

# Technology Audit

## Application Development

### Borland Lifecycle Quality Management v1.0

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#### Abstract

Borland’s Lifecycle Quality Management (LQM) is a solution set that offers integrated technologies and services that align requirements, development activities, test automation, and test management to potentially improve the quality of delivery by ensuring that quality is addressed in every phase of the development lifecycle. By assuring the quality of requirements themselves, and also that development teams have processes to detect and isolate defects earlier, visibility into quality can be increased. This major benefit can be gained throughout the ownership lifecycle as requirements change, so the benefits of reduced errors (and therefore reduced costs of non-compliance and re-work), and speedier achievement of code that meets specification, are repeatable, increasing the value that LQM can deliver. LQM emphasises proactive, full-lifecycle activities, aimed at increasing the quality of requirements and test cases, supporting continuous testing and improving build quality, and making these applicable repeatedly throughout phases of the software delivery lifecycle. This focus ensures that when tests are finally executed, they are aligned and integrated with the business requirements at the time. This is the first release of the solution set, following Borland’s acquisition of Segue (the source of the testing-related capabilities) in 2006. Butler Group is impressed by the vision of requirements-based testing extolled by the company, which promises benefits that may accrue to be substantial, as they are repeatable over the software ownership lifecycle. Although a number of helpful integrations are available, including many which customer organisations will find particularly valuable in enabling them to work with popular third-party tools, there is still work for Borland to do in integrating the solution components. Nonetheless, Borland now has an impressive capability range, providing tools to address several types of testing, and mature requirements management tools – many organisations looking to address the compliance, efficiency, and quality issues that arise in application development will find Borland LQM well worth consideration.

#### KEY FINDINGS

Key: ✓ Product Strength ✗ Product Weakness ⓘ Point of Information

✓	Enables testing to be requirements-driven, and applied earlier in the application lifecycle, potentially reducing cost of errors and re-work.	✓	Potentially delivers long-term benefits, throughout the software ownership lifecycle.
✓	Good range of integrations available with third-party, and other Borland, products.	✓	Supports testing of applications across a wide range of heterogeneous platforms.
ⓘ	Some elements are dependent on Windows platforms.	✗	Borland has further integration work to do between some components.

#### LOOK AHEAD

LQM enhancements will continue to focus on workflow, traceability, visibility, and control of key processes associated with individual LQM capabilities, as well as integration within the solution, and with some maturing technologies in the industry.

► **FUNCTIONALITY**

**Product Analysis**

The Borland LQM solution answers the need to increase quality, efficiency, and compliance around software testing activities. It focuses on business, functional, and performance requirements, and enables organisations to ensure that these are addressed throughout the lifecycle of software ownership, and at as early a stage as possible. The solution provides the framework for following iterative cycles of planning, measurement, management, and improvement of both testing activities and the underlying assets (e.g. scripts), and in effect can bring a process optimisation approach to an organisation’s testing regime. It provides management or practitioner capabilities for a number of types of testing, as follows:

- Software test management, enabling a process-driven approach for planning, documenting, and managing the entire testing process.
- Software performance testing, the load and stress testing of applications to identify and diagnose performance bottlenecks.
- Software functional testing, to ensure that the features and functionality meets end-user expectations and business requirements.
- Requirements-based testing (RBT), to ensure the alignment testing priorities with business requirements.
- Continuous build and test automation, providing automated testing, integration, and validation facilities that are particularly suitable for development using the Agile methodology.

The Borland products within the solution combine variously to provide these types of testing, as summarised in the following table:

Product	Type of Testing	Requirements-based Testing	Performance Testing	Functional Testing	Test Management	Continuous Automation of Build and Test
SilkCentral Test Manager (SCTM)		✓	✓	✓	✓	
Caliber DefineIT		✓		✓		
Caliber RM		✓				
Silk Test		✓		✓		
SilkPerformer		✓	✓			
SilkPerformer SOA Edition			✓	✓		
SCTM Manual Testing Client				✓		
Gauntlet						✓

RBT is a relatively recent focus for Borland, and the company highlights the potentially significant cost reduction from being able to automate (to an extent) the connection between requirements and testing, compared to the involved and expensive processes that would be needed to achieve this manually. The requirements management tools can be used to ensure that requirements information captured is of good quality, to improve the collaborative processes used to agree the requirements, and also to validate their completeness. LQM provides facilities to generate logical test cases directly from the requirements, thereby helping to enable functionality to be tested from the viewpoint that is agreed by business users.

