

Service-Oriented Architecture Quality Management & Testing Best Practices

Christophe Telep

Product Manager, IBM Rational

christophe.telep@fr.ibm.com



IBM Rational Software Development Conference 2008

WHERE TEAMS ARE **R-HEROES**



What is

... a service?

A **repeatable business task** – e.g., check customer credit; open new account

... service orientation?

A way of integrating your **business as linked services** and the outcomes that they bring

... service oriented architecture (SOA)?

An IT **architectural style** that supports service orientation

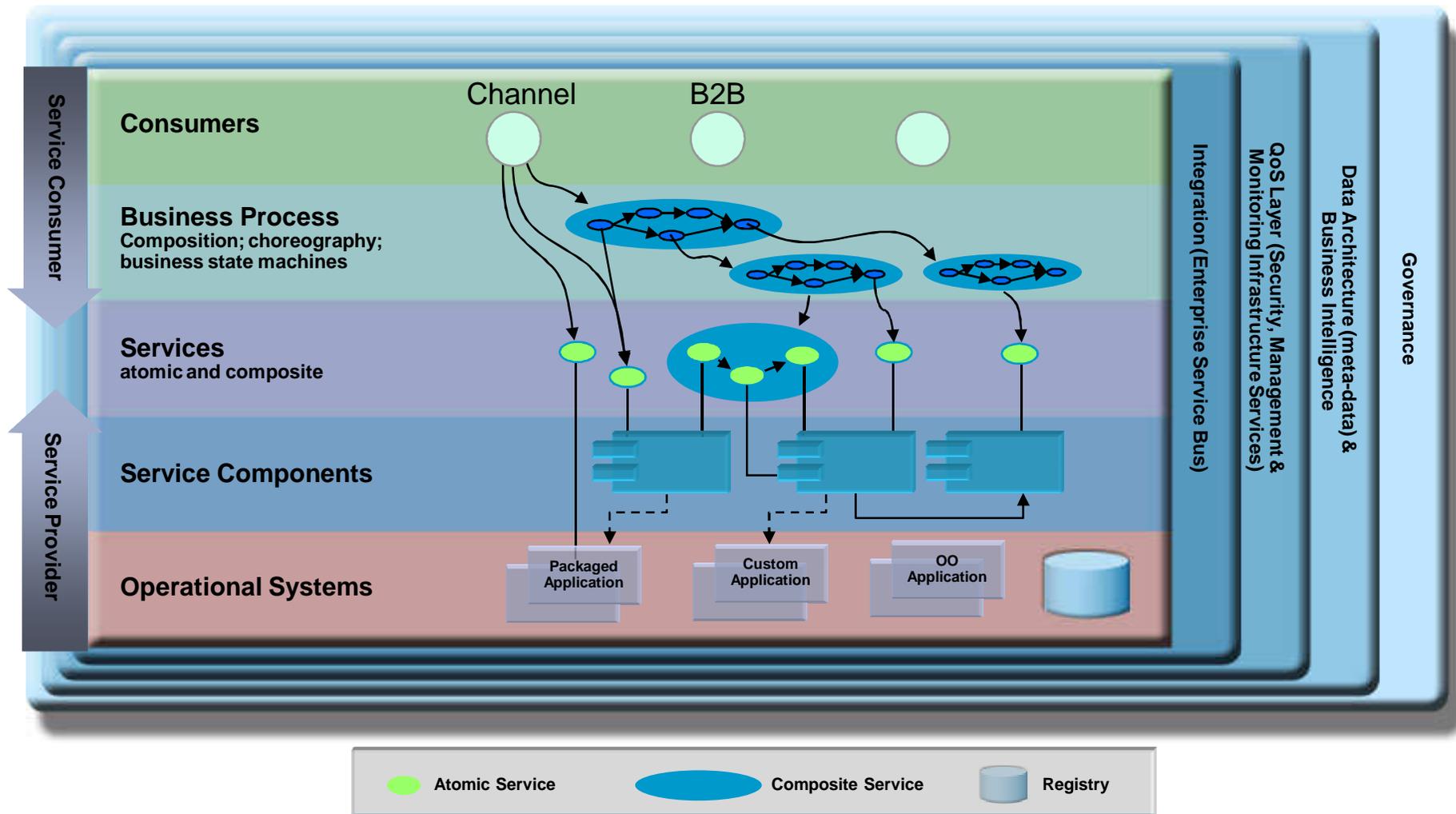
... a composite application?

A set of **related & integrated** services that support a business process built on an SOA

