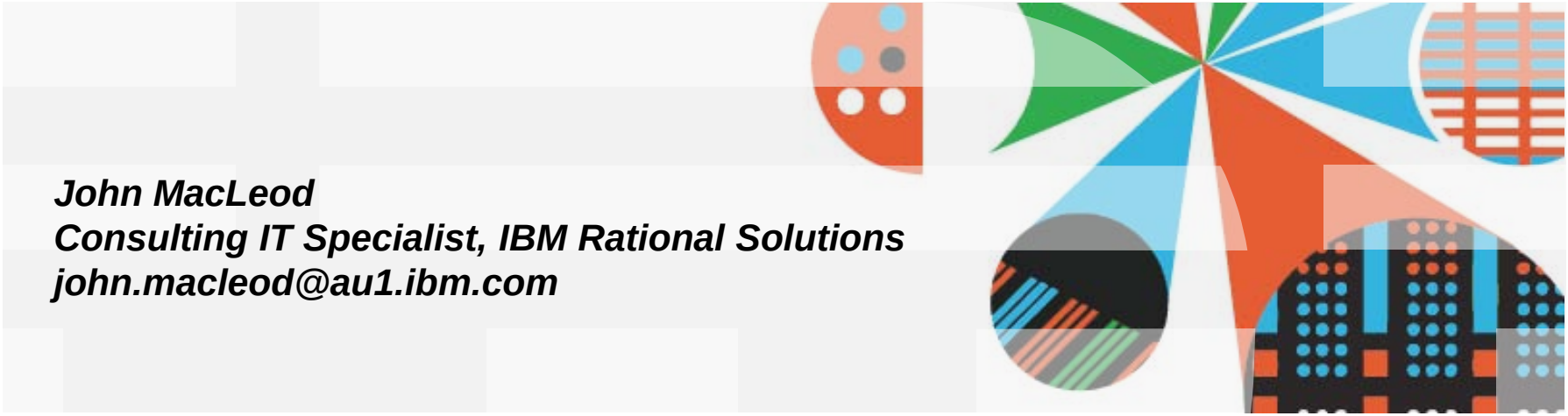
Integrated Requirements Management and Quality Management



John MacLeod
Consulting IT Specialist, IBM Rational Solutions
john.macleod@au1.ibm.com

© 2010 IBM Corporation

Driving Business Differentiation in Challenging Economic Times with Agility and Confidence

Analyze business opportunity and the impact of change and effectively manage organizational transformation by better aligning business and development priorities

Deliver quality solutions and improve efficiency through real-time team collaboration, automation and reporting and leveraging proven best practices

Build consensus through business and development collaboration making good decisions based on real-time and accurate information across all stakeholders

© 2010 IBM Corporation

Achieve Precision in Desired Business Outcomes

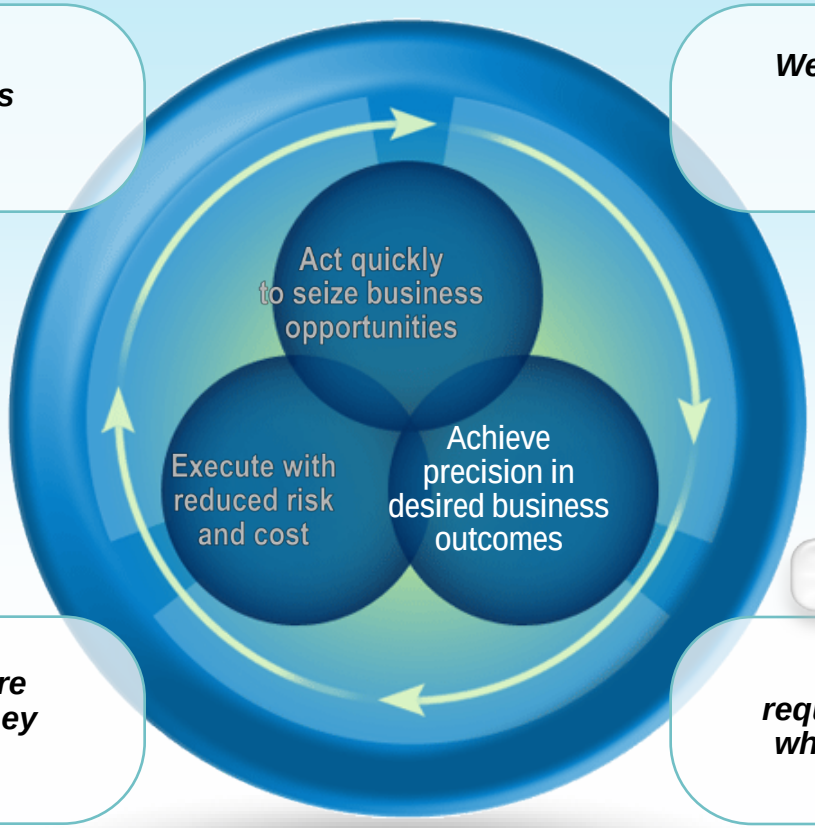
Deliver the high quality products/systems the customer needs

We struggle with complex projects meeting customers needs a timely manner

CTO

We are continuously pushed to increase quality with less resources!

Quality Manager



Analyst

It's hard to accurately capture requirements & make sure they are implemented & tested

Tester

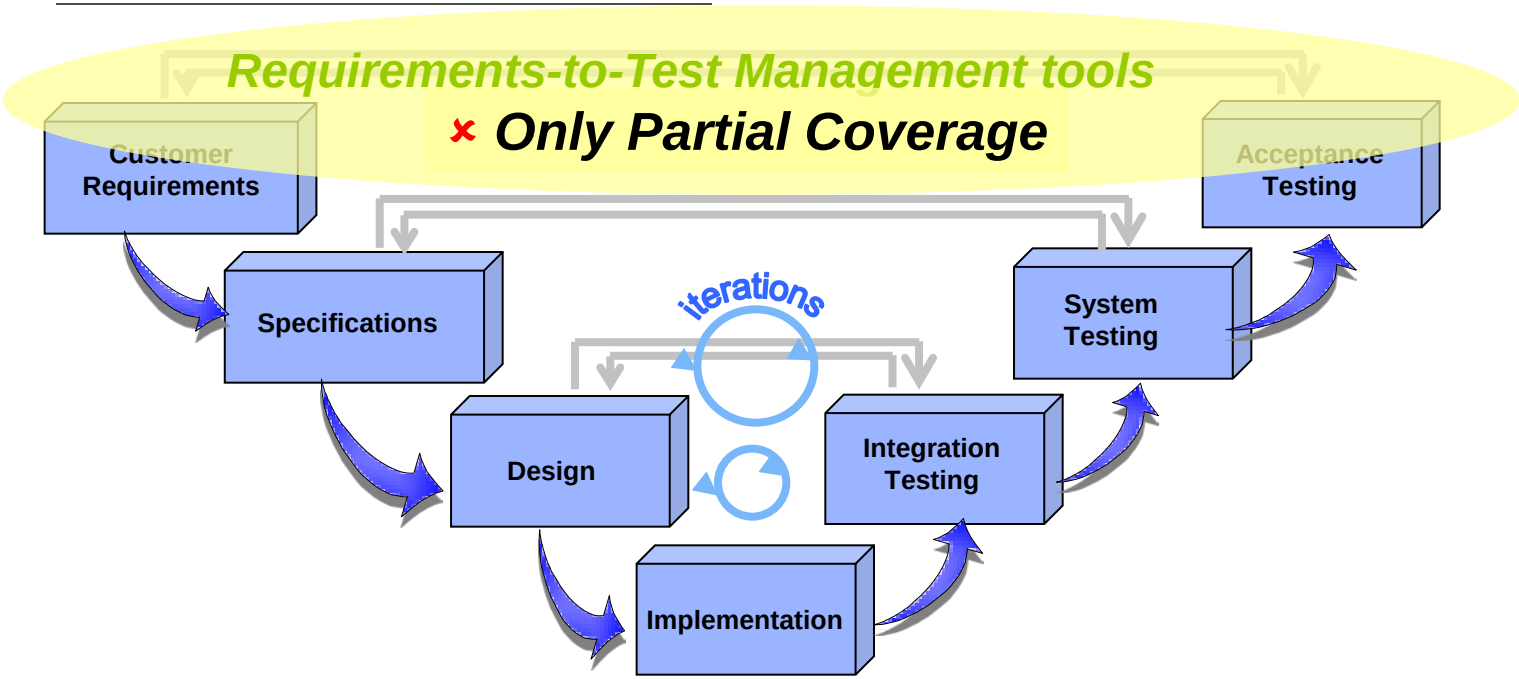
It's hard to keep up with requirement changes and know what is most important to test

