Increase Feature Velocity and Test Coverage

Who says you can’t have your cake and eat it too?

Ameya Barve, Product Marketing Manager, Spirent
Moshe Cohen, Offering/Market Manager, Rational IBM

Let’s build a smarter planet.
Agenda

- Challenges
- Balancing Quality with Business reality
- IBM Rational and Spirent Joint Solution
- Integrated process
- Quality and Cost impact
Costs Have to be Reduced While Expanding Market Relevance and Operational Excellence
Convergence Increases Complexity
Network issues turning into Computer Glitches...

THE WALL STREET JOURNAL
WSJ.com

TECHNOLOGY | Updated September 21, 2012, 12:09 p.m. ET
RIM Restores BlackBerry Service in Europe
By LILLY VITOROVICH and JESSICA HODGSON

THE WALL STREET JOURNAL
WSJ.com

BUSINESS | August 29, 2012, 4:55 p.m. ET
United Says Computer Glitch Delayed 580 Flights

Computer glitch takes down DMV, other statewide offices
By Daniel M. Jimenez Bay Area News Group San Jose Mercury News
Posted:
Field found Defects linked to Test Coverage

- 128 bugs (GMRs) found in the field with 0-30% test coverage and only 29 bugs found in the field with 60-80% test coverage
We also hear that...

“I have hundreds of testers & lots of automation, but all I do is find more defects.

I don’t have a testing problem, I have a quality problem.”

1. I have tens of thousands of test cases... Do I really need them all?
2. Which test cases do we need to automate?
3. How many of the requirements do we have covered?
4. On a change-request... which of the test cases are affected?
5. Is the quality improving from one iteration to the next?
6. How far are we from being able to release?
7. How can we improve our process?
How Do We Do That?

“I have hundreds of testers & lots of automation, but all I do is find more defects. I don’t have a testing problem, I have a quality problem.”

- Requirements ↔ Test Cases ↔ Test Results
  - Requirements Driven Testing with Full Lifecycle Traceability
  - Early automation of the right tests
  - Real Time, In Context Collaboration
  - Quality Management analytics with Reports and Dashboards

Testing
A technical investigation done to expose quality-related information about the product or service under test

Quality Management
Systematic monitoring and evaluation of the various aspects of a product or service, to maximize the probability that target quality standards are being attained
Rational Quality Manager: Central Hub for Quality Management & Spirent: A Global Communications Test Leader

Rational Quality Manager

- Requirements Driven Testing with full lifecycle traceability
- Early Automation of the right Tests
- Real Time, In Context Collaboration
- Quality Management Analytics with Reports and Dashboards

Rational DOORS
Rational Requirements Composer
Word, Excel, emails, etc.

Rational Team Concert
Rational ClearQuest

Smartphones & mobile devices
High-speed IP networks & applications
Live network services
Mobile access, backhaul and packet core
Data center, cloud computing & virtualization
GPS technologies
Requirements Driven Testing with Full Lifecycle Traceability

Requirements Based Testing is a risk reduction process answering the following...

- Any Requirements left untested?
- Which Requirements need to tested via Automated vs Manual Testing?
- Which Requirements need to be tested as part of Continuous Integration?
- Any test cases are “orphan”? Are they needed?
- Did our engineers implement any cool features just because they could?
- How many Requirements have test cases completed and assigned to them?
- How many Requirements pass their test cases? Does it converge over time?
- On a change request – Which test cases need to be updated?
- Which test cases can be reused across products and/or multiple customers?
- Now that I understand the Requirements, can I do exploratory Testing?
Real-time Visibility and in-context collaboration

A single, dynamic quality contract provides clear and accountable action plan

- Unifies the entire team
  - Product Managers, Dev and QA
  - SPs, NEMS, subcontractors
- Single source of truth with shared view of all quality assets
  - e.g., requirements, test assets, test status, work completion status, etc.
- Process enactment and enforcement
  - Test artifacts workflow customization
  - Review and approval process
  - E-Signatures
  - Process templates reuse across projects
- Rapidly bring new team members on board
Quality Management Analytics

- Make informed decisions with real time dashboards
  - Track KPIs, and identify trends for project, teams and individuals.
- Consolidates data from RQM and Spirent’s tools
  - And others that integrate with Spirent’s iTest
- Drive continuous and measured improvement
- Reduce risk by identifying trends before they become issues
The Testing Silo

Project Manager
- Create change request
- Assess progress

Architect
- Modify requirements and evaluate impact
- Derive software requirements

Developer
- Software Development
- Defects

Test Design?

Tester

Tools:
- Word/DOORS
- Eclipse/VS/…
- Team Concert
# An Improved Development Process!