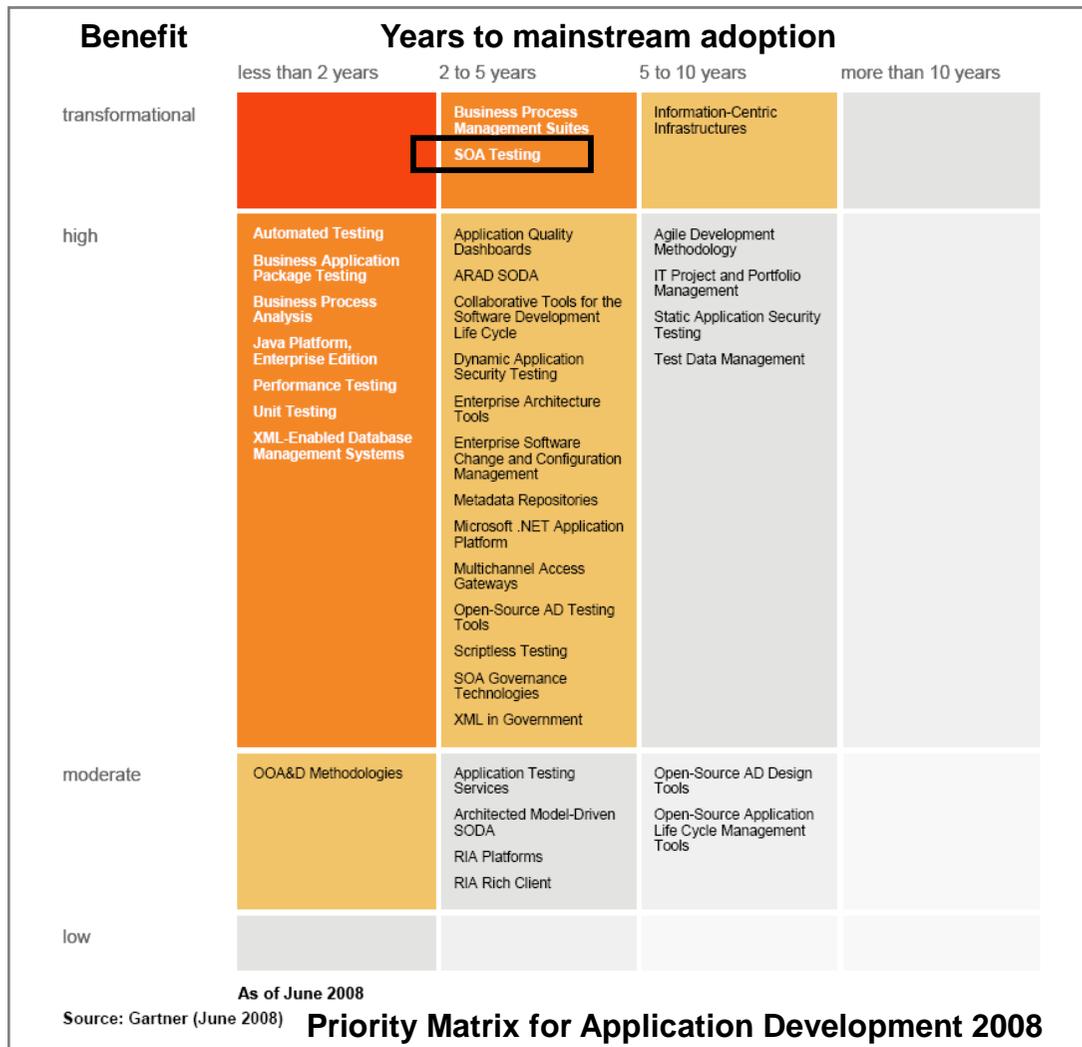


SOA Solution Layering

At the heart of the SOA are Services



SOA Testing: a Transformational Priority



From Gartner's Hype Cycle for Application Development 2008

“ Users are moving beyond simple Web services, and are quickly finding the **need for more robust tools to drive quality and to support the goals of agility promised by SOA**

Web services must be stable and reliable for applications to be built on top of them. **They need a solid testing focus, or the services will become liabilities to application stability.** ”

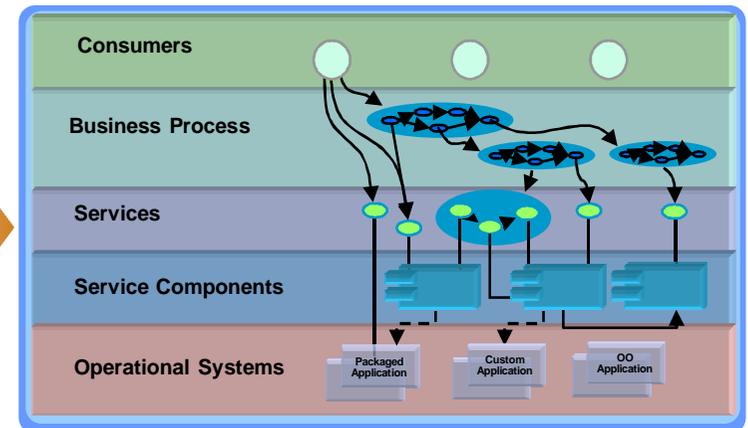
What is a Good Quality Service?

- **Standard Quality Factors**

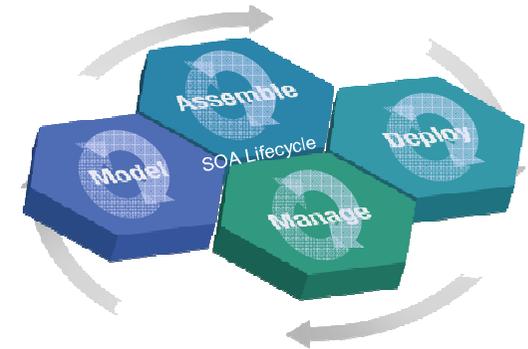
- Correctness, Reliability, Performance, Interoperability, Security

- **SOA Specific Quality Factors**

- Meet Business Goals
- Loose coupling
 - Changes on the service consumer or provider should not require a change of the other one (e.g. service provider location change)
- Encapsulation
 - Well-defined interface that hides internal data not needed for the consumer
- Stateless Service
 - Transient state to a particular consumer add complexity and prevent readily scalable and highly available service provide
- Technology neutral
 - Invoke a service with any technology



SOA Testing Strategy



- **Continuous testing across the delivery lifecycle**
 - Focus on **Business Goals**
 - **Quality & test management** should be first and central
 - The “**test early, test often**” mantra is key to success with SOA
 - Comprehensive **testing of each service**
 - **Performance testing** of critical services
 - **Integration testing** of services composed into business processes leveraging business process models
 - System verification testing of composite applications to **validate the solution meets the business objectives**

Build a collaborative cross-functional test team

- **Business analysts**
 - Provide inputs for defining the test objectives
 - Review the test strategy and test plans
 - Supports the team during test design phase
- **Architects**
 - Identify unknown factors in using the services
 - Assess the impact of changes and fixes onto the design
- **Developers**
 - Provides Schema and WSDL of the Services
 - Review the test cases
 - Provides technical details on how a service works
- **Test managers**
 - Define overall test strategy in regards to the business objectives
 - Write test plans taking into account Service Level Agreements
- **Testers, performance engineers**
 - Write the detailed test cases
 - Execute the tests
 - Automate the tests
 - Feedback the architects and developers with lessons learned