The Solution:
Requirements Engineering and Quality Management

© 2010 IBM Corporation

Other Tools Offer Partial Coverage To Pain Points

- Approach focused on needs of test audience



Capability Gaps

- Only support linkage of test to a single level of requirements
- Incomplete life cycle coverage (no design/build)

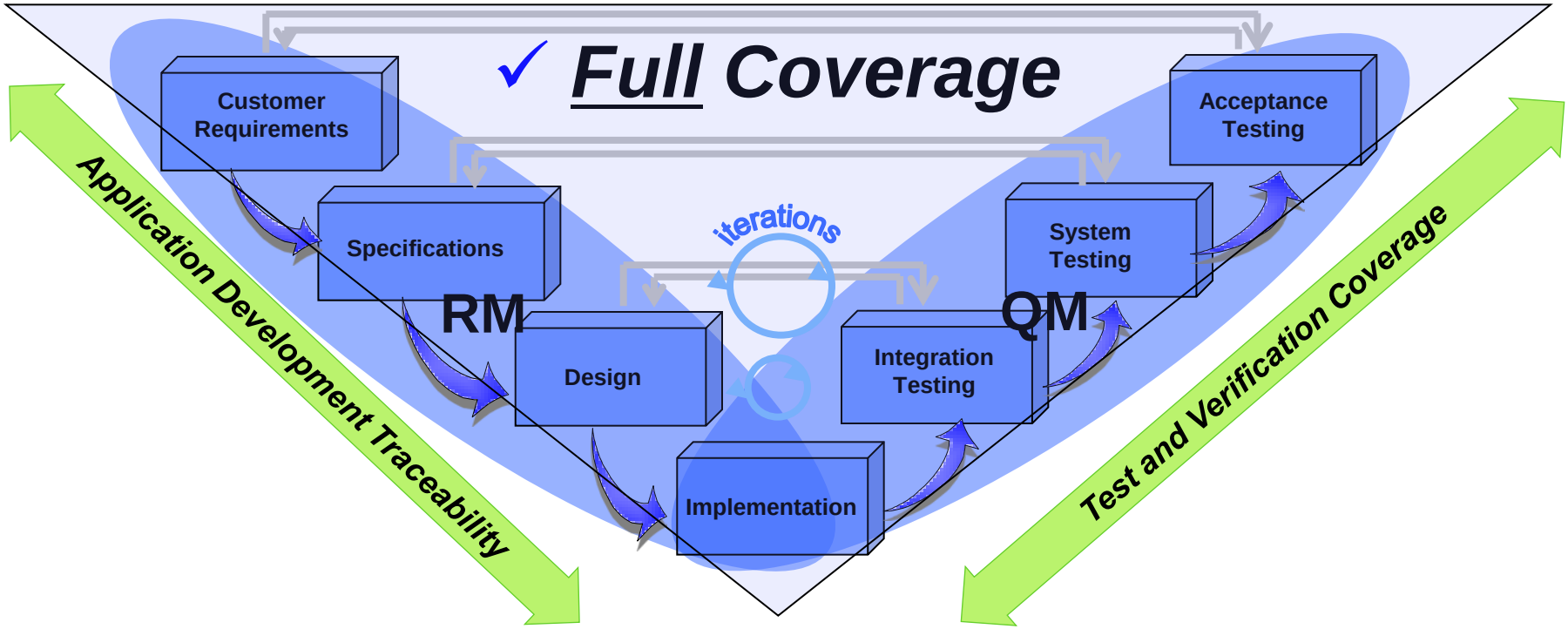
Implications of Gaps

- No common set of clear requirements shared by team
- Risk of missing critical requirements & serving business
- Limited ability to assess requirements change impact
- Limited ability to identify most critical requirements to test
- Difficult to prove compliance (traceability, audit-ability)

© 2010 IBM Corporation

IBM Offers A Unique Solution

That Ensures Entire Lifecycle Collaboration and Traceability



IBM's full life cycle coverage and traceability solution

- ✓ Common set of clear requirements shared by team
- ✓ Don't miss out critical requirements
- ✓ Assess requirements change impact
- ✓ Identify most critical requirements to test
- ✓ Prove compliance (audit-ability)

© 2010 IBM Corporation

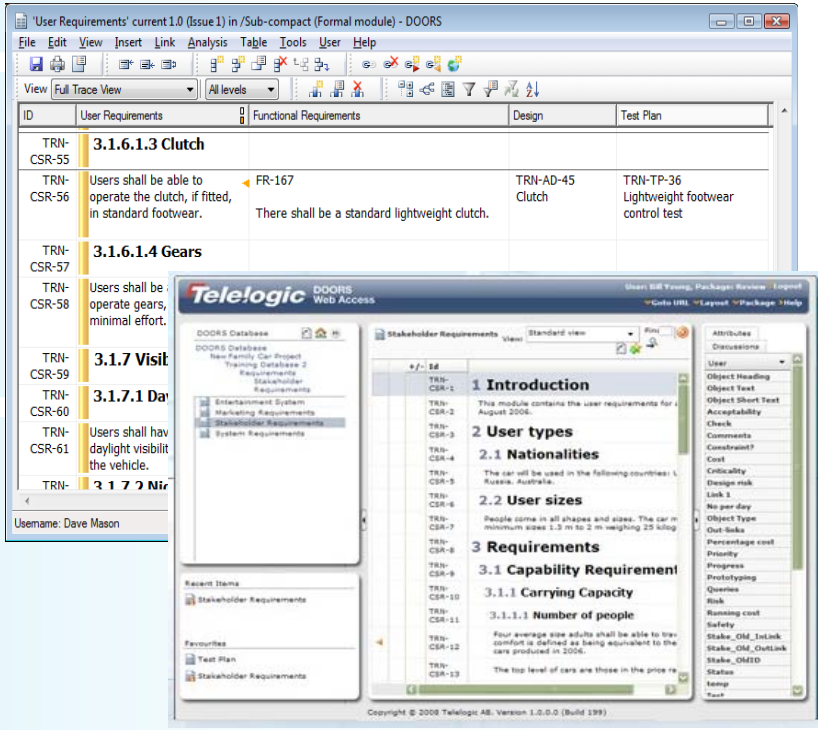
IBM Rational DOORS

Worldwide market and technology leader

- ✓ **Yphise award for best RM Product**
- ✓ **ISO 9001 Compliant development**

Success from comprehensive requirements management process

- ✓ **Easy-to-use document oriented views**
- ✓ **Lifecycle traceability to *any* information**
- ✓ **Web-based access and review**



Highest compliance and audit capabilities

- ✓ **Simple but powerful versioning**
- ✓ **FDA Compliant Electronic Signature**
- ✓ **Comprehensive traceability reporting**

© 2010 IBM Corporation

Rational Quality Manager

Central hub for business-driven software quality delivery

Mitigate business risk with collaboration

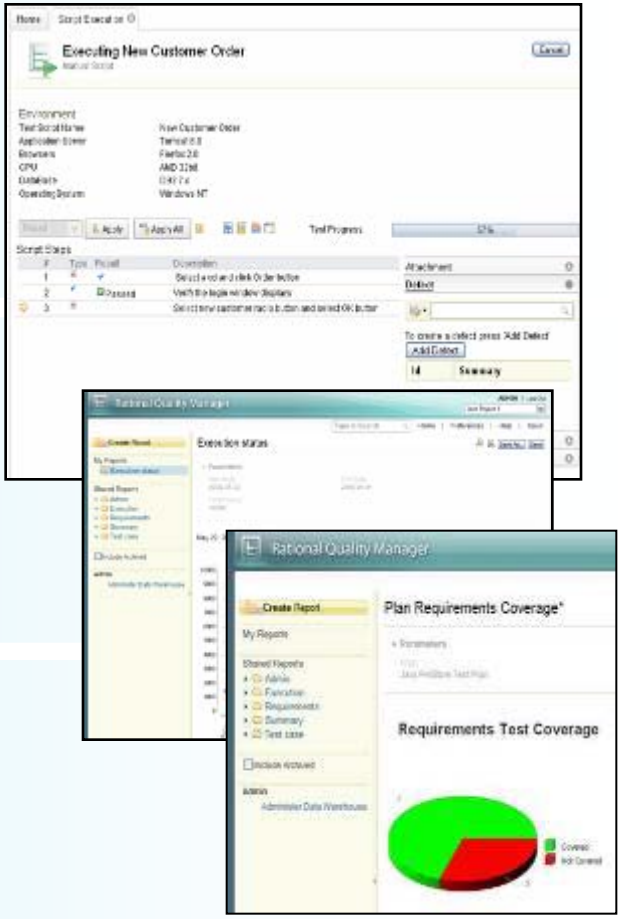
- ✓ **Team coordination of test planning**
- ✓ **Enforceable process workflow**
- ✓ **Upstream and downstream quality**