<table>
<thead>
<tr>
<th>Project Manager</th>
<th>Architect</th>
<th>Developer</th>
<th>Test Architect</th>
<th>Tester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create change request</td>
<td>Modify requirements and evaluate impact</td>
<td>Derive software requirements</td>
<td>Software Development</td>
<td>Implement test, analysis, and reporting</td>
</tr>
<tr>
<td>Assess progress</td>
<td></td>
<td>Schedule tests</td>
<td></td>
<td>Execute tests and generate results</td>
</tr>
<tr>
<td></td>
<td>Implement test, analysis, and reporting</td>
<td>Submit defect</td>
<td></td>
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</tbody>
</table>

Software and Systems Engineering | Rational

**Tools:**
- Word/DOORS
- Eclipse/VS/…
- Team Concert
- Quality Manager
- Spirent TestCenter | Avalanche | Landslide | iTest
IBM Rational Quality Manager
- Test Plans
- Test Cases
- Test Schedules

Execution Records
- Requirement Links
- Quality Dashboards

• Capture/Replay/Debug & Execute
• Parameterized test cases
• Test Abstraction
IBM Rational Quality Manager
- Test Plans
- Test Cases
- Test Schedules
- Execution Records
- Requirement Links
- Quality Dashboards

Spirent Test Cases

Spirent Test Solutions
- Spirent TestCenter
- Avalanche
- Studio
- Landslide
- Datum
- Nomad

Software and Systems Engineering
Requirements Documents
IBM Rational Quality Manager
- Test Plans
- Test Cases
- Test Schedules

Spirent Test Solutions
- Spirent TestCenter,
  Avalanche, Studio,
  Landslide, Datum, Nomad

IBM Rational Quality Manager
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Test Results
IBM Rational Quality Manager
- Test Plans
- Test Cases
- Test Schedules
- Execution Records
- Requirement Links
- Quality Dashboards

Spirent Test Solutions
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- Datum
- Nomad

Dashboards and Analytics

Requirements Documents

Test Results
An *End-to-End* Quality Management Solution

Efficient *traceability* and *collaboration* between ALL teams - *including test*

- Test cases linked to Requirements and managed through a Quality plan, reducing risk and cost of quality
- Automatic scheduling and deployment of test cases increases test asset utilization and capacity
- Test results automatically available to appropriate team members, linked to test cases and requirements for more efficient change and defect management
- Test component re-use throughout project phases providing operation efficiency and accuracy
Spirent… Putting Innovation to the Test

Offering the industry’s most comprehensive communications test & measurement portfolio

Applying our extensive subject matter expertise to defining next-generation industry standards

Serving and staying close to our customers with our global reach and world-class global services organization
Overall Impact on Test Process Effectiveness

Impact of Quality Management on Process Efficiency

<table>
<thead>
<tr>
<th>CMMI Levels</th>
<th>W/O QM</th>
<th>W QM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20%</td>
<td>32%</td>
</tr>
<tr>
<td>2</td>
<td>40%</td>
<td>58%</td>
</tr>
<tr>
<td>3</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>4</td>
<td>40%</td>
<td>76%</td>
</tr>
<tr>
<td>5</td>
<td>10%</td>
<td>85%</td>
</tr>
</tbody>
</table>

**W/O QM:** Percentage of defects detected during Requirements review, design reviews, unit testing and Functional testing – Current practice

**W QM:** Percentage of defects detected thru Requirements review, design reviews, unit testing and Functional testing – Improved practice
Overall Impact on Financials

Assume a project at CMMI level 2, with 1000 defects detected by Functional testing.

Current practice:
- Total number of defects: 3300
  - (=1000 / 30%, based on previous slide)

Best practice:
- 1914 of the 3300 defects will be detected by Functional Testing
  - (=3300 x 58%, based on graph B in previous slide)

=> 914 defects will be detected sooner if best practices are followed.
- Fixing defects in User Acceptance Testing (UAT) or in production is 7-14 times more expensive that Unit Test (see table on the right). Let’s assume 7x.
- Assuming a cost of $120 for fixing a defect…

=> Fixing 914 defects earlier rather than later saves $658,080 !!!
  - (= $120 x 914 x (7-1) )

Comment: Most projects have over 1000 defects detecting by Functional Testing

<table>
<thead>
<tr>
<th>Defect Removal Activity</th>
<th>Cost Multiplier ($120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements Review</td>
<td>1</td>
</tr>
<tr>
<td>Detailed Requirements Review</td>
<td>2</td>
</tr>
<tr>
<td>High Level Design Review</td>
<td>4</td>
</tr>
<tr>
<td>Detailed Design Review</td>
<td>7</td>
</tr>
<tr>
<td>Unit/Integration Test</td>
<td>10</td>
</tr>
<tr>
<td>System Test</td>
<td>16(!)</td>
</tr>
<tr>
<td>UAT</td>
<td>70 (!!!)</td>
</tr>
<tr>
<td>Production</td>
<td>140 (!!!)</td>
</tr>
</tbody>
</table>

Source: Based on finding by IBM, Barry Boehm and Caper-Jones
Learn more…

• Read more about Rational Quality Manager on wikipedia or at http://www-03.ibm.com/software/products/us/en/ratiqualmana

• Read more about Spirent at www.spirent.com/itest

• View a demonstration video at http://goo.gl/XAw76

• Contact us for a solution brief and an in-depth discussion about the solution.
QUESTIONS

www.ibm.com/software/rational