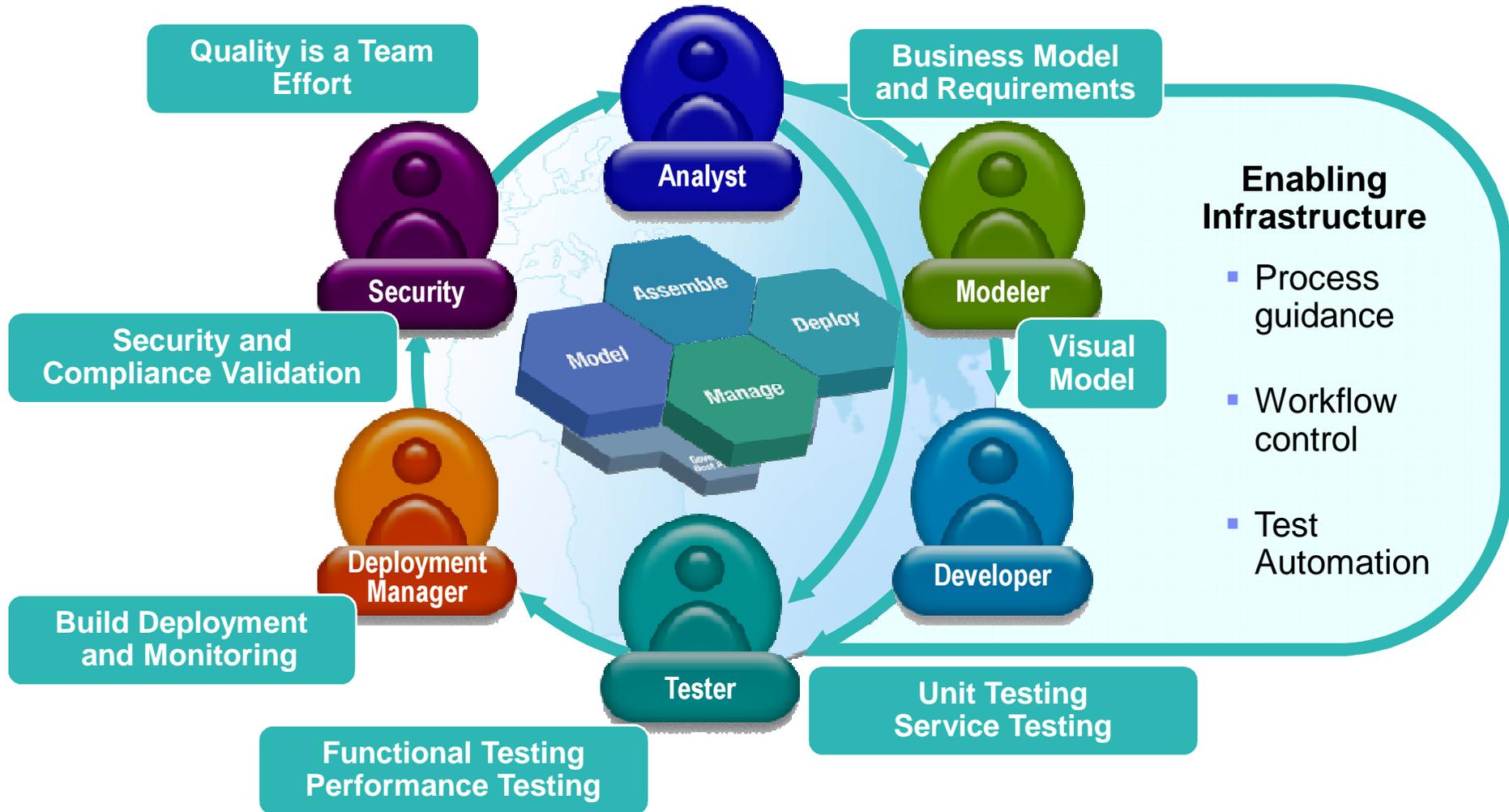
QA Team Skills Training



- **Start Small – Basics first**
 - Learn the SOA theology
 - Learn the benefits of SOA
 - Understanding the new processes and deliverables
- **Methodology Training**
 - The complexity introduced by SOA demands an organized standardized approach
 - The key is to be able to track, and trace your testing, defects and results in a fashion that you can consistently reproduce them without impacting your timelines severely.
- **Technology Training**
 - WS Standards, WSDL, XML, SOAP, ...
- **SOA Testing Tools Training**

SOA Quality Management in Action

SOA Quality Management is continuous and takes place across all phases



IBM Rational SOA Quality Management Solution

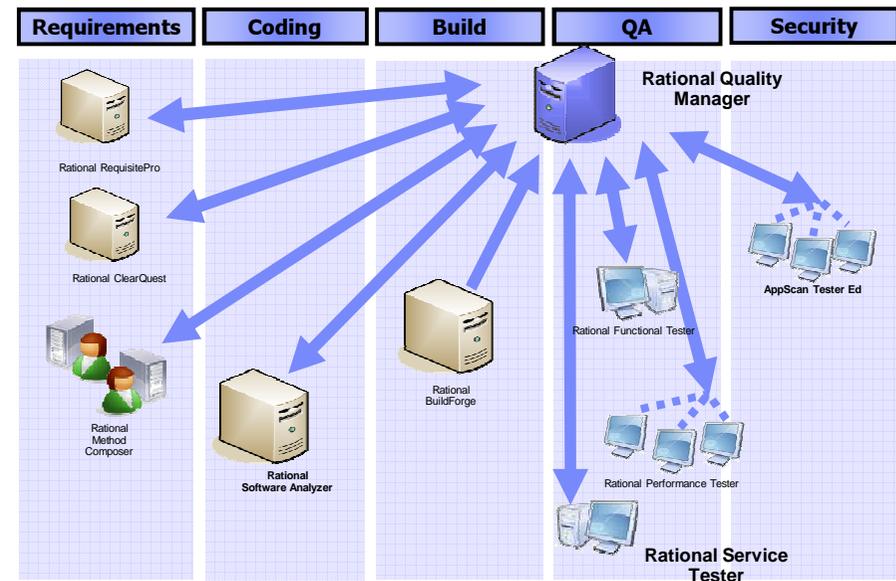
SOA Layer	IBM tools that support SOA Construction & Deployment	Rational SOA Quality Management
Consumer	Portlets or Web 2.0 App Build with: Rational Application Developer Deploy on: Websphere Portal Server	Rational Functional Tester Rational Performance Tester
Business Process	Business Process Build with: Websphere Integration Developer Deploy on: Websphere Process Server	Rational Tester for SOA Quality
Services	Services exposed as Web Services Build with: <ul style="list-style-type: none"> ▪ Rational Software Architect ▪ Rational Developer for Z ▪ Websphere Message Broker Toolkit Deploy on: <ul style="list-style-type: none"> ▪ Websphere Application Server ▪ Websphere Service Registry & Repository ▪ CICS Transaction Gateway / Server ▪ Websphere MQ / Message Broker ▪ IMS SOAP Gateway / Connect / Transaction 	Rational Tester for SOA Quality
Service Components	Java classes, EJB, SCA module, Web Services Build with: Rational Application Developer Deploy on: Websphere Application Server	Rational Application Developer Rational Tester for SOA Quality
Operation Systems	Database, CICS applications, Package applications Build with: Rational Developer for Z, Rational Data Architect Deploy on: CICS, DB2,	Rational Functional Tester Rational Performance Tester ext.

