IBM’s SOA Quality Management Strategy with Rational and Tivoli

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What is IBM SOA Quality Management?

SOA Quality Management is the process to assure services meet business requirements by validating service functionality and operations throughout the SOA Lifecycle.

SOA Quality Management is continuous and takes place within each phase of the SOA Lifecycle.
SOA characteristics & testing challenges

- Business driven development
  - Effective quality management calls for understanding of the business processes across several composite applications

- Agile architecture that enables business flexibility
  - Ever changing environment requires agile and continuous testing

- Loosely coupled business processes and services
  - No assumption can be made on how a service will be used
  - No control over the entire solution under test

What keeps me Rational?
SOA characteristics & testing challenges

- Abstract and GUI-less services
  - No user interface directly available to interact with the services
  - Hide the business logic to be tested
- Reusable services
  - One under-performing service could slow down several composite applications
  - Impact of one single service failure can be catastrophic
Other SOA Testing Challenges

- Atomic and Composite services are headless
  - No User Interface to easily play a test

- Test of business processes by non-technical subject matter expert

- Level of reuse of the services
  - High impact of low quality services

- Services are loosely-coupled
  - No end-to-end predefined scenarios Testing at the service and end-to-end levels

- Interoperability, conformance, security penetration...

- Support of SOA standards and specific implementations
  - WSDL, SOAP, UDDI, HTTP, JMS, WS-Security, …
Why is testing SOA systems different?

A Service Oriented Architecture is composed of multiple layers. At the heart of SOA are services and components that realize services.
## Business Pains, Needs, and Features

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<th>Pain</th>
<th>Need</th>
<th>Feature</th>
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| Late detection that key business requirements have not been met. | **Minimize cost of defects**  
  • Test services as soon as possible while developing SOA applications.  
  • Allows the non technical user to test the functionality of Web services to ensure they meet business requirements | **Script-less automated functional testing of Web Services**  
  • Users record or define test cases using a graphical editor. Test cases are made from a sequence of Web Services calls, and verification points. Test cases can be run unattended, and test results are automatically generated with a global verdict. |
| Loss of revenue and decrease in customer and partner satisfaction (loss of customer/partner loyalty, return customers/partner, etc.) | **Ensure service functionality and performance uptime**  
  • Assess the performance of SOA applications and of individual Web Services to plan the future system capacity.  
  • Pinpoints the area of the SOA application that under performs. | **Load testing of Web Services with System Resource and SOA Monitoring**  
  • Users define a test schedule using a graphical editor. Test schedules can model complex performance load model, and run several test cases in parallel deployed on local and on remote machines. Test results are displayed on-the-fly in a set of charts which optionally visualize the resource consumption.  
  • Validate the SOAP messages against the Web Services standards. |
| Inability to leverage existing assets and distributed team | **Leverage globally distributed workforce and heterogeneous and existing environments**  
  • Ensure that the Web Services can be consumed by a client developed in a heterogeneous environment. | |
The test market is changing... 

Test is evolving into quality management

What keeps me Rational?
Challenge: Validating SOA component functionality & performance

Ensuring functionality of composite application units

Web Services are the building blocks of SOA applications. A single service is a stand-alone component but may be used in dozens of systems. Some of those services will be yours, some not. How do you test a service without the rest of the system? Does it work? All the time? Under load? Are you sure?

“The Web Service is ready for testing, but there is no user interface to exercise it.”

“We don’t want to pull Programmers off their projects to write complex test harnesses.”

“How can we leverage our Business Process analysis in our services testing efforts?”

What keeps me Rational?
Challenge: Post Deployment Monitoring of Services

Creating a feedback loop from operations to development

Congratulations you’ve gone live. How are things going out there? Do you know? What happens when you need to make a change? And what if operations found a problem – how would it get back to development? *Do these groups communicate?*

“How can I monitor web services running on many different platforms against thousands of users?”

“How do I change policies and ensure those changes don’t break the implementations?”

“How can I communicate problems found in the field back to development?”

What keeps me *Rational?*
Quality Management of Service Oriented Applications

The IBM Rational Solution.

The IBM Rational Solution is a three pronged approach:

- Traditional user centric requirement, test and defect management
- New Web Service Quality functionality to address building blocks of SOA Apps
- Post Deployment monitoring of service oriented architecture applications
Quality management

An integral part of SOA Governance & Service Lifecycle Management
Quality Management must occur in every phase of the lifecycle!