Improve operational efficiency with automation

- ✓ **Lab efficiency and asset utilization**
- ✓ **Test coverage optimization**
- ✓ **Environment and lifecycle coverage**

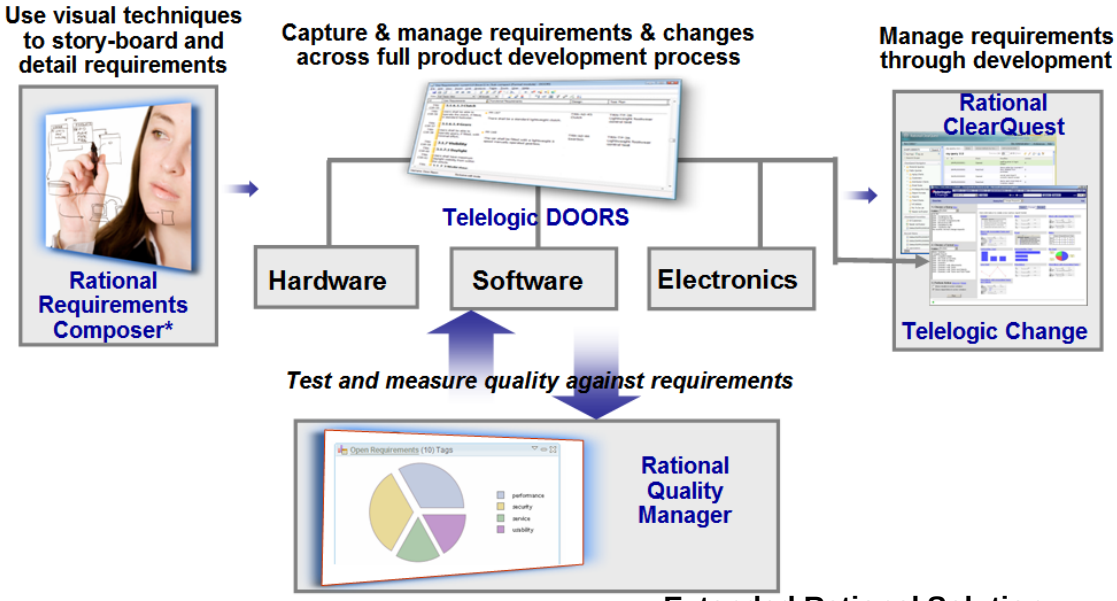
Make confident decisions with effortless reporting

- ✓ **Ongoing analysis & process improvement**
- ✓ **Proactive risk management**
- ✓ **Greater predictability**



© 2010 IBM Corporation

The Extended Rational Solution



Extended Rational Solution

IBM Requirements Engineering Solution

- Getting marketing , engineering, manufacturing, suppliers and subcontractors on the same page
- Managing scope, plus assessing and controlling the impact of change
- Ensuring end-to-end traceability
- Ensuring conformance to contractual agreements
- Demonstrating compliance to regulations

- **Rational Requirements Composer**
- **Rational ClearCase** or **Telelogic Synergy**
- **Telelogic System Architect**
- **Telelogic Rhapsody**
- **Rational Method Composer**
- Quality Management **portfolio** RQM integrates with many tools, including **Rhapsody TestConductor*** (for Model Driven testing), **Rational TestRT** (for Unit/Integration testing) and **Rational Software Analyzer** .
- **MCIF**

© 2010 IBM Corporation

Process-led Automation yields real savings

Examples of automation capabilities

	Developing repeatable industry test solutions			Advanced Defect Analysis	Developing repeated test process models applicable to future projects		Integrating end to end processes	
Asset	Test cases copied	Manual scripts copied	Manual scripts Reuse	Prevent and Block duplicate Defects	Baseline & migrate documentation	Baseline artifacts	Leveraging component Reuse	Dynamic updates of test assets
Quantity	290	296	1,178	765	1,154	1,711	870	1,883
Hours saved	141	148	589	Discovery in 4 Hr 1,484	577	855	435	470
Value	$11, 600	$11,850	$47,000	$857,000	$46,200	$68,000	$34,800	$37,700

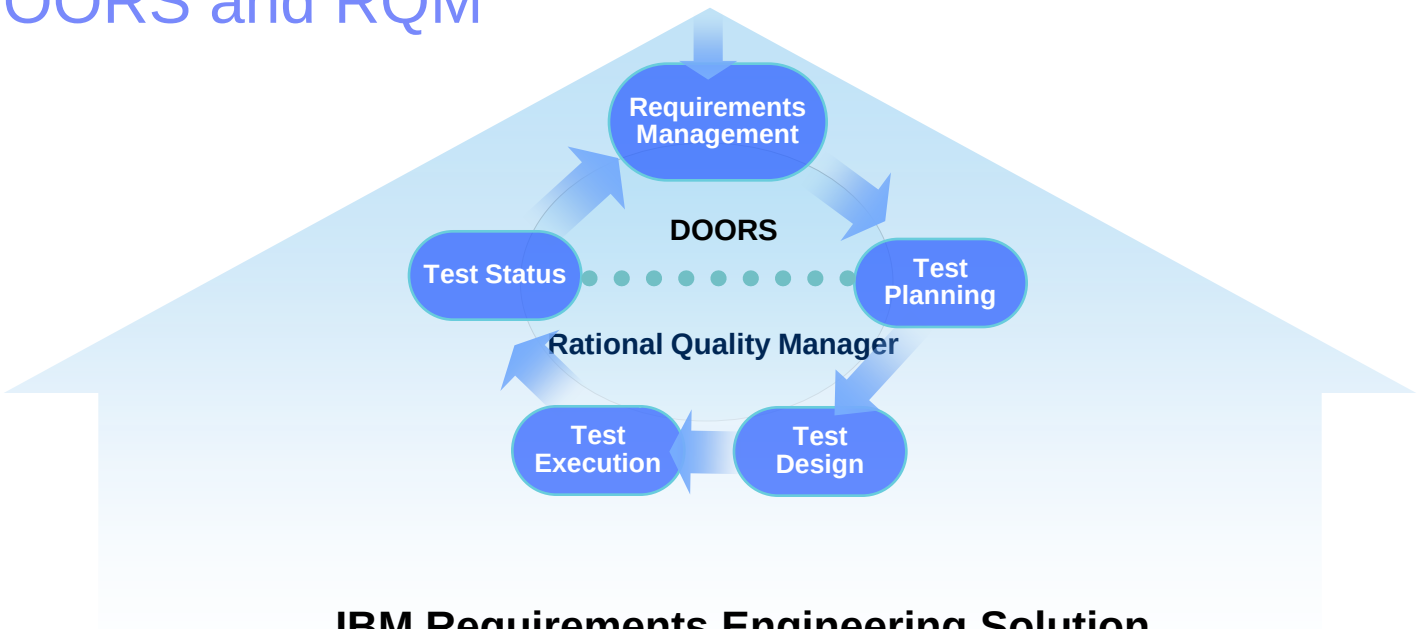
Source: 2008 GBS Test Practices study over 855 projects

Average per project saving with automation and collaboration best practices calculated on a per asset task and process savings

