Driving Product Quality Towards Release

Bhushan Gupta
Nike Inc.

October 19, 2010
Agenda

- Introduction
- GQM
- Release Criteria – a measuring stick for release readiness
- Measuring Scope Coverage
- Measuring Quality
- Code Volatility and Defect Aging
- Proactive approach towards Quality
- Conclusion
- Q&A
Are We Ready to Release?

- Voting – Thumbs UP OR Thumbs Down
- I feel its good quality – gut feel, hunch
- Product meets business goals –
  - Providing value to the customer
  - Achieving revenue and profit goals
  - Enhancing brand image

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Applying GQM To Release Quality

- **GOAL** – Deliver a quality product on schedule
- **Question** –
  - Would we be able to deliver the intended functionality on time?
  - Would the functionality have intended quality?
- **Metrics**
  - Scope Coverage
  - Quality Measurements
What is a Release Criteria?

Definition – a documented set of conditions that has been agreed upon by the stakeholders and must be met before releasing the product.

Areas to Set the Conditions Around

- Requirements Coverage
- Test Coverage
- Defect trends by Severity
- Highest Severity Open Defects not Planned to be Fixed
- Number of Defects Fixed but NOT Verified
- Code Volatility Measures
- Other Release Readiness aspects:
  - Training and Support Requirements
  - Invention Disclosures

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
## Release Criteria - Example

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functionality/Requirements</td>
<td>100 Percent of the planned requirements completed</td>
<td>Development Manager</td>
</tr>
<tr>
<td><strong>Test Coverage</strong></td>
<td><strong>100 percent test cases executed</strong></td>
<td>QA Manager</td>
</tr>
</tbody>
</table>
| Defects                | • 100 percent “high severity” defects addressed as either:  
  1. Fixed, verified, and closed  
  2. Workarounds available where possible  
  3. Support cost estimated and agreed upon  
• 100 Percent customer impacting “medium severity” defects understood  
• **100 percent defect fixes verified**  
• Find rate declining for 3 consecutive weeks | Program Manager + QA Manager |
| Support Readiness      | • Release notes up to date with workarounds where available  
  • Documentation/Training material ready | Support Manager              |
| Marketing Readiness    | • Rollout plans ready and communicated                                       | Marketing Manager            |
| Development            | • Intellectual property activities completed  
  • Open defects moved to next release | Program Manager              |
Metrics - When? Test Execution Phases and Activities

- New Functionality Testing
  - Following Test Strategy/Plan
  - Create Scope Coverage Matrix
  - Creation of Test Cases
  - Test Case Execution
  - Enhancing Test Cases for Efficiency and Effectiveness
  - Defect Logging
  - Defect Reproduction and Resolution Support

- Regression Phase
  - Test Case Re-execution for Defect Fix Verification
  - Reopen Defects
  - Re-execution of a Subset of Test Cases
  - Finding New Defects

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
### Release Criteria – % Panned Functionality Complete

**A Snap Shot**

<table>
<thead>
<tr>
<th>Functional Area</th>
<th>Test Cases Planned</th>
<th>Planned for execution till date</th>
<th>Executed till date</th>
<th>% of Total planned Executed</th>
<th>% Test Cases Passed</th>
<th>Test cases blocked</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Interface</td>
<td>45</td>
<td>35</td>
<td>32</td>
<td>71</td>
<td>98</td>
<td>3</td>
</tr>
<tr>
<td>Database</td>
<td>195</td>
<td>45</td>
<td>12</td>
<td>27</td>
<td>75</td>
<td>8</td>
</tr>
<tr>
<td>Output Display</td>
<td>25</td>
<td>20</td>
<td>15</td>
<td>60</td>
<td>99</td>
<td>2</td>
</tr>
<tr>
<td>Reporting</td>
<td>40</td>
<td>10</td>
<td>10</td>
<td>25</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>305</strong></td>
<td><strong>110</strong></td>
<td><strong>69</strong></td>
<td><strong>22</strong></td>
<td><strong>87</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functional Area</th>
<th>User Interface</th>
<th>Database</th>
<th>Output Display</th>
<th>Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td><img src="image" alt="green" /></td>
<td><img src="image" alt="red" /></td>
<td><img src="image" alt="yellow" /></td>
<td><img src="image" alt="red" /></td>
</tr>
</tbody>
</table>

