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Effective Test Planning and Execution Tracking Using IBM Rational Quality Manager

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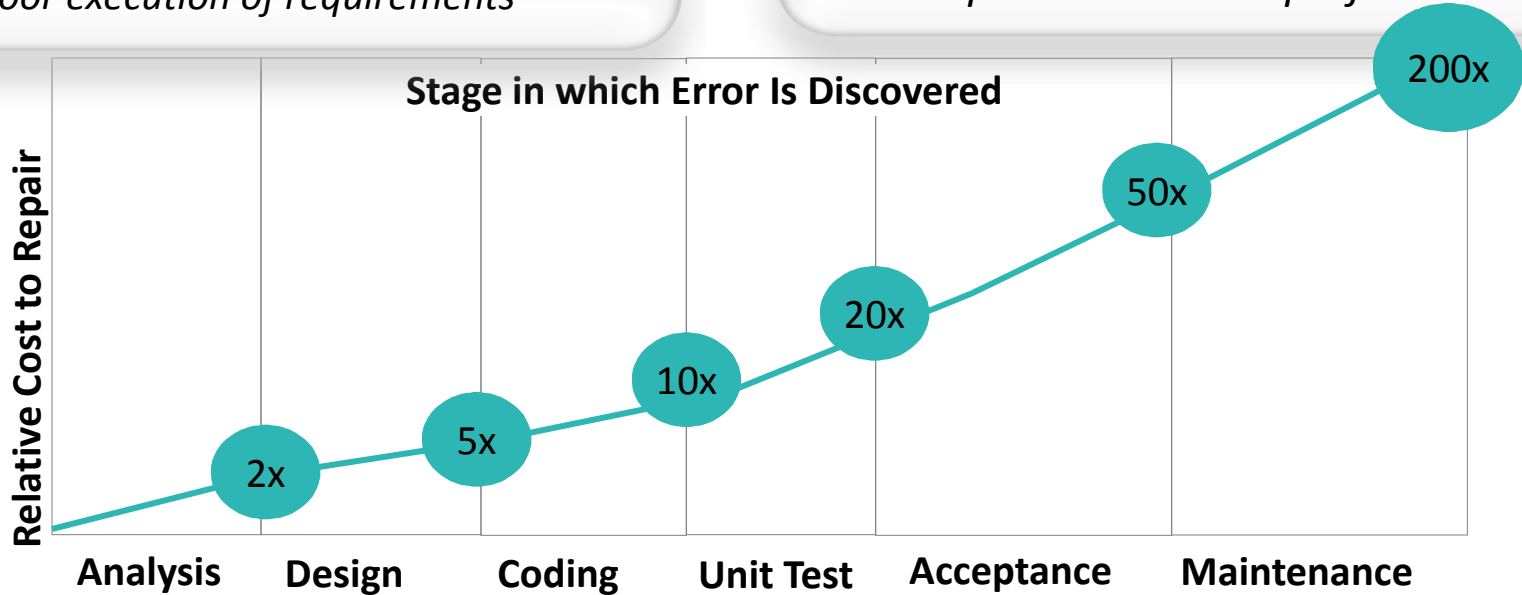
Errors caught early cost less to fix...

- Bugs/failures are exponentially more expensive the longer they go uncaught
- Extends to analysis, requirements, development, and everywhere across the application lifecycle

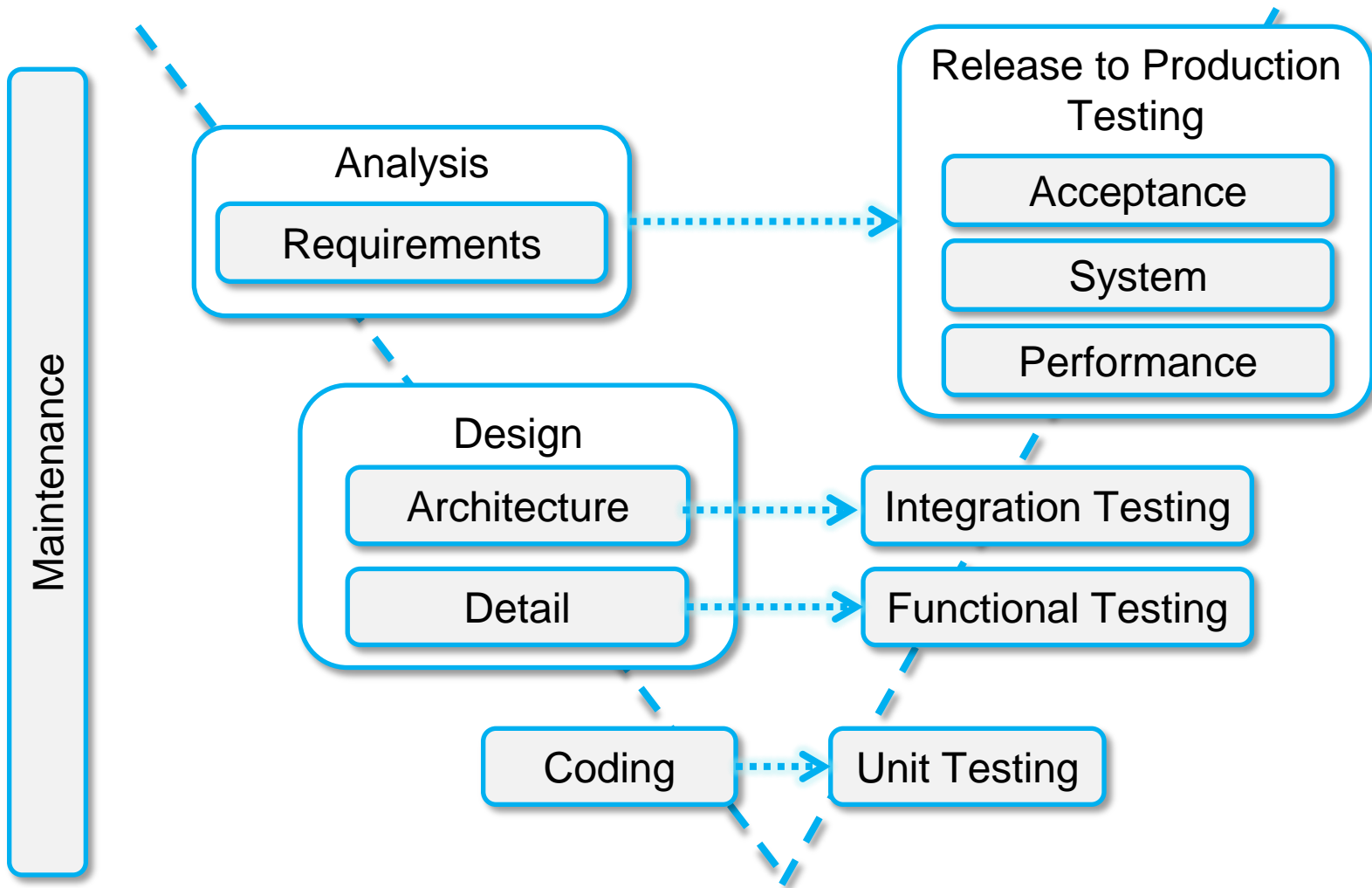
“34% of software projects are deemed successful costing \$300B annually”

“30% of project costs are due to rework and poor execution of requirements”

“50% of outsourced projects are expected to under perform”