Estimated hours saved per project: 4700 hours

© 2010 IBM Corporation

Overall Benefits of an Integrated Approach with DOORS and RQM

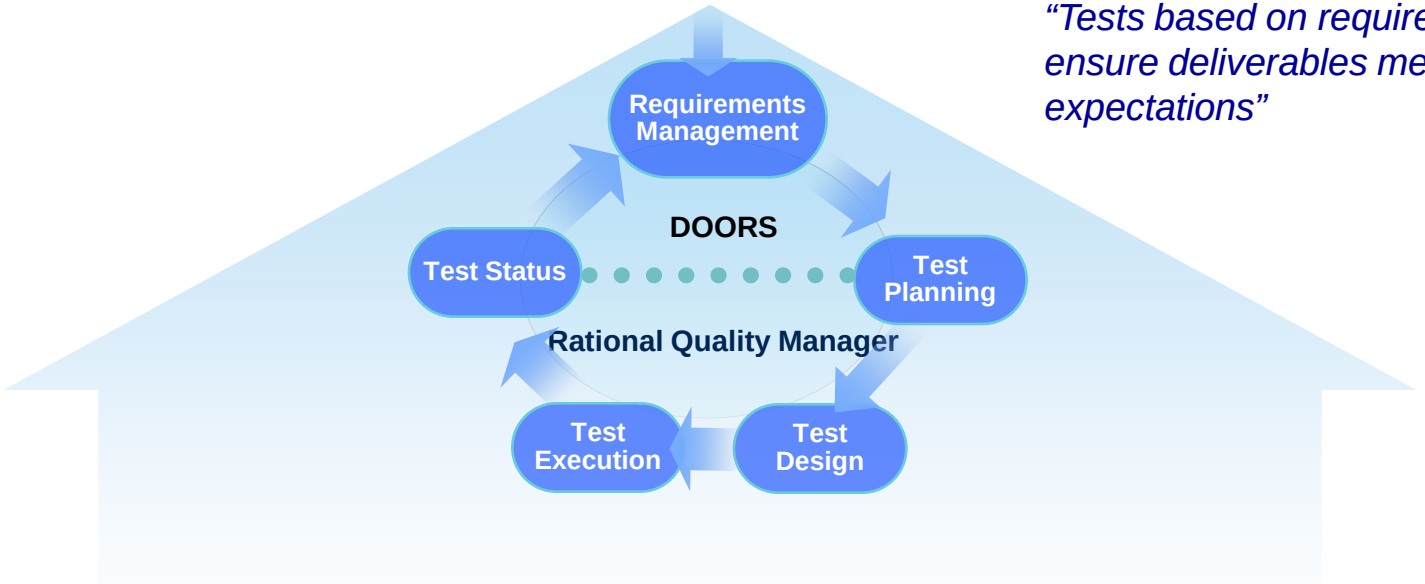


IBM Requirements Engineering Solution

- Getting everyone on the same page with minimal learning curves
- Accessing information from other disciplines without the need to move outside of a preferred working environment
- Managing scope, plus assessing and controlling the impact of change
- Ensuring end-to-end traceability
- Ensuring conformance to contractual agreements
- Increasing systems quality
- Demonstrating compliance to regulations

© 2010 IBM Corporation

Principles of an Integrated Approach



"Tests based on requirements ensure deliverables meet customer expectations"

1. Plan Tests Early
- Plan tests for each requirement as the requirement is written.
- "How will you know the requirement has been met?"
- Improves understanding of the requirement

2. Conduct Tests Early
- Perform tests as early as possible in the development process.

3. Relate Tests to Requirements
- Trace tests back to the requirements they are design to check.

4. Relate Defects to Requirements
- Trace defects back to the requirements that they show are not satisfied.

5. Measure Progress against Requirements
- Set targets
- Measure the progress of testing in terms of satisfied/unsatisfied requirements

© 2010 IBM Corporation

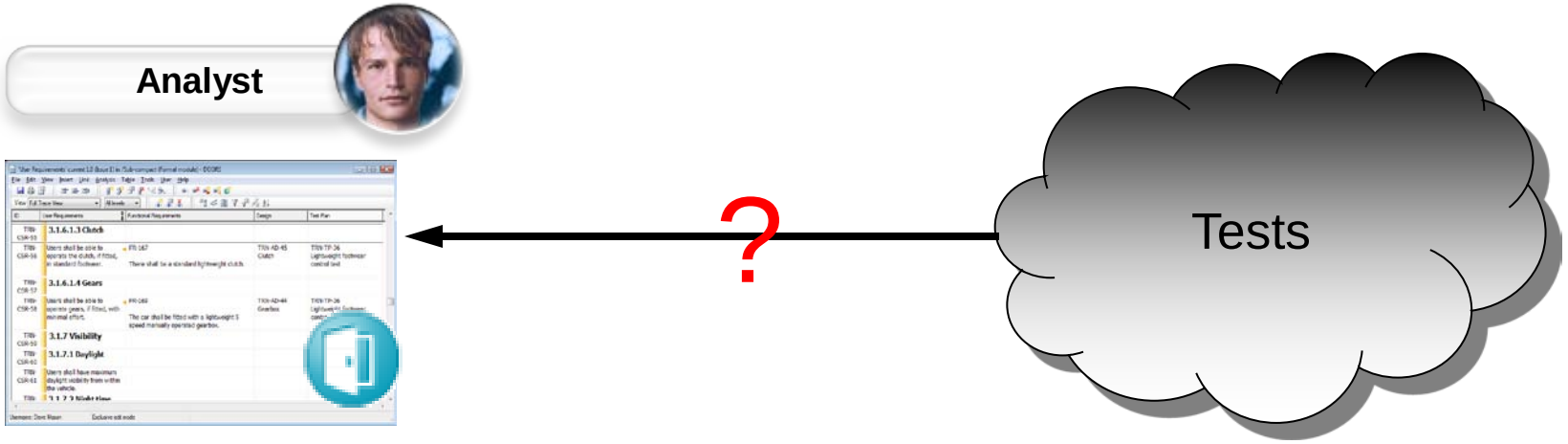
Benefits

- Providing a requirements based integration between Requirements Management and Test Management enables:
  - The Requirements Analyst to focus on delivering testable requirements with fully defined qualification criteria
  - The QA/Tester to focus on developing tests against a known set of requirements
  - Release Management can be performed based on requirement quality measures rather than on statistics of test pass/failure

© 2010 IBM Corporation

Role: Analyst

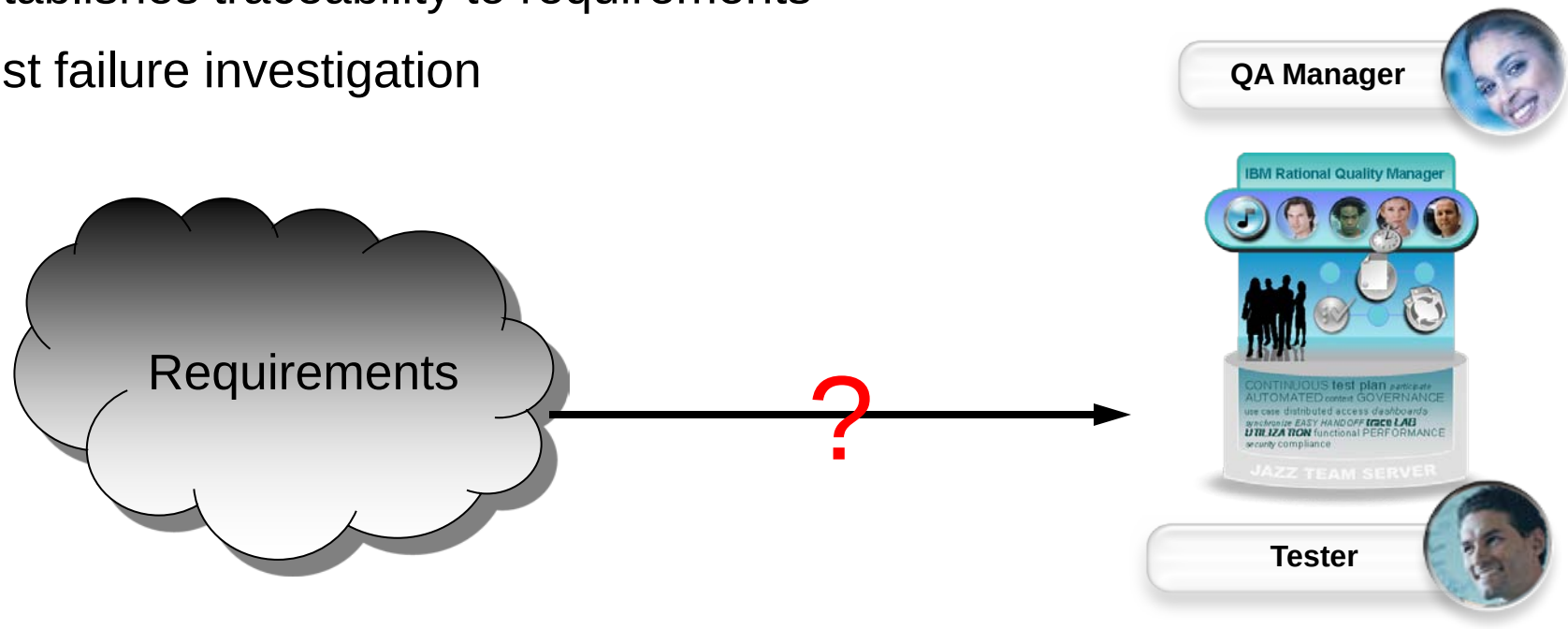
- The Analyst is a DOORS user principally interested in Requirements Management
- Specifies *Qualification Criteria* that must be met by testing
- Needs to know that requirements are tested
- Performs Impact analysis to cover requirements and test
- Wants to be involved with Release Review Boards