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
QA Proactive Approach
- Raise awareness
- Identify Risks
- Develop and Implement Mitigation with Stakeholders
- Monitor the situation with Stakeholders

Example: Reporting Functionality
- Testing is on schedule
- A large # of test cases have failed
- Risk – Release criteria will not be met
- Mitigation – Reviews code and design, Improve Development Approach

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Other Quality Attributes

- Ease of Installation
- Performance
- Security
- Localization
“Should 100% of defects be fixed?”
Defect Resolution Implies – a defect that is no longer an issue for this release
- Customer Impact – Severity and Frequency (basis of prioritization)
- Support Impact – Cost Incurred in Resolving Customer Problem
  - Release Notes Including workarounds
  - Call Support
- Release Plan
  - Hot fixes
  - Plan for next release
- High Risk of Fixing – too late in the development cycle
- Customer Loyalty and Perception

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Release Criteria - % Defect Resolved – Resolution (Fix)

Modes of Defect Resolution:

- Code Fix
- Low Customer Impact and Frequency – No Fix Needed
- Relatively Low Support Cost – Easy Workaround
- Planned for a Hot Fix
- Include in Future Release
- High Risk – Impacts Multiple Functional Areas, Future Release
Testing is Time Bound - Find and Fix as many defects as possible by Release Date

Weekly Defect Find Rate by Severity

- Urgent
- High
- Medium
- Low
- None

Regression

New Functionality Testing

Planned Release Date

Regression

Special Cause

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Characteristics of Defect Find Rate - Weibull Distribution

- Initial Ramp-Up
  - Understanding functionality
  - Planned Functionality not Yet Complete OR Blocked
  - End-to-End Workflow not Ready
  - Test Case Repair and Development

- Study Incline and Peak

- Tapering Off
  - Complex Functionality Testing Complete
  - Majority of Functionality Tested
  - Regression In progress

- Special Causes
  - Delayed Functionality
  - Feature Creep
  - Other Aspects – Localization

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Release Criteria - % Defect Resolved

Resolution Rate Must keep Up with the Find Rate

Weekly Find - Fix Rate

New Functionality Testing

Regression

Planned Release Date

Find Rate  Fix Rate

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Code Volatility – An Indicator of Defects Introduced

Definition – Lines of Code Delta between Two Releases

Weekly % Lines Touched

Development

New Functionality Testing
Code Fixes

Regression

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Code Volatility & Defects Relationship

- Defect Density – Number of Defects per 1K Lines of Code
- Code Volatility – Number of Lines Changed Between TWO Release

Defects Introduced Between TWO Releases
= Defect Density * Code Volatility/1K

Considerations:
- Commented vs. Non-Commented
- Deleted Lines
- Code Reuse (Counted as New lines)
- Change in Environment

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Code Volatility Usage

- Number of Defects Anticipated in a Code Drop
- Resources Required
- Test Effectiveness
- Release Readiness – Controlled Code Volatility

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Defect Aging – period of time a defect stays in a particular state

Prominent States and Aging Time:

- New – ASAP
  - Immediate Reproduction
  - Need for Logs and other Data for RCA
  - Replication of Test Environment
- Open – Necessary Time to Resolve the Defect
- Fixed – In a Reasonable Time
- Accuracy of Fixed Rate to Meaningfully predict Release Date
- Verified – Don’t Care
- Closed – Final State

Ultimately Defect Aging Time is a Business Decision
Release Criteria

- We Have Meet the Release Criteria – Kudos to Everyone
  - Functional Coverage
  - Quality Coverage
  - Other Conditions

- We Are Unable to Meet the Release Criteria
  Business Decision to move forward
  - Delay the release
  - Pay the cost of poor quality
    - Support Cost + Customer Loyalty

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Proactive QA Approaches

- Prevention is better than cure
- Get to Know the Product Early
- Understand High Risk Functional Areas
- Understand Root Causes for Testing Delays
- Understand Testing Capacity and Resource Needs
- Provide Complete Support for Defect Resolution
- Be Innovative – Use Effective Alternative Testing Approaches
- Remember “we are all in it together”
Conclusion

- Release criteria minimizes the polarity tension
- A release should be bonded by a release criteria
- At any time during testing the QA team can evaluate the progress towards release and act upon the data
- Prevention is better than cure
- A QA organization can proactively improve release quality and help maintain schedule

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com
Thank You.

Questions ??

Bhushan Gupta, Nike Inc., bhushan.gupta@nike.com