Rational Quality Manager

Rational Quality Manager

Providing full control, execution, and governance to improve the quality

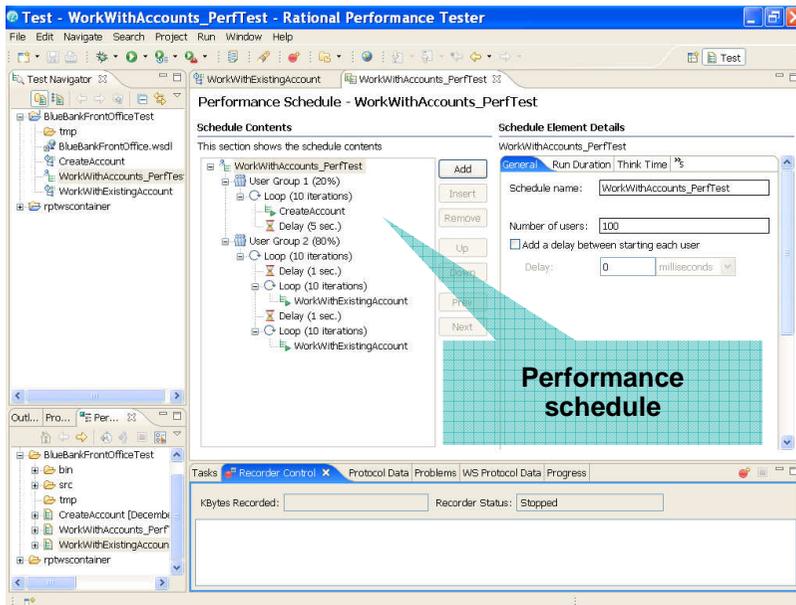
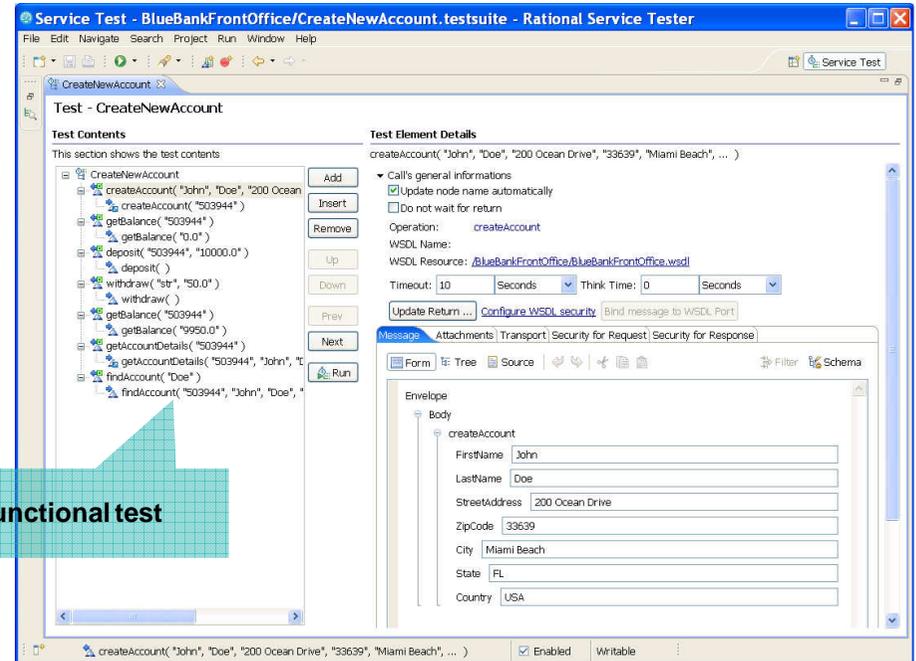
- **Collaboration across roles**
- **Integrated Test Plan data**
- **Test Plan/Case Versioning**
- **Full feature Manual Tester**
- **Dynamic linkages to requirements and defects**
- **Open Test Framework with published schema and APIs**
- **Process Enactment that can be customer customized**
- **Execution of tests**
- **Customized dashboards**