© 2010 IBM Corporation

Role: QA Manager/Tester

- The QA Manager/Tester is a RQM user principally interested in Test Management and execution
- Uses the *Qualification Criteria as test requirements*
- Needs to be involved with requirements review
- Establishes traceability to requirements
- Test failure investigation



© 2010 IBM Corporation

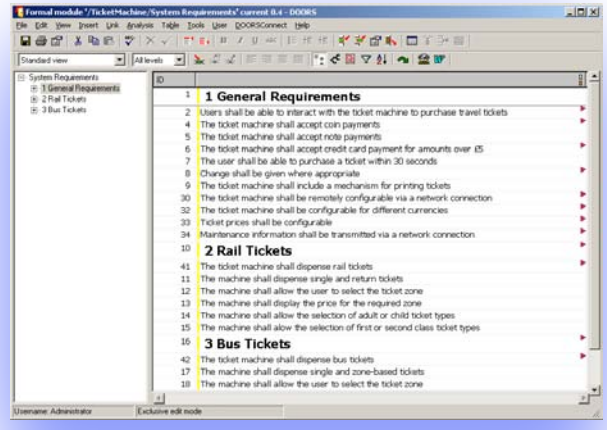
Role: CTO (Change Control Board)

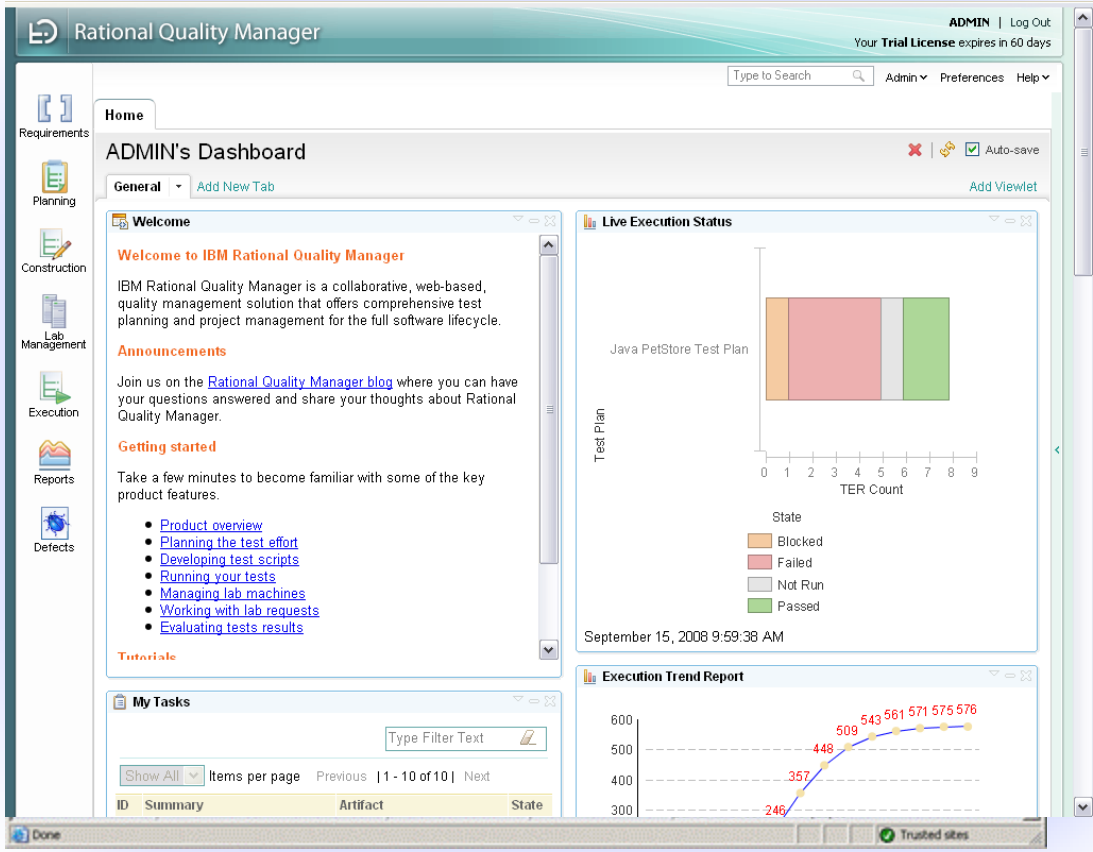
- The Change Control Board (CCB)
  - Analyze impact of defects (priority, severity)
  - Have the final say regarding release decision
- Test managers
  - influence the CCB in the confidence that they have an efficient test process working against the requirements
- Development managers
  - influence the CCB based on the latest test information against their development efforts
- Analyst manager
  - influence the CCB with the full business impact of making a release based on requirements met or not.

© 2010 IBM Corporation

Requirements - Test Integration

- Test against requirements rather than what is built
- See Requirements data inside requirements tab in Testing tool
- Integration with Rational Quality Manager & HP Quality Centre