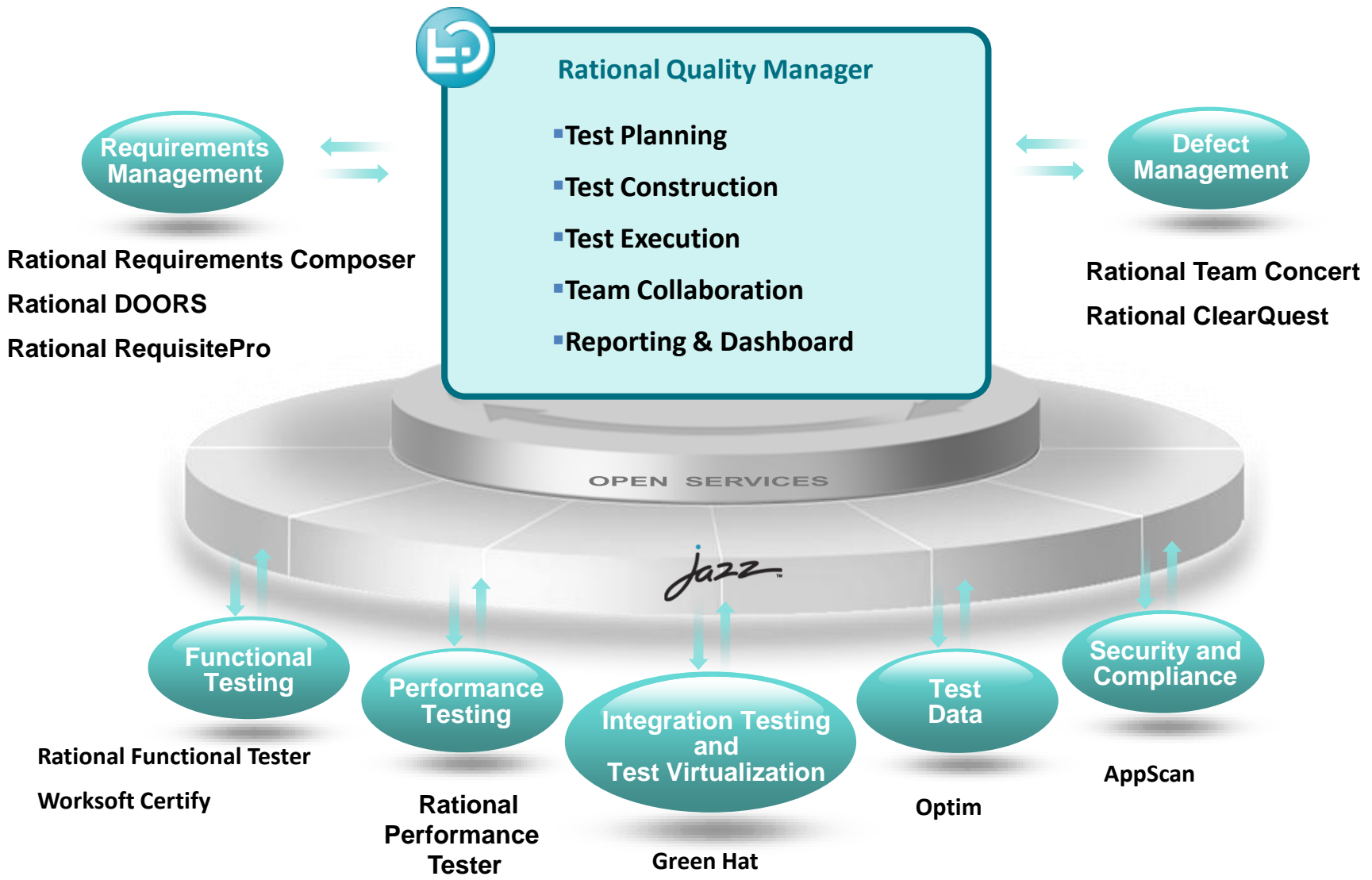


... so quality management must span the lifecycle



All of these tests must be planned. Artifacts created by tests need to be managed, linked to other development artifacts, and analyzed.

It all starts with IBM Rational Quality Manager



Rational Quality Manager (RQM): closer look at its functions

Test Planning

- Comprehensive test plan
- Shared objectives
- Scope, Timeline, Resources
- Risk assessment

Test Construction

- Requirement driven testing
- Test environments coverage
- Manual test authoring
- Test lab management

Test Execution

- Manual test execution
- Use test automation tools
- Record test results
- Submit & track defects

Team Collaboration

- Process enactment and enforcement
- Review and approval
- Task management
- Rapid team member on-boarding

Reporting & Dashboards

- Status and progress tracking
- Customizable live dashboard
- Real-time metrics and reports
- Compliance and quality audit



Rational Quality Manager's test plan

- Central location for business objectives, requirements, resources, platform and exit criteria to name a few
- Defined Responsibilities
 - Individual sections
- Goal-Oriented
 - Formalized and documented exit criteria
- Extensible
 - Add sections, import custom data
- Snapshot version control to track plan history

The screenshot displays the Rational Quality Manager interface for a test plan titled "1 : JKE Banking Release 1". The interface includes a navigation sidebar on the left with sections like "Manage Sections" and "Table Of Contents". The main content area shows the test plan overview, including the originator (Tammy), owner (Tammy), and a description: "Defines testing for the Release 1 of JKE Banking. Significant 1 include the Money that Matters initiative whereby account from their investments to causes needing assistance." Below this, there is a "Requirement Collection Links" section with a table of OSLC Requirements. The table has columns for Status, Risk, and Summary, and shows one entry: "14: Release 1 Planning" with a risk level of 5 orange circles.

Status	Risk	Summary
<input type="checkbox"/>	○○○○○	14: Release 1 Planning

Prioritization helpers

Tackle the top priority tests first, find critical defects early

- New planning fields for test artifacts to help prioritize, schedule and manage testing activities:
 - Test Suite/Case: priority, estimate
 - Test Suite/Case Execution Record: priority, estimate, time spent
- New generated Test Execution Records (TERs) inherit estimate and priority from associate test case/suite

Test Cases ?

View As: General Group By: Ungrouped

10 Items per page Previous | 1, 2, 3 | Next

<input type="checkbox"/>	ID	Priority	Name	Estimate	State	Test Ph
<input type="checkbox"/>	22		Dispute Credit Card Charge	2 h	Under Review	Integrat
<input type="checkbox"/>	19		Allocate Dividends to a Single Cause	2 h	Under Review	Develop
<input type="checkbox"/>	23		Pay Bills Online	1 h	Under Review	Integrat
<input type="checkbox"/>	24		Request Credit Increase	45 m	Under Review	Integrat
<input type="checkbox"/>	21		Close Account	30 m	Under Review	Integrat
<input type="checkbox"/>	20		Check Account Balance	45 m	Under Review	Integrat
<input type="checkbox"/>	18		Dividend Allocation by Percentage	45 m	Draft	Develop
<input type="checkbox"/>	17		JKE Charity Coordinator responds to online request	30 m	Draft	Develop
<input type="checkbox"/>	25		(QM Tutorial) Allocate Dividends to Multiple Causes	1 h	Under Review	Develop
<input type="checkbox"/>	16		Donor dividend allocation conforms to stated criteria	30 m	Draft	Develop

Test planning: new in RQM 4 views, actions and dashboard widgets

Accurate and real-time views to quickly respond to change

- Test Suite/Case Execution Record section in test plans
- New dashboard widgets for testers and team leaders with roll up
- Row level TER action menu to allow changing of TER owner, priority, running TER
- Export data in the table views to CSV format

The screenshot displays two main components of the RQM 4 interface:

Test Plan Overview: Shows details for a test plan titled "2: System Verification". It includes fields for Originator (Tammy), Owner (Tammy), Priority (Medium), and Action (Select Action). The description is "Formal test plan for system verification." Below this is a section for "Test Case Execution Records" with a table listing individual test cases.