Testing SOA Services

IBM Rational Service Tester for SOA Quality

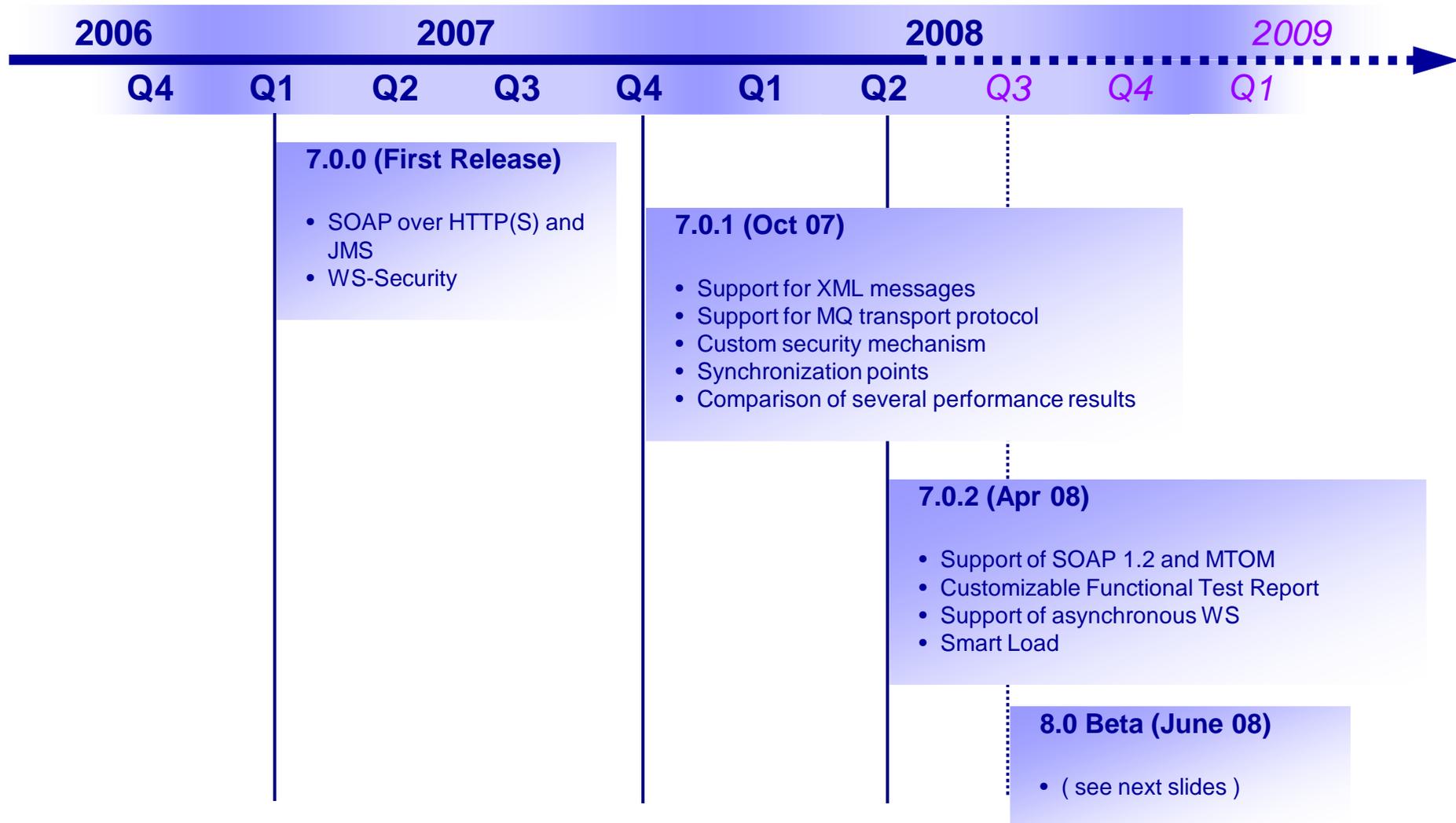
Automated regression and functional testing for GUI-less services



IBM Rational Performance Tester Extension for SOA Quality

Performance Testing for Service - based applications

Rational Service Tester (RST) – Product Timeline



IBM Rational Quality Management v8.0

Open Beta now LIVE!

- **Two new offerings**
 - Rational Quality Manager
 - Rational Test Lab Manager
- **Three enhanced practitioner tools**
 - Rational Functional Tester
 - Rational Performance Tester
 - Rational Service Tester

Software > Early programs > Rational >

IBM® Rational® Quality Management Open Beta

Overview

Download

Support

Welcome!

Thank you for your interest in the Rational® Quality Management Open Beta Program - we appreciate your support.

This open beta program includes two new Quality Management products and three enhanced versions of Rational products that you may already know:

- **NEW*** IBM® Rational® Quality Manager v8.0
- **NEW*** IBM® Rational® Test Lab Manager v8.0
- **ENHANCED*** IBM® Rational® Performance Tester v8.0
- **ENHANCED*** IBM® Rational® Functional Tester v8.0
- **ENHANCED*** IBM® Rational® Service Tester for SOA Quality v8.0

Read on to learn more about each of these products and how you can get involved with this exciting new opportunity.

The products are available in English only. Similarly, documentation and forum support for this open beta program are provided in English only.

<https://www14.software.ibm.com/iwm/web/cc/earlyprograms/rational/QMOpen/>

New & Noteworthy in RST 8.0

- **New user experience for test creation**
 - Generic Service Client
 - New Form View
 - Test Editor Update
 - Message Header Edition Assistance
- **Support for the additional Web services standards**
 - Text & JSON message support
 - Security: NTLM support
 - Asynchronous Communication Support Update
- **Enhanced functional test report**
- **Integrated with Rational Quality Manager**

	HTTP	JMS	MQ
SOAP 1.2	7.0.2	7.0.2	7.0.2
SOAP 1.1	7.0	7.0	7.0.1
XML	7.0.1	7.0.1	7.0.1
Text / JSON	new	new	new

Generic Service Client (GSC)