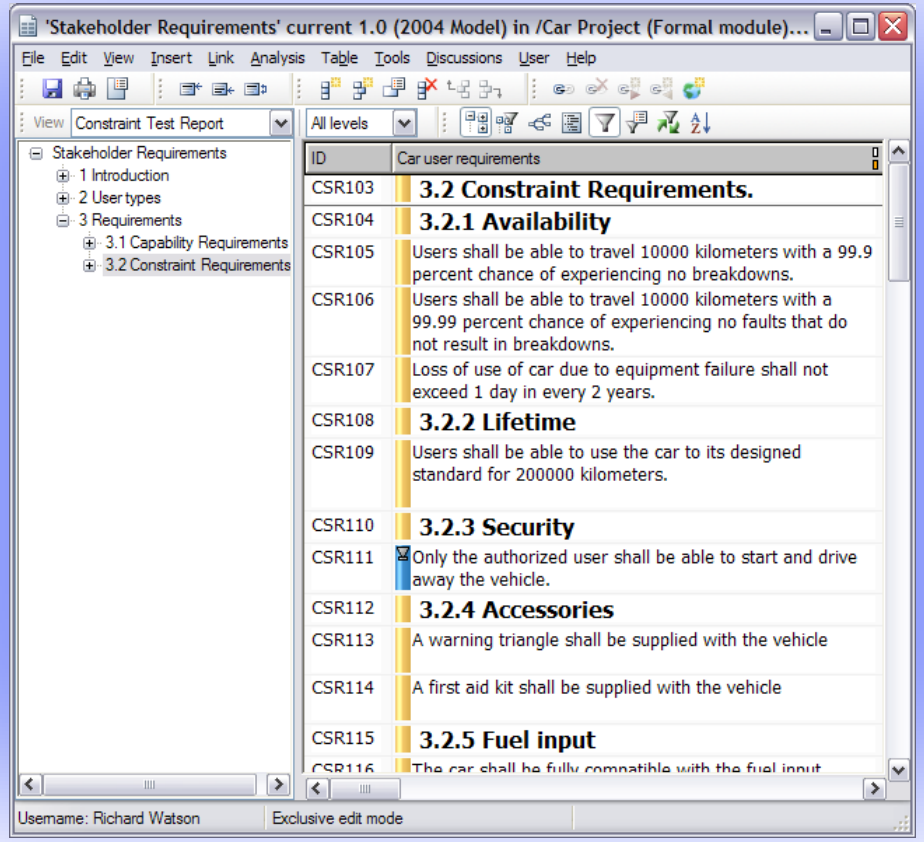


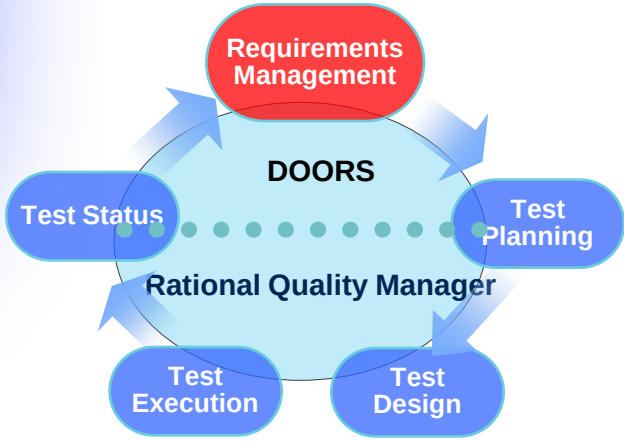
© 2010 IBM Corporation

A walkthrough a Requirements-Based Testing scenario using DOORS and RQM

© 2010 IBM Corporation

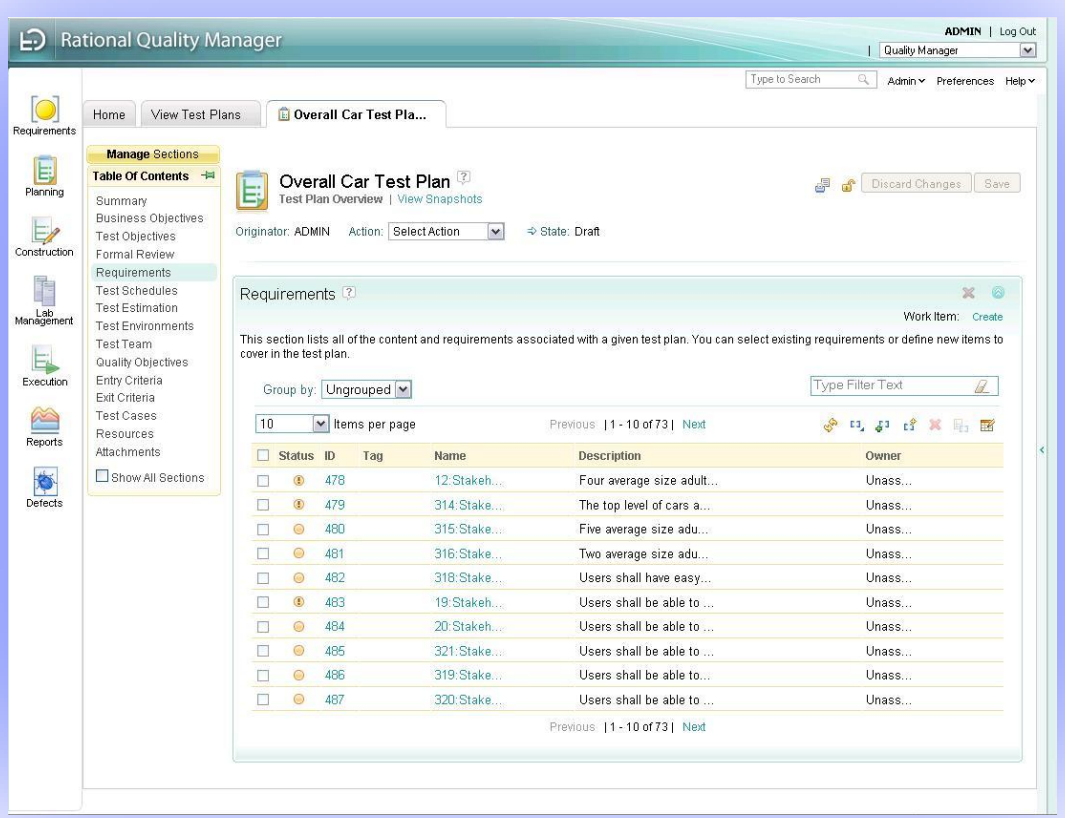
The Analyst Captures Requirements in DOORS

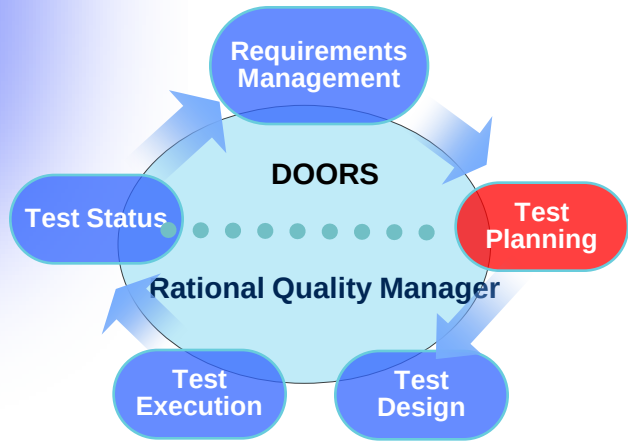




© 2010 IBM Corporation

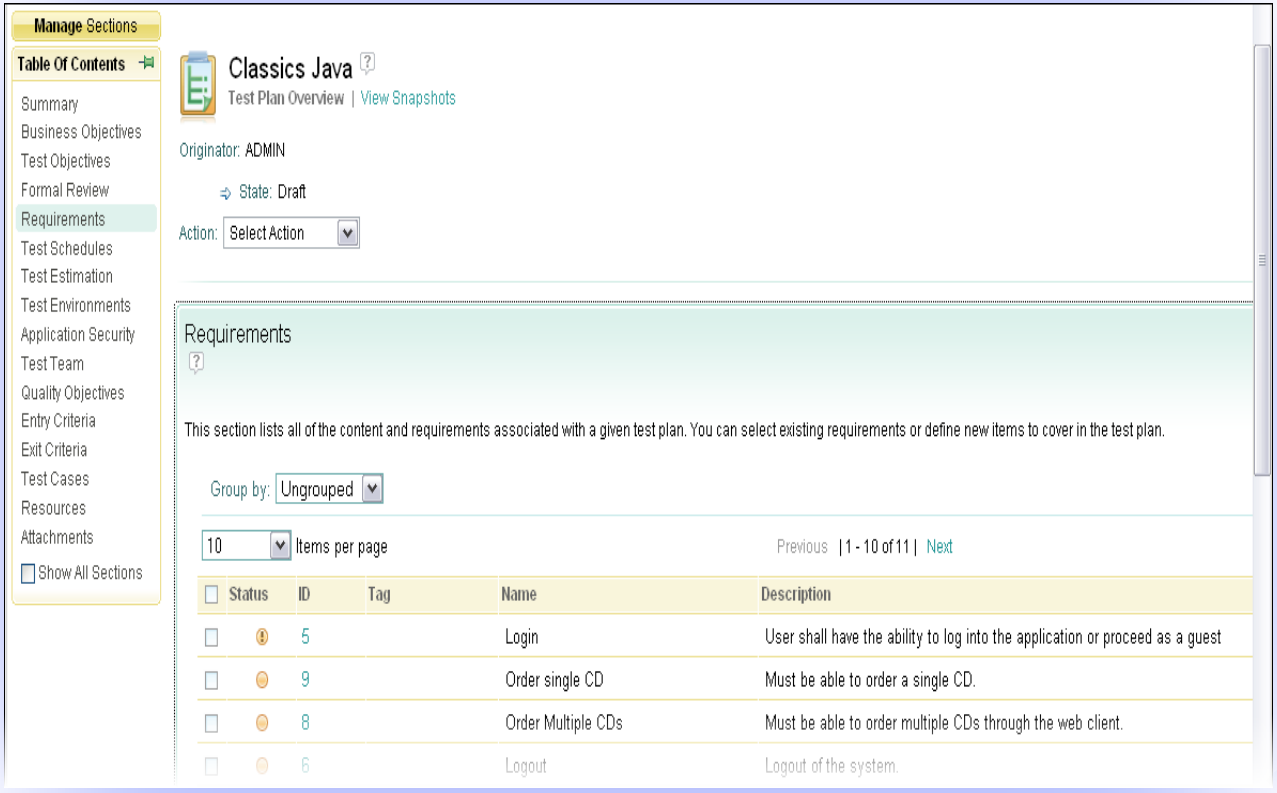
The QA Manager/Tester Sees Requirements in RQM