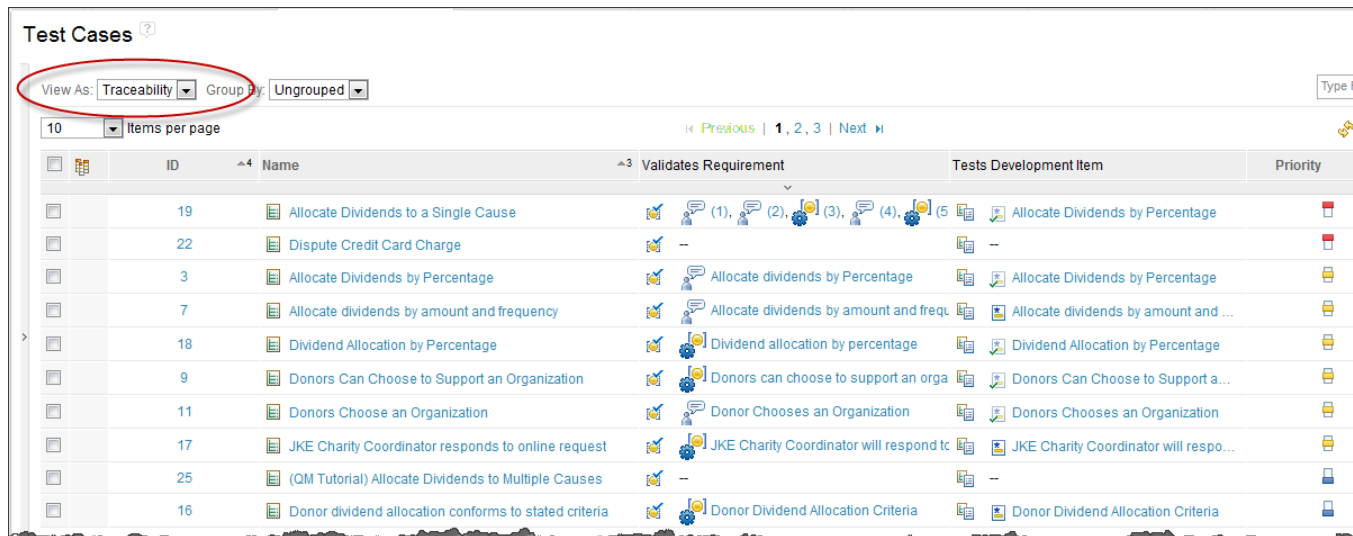
Team Execution Status for TestCases: A dashboard widget showing progress bars and statistics for team members: Deb, Tanuj, Marco, Rebecca, Tammy, and AI. Each team member's row displays total hours, estimated progress, and counts for various execution states.

Team Member	Total Hours	Estimated Progress	Progress Count	Total Count	Progress Value	Total Value
Deb	15/16 h	Estimated: 100%	Progress:3	Total:3	Progress:300	Total:300
Tanuj	80/85 h	Estimated: 100%	Progress:11	Total:11	Progress:1254	Total:1255
Marco	105/109 h	Estimated: 100%	Progress:9	Total:13	Progress:820	Total:1345
Rebecca	20/21 h	Estimated: 100%	Progress:2	Total:2	Progress:100	Total:200
Tammy	125/100 h	Estimated: 100%	Progress:15	Total:15	Progress:1495	Total:1495
AI						

Traceability views

Identify gaps and analyze impact with lifecycle traceability

- Traceability views for test plans, test cases/scripts, test suite/case execution records and test suite/case results showing links:
 - From test plans to requirement collections and development plans
 - From test cases to requirements and development work items
 - From test scripts to requirements
 - From test suite/case execution records (TERs) and results views show links to defects
- Menu action directly available to add links



Execution progress views

Track and optimize test execution in real-time

- Execution progress view for test plans
- Test plan execution status dashboard widget
- Test suite/case execution status summary viewlet in the test plan header
- Each status bar has rich hover and drill down to the TCER list, or TSER list options
- View setup can be saved as a personal or shared query for re-use

The screenshot displays the 'Test Plans' section of the IBM Quality Dashboard. The view is set to 'Execution' and shows a table of test plans with columns for ID, Name, Iteration, Test Case Estimates, Test Case Points, and Test Case Attempts. A detailed 'Progress Report - Estimate' popup is shown for the 'User Acceptance' test plan (ID 3).

ID	Name	Iteration	Test Case Estimates	Test Case Points	Test Case Attempts
3	User Acceptance		Total: 125/100 h Estimated: 100%	Progress:1495 Total:1495	Progress:15 Total:15
4	Master Test Strategy		Total: 0/0 h Estimated: 0%	Progress:0 Total:0	Progress:0 Total:0
2	System Verification		Total: 105/104 h Estimated: 100%	Progress:1155 Total:1580	Progress:10 Total:14
1	Development Test		Total: 115/107 h Estimated: 100%	Progress:1319 Total:1520	Progress:15 Total:15

Progress Report - Estimate

Total: 125h
Progress: 100h

Estimate: 125h
Time Spent: 100h

Details...

Hierarchical test iterations across test plans

Flexible planning across test plans and iterations

- Test iteration schedule is used to plan test effort and track progress
 - Points value is as an estimate of the execution effort for the iteration in relation to other iterations
 - Planned Defects
- Timeline: activity within a project area with its own schedules, deliverables, teams and processes
- One timeline can be designated as the project timeline
- Iteration: Represents a hierarchy of sequential phases or intervals within a timeline
- Timeline and iterations are defined by project administrators
- Enable re-use of test iterations across test plans
- Advanced option to use multiple timelines via team areas

Hierarchical test iterations across test plans

Active Project Areas > JKE Banking (Quality Management)

Overview

- Timelines ?
- Roles
- Permissions
- Iteration Types
- Access Control
- RequisitePro Projects
- Process Description
- Releases
- Categories
- Mail Templates
- Work Items
- Test Artifacts
 - Workflows
 - Priority

Timelines

The project timeline defines a start and end date along with an iteration breakdown. Additional timelines can be defined to track secondary activities.

Tip: Iterations can be manually reordered using drag and drop.

Defined Timelines

- Development [Project Timeline]
 - First Project Phase [2/7/2012 - 4/7/2012]
 - Rest-Import
 - TestPlan 4
 - TestPlan 1
 - TestPlan 2
 - S1 [2/25/2012 - 3/6/2012]
 - S2 [3/8/2012 - unknown]
 - S3
 - TestPlan 3

Quality Dashboard | Browse Test Plans | 2: System Verificati...

Manage Sections

Overview

Summary

Business Objectives

Test Objectives

Formal Review

Requirement Collection Links

Development Plan Links

Risk Assessment

Test Schedules

Test Estimation

Test Environments

Quality Objectives

Entry Criteria

Exit Criteria

Test Suites

Test Cases

Resources

Attachments

Test Case Execution Records

Show All Sections

* 2: System Verification

Test Plan Overview | Snapshots | History

Originator: Tammy

Owner: Tammy

Priority: Medium

Action: Select Action → State: Draft

Description: Formal test plan for system verification.

Test Schedules

Define the test schedule for this Test Plan.