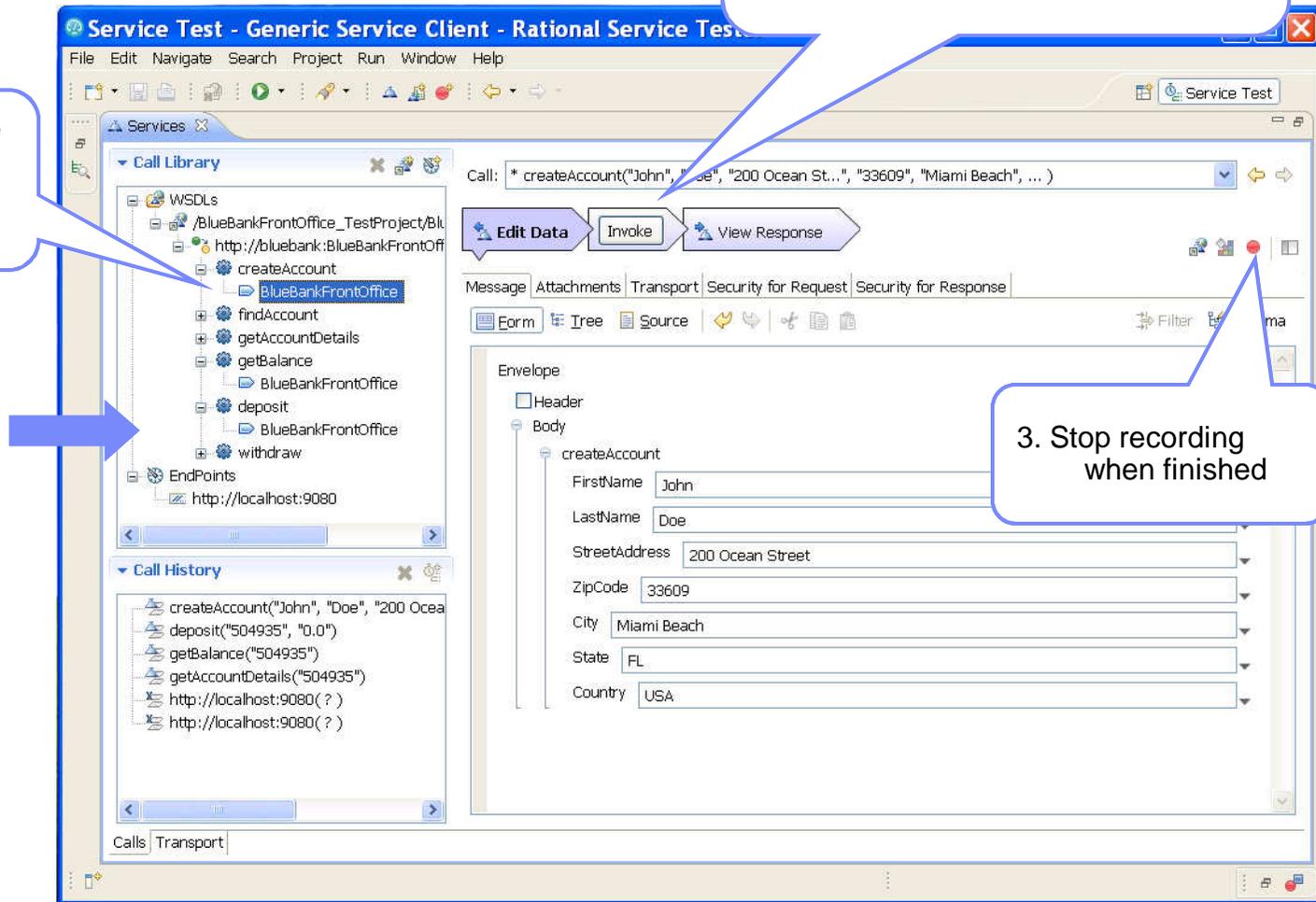
- One generic client to interact with any kind of SOA or Web services
 - Can be used to manually test a service
 - Used to record a test
- Easy to configure
 - Import WSDL from file system, URL, UDDI
 - Import service definition from Websphere Service Registry and Repository (WSRR)
 - Wizard driven advanced protocol configuration (HTTP, JMS, MQ)
- 3 data edition / visualization modes:
 - Form view, less technical and intimidating view
 - Tree view, structured data view that can be filtered out to show more or less details
 - Source view, raw XML message data view
- Replaces the Eclipse Web Services Explorer

Create a test with the GSC

2. Invoke a service in 3 easy steps:

- Edit input message data
- Invoke service operation
- View Response

1. Select the Service and Operation to invoke



3. Stop recording when finished

New Form View for editing input data

- Simplified edition / presentation of the SOAP / XML messages
- SOAP and XML elements and attributes are displayed as a Form
 - No namespace
- Easy manipulation of complex structures
 - Optional Element
 - Unbounded Sequence
 - Choice
- Form view is synchronization with Tree and Source view
- Automatic data validation, with quick fix when possible

Form View Details

The screenshot shows a form view in a software development tool. The form contains several fields and sections:

- Optional element:** A callout points to a checkbox labeled "NumeroVersionService" which is checked.
- Validation Error (with Quick Fix when possible):** A callout points to a red 'x' icon in the left margin of the form.
- Complex Element:** A callout points to a section titled "ProduitsAchetes" which contains a sub-section "MSDVProduit".
- Unbounded Sequence:** A callout points to a sub-section "ListeService" within "MSDVProduit", which contains a sub-section "MSDVService".

Other visible fields include "CodeNatureFlux", "CodeModeEchange", "ZoneBanalisee", "DossierVente", "IdentifiantDossierVente", "EntiteSouscription", "CapaciteEpargne", "ClientPrincipal", "CodeClient", "CodeClientBancaire", "CodeProduit", "NumContrat", "AutorisationMineur", "DeclarationSurLhonneur", "AnneeImposition", "Justificatif", "OptionFiscale", "Bonus", and "CodeService".

Test Editor Update

Collapse general information to allow more space for data edition

New Form View

Supports datapooling and substitution

Test Element Details
createAccount("John", "Doe", "200 Ocean St...", "33609", "Miami Beach", ...)

Call's general informations

Message Attachments Transport Security for Request Security for Response

Form Tree Source Filter Schema

Envelope

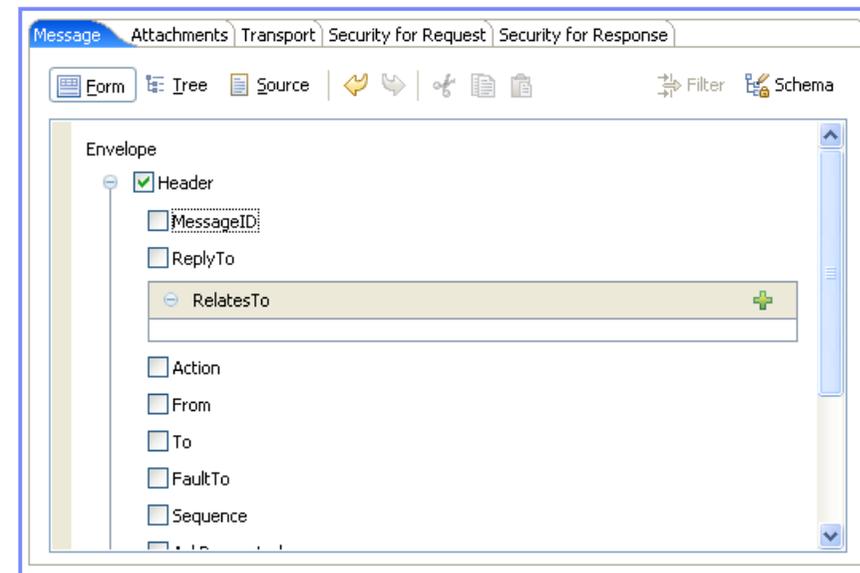
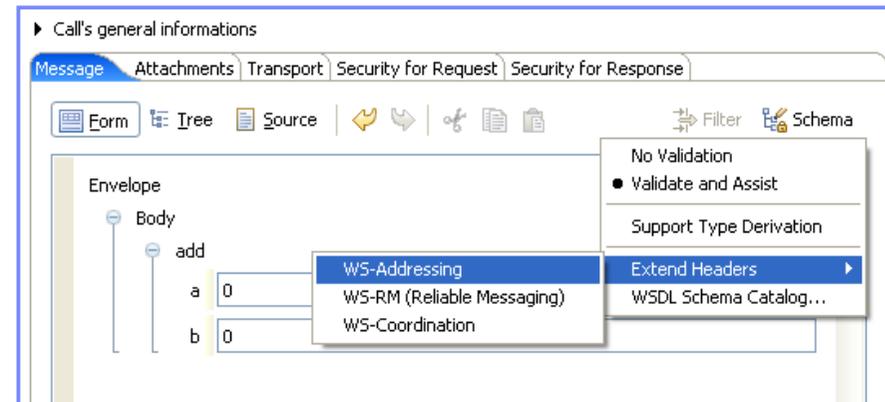
- Header
 - MessageID
 - ReplyTo
 - RelatesTo
- Action
- From
- To
- FaultTo