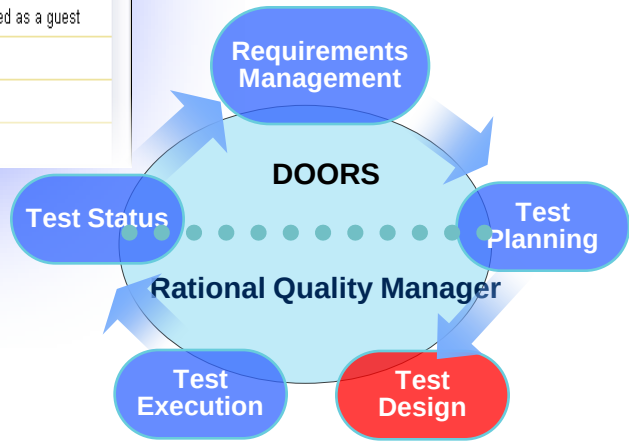




© 2010 IBM Corporation

The QA Manager/Tester Develops Test Cases to Test the Requirements





© 2010 IBM Corporation

The Analyst Checks Test Coverage in DOORS

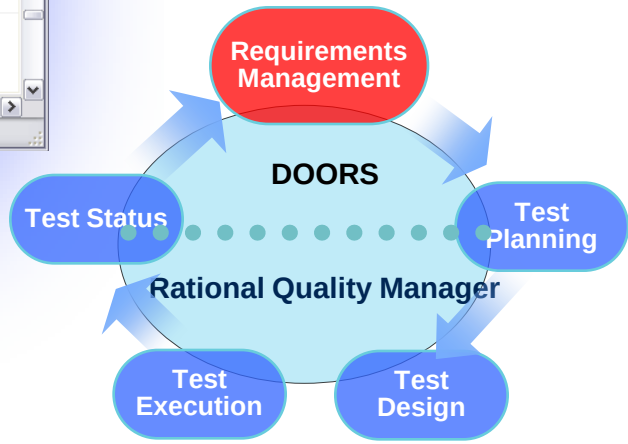
'Stakeholder Requirements' current 1.0 (2004 Model) in /Car Project (Formal module) - DOORS

File Edit View Insert Link Analysis Table Tools Discussions User Help

View: RQM Traceability View | All levels

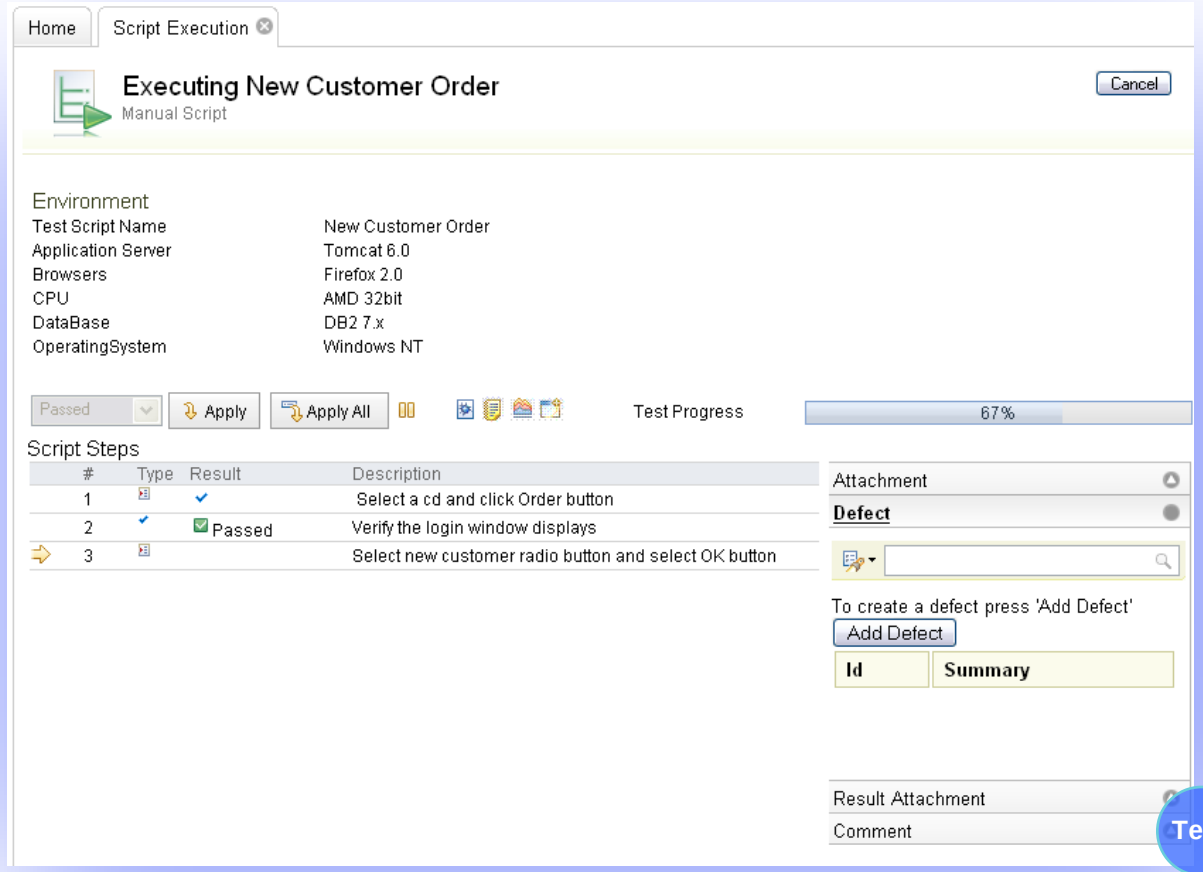
ID	Car user requirements	Test Plan and Test Cases
CSR103	**3.2 Constraint Requirements.**	
CSR104	**3.2.1 Availability**	
CSR105	Users shall be able to travel 10000 kilometers with a 99.9 percent chance of experiencing no breakdowns.	Quality Manager Car Constraints Test Plan 1: 10K Reliability Quality Manager Overall Car Test Plan 1: 10K Reliability
CSR106	Users shall be able to travel 10000 kilometers with a 99.99 percent chance of experiencing no faults that do not result in breakdowns.	Quality Manager Car Constraints Test Plan 1: 10K Reliability Quality Manager Overall Car Test Plan 1: 10K Reliability
CSR107	Loss of use of car due to equipment failure shall not exceed 1 day in every 2 years.	Quality Manager Car Constraints Test Plan 2: Stress Test Quality Manager Overall Car Test Plan 2: Stress Test
CSR108	**3.2.2 Lifetime**	
CSR109	Users shall be able to use the car to its designed standard for 200000 kilometers.	Quality Manager Car Constraints Test Plan 2: Stress Test 3: Security Check

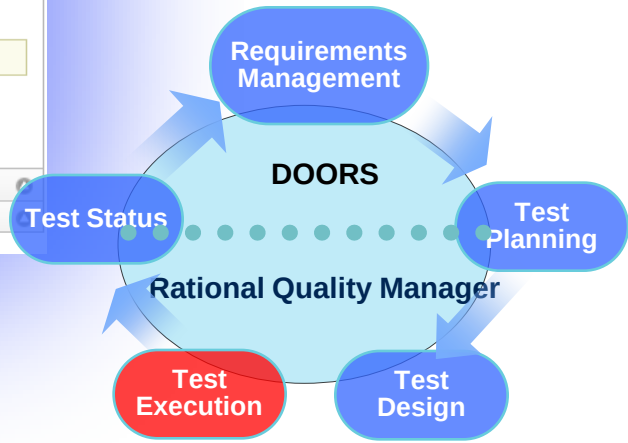
Username: Richard Watson | Exclusive edit mode