Show All Items per page

Name	Description	Points
TestPlan 2 [-]		0
S1 [2/25/2012 - 3/6/2012]	Sprint 1	1000
S2 [3/8/2012 -]	Sprint 2	5000
S3 [-]	Sprint 3	5000



Demo 1: Test plan overview

Demo 1: test plan overview

- Overview of JKE Test Plan
 - Traceability view
 - Execution view
 - Hierarchical test iterations

Rational Quality Manager: test construction

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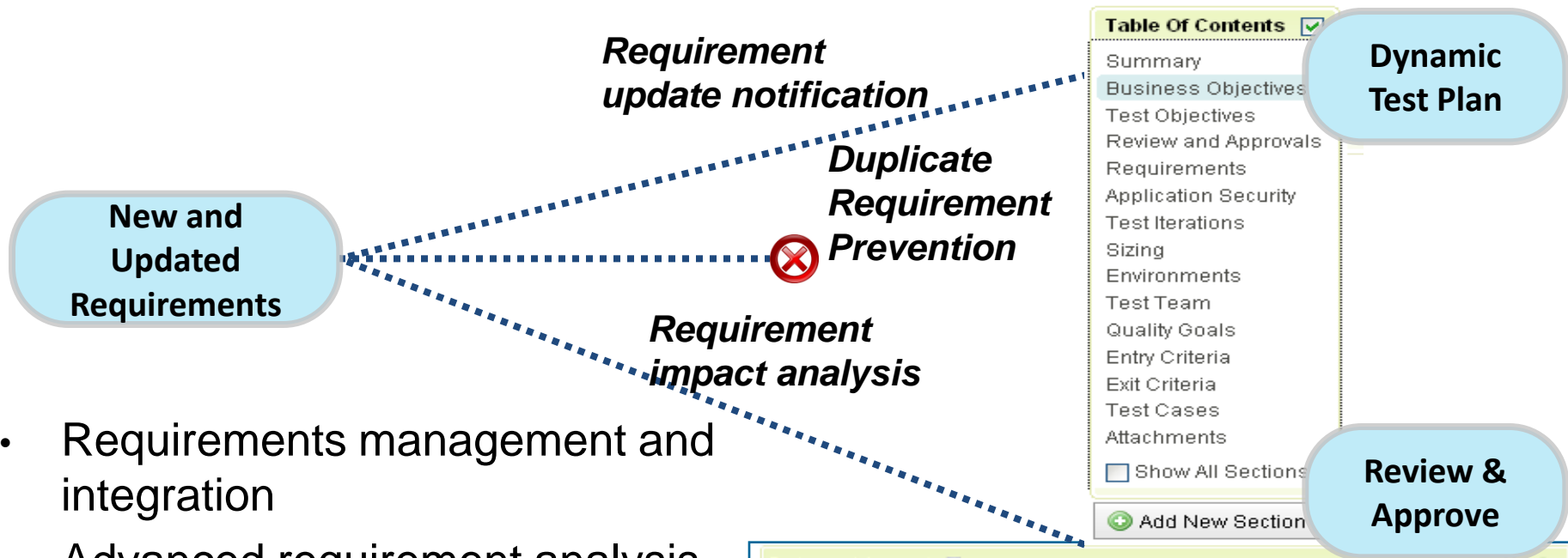
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Requirements - Driven Testing With RQM



- Requirements management and integration
- Advanced requirement analysis prevents duplicates and duplicate efforts
- Review and approvals of tasks across projects
- Asset versioning with dynamic update

Review and Approvals ? Work Item: [Create](#)

List the people who will be reviewers and approvers of this content and define your approval process.

View: All Type Filter Text

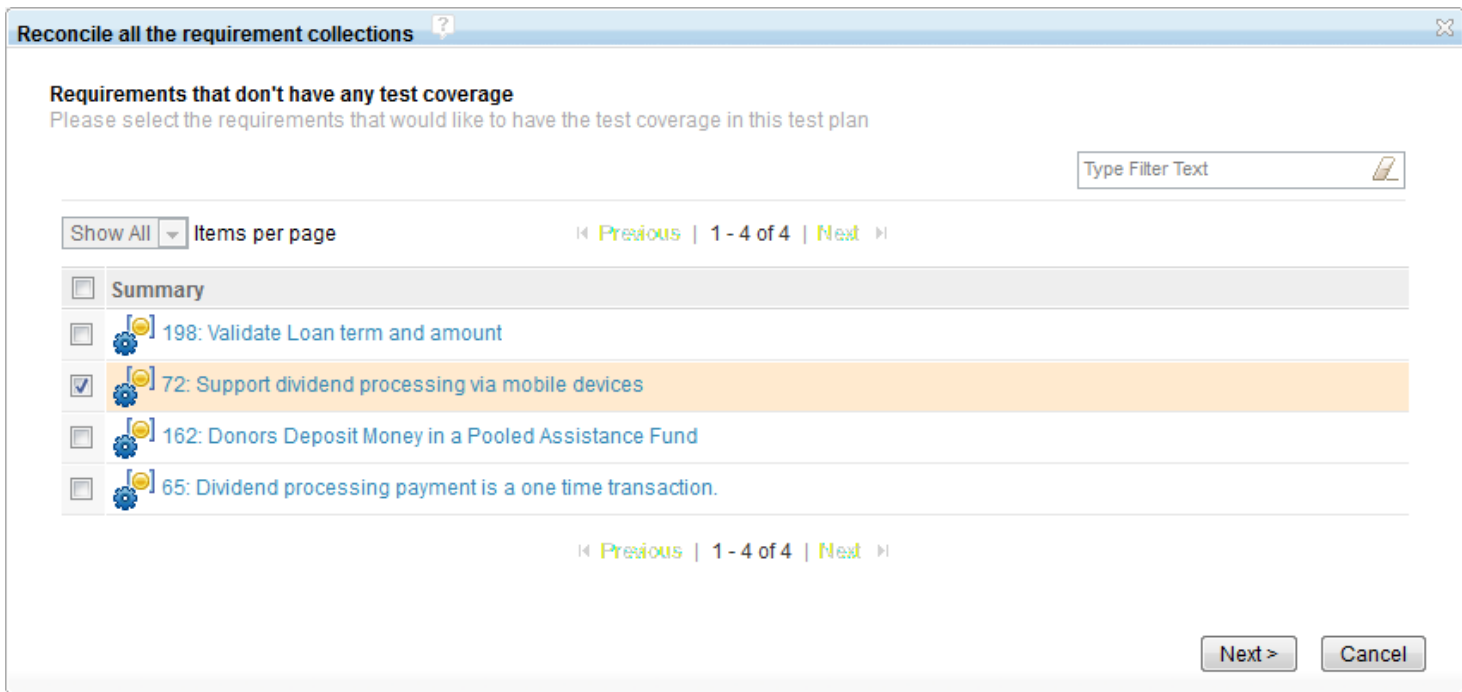
Show All Items per page Previous | 1 - 2 of 2 | Next

	Review Type	Name	Status	Comments	Modified
<input type="checkbox"/>	Approver	Mary (Manager)	Pending		
<input type="checkbox"/>	Reviewer	Larry (Lab Manager)	Pending		

Requirement reconciliation wizard


Ensure full coverage even if requirements keep changing

- Show requirements not covered by test cases in the current test plan
- Can create automatically new test case for those requirements
- Can add existing test cases linked to those requirements to the current test plan
- Show modified and removed requirements
- Can update the links and mark test cases as suspect







Reconcile all the requirement collections ?

Requirements that don't have any test coverage
Please select the requirements that would like to have the test coverage in this test plan

Type Filter Text 

Show All ▾ Items per page < Previous | 1 - 4 of 4 | Next >

<input type="checkbox"/>	Summary
<input type="checkbox"/>	 198: Validate Loan term and amount
<input checked="" type="checkbox"/>	 72: Support dividend processing via mobile devices
<input type="checkbox"/>	 162: Donors Deposit Money in a Pooled Assistance Fund
<input type="checkbox"/>	 65: Dividend processing payment is a one time transaction.

< Previous | 1 - 4 of 4 | Next >

Next > Cancel

Manual test script recording with IBM Rational Functional Tester

- Requires IBM Rational Functional Tester (RFT) 8.2.2
- Records user interactions with application under test using RFT
- Recording is captured as a RQM manual test script in English natural language with screenshots, independent from RFT
- Resulting manual test scripts are executed manually using RQM only
- Support Web and Java applications running on Windows

Manual Steps (?)

Step	Description:	Expected Results	Validates
1	select the "Jazz Community Site" window		
2	select the "Rational Quality Manager - Projects - Jazz Community Site" window		
3	select the "New Work Item - Change and Configuration Management" window		
4	click the "Conditions" link		
5	drag the "com_ibm_team_workitem_web_ui_internal_view_queryeditor_Attribute" html		
6	click the "is" textbox		
7	click the "Run" button		

Keyword View (?)

Clipboard (?)