- Validate the business requirements
- Discover and assess against current services
- Model service requirements
- Create service update plan
- Create/modify the service to meet the business requirements
- Assess service against governance policies
- Approve assembly completion
- Manage & monitor the service throughout its lifecycle
- Track the service in the registry
- Report on the service against SLAs
- Quality assure the services
- Function testing
- Performance testing
- Compliance testing
- Approve service deployment
IBM’s Toolset

What does the toolset provide?
- Automate business processes to achieve improved business flexibility
- Proactive response to quality issues earlier in the lifecycle
- Collaborative process automation & enforcement
- Extensible framework and registry/repository

Define, approve & monitor
- Rational Portfolio Manager
- Rational ClearCase
- Rational Asset Manager

Design, code, build
- Rational Application Developer
- Rational Build Forge

Create, document and prioritize business requirements
- Rational RequisitePro
- WebSphere Business Modeler

Deploy, build & monitor in production environment
- Tivoli Composite Application Manager
- Tivoli Provisioning Manager

Evaluate & execute functional & performance test cases
- Rational Tester for SOA Quality and Performance Tester Extension for SOA Quality
- Rational ClearQuest

What keeps me Rational?
IBM Rational Asset Manager

- Collaborative asset management to identify and manage assets & ROI best practices
- Manages assets across their lifecycle from design/creation to consumption/change
- Manages service creation & reuse across service oriented architectures (SOA) projects
- Leverages an extensive library of process best practices for asset creation & reuse in Rational Method Composer (ABS, SOA, GDD, etc.)

What keeps me *Rational*?
Rational Asset Manager works seamlessly with the IBM Software Delivery Platform

- Develop code in a team environment
- Create and package assets
- Search for and reuse assets
- Track and fix problems
Seamlessly! All in the same IDE!

Eclipse based Rational Software Delivery Platform
Service Quality Management

Functional and Performance Testing of Web Services from a common interface

Rational Tester for SOA Quality
Automated regression and functional testing for GUI-less Web services

Rational Performance Tester Extension for SOA Quality
Performance Testing for Web Service based applications
IBM Rational Tester for SOA Quality

*Automated regression and functional testing for GUI-less Web services*

- Script-less automated functional testing of web services
- Automated data correlation and data driven testing
- A graphical test editor, allowing for both high-level and detailed test views
- Interoperability of web services
- Java code insertion for flexible test customization
- Windows and Linux user interface
- Support for Windows, UNIX, Linux and z/OS
- Supports Web services standards
- Test creation from WS-BPEL business processes

What keeps me *Rational*?
IBM Rational Performance Tester Extension for SOA Quality

Performance testing for Web service-based applications

Includes all features of Rational Tester for SOA Quality plus:

- Load testing of Web services
- Real-time reporting of server response time and throughput
- A graphical schedule editor for workload and user population modeling
- System resources and transactions monitoring of SOA applications
Create a Test

**Record**

- **Given only the Web Services description (WSDL)**
  - Uses the open source Eclipse WTP Web Services Explorer
  - Automatically create web pages to interact with the Web Services
- **Given an existing client application**
  - using an HTTP proxy
  - using API-level probes on Apache Axis
- **Automatic Identification and Correlation of Variable Data (SOAP, Cookies)**

**Generate from BPEL**

- **Business Process Execution Language (BPEL)**
  - Generate Web service tests based on paths in BPEL

**Hand code**

- **Given only the Web Services description (WSDL)**
  - Create Web service tests by manually adding elements to test
Record from Web Services Explorer

Three recording modes for Web Services

Web Services Explorer client

What keeps me Rational?
Generate from BPEL

What keeps me Rational?
Hand code

What keeps me Rational?
Enhance a Test

- Visual Test Editor
  - Tree view of operation calls and responses
  - Interactively update responses
  - Multiple views of the SOAP message (Raw XML, Values, Structure)
  - Transport Protocol & WS Security Configuration

- Test Editing
  - Data pooling
  - Manual Correlation (SOAP, Cookies)
  - Verification Points (SOAP, MIME)

What keeps me Rational?
What keeps me Rational?

