application stakeholder requires different levels of information. With a central repository, it’s easy to sort and report on the information necessary to make informed business decisions. And shared access promotes collaboration and communication, creating new efficiencies that shorten release cycles.

- **Security.** User access levels can be defined to ensure appropriate confidentiality and protection of data.

- **Comprehensive integration.** Data can easily be shared with other third-party, quality-related applications as well as the complete range of Silk products, including:
  - Silk Test, for automated functional and regression testing.
  - Silk Performer, for enterprise level load and performance testing.
  - Caliber, for business requirement management and elicitation.
  - Silk Central Issue Manager, for defect tracking and resolution.

Requirements Management, Test Planning, Test Execution, Issue Tracking and Reporting
As the industry’s most robust and flexible web-enabled test management solution, Silk Central’s five modules—Requirements Management, Test Planning, Test Execution, Issue Tracking and Reporting—represent the five key elements that make up an effective quality management effort. Seamlessly integrated, these modules provide for a transparent flow of information throughout all phases of the quality process.

Requirements Management
Silk Central provides the framework needed for testing organizations to capture, organize and document key business requirements—and then verify that they are testable. With shared access to these requirements, development and testing teams can work in parallel. As developers begin to build the features specified in the requirements, QA can create the test strategy and test plans.

Silk Central provides a central repository for storing requirements from several leading requirements management solutions, such as Rational RequisitePro, Micro Focus Caliber and Microsoft Office. Once imported into the Silk Central repository, requirements can be linked to their respective test cases. By capturing a history of requirements, including modifications, Silk Central enables users to determine the impact of changes on a test plan or release schedule.
Test Planning

With clear insight into which features must be tested to meet key requirements, quality personnel can design the most appropriate test—defining the nature of the test (manual or automated), test type (regression, functional or performance), level of testing (unit, system, integration or pre-production release), and platforms, environments and technologies to be tested, in addition to aligning test efforts with quality goals such as risk mitigation. The new manual execution planning approach assists you in selecting, distributing, and executing those manual tests that result in best achieving your quality goals under given time and resource constraints.

To stay focused on the important high-risk areas, testers can then integrate requirements into all test cases, scripts, scenarios and overall test coverage. To help determine test design priorities and eliminate the opportunity for inefficiency prior to moving to the test execution phase, testers can analyze and report on their test plan and map results against the pre-defined goals to determine how well the plan meets their stated objectives.

Test Execution

Through its web portal, Silk Central provides anytime, anywhere access for centralized test scheduling and execution—even when testing activities are distributed across remote labs in different time zones. From a single test script, users can simultaneously schedule and run multiple tests covering different browsers, operating systems and environments, in multiple locations. And, as new builds become available, test re-runs are automatic. In addition, the new dashboard in Test Manager provides for levels of personalization, the likes of which you've never seen before. You can customize it by adding and arranging various panels, which give you the information you need, at a glance, for your daily work. Quality personnel can even trace tests against requirements to prove compliance with industry regulation and standards.

Issue Management

Silk Central provides comprehensive integration for leading third-party defect tracking systems such as IBM Rational ClearQuest, as well as Silk Central Issue Manager, a web-based issue tracking tool that automatically records defects, tracks their status and monitors resolution across multiple products and releases. Requirements can be linked to a...
specific defect—ensuring traceability throughout the software application lifecycle. The integration features a flexible workflow that enables developers to easily reproduce the defect for rapid resolution. Best of all, it is fully customizable to meet the needs of any business environment. Silk Central also provides integration to other defect-tracking systems.

**Personal Dashboard Reporting**

**Reporting**

With Silk Central’s flexible and robust reporting capability, all quality stakeholders have immediate access to the same, up-to-the-minute information they need, when they need it. Test teams and developers can view in-depth reports containing granular-level detail, while management can obtain high-level visibility into the testing process and the progress made against the overall project plan. Personal dashboards and reports deliver targeted information to ensure a clear focus and direction on the status of activities for informed, go or no go decisions.

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**Figure 8.** Find Fix Deferred Issue Management Overview

**Figure 9.** How many issues have testers raised?

**Figure 10.** Issue Status over time period

**Figure 11.** Quality Overview report
Each stakeholder can then choose from an array of built-in reports covering the entire testing process—or create custom reports to meet specific reporting needs. Providing home page and reporting that focuses testers and test managers on current projects and activities with the flexibility to customize the report panels to suit individual needs improves effectiveness and focus within work.

Silk Central also allows organizations to more effectively manage application quality and accelerate time-to-market—even when applications integrate diverse components, technologies and platforms across a global computing environment. As a web-enabled quality management solution, Silk Central provides the visibility into application quality status that is necessary to make faster, more informed decisions and to foster collaboration and communication among distributed teams and projects.

Summary
Initiatives that improve the delivery of software projects help companies move their software quality efforts into the 21st century and more effectively align application quality to support business needs—such as faster time-to-market, improved customer satisfaction and competitive advantage. By eliminating the risks inherent in traditional quality management programs, organizations can minimize costs and maximize the potential for application success by adding discipline and structure to the testing process and working toward continuous improvement of the application release process.

As an end-to-end global quality management solution, Silk Central serves as the hub for pre-deployment quality activities and provides a more efficient and effective way of managing quality-related activities. Silk Central builds best practices into the software quality process and promotes collaboration between teams so they can:

- Work from one, consistent definition of quality goals to help meet stated business goals.
- Gain clear visibility into the overall quality process.
- Measure quality progress against defined goals.
- Leverage quality assets—from one phase in the software application lifecycle to the next, from one build to the next and from one release to the next—to extend coverage and continually improve software quality.
- Proactively manage quality issues by gaining early insight into potential areas of concern.
- Accelerate time-to-market and engage in sound decision-making regarding release readiness.
- Attain business goals and return value to the organization.

Silk Central Feature Summary
- Advanced Manual Execution Planning supporting resource capacity, time planning and quality goal driven testing.
- Risk Based Testing driving testing according to your business risk and priorities through definition of quality goals.
- Personal Dashboards & Analytics.
- Comprehensive management of unit tests across all development areas.
- Data driven manual testing.
- Automatic code coverage for manual and automated tests, with the additional benefit metric to guide test planning.
- Configuration Testing.
- Powerful (virtual) dynamic hardware provisioning and load resource management.
- Custom Information dashboard presenting external information and hyperlinks.
- Shared Libraries across projects.
- Platform and process agnostic runs tests cross environments and implements your processes.
- Test Creation based on Requirement Visualizations
- Cross Browser Support for IE/Firefox/Chrome.
- Tool agnostic so open to any Requirements Mgmt./Issue Mgmt./Testing/Source Control Tool.