## Product Operation

SCTM is used by testing managers to plan, manage, and visualise the overall testing activities. Test planning encompasses any type of testing, including that undertaken manually, and Borland provides the SCTM Manual Testing Client so quality assurance engineers can effectively execute manual tests and enables results of such tests to be recorded and integrated with other results. SCTM allows the user to define when tests will be run, on what type of machine, and what interdependencies should control the sequence of testing (e.g. whether success must be achieved in one test before another is run). When planning testing of changed applications, the user can define whether all components should be retested, or select specific components, and SCTM automatically selects the appropriate tests. All test scripts are formally controlled within a central repository, thereby addressing compliance requirements.

Test results are managed within SCTM. Defect tracking and change control can be performed using StarTeam or other leading third-party defect tracking tools. As well as with the Borland testing tools, it provides integration with JUnit and NUnit, and facilitates integration with third-party testing tools, such as Mercury, or with open source testing tools, and facilitates the creation of plug-ins to cater for further integration needs. SCTM provides a number of out-of-the-box reports, covering management concerns such as test coverage of requirements, and bug fix rates. Any report can provide drill-down into the details of individual test executions, and results and issues. Reporting can be enhanced by using additional user-configured attributes that can be incorporated within querying and filtering. SCTM also allows new reports to be defined (which can incorporate any data from the repository), and a number of delivery mechanisms can be chosen (e.g. Excel, XML stream into Crystal Reports, or Eclipse BIRT, which is provided with SCTM).