Type Filter Text

Steps

- Insert New Step Above
- Insert New Step Below
- Insert New Step(s) via Recording
- Reporting Step
- Add to Clipboard
- Remove Step
- Link to any Requirement
- Remove Requirement Links from step

+ Click to add step



Demo 2: Requirements-driven test case construction

Demo 2: create a test case and link it to requirements and manual test recording

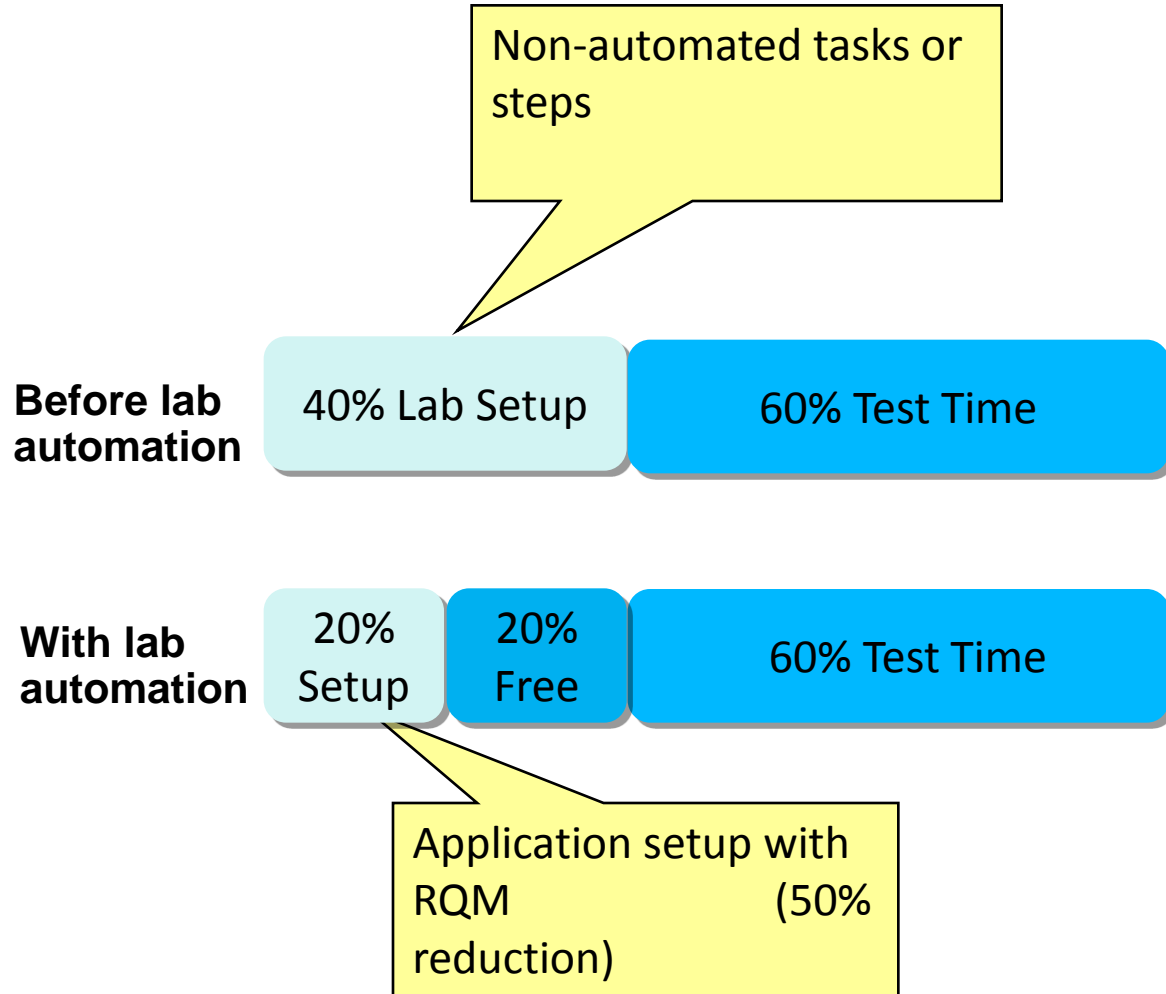
- Requirements-driven test planning
- Creating a manual test case
- Manual test recording with Rational Functional Tester

Built-in Test Lab Management

- RQM includes test lab management capability
 - Capture and organize test lab inventory
 - Manage requests and reservations of test lab components
 - Deploy test tools to lab machines
 - Analyze usage patterns to optimize lab utilization
 - Do comprehensive reporting on test assets
- Integrates with virtual automation platforms, e.g., Surgient and VMLogix
- RQM can integrate with 3rd party test lab management products

RQM lab automation allows to gain more test time

- Manage
 - Verify that there are resources required to fulfill their test plan
- Deploy
 - Deliver the configurations teams require for test
- Optimize
 - Analyze patterns to minimize cost and maximize utilization



Work smarter, save on test lab overhead, infrastructure and duration costs

Rational Quality Manager: test execution

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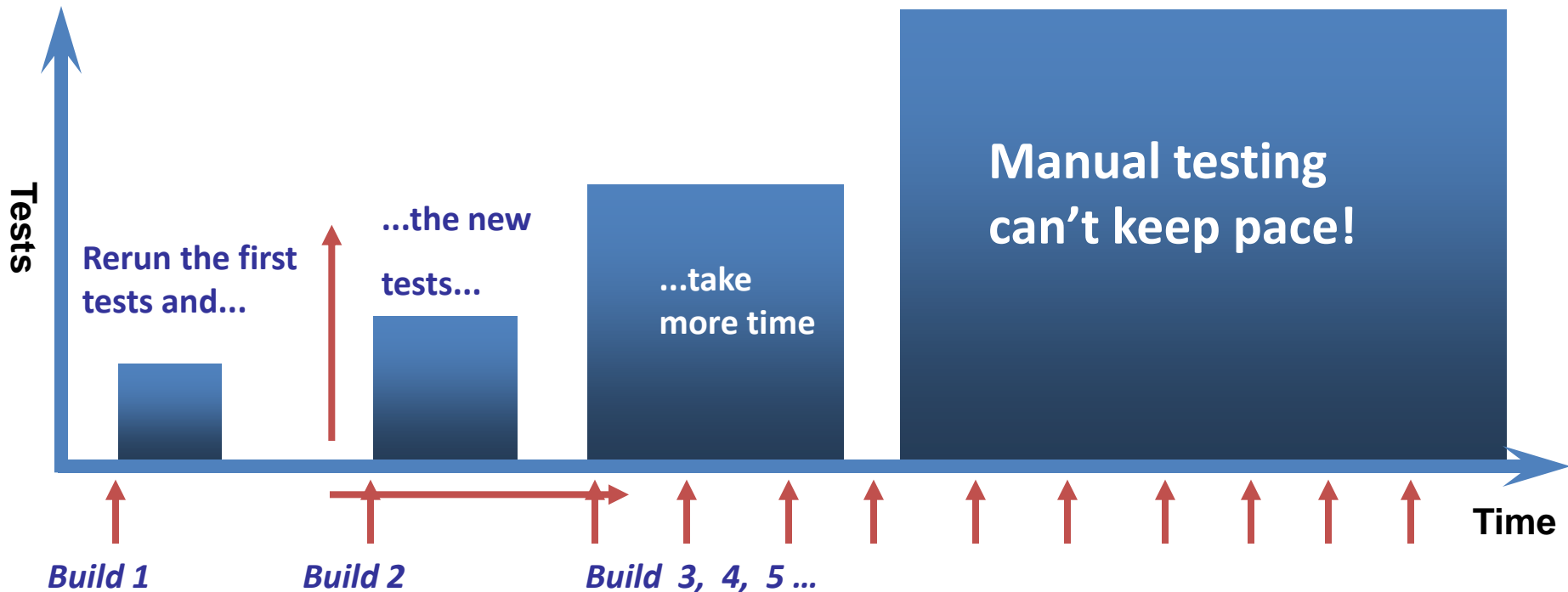
Reporting & Dashboards

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- Customizable live dashboard
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Keeping up with manual tests is challenging...