Tree-oriented test view

Multiple views of parameter data

Interactively update return values
Verification Points, Correlation, and Datapooling

Four types of verification points

Operation call correlated to prior return message

Datapool reference
Execute and Analyze - Functional Testing

- Run a single test or a suite of tests
  - From the tool user interface
  - From command line (batch mode)
  - From ClearQuest Test Manager

- Functional Test Report
  - Global verdict
  - History execution view with all the messages including the verification verdicts
What keeps me Rational?
Workload Scheduling - Performance Testing

- **Create**
  - Record
  - Generate from BPEL
  - Hand code

- **Enhance**
  - Enhance

- **Execute & Analyze**
  - Execute & Analyze

- **Workload Schedule**
  - Workload Schedule

- **Powerful and flexible scheduling**
  - Visual schedule editor for no code scheduling
  - Coordinate timing and dependencies
  - Accurately model real users workloads
  - Dynamically increase the load during the run

- **Tests are assembled for execution**
  - Schedule defines order and sequencing of script execution
  - Schedule defines physical agents to be used to generate load

What keeps me **Rational**?
Execute and Analyze - Performance Testing

- **Performance Test Report**
  - On-the-fly results
  - Detailed Response Time Data Presented in Charts and Table
  - Export to HTML

- **Simultaneously monitor resources utilization during the test**
- **Identify the Root Cause of Performance Problems**
  - Through the integration with Tivoli monitoring tools

What keeps me **Rational?**
Performance Reports

What keeps me Rational?

- Server response time of Web service
- User action throughput
Operationally Manage Service Quality with ITCAM

- **Performance Monitoring and Transaction Management**
  - Populate WSRR with live service performance data
  - **NEW!** Response Time dashboards - 2Q ‘07

- **Change and Configuration management**
  - DataPower configuration support
  - Reroute services by making changes and upgrades while staying in full production mode
  - Auto-discover services for populating WSRR with services information

- **Health Monitoring of SOA components** – ESB, Process Server, DataPower
  - **NEW!** Application Management dashboards for IT and business reporting supports Web Services, ESB and Process Server – 2Q ‘07

What keeps me **Rational**?
Tivoli Provisioning Manager (TPM) will assist SOA Quality Management

Leveraging the service artifacts improves the deployment of composite applications

- Dependency Checking
  - Analyzing the environment to ensure the change will be successful

- Integrity Checking
  - Analyzing relationships and the impact the change will have on them
Rational Software Solutions in Action

**Business Executive**
- Model business goals: Websphere Business Modeler
- Identify key business goals: Rational RequisitePro

**IT Executive**
- Establish change management process for development: Service Oriented Modeling (SOMA)
- Establish change management process for operations: RMC (RUP & TUP)
- Track Service Development: Rational Portfolio Manager

**Developer**
- Discover service for reuse / publish service: Rational Software Architect (RSA) / RAD Rational Asset Manager
- Manage and build run time assets: Rational ClearCase Rational Buildforge

**Tester**
- Test Changes:
  - Rational Tester for SOA Quality
  - Rational Performance Tester Extension for SOA Quality
- Ensure signoff and create audit trail for change: Rational ClearQuest

**Deployment Manager**
- Track service information: Tivoli ITCAM for SOA

**Note:** The boxes highlighted in blue have Rational Software solutions.

**What keeps me Rational?**
### Quality Management of Service Oriented Applications

**A complete solution**

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<th>Enable quality management throughout the lifecycle</th>
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<td>Continuous, comprehensive, and collaborative quality management throughout the lifecycle reduces costs and improves credibility</td>
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<th>Ensure business flexibility</th>
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<td>Functional and performance testing of business services helps ensure compliance and improve customer satisfaction</td>
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<th>Enhance organizational efficiencies</th>
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<td>Automating workflows across business processes by streamlining and eliminating redundancies to improve return on investment</td>
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*IBM Rational software quality management: Connecting software results to business objectives*
IBM SOA quality management

Comprehensive and collaborative solution to address triggers across the SOA lifecycle

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<th>Client Need</th>
<th>Solution</th>
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<tr>
<td>Development or modification of SOA Services</td>
<td>End-to-end Quality Management Process and Tools</td>
<td>- GTS Quality Management</td>
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<tr>
<td>Drive for Service Reuse</td>
<td>Create cross-LOB and IT Quality standards accepted by both Business and IT</td>
<td>- Rational Tester for SOA Quality &amp; Rational Performance Tester Ext for SOA Quality</td>
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<tr>
<td>Business requirement for improved flexibility</td>
<td>Ability to modify and test services already deployed</td>
<td>- Tivoli Composite Application Manager for SOA</td>
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<td>Provide proof of Service Quality</td>
<td>Track and report on Service Quality throughout the life of the Service</td>
<td>- GTS Quality Management Services</td>
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What keeps me **Rational**?
Next Steps – Learn and Explore

- Additional Product Information
  - www.ibm.com/software/rational/offers/testing/performance/

- Download Evaluation Software

- Developer Works Community
  - Forums, Tutorials, Tech Notes, etc…
Questions

What keeps me Rational?
Thank You

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