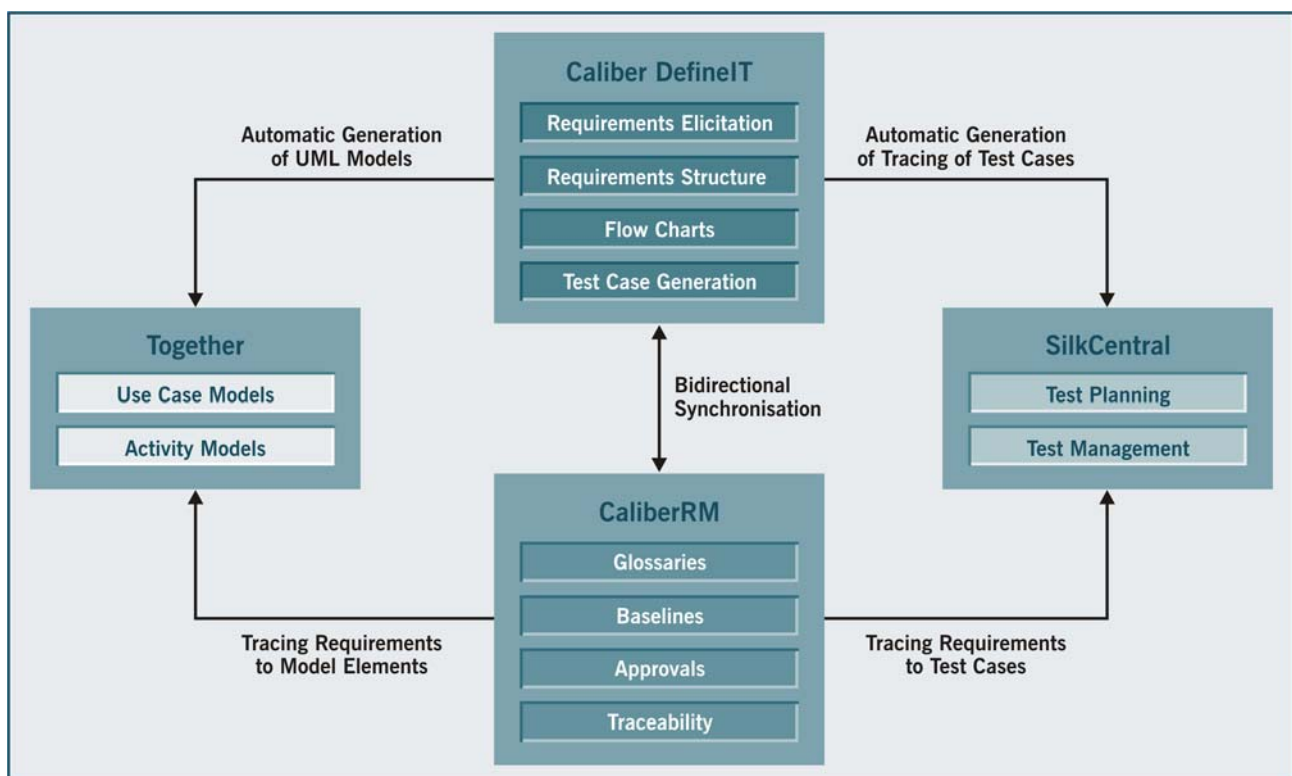


Figure 1: Borland's RBT Solution Architecture

Caliber DefineIT is a requirements elicitation tool that helps provide both text and storyboard explanations of the business' requirements, it can generate test cases and scenarios which, via its integration with SCTM, can be used in test planning and management processes. As SCTM provides centralised test management, it can trace whether test cases have been successfully executed, and therefore whether particular requirements have been covered by testing. Caliber RM allows requirements to be managed and tracked throughout their lifecycle, and includes functionality to facilitate approval and change management but also provides traceability to test cases via this product's integration with SCTM. Both of these requirements management products are also integrated with Borland's Together modelling and design tool (although it should be noted that this is external to LQM), which enhances visualisation of how the requirements map to application structure and provides further modelling insight via, for example, use cases and activity diagrams. These processes and integrations are illustrated in Figure 1.

SilkTest is a GUI-based tool for testers that supports functional, regression, cross-platform, and internationalisation testing of code that is driven by a client-side user interface. It enables scripts to be recorded, and subsequently modified or extended, and maintains a centralised library of scripts, which encourages re-use. It uses execution agents that allow the same script to be run on different machines, and it can simulate executions by multiple users. Both .NET and J2EE environments are supported directly, without testers needing to take this into account.

SilkPerformer is used for testing the performance and scalability of server-side code, enabling multiple tests to be run together, and measuring the results to highlight and diagnose performance issues. Many metrics are used to identify performance at different points in the transaction architecture, including the user interface, processor, memory, and database. Diagnostics reporting integrates the client and server monitoring, and includes root cause analysis features. SilkPerformer SOA Edition has specialist capabilities for testing components designed to operate in a Service Oriented Architecture (SOA) environment, where performance analysis is more complex due to the potential for the design of frameworks (rather than solely the application) to influence performance.

Gauntlet operates on the server side, at the point where development teams interface with version control systems, continuously analysing changes to provide visibility into code quality, stability, and compliance. Gauntlet also helps ensure quality and enforce software development policies by isolating problematic code in 'sandboxes' until they pass required tests, at which point Gauntlet will automatically integrate the changes into the main code line. Gauntlet serves an important role in quality improvement by providing visibility and quality control earlier in the application lifecycle.

Scalability and fail-over are addressed by product architectures that allow individual components of the solutions to be installed on different, distributed machines. SCTM provides multiple front end, Web server, components for quick access to the solution. Delivery of complex graphics, such as those in complex charts, can degrade performance, and so LQM can configure multiple Chart servers. The application server contains the business logic, and the execution server components (which can be remote) provide the script execution functionality and connectivity to third-party test execution tools. Metadata assets are stored in a SQL database, and file-based assets are stored in a configuration management database (e.g. StarTeam). SilkPerformer provides scalability through its agent technology, allowing for a two-tier scaling of load (using agents and the number of virtual users).

## Product Emphasis

The LQM solution helps organisations to deliver applications and systems that meet or exceed both functional and performance requirements, from the beginning and throughout the asset lifecycle. By enabling organisations to implement and follow well-defined processes involving planning, measurement, management, and improvement, and connecting all types of testing with requirements (even as they change), it can allow significant reductions in the cost of re-work that results from defects found during software development.

## ► DEPLOYMENT

Typically a mix of different skill sets is needed to deploy the solution. For example, SCTM administrator tasks include the configuration of locations for application, Web, and chart servers; setting up and maintaining repositories and notification settings; creating accounts; and configuring locations and execution servers. For testing products like SilkPerformer or SilkTest some administration is needed for setting up and configuring the product. Mainly technical skills, and those in basic programming or scripting, are needed for testing practitioners, and test developers also need domain knowledge to understand the business nature of the tests. Various levels of domain or technical knowledge are needed for the roles of Project Manager, Test/QA Manager, Tester, Analyst, and others.