- Manual testers can't keep pace with the rapid releases of an agile development process
- Testers need a tool to **provide assistance to the manual tasks involved with manual testing** (i.e. reuse, data entry, data validation)



RQM's manual tester assists manual test case execution

Rich Text Editor

Reusable keywords

Step by step capture and execution

Automatic defect creation – send directly to RTC (or your own CCM tool)

Assisted data entry and validation

Manual Steps

Step	Description	Expected Results
1	Select Money Market account	Accounts Details screen appears
2	Click Allocate Dividend Percentage	
3	Select American Cancer Society and click Add	American Cancer Society is added
4	Select Salvation Army and click Add	Salvation Army is added to the org
5	Enter 10 for the percentage	
6	Click Next	Verify Donation Amount is \$50.00 total
7	Click Confirm	

Keywords	Type
JKE Logout	Man.
JKE Login	Man.

Showing 1-2 of 2 items

Clipboard

Type Filter Text

Steps

Add one or more steps to this view by dragging them from the Manual Test editor.

Execution Variables

Type Filter Text

Script Steps

Step	Result	Description	Expected Results
1	✓	Login with jbrown/jbrown	Accounts Overview screen appears
2	✓	Select Money Market account	Accounts Details screen appears. Dividends earned will be \$500.00
3	✓	Click Allocate Dividend Percentage	Money That Matters screen appears
4	✓	Select American Cancer Society and click Add	American Cancer Society is added to the organizations list
5	✓	Select Salvation Army and click Add	Salvation Army is added to the organizations list
6	✓	Enter 10 for the percentage	
7	✗	Click Next	Verify Donation Amount is \$50.00 total
8	✗	Click Confirm	

JKE Banking

Money That Matters

Donation Confirmation

Organizations:	American Cancer Society, Salvation Army
Amount:	\$100.00
New balance:	\$400.00
Dividends earned:	\$500.00
Dividends earned:	\$35.00

Script Steps

Step	Result	Description	Expected Results	Actual Results
1	✓	Login with jbrown/jbrown	Accounts Overview screen appears	
2	✓	Select Money Market account	Accounts Details screen appears. Dividends earned will be \$500.00	



Demo 3: Manual test case execution and defect logging

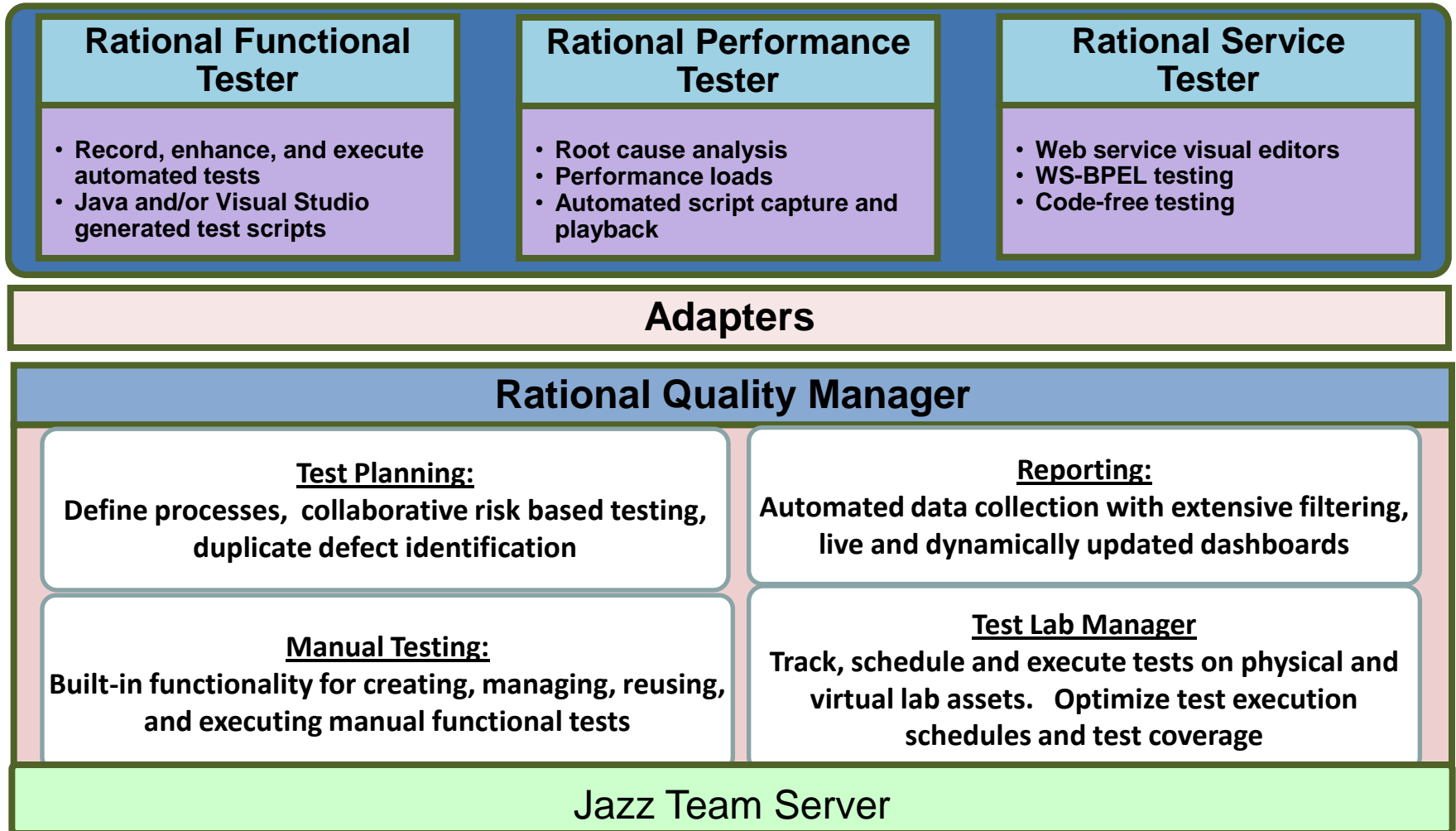
DEMO 3: execute a test case and log defect with automatic traceability

- Tanuj already had deployed the package created by the most recent build
- He executes one of the test cases
- He discovers an issue with dividends amount distribution to multiple organizations and creates a new defect
- Tanuj views the execution results, the new defect and the links to related artifacts that were created by RQM and RTC automatically

Rational also offers a complete suite of testing tools



RQM integrates with testing products like Functional Tester, Performance Tester, and Service Tester, for a complete Quality Management solution



RQM integration with rational testing tools extends quality management

RQM + RFT + RPT + RST = increased reuse and centrally managed Automated Functional, Performance and Service Testing

- Automatically populate defects, scripts, results, etc. from Rational Functional Tester, Rational Performance Tester, and Rational Service Tester into Rational Quality Manager for complete lifecycle integration
 - Testers don't need to learn how to use RQM – their artifacts are reused from RQM that connects via adapters to the testing tools
 - All artifacts can be linked to RRC and RTC from RQM for greater traceability
- Build and execute test cases with scripts from any combination of testing tools
 - Example: RFT or RST scripts combined in a performance test case

Automated functional testing

Definition: Testing that ignores the internal mechanism of a system or component and focuses solely on the outputs generated in response to selected inputs and execution conditions.¹

- Automated test scripts are more productive
- Use to test new code or for regression testing on changed code



**Record
Test Script**

**Enhance
Recorded Script**

**Execute
Test Scripts**

¹[IEEE 90] Institute of Electrical and Electronics Engineers. *IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries*. New York, NY: 1990.