Body

- createAccount
 - FirstName: John
 - LastName: Doe
 - StreetAddress: 200 Ocean Street
 - ZipCode: 33609

Message Header Edition Assistance

- Headers contains additional information not directly related to a particular message, such as:
 - Authentication
 - Reply To address
 - Payment
- Headers are not described in WSDL files
- Assistance is now provided to add headers based on one of the following standards:
 - WS-addressing
 - WS-Reliable Messaging
 - WS-Coordination



Text & JSON Message support

- JSON (JavaScript Object Notation) is also more & more used as an alternative to SOAP/XML data format
- Some services use text message format, often when based on MQ transport
- Text/JSON support
 - New kind of message (Text Message)
 - JSON is considered as text message
 - Only Source view is available
 - Only manual correlation (reference/substitution) is supported (No automatic correlation)
 - All transport protocols (HTTP, JMS, MQ) available for this kind of message
 - Recording is also available using the Generic Service Client

JSON Message Example

Test - rest

Test Contents
This section shows the test contents

- rest
 - GET http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/ (?)
 - resources("CUSTOMER", "INVOICE", "ITEM", "PRODUCT")
 - { "resources": { "xmlns": "htt...content": "PRODUCT" } }

Test Element Details

{ "resources": { "xmlns": "htt...content": "PRODUCT" } }

Update node name automatically

Source Attachments Return Properties

1:390

```
{ "resources": { "xmlns": "http://www.example.org/RestApp/db", "xmlns:xlink": "http://www.w3.org/1999/xlink", "resource": [ { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/CUSTOMER/", "content": "CUSTOMER" }, { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/INVOICE/", "content": "INVOICE" }, { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/ITEM/", "content": "ITEM" }, { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/PRODUCT/", "content": "PRODUCT" } ] }
```

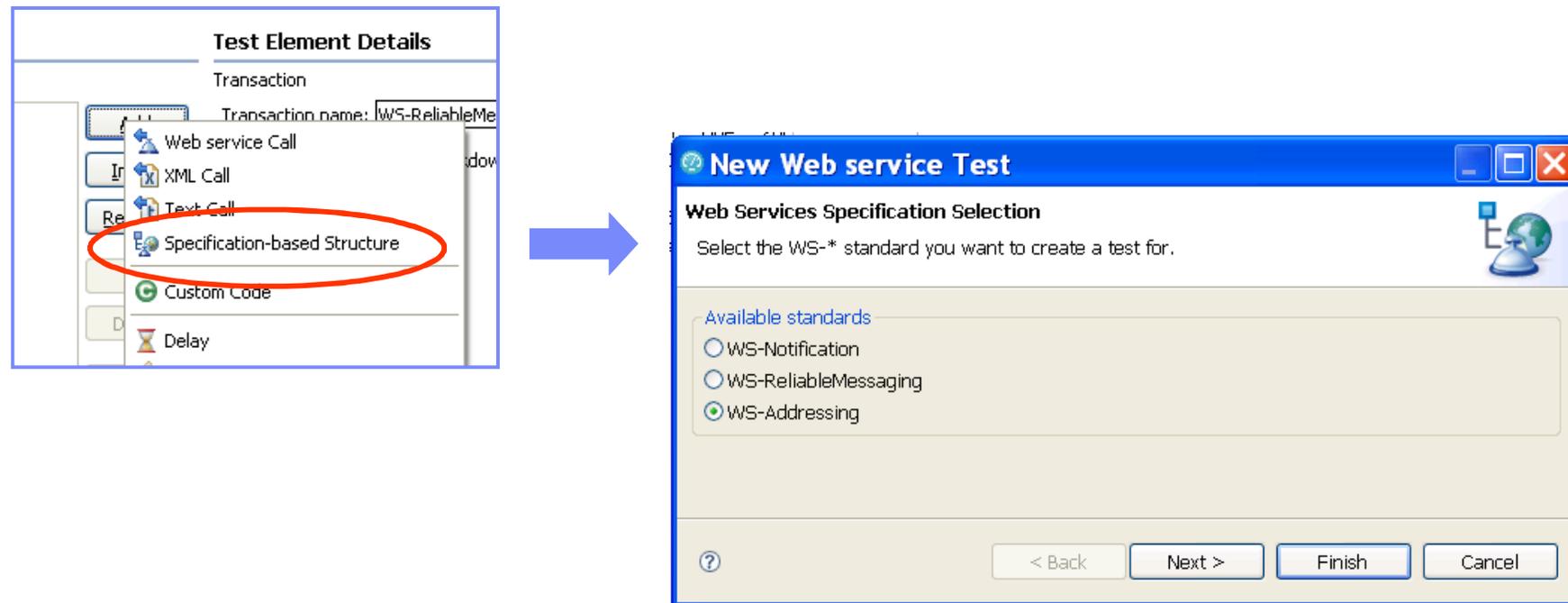
Recorder Control WS Protocol Data SAP Protocol Data