Implementation timescales vary extensively depending on the scale of the project and the scope of the addressed business issue, ranging from as little as a few weeks (including training, installation, configuration, implementation, and results analysis for testing products) to months, for a staged deployment of a more comprehensive solution including several products. The nature of the solution's product makeup enables modular adoption to be an approach common to many customers.

The requirement for ongoing commitment of resources depends on the scale of the solution put in place, but Borland states that the need for administration of the products is very limited, and that they provide easy maintainability of test scripts and other testing assets. Borland would expect customers' own resources to undertake these tasks. The company provides training in three broad areas: End-User, Administrative, and Project Management. Additionally it also provides domain training about requirements that is not specific to products, and training on process enablement and best practice as part of its Borland Accelerate framework. Training delivery is conducted variously on-line, in classrooms at various Borland office locations, or on-site at customer premises. Key classes are summarised in the following table:

Product	Course	On-line	Classroom	On-site
General Training	Software Quality Optimisation Foundation		X	X
SCTM	Managing Quality with SCTM	X		
SilkTest	Verification Testing with SilkTest	X	X	X
SilkTest	Advanced Testing with SilkTest	X	X	X
SilkTest	Testing Dynamic Applications		X	
SilkPerformer	Modelling and Implementing Load Tests	X	X	X
SilkPerformer	Testing SAP Applications	X		
SilkPerformer	Results Analysis and Correlation	X	X	X
SilkPerformer	BDL Scripting Techniques I	X		

Borland provides three levels of support, which cover customers as per the detailed descriptions in the following table:

Support Level	Premium	Advantage	Software Assurance
Number of incidents covered	Unlimited	Unlimited	Three per Year <sup>1</sup>
Number of authorised contact names	Five	Two	One
Access to updates and upgrades	Yes	Yes	Yes
Access to the Borland on-line Knowledge Base	Yes	Yes	Yes
On-line support incident submittal and tracking; full access to Borland Support Online	Yes	Yes	Yes
Priority for submitted support incidents	Yes	No	No
Telephone access to the Borland Support Center during regional business hours	Yes	Yes	Yes
Critical failure support, including patch provision in critical situations where a deployed system is inoperable	Yes	No	No
Defined response time goals, linked to the support incident's severity	Yes	No	No
24x7 Emergency Support	Additional	N/A	N/A
Extended Support for de-supported products	Additional	N/A	N/A
Global Support	Additional	N/A	N/A

Note 1 – in Software Assurance, the support element of the service is provided until the predefined number of incidents has been used or 12 months have elapsed, whichever comes first. The maintenance element of the service is always provided for the full 12 months.

Installation support is available predominantly on Windows platforms, with certain components available on non-Windows platforms. The user interface for SilkCentral Test Manager is Web browser-based for the users. Although the testing products such as SilkPerformer are Windows-based, they support testing of applications regardless of the platforms used by client and server components of those applications. The only dependency on an external product is that of SilkCentral requiring an SQL database, which can be Oracle, or Microsoft SQL Server.

A number of out-of-the-box integrations (via a large number of APIs and an efficient plug-in technology) with legacy or third-party products allow effective use of existing investments, strengths, and assets. For example, SCTM provides integration to requirements management systems including (but not limited to) CaliberRM, IBM® Rational® Requisite Pro, and Telelogic® DOORS, as well as Microsoft Office components commonly used for requirements, such as Excel or Word. Integrations to defect tracking systems include Borland StarTeam, IBM® Rational® ClearQuest, Issue Tracking Web Service, and Bugzilla. Supported version control systems include StarTeam, Microsoft Source Safe, Serena®PVCS, CVS, Subversion, and MKS Source Integrity: third-party testing tools can also easily be integrated. SilkTest, SilkPerformer, CaliberRM, and DefineIT also provide individual integrations.

Within SCTM, standard parts include test requirements management, test planning, test execution for automated and manual tests (the latter via the built-in manual testing client), and defect tracking and reporting. Licensing is provided for named users, or concurrent users, in both cases either perpetual or term-based.

SilkTest's standard parts include the IDE, agents, Extension Kit API, and TrueLog Explorer. Licensing is provided for named users, or concurrent users, in both cases either perpetual or term-based. To enable parallel testing on distributed machines, a number of SilkTest replay-only versions (called SilkTest Runtime) should be bundled with SCTM. SilkTest Runtimes are available separately to accommodate lab environments where execution-only capability is required to test multiple platforms or configurations without requiring full-feature licenses.