Demo 4: Automated functional testing with RQM and RFT

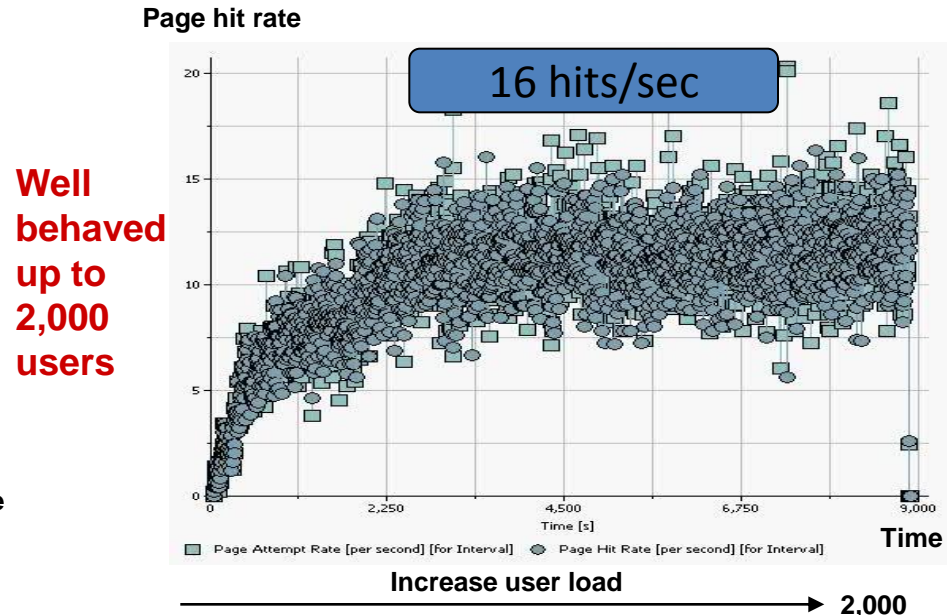
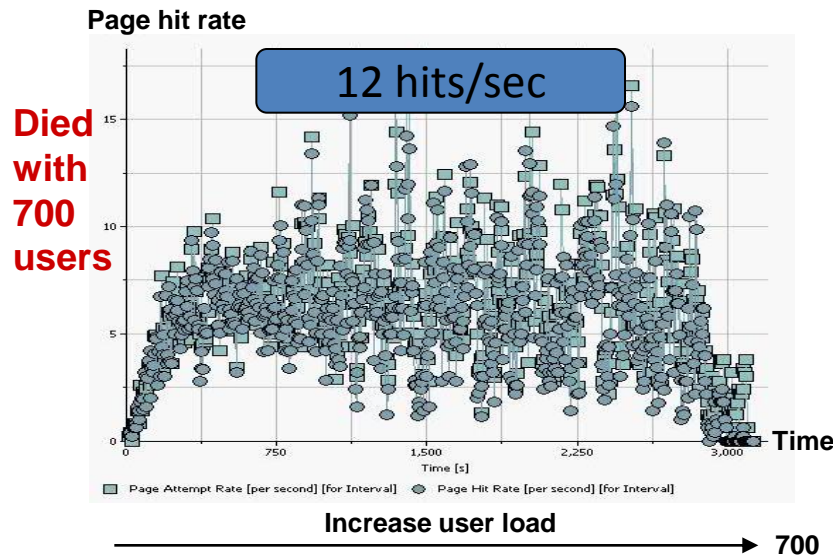
Demo 4: integration between RQM and RFT

- Tanuj created an automated functional test with Rational Functional Tester
 - RFT and the script recorder makes it easy for Tanuj to record and automatically generate a repeatable automated functional test
- From RQM, Tanuj can connect with RFT to link any test script to a test case in
- Test Execution Records can be viewed instantly within RQM and defects could be submitted directly to RTC

Performance Testing

Definition: Testing conducted to evaluate the compliance of a system or component with specified performance requirements¹

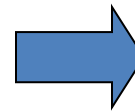
- The evaluation of a system’s capability to provide acceptable response times and function while serving a large number of clients
- Also known as Load Testing, Capacity Testing, or Stress Testing



¹[IEEE 90] Institute of Electrical and Electronics Engineers. *IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries*. New York, NY: 1990.

Rational Performance Tester

- Use Rational Performance Tester
 - Develop and execute scripts on Windows or Linux
 - Collect server resource data and application performance data in the same product
 - No programming knowledge necessary to create/execute test
- Perform tests on a variety of applications
- Root Cause Analysis – identify both source code and application tier causing the bottleneck



Any Web Application



Rational Service Tester

- Functional testing tool - test web services without writing code
- Create, execute and analyze tests
 - SOAP over HTTP
 - SOAP over JMS
 - WS-Security
- Visual editor for testing web services
- Automated data detection and creation
 - Record tests
 - Update tests with custom data via editor and data sets
 - Playback test
- Create tests from WS-BPEL business processes

Rational Quality Manager: reporting and dashboards

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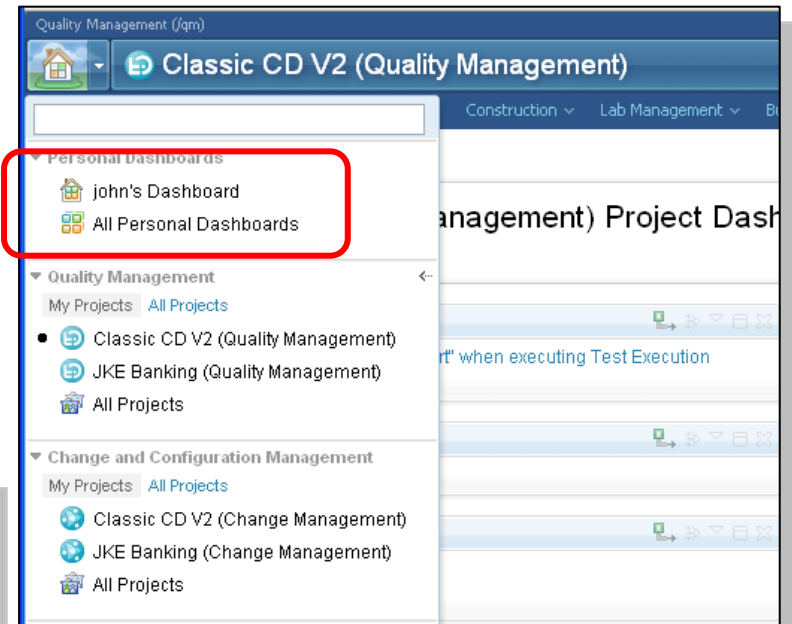
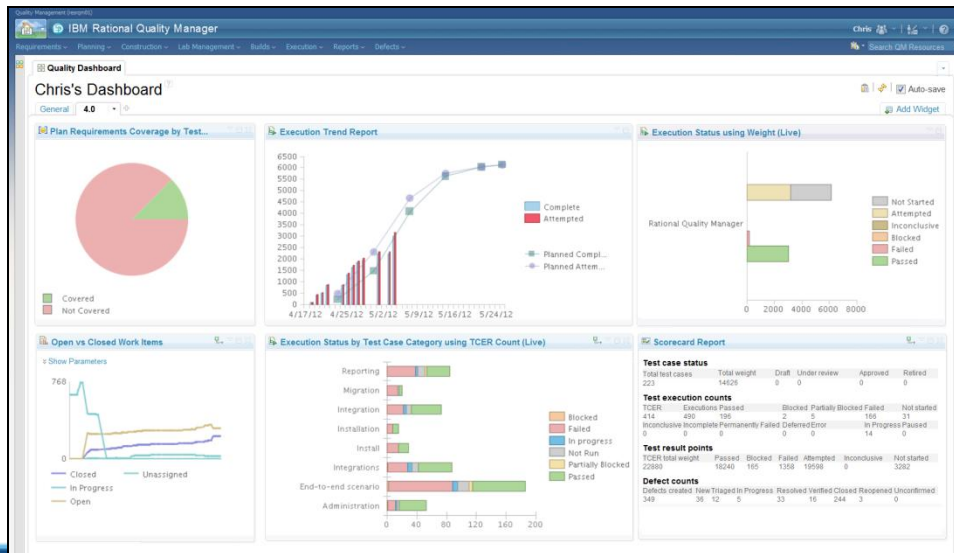
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Rational Quality Manager dashboards