Properties

```
{ "resources": { "xmlns": "http://www.example.org/RestApp/db", "xmlns:xlink": "http://www.w3.org/1999/xlink", "resource": [ { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/CUSTOMER/", "content": "CUSTOMER" }, { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/INVOICE/", "content": "INVOICE" }, { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/ITEM/", "content": "ITEM" }, { "xlink:href": "http://fr02rhel.ttt.fr.ibm.com:8080/RestApp/db/PRODUCT/", "content": "PRODUCT" } ] }
```

Asynchronous Communication Support Update

- Wizard driven creation using one of the WS-* standard
- Automatic creation of the calls with specific headers and callback structure



Enhanced support for WS-Addressing

The screenshot displays the 'Performance Test - TestOp2' configuration window. On the left, the 'Test Contents' tree shows a sequence of operations: 'TestOp2', 'add("1", "2")', 'mult{"http://local...", "mult", "91199285-6ed...", "http...', 'Callback', 'Parallel', 'Receive', and 'Timeout'. The 'mult' operation is selected. On the right, the 'Test Element Details' panel shows the configuration for the 'mult' operation, including WSDL Name, WSDL Resource, and Timeout settings. Below this, the 'Overview' tab shows the message structure with a table of headers and values.

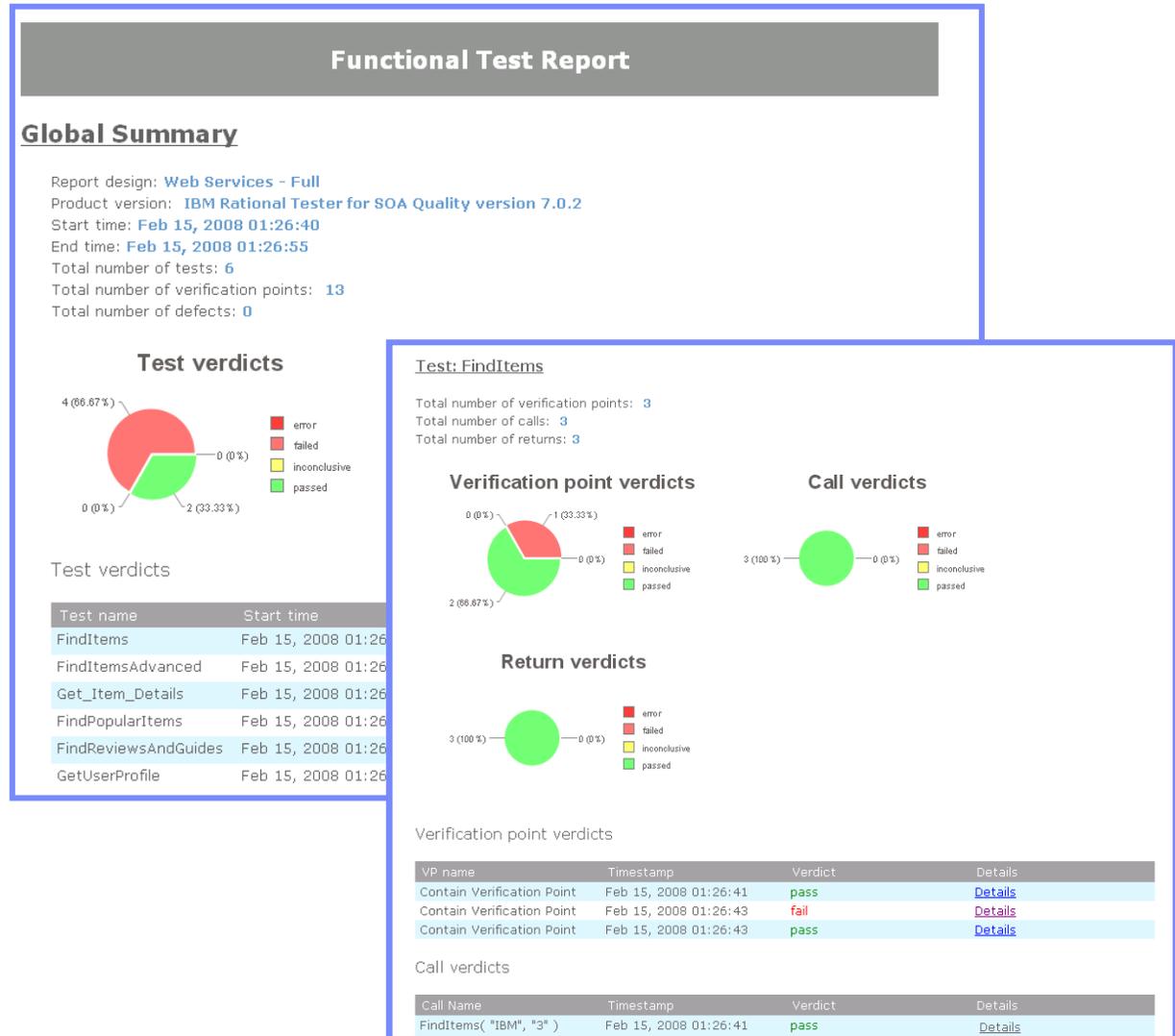
Name	Value
Envelope	
xmlns:soapenv	http://schemas.xmlsoap.org/soap/en...
xmlns:xsi	http://www.w3.org/2001/XMLSchema...
xmlns:xsd	http://www.w3.org/2001/XMLSchema
xmlns:tns0	http://myPackage
Header	
To	http://localhost:9082/myWebService/...
xmlns:wsa	http://www.w3.org/2005/08/addressing
Action	mult
xmlns:wsa	http://www.w3.org/2005/08/addressing
MessageID	91199285-6ed1-4f1f-a39a-0caa316b...
xmlns:wsa	http://www.w3.org/2005/08/addressing
ReplyTo	

Automatic creation of callback structure

WS-Addressing Header automatically added to message data

Enhanced Functional Test Report

- Customizable Report
 - HTML or PDF
 - BIRT designer or XSLT





DEMO



QUESTIONS



THANK YOU

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