SilkPerformer's standard parts include SilkPerformer Workbench, agent, Silk Performance Explorer, and TrueLog Explorer. Optional parts include the Server Analysis Module, and virtual users for load testing can be purchased from Web, Standard, or Premium categories (a minimum of 25 applies). Licensing is available on a node locked or concurrent basis, in both cases either perpetual or term-based.

For SilkPerformer SOA Edition: the standard parts include, SilkPerformer .Net Explorer or SilkPerformer Java Explorer, Silk Performance Explorer, Silk TrueLog Explorer, and SilkPerformer SOA WorkBench to run concurrency test with up to five virtual users. Optional parts include the Server Analysis Module. Virtual users for testing can be purchased from Web, Standard, or Premium categories (a minimum of 25 applies). Licensing is provided on a node locked or concurrent basis both perpetual or term based.

Caliber Analyst is a bundling of two products: CaliberRM (which focuses primarily on Requirements Management) and Caliber DefineIT (which focuses primarily on Requirements Definition).

## ► PRODUCT STRATEGY

The target market for LQM is Global 2000 organisations, and more generally those seeking an enterprise-class solution for optimising quality. Typically solutions sales are to IT executives or senior management. The finance, telecommunications, healthcare, and software production vertical sectors have been successful adopters, as they require tight controls for compliance, high frequency delivery cycles, standardisation of process and technology, and a direct link from software applications directly driving revenue. Borland sees the key benefits of LQM as being its enablement of risk mitigation, cost reduction, and efficiencies, and enhancement of profitability and competitiveness. The company estimates that customers can see the Return On Investment (ROI) amounting to 15% – 25% improvement in quality, 100% – 500% improvement in productivity, 25% faster time-to-market, and 15 – 25% reduction in operational costs.

LQM is sold direct via Borland's sales and services teams, and indirectly via an extensive partner and alliance programme that includes EDS, Accenture, Microsoft, Oracle, Atos Origin, SAP, T-Systems, Avanade, Getronics, and CapGemini. Borland has technology partnerships with Microsoft, SAP, Fortify, Mercury (part of HP), BMC Software, BEA, IBM Rational, and Sun Microsystems. Direct competitors are IBM Rational, Mercury, Compuware, and Microsoft.

Pricing is determined individually by product and service offering since customers typically purchase components of the solution based on their maturity and where they would like to see immediate improvement. Typically, customers begin with implementing one of the LQM point solutions (e.g. functional testing with SilkCentral Test Manager, Caliber DefineIT, and SilkTest) and undertake some process improvement services with some business users, and training courses, graduating later to a full lifecycle quality platform. For individual named user seats of the LQM products, prices start at between US\$1,700 and US\$2,000.

The total cost of deployments is considerably variable, as a range of solution scopes can be implemented. Small scale projects may cost less than US\$20,000, while large scale projects (e.g. involving complex or high-volume load testing) may easily be over US\$500,000. In most cases licence cost is the most significant part of total cost.

Borland provides support and maintenance at a standard typical rate of 20% of license cost annually. Support includes designating up to three contract contacts, and central support via telephone, fax, and e-mail, available during normal (local) office hours. Support agreements can be extended to provide 24x7 global support. Most customers can get support in their own time zone and language, and escalations are handled on a regional basis before being further escalated to Borland's Engineering organisation. Maintenance agreements entitle customers to all major releases (which are planned to be available twice per year) during the period of validity, and additional hot fixes or patches that may be released when necessary. Release of the following enhancements was planned for late 2006:

- LQM solution: Enhanced team efficiency and defect prevention; unification of project views and control across development and quality assurance functions; integrated support for developer testing; enhanced manual testing; and enhanced data-driven test support.
- SilkCentral Test Manager: Eclipse-based manual testing client; and enhanced data-driven testing.
- SilkTest: TrueLog for SilkTest, and technology updates (e.g. Windows XP 64-bit, Vista, and Internet Explorer version 7).
- SilkPerformer: load testing for fat client technologies: an Eclipse Java Framework plug-in; enhanced, real-time monitoring of user response times and those arising within JMX; enhanced integration with SilkCentral.
- Gauntlet: integration with SCTM to enable continuous functional and performance testing.