Make informed decisions with real-time dashboards

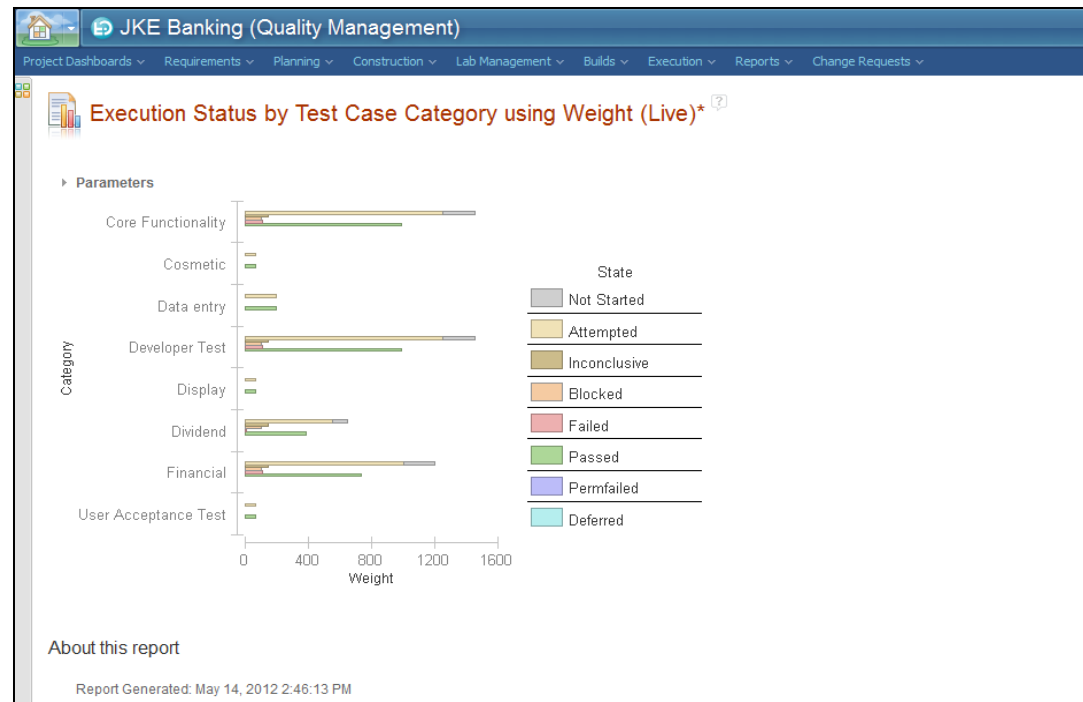
- One common project dashboard and team dashboards
- Project dashboard is opened in the first tab of the RQM console
- Team dashboards appear in the “Project Dashboard” action bar menu
- Personal Dashboards are now CLM wide and appear in the home menu



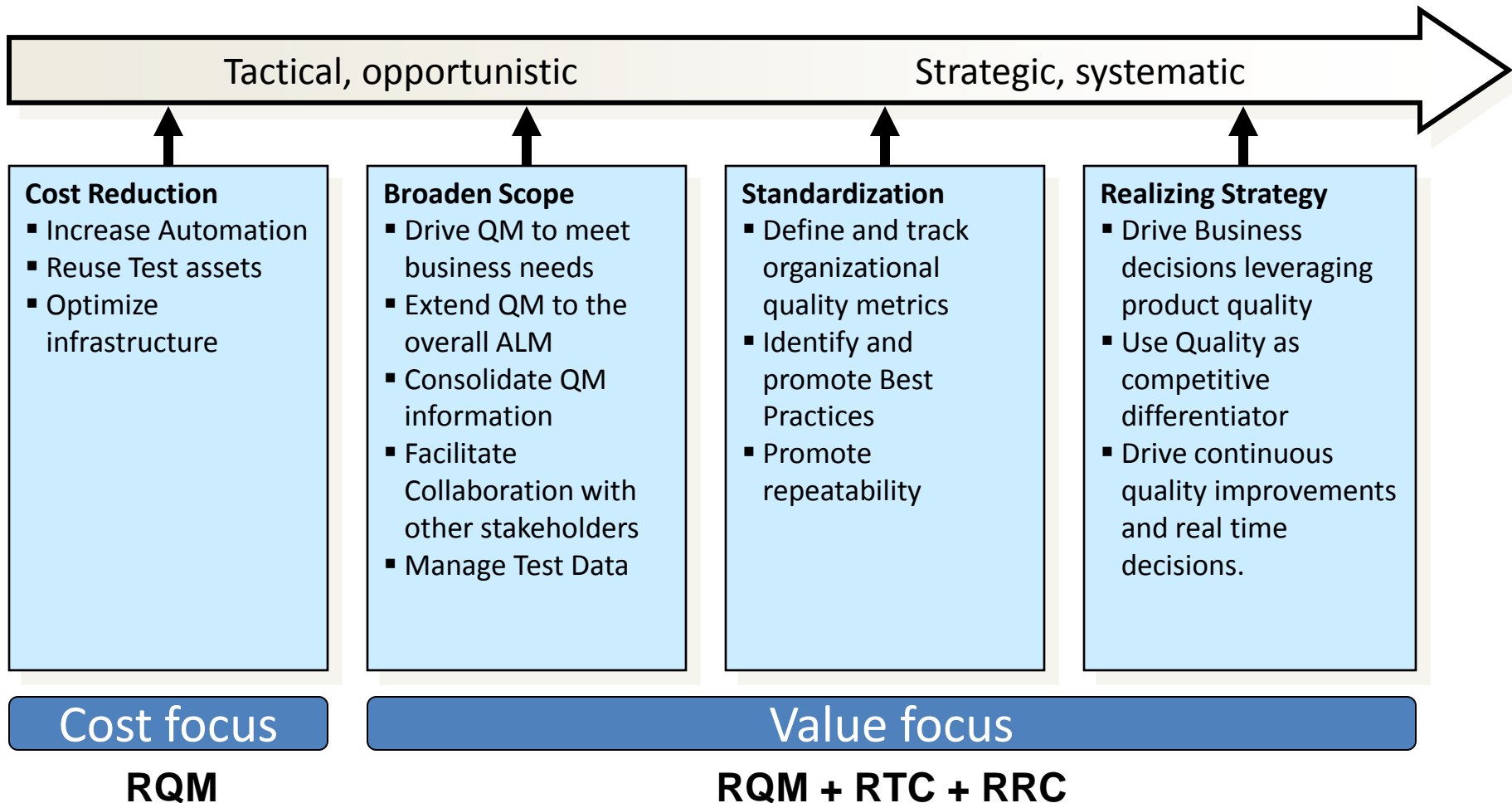
Reporting solutions in RQM

Define metrics, set goals, track progress and improve over time

- Three reporting solutions in Rational Quality Manager
 - Built-in reports based on Birt technology
 - Custom reports (Rational Reporting for Development Intelligence, RRDl)
 - Interfaces for document generation (IBM Rational Publishing Engine)
- Reporting in Collaborative Lifecycle Management using RRDl
- Reporting for the Enterprise with IBM Rational Insight



Jazz quality management adoption model



Organizations often move through a set of phases as they adopt Quality Management

QUESTIONS

www.ibm.com/software/rational



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