Chapter 10

Testing and Change Management

Copyright © 2000 by Addison Wesley

Version 1.0
Topics

- Testing System Services
- Testing System Constraints
- Test and Change Management Documents
- Managing Change
- Traceability
Testing system services

- Informal testing
- Methodical testing
- Nonexecution-based (formal reviews)
  - Walkthroughs
  - Inspections
- Execution-based
  - Testing to specs
  - Testing to code
Walkthrough

- **Formal review meeting** but of a brainstorm flavor
- Can be conducted
  - In any development phase
  - On a regular basis (e.g. weekly)
- The **moderator** organizes and conducts the meeting
- **Participants** prepare prior to the meeting
- The **purpose** of the meeting is to identify and confirm the existence of a problem (defect), not to attempt to solve it
Inspection

- Similar to walkthrough but includes project managers

- Like walkthrough
  - To identify defects, not to solve them

- Unlike walkthrough
  - Conducted less frequently
  - Targets selected and critical issues
  - More formal and rigorous
  - Organized in a number of stages
    - Planning
    - Informational meeting
    - Meeting
    - Reinspection
Testing to specs

- Execution-based testing
  - Applies to software, not documents or models
- Black-box testing
- Refers to test requirements
  - Test case document - test scenario for the tester
  - Can be recorded in capture-playback tool
    - Regression testing
- Discovers defects difficult to find with testing to code
  - Missing functionality
- Cannot be exhaustive
Testing to code

- Execution-based
- White-box (glass-box) testing
- Exercises the code
- Can be
  - Supported by capture-playback tools
    - Many scripts must be written by the programmer rather than generated
  - Used for regression testing
- Cannot be exhaustive
Testing system constraints

- Predominantly execution-based
- Includes
  - User interface testing
  - Database testing
  - Authorization testing
  - Performance testing
  - Stress testing
  - Failover testing
  - Configuration testing
  - Installation testing
User interface testing

- Starts in requirements phase
  - Storyboarding
  - Windows in use case documents
  - GUI prototypes

- Post-implementation GUI testing
  - Developers
  - Testers
  - Customers (pilot tests)

- Like many other kinds of tests, requires answering a wide range of questions and marking each question as
  - Passed
  - Passed conditionally (explanation required)
  - Failed
Database testing

- Inherent in many other kinds of tests
- Done as
  - Black-box and
  - White-box
- Tests needed for
  - Transaction processing
  - Performance
  - Concurrency
  - Authorization
- Some DB tests can be included as part of other tests
  - E.g. performance test would include DB performance
Authorization testing

- To verify the security mechanisms
  - In the Client and
  - In the Server

- Authentication

- Authorization
  - GUI to configure dynamically to authorization level of the user
  - Server permissions (privileges) granted to the user
    - To access server objects
    - To execute SQL statements

- Authorization design
  - User level
  - Group level
  - Role level
Other tests

- **Performance testing**
  - Transaction speed and throughput
  - Peak loads

- **Stress testing**
  - For abnormal demands

- **Failover testing**
  - For hardware, network and software malfunctions

- **Configuration testing**
  - For various software and hardware configurations

- **Installation testing**
  - For every installation platform
Test and change management documents

- Business Use Case Document
  - Feature 1
  - Feature 2
  - ...

- Use Case Documents
  - Use Case Req 1
  - Use Case Req 2
  - ...

- Enhancements Document
  - Enhancement 1
  - Enhancement 2
  - ...

- Test Plan Document
  - Test Case 1
  - Test Case 2
  - ...

- Test Case Documents
  - Test Req 1
  - Test Req 2
  - ...

- Defects Document
  - Defect 1
  - Defect 2
  - ...

(c) Addison Wesley  Chapter 10
**Application Name:** OnLine Shopping

**Unit Name:** [TCR1 Order Configured Computer]  
**Version:**

**Location:** \Kosciuszko\Projects\Test Cases\Test_OrdConfCmp

**Use Case:** OnLineShopping :: Order_Conf_Comp

**Description:**

**Tester:** Leszek Maciaszek  
**Test Date:** 08/04/00  
**Result:** Pass | Fail

**Test Results/Metrics**

<table>
<thead>
<tr>
<th>No of Classes</th>
<th>No of Methods</th>
<th>No of Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coding Errors</th>
<th>Design Errors</th>
<th>Specification Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Database Errors</th>
<th>GUI Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conformance to Use Case Specs**

<table>
<thead>
<tr>
<th>conformance to Use Case Specs</th>
<th>Fail</th>
<th>Pass conditionally</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>[TCR1.1 Order entry form displays in the Web browser after pressing the “I Want to Buy It” button]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[TCR1.1.1 The title of the form is “Order Your Computer”]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Managing change

- Testing $\rightarrow$ defect
- Defect $\rightarrow$ change request
  - To be fixed
  - Enhancement
- Defects and enhancements
  - Undergo status changes
  - May be prioritized
  - Have owners
  - Are traced back to test and use case documents

- Managing change in multi-developer projects
  - Locking
  - Version control
Submitting change request

- **Submitting**
  - Entering defect or enhancement into project repository
  - Submitted status
  - Can result in automatic email notifications to interested team members

- **Possible actions on submitted change request**
  - Assign (to team member)
  - Modify (the change request)
  - Postpone
  - Delete (without fixing)
  - Close (probably after fixing)
Keeping track of change requests

- Assigned to a team member
- Only one team member can open it at a time
- Open state $\rightarrow$ Resolve state
  - Email notifications
- Resolve state $\rightarrow$ Verify state
- Charts and reports (project metrics)
  - Number of unassigned defects
  - Allocations to team members
  - Number of unresolved defects
Traceability

Cost-benefit analysis for traceability
- Traceability requires time and money
- Projects can fail if change not traced and managed
- Long term benefit – project management with metrics

Levels of traceability
- Use case requirements $\rightarrow$ defects
- Use case requirements $\rightarrow$ test requirements $\rightarrow$ defects
- Also system features, test verification points, enhancements, etc.
System features → use cases → use case requirements
Test plans → test cases → test requirements
Use case → document

Associate Document to Use Case 'Maintain Ads'

- Display
  - Documents of Type: All Document Types

- CategoryTBV
- ContactEV
- ContactNBV
- EV
- Filter Displayed Data
- FilteredDisplayedData
- FV
- Maintain Ad Duration Tolerances
- Maintain Ad Links
- Maintain Ads
- Maintain Advertiser Groups
- Maintain Agency Groups
- Maintain Billboard Splits
- Maintain Category-Product Links
- ModifyAdLinks
- OrganizationAdvertiserMDEV
- OrganizationEV
- OrganizationOutletMDEV
- OrganizationPPV
Use case → requirement
Use case requirements → test requirements

![Diagram showing relationships and test requirements]
Test requirements → defects
Use case requirements → enhancements

- Defects are traced back to test requirements
- Enhancements are traced back to use case requirements
- Enhancements can also be traced back to defects (when a minor defect has been postponed to a future release of the product)
Summary

- Testing divides into
  - testing of system services and
  - testing of system constraints

- **Testing of system services** can be nonexecution-based or execution-based.

- **Testing of system constraints** includes testing of user interface, database, authorization, performance, stress, failover, configuration, and installation

- Testing and change management require specialized **documentation**, such as test plans, test case documents, defect and enhancement documents

- **Change request** is normally either a **defect** or an **enhancement**

- A vital part of the change management tool relates to the establishing of **traceability** paths