© 2010 IBM Corporation

The QA Manager/Tester Executes Test Cases





© 2010 IBM Corporation

The Analyst Checks QA Status in DOORS

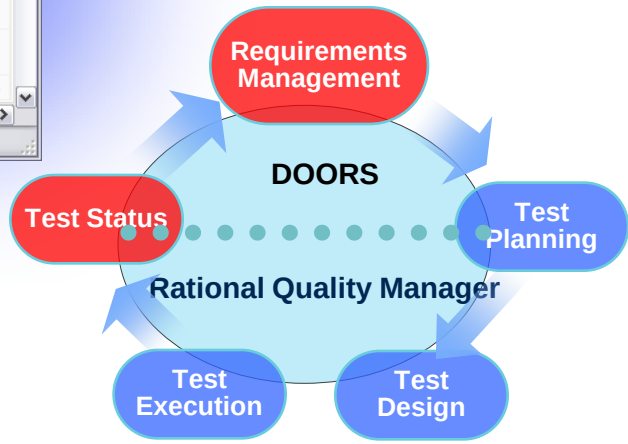
'Stakeholder Requirements' current 1.0 (2004 Model) in /Car Project (Formal module) - DOORS

File Edit View Insert Link Analysis Table Tools Discussions User Help

View: Constraint Test Report | All levels

ID	Car user requirements	Test Cases	Test Status	Verdict
CSR103	**3.2 Constraint Requirements.**		Mixed Status	Failed
CSR104	**3.2.1 Availability**		Mixed Status	Failed
CSR105	Users shall be able to travel 10000 kilometers with a 99.9 percent chance of experiencing no breakdowns.	(1) 10K Reliability: Failed	Approved	Failed
CSR106	Users shall be able to travel 10000 kilometers with a 99.99 percent chance of experiencing no faults that do not result in breakdowns.	(1) 10K Reliability: Failed	Approved	Failed
CSR107	Loss of use of car due to equipment failure shall not exceed 1 day in every 2 years.	(2) Stress Test: Error	Not Approved	Error
CSR108	**3.2.2 Lifetime**		Not Approved	Error
CSR109	Users shall be able to use the car to its designed standard for 200000 kilometers.	(2) Stress Test: Error (3) Security Check: Passed	Not Approved	Error
CSR110	**3.2.3 Security**			
CSR111	Only the authorized user shall be able to start and drive away the vehicle.			
CSR112	**3.2.4 Accessories**		Approved	Passed
CSR113	A warning triangle shall be supplied with the vehicle	(4) Accessory Audit: Passed	Approved	Passed
CSR114	A first aid kit shall be supplied with the vehicle	(4) Accessory Audit: Passed	Approved	Passed
CSR115	**3.2.5 Fuel input**		Approved	Incomplete

Username: Richard Watson | Exclusive edit mode



© 2010 IBM Corporation

Analyst Benefits

- Better visibility of test plan increases systems quality
  - Review construction of the audit trail to ensure that requirements have been planned to be tested
  - Monitor test status against requirements to identify business impact
- Fully role based integration within DOORS
  - Traceability columns on requirements and test
  - Reporting facilities
  - Suspect Links

© 2010 IBM Corporation

QA Manager/Tester Benefits

- Work against a defined set of requirements
  - Maximize system quality while controlling an efficient test process
  - How much testing is enough?
- Efficient test autopsy
  - is a defect in the test, implementation or requirement?
  - Traverse audit trails back to original requirements analysis
- Fully role based integration
  - Combined reports from within RQM
  - Traceability alerts so requirements changes are never lost

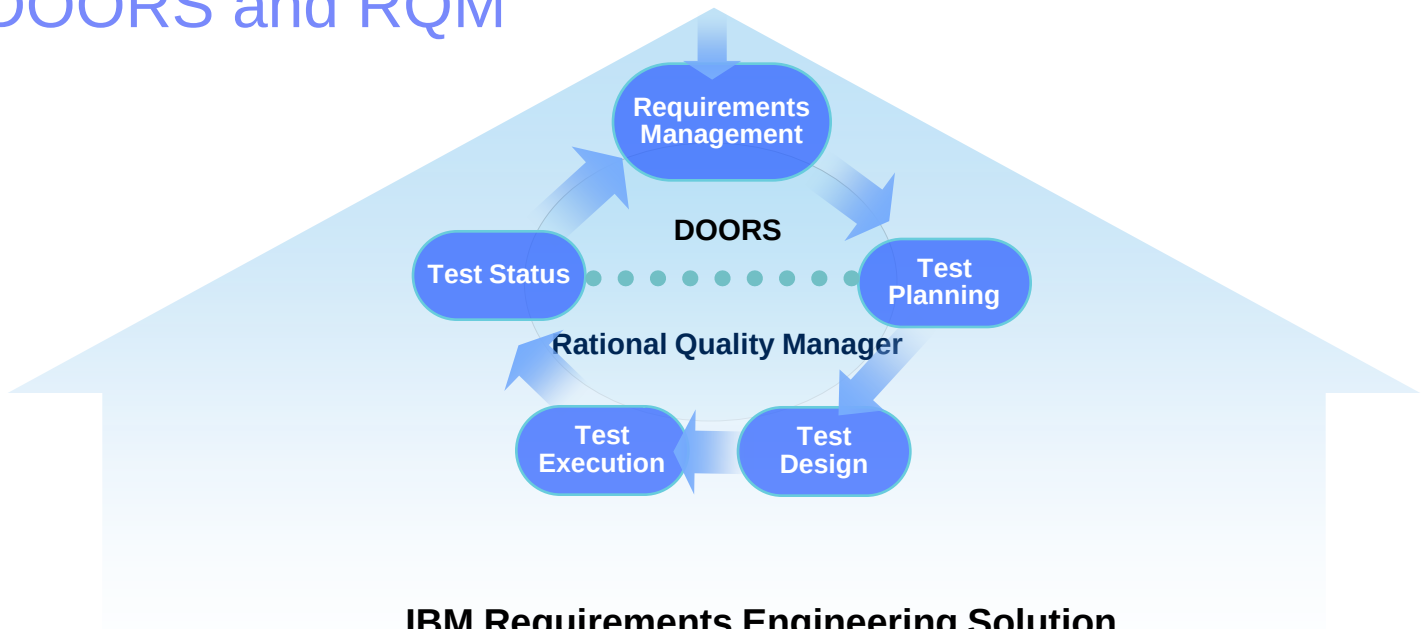
© 2010 IBM Corporation

CTO Benefits

- Quality Assurance statistics alongside requirements ensure that:
  - Full business criticality understood and traced back to user need
  - Overall development process prioritized commercially rather than technically
- Statistics aggregated up through the requirements hierarchy
  - Fast identification of overall systems quality
  - Easier to communicate quality assurance to the end customer

© 2010 IBM Corporation

Overall Benefits of an Integrated Approach with DOORS and RQM



IBM Requirements Engineering Solution

- Getting everyone on the same page with minimal learning curves
- Accessing information from other disciplines without the need to move outside of a preferred working environment
- Managing scope, plus assessing and controlling the impact of change
- Ensuring end-to-end traceability
- Ensuring conformance to contractual agreements
- Increasing systems quality
- Demonstrating compliance to regulations

© 2010 IBM Corporation

© 2010 IBM Corporation

© Copyright IBM Corporation 2009. All rights reserved. The information contained in these materials is provided for informational purposes only, and is provided AS IS without warranty of any kind, express or implied. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, these materials. Nothing contained in these materials is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software. References in these materials to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in these materials may change at any time at IBM's sole discretion based on market opportunities or other factors, and are not intended to be a commitment to future product or feature availability in any way. IBM, the IBM logo, Rational, the Rational logo, Telelogic, the Telelogic logo, and other IBM products and services are trademarks of the International Business Machines Corporation, in the United States, other countries or both. Other company, product, or service names may be trademarks or service marks of others.

© 2010 IBM Corporation