## ► COMPANY PROFILE

Borland (NASDAQ: BORL) has been an application development vendor since being founded in 1983, and by 1992 it had become a leading client/server tools provider. The mid-1990s saw a downturn in fortunes, but this was addressed by a focus shift from individual developer productivity to team productivity (in particular with the acquisition of Starbase Corporation, which brought the CaliberRM and StarTeam SCM solutions into the product mix), and therefore increased relevance to enterprise application development. A more recent restatement of focus towards Borland's SDO (Software Delivery Optimisation) vision brought the need to transform software development into a predictable and reliable business function, and the acquisition of Segue earlier in 2006 (and with it the testing-related capabilities within SCTM, SilkTest, SilkPerformer, and SilkPerformer SOA Edition) is a means of meeting this vision in part.

Borland's corporate headquarters are in Cupertino, California, and has major offices on the US East Coast, and in the UK, Germany, France, Austria, Singapore, Australia, Japan, The Netherlands, and Ireland (as well as smaller scale offices in many other locations). Following its series of acquisitions, the company now has around 1200 employees worldwide, of whom 55% are based in the USA, 30% in the Europe, Middle East, and Africa (EMEA) region, and 15% in Asia Pacific. Its Research and Development (R&D) function operates on a global scale, with development teams based in California, Russia, the Czech Republic, and Singapore, with 557 people undertaking roles in R&D or technical support. Borland also has 69 people active in marketing, 12 in legal roles, 15 in human resources, 151 in finance, and 501 in field operations (sales and services roles). Overall it expects to add 10% to the size of its workforce in the forthcoming 12 months.

Half of the company's revenues arise in the USA, 35% in EMEA, and the remainder from Asia Pacific countries. Borland's outline financial performance in recent financial years has been as follows:

Year	2005	2004	2003
Revenue (US\$ million):	277.0	309.5	295.2
Revenue growth:	(10.6%)	4.8%	20.7%
Net Income/(Loss) (US\$ million):	(29.8)	11.4	(40.5)

Borland states that approximately 3,000 organisations are customers of LQM. The company's total customer base in the wider Application Lifecycle Management (ALM) market is around 5,000 organisations, and in the even wider context of Integrated Developer Environment (IDE) tools which was once a major focus for Borland, it has millions of customers worldwide. The following is a list of a few major customers, with brief details of their uses of LQM within some of their organisations:

- EDS has approximately 5,000 user licences (and that is a growing number). The product is deployed in at least 5 countries, with a central hosting service based in Sydney, Australia, and EDS is aiming towards a global deployment).
- British Telecom (UK): Approx 3000 user licenses, deployed in more than 6 locations in the UK. Global Deployment (outsourcing support to India).
- Hewlett Packard (OpenView Division, Germany): 200 Deployed licenses in at least 4 countries (Japan, Germany, France, USA) Global Deployment.
- Jaguar Cars (UK): Approx 200 licences, mainly deployed at HQ in the UK. Departmental Deployment (Electrical Engineering).
- NOKIA (Finland): Approx 200 licenses, mainly deployed in Finland. Departmental Deployment.
- MetOffice (UK) – Departmental Deployment.
- ABN Amro (The Netherlands) – Departmental Deployment covering mostly the Benelux countries.
- ING Direct (Benelux) – Global deployment.

## ► SUMMARY

Having gained an extensive range of testing tools via the acquisition of Segue, Borland has created the LQM solution set to address customers' long-standing difficulties with ensuring that the right testing is carried out to meet business needs. This solution enables organisations to be assured of producing and maintaining high-quality requirements, and directly integrating the requirements with functional, regression, and performance testing so that organisations can directly generate outline test programmes from their requirements, and measure the coverage of requirements by their testing. As its requirements management tools can maintain requirements information through the ownership lifecycle, the considerable value that LQM enables organisations can be multiplied as requirements change, and need to be re-tested.

LQM gives organisations a direct, evidential link between requirements and tested applications, and enables managers to ensure that time spent on testing addresses the right areas to prove that business requirements have been delivered to agreed quality levels. This approach can save costs by avoiding wasted effort, and by reducing the errors that can be left in code that is mistakenly untested. The prospect of such visibility, efficiency, and assured compliance, is likely to arouse the interest of many IT executives and managers – Butler Group believes that it is long overdue, and that Borland has a potential winning combination with LQM.

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