Challenges of Managing a Testing Project: (A White Paper)
**Introduction**

Testing is expected to consume 30 – 50% of the Project Effort. Still properly managing testing project is not considered seriously. Project Managers always undermine the impact the testing activity has on the Project Cost and Schedule. Hence the testing activity is usually unplanned and uncontrollable. As the project manager assumes that the main focus of the testing activity in the project is not to meet the project schedule.

But its a reality that a thorough and close monitoring of the Testing project is required to increase productivity, reduce cycle-time and improve quality.

Below pie chart depicts the Project effort distribution by phase for a development project, where independent testing team performs the testing activity.
The Problem / Issues / Improvement Opportunity in Hand:

Ask a Tester ‘Why he/she needs to burn midnight oil to churn a Quality Product?’

Answer is obvious ‘Needs to put extra time and effort to overcome the Project schedule slippage ‘

Ask a Project Manager ‘Why the Project is in trouble during the last phase?’

Answer is obvious ‘Not Sure, Did not anticipate the dynamic changes effecting the Project’

The White paper ‘Managing the Testing Project’ focuses on the challenges faced by the testing team to effectively manage the testing project. Also the approach to overcome this challenges is addressed in subsequent sections.

Objective:

The testing activity should begin from the inception stage of the product development. This should be treated as a project by itself, and undergo an exhaustive test development life cycle starting with Test Planning, Test Requirements, Test Design, Test Development and Test Execution. Hence all stages of the test development life cycle need to be measured, analyzed and controlled. This may results in resetting the goals and re-planning the testing activity.

However, when an independent testing team exists, then a complete test development cycle is followed and the following area’s become very crucial in managing the Testing Project.

- Test Planning
- Testing Process
- Resource planning
- Testing Metric
- Tracking & Resetting Plan
- Synchronization with the Development plan / Process
- Synchronization with the Customer’s Requirement
- Intra group Coordination
- Technology and Training
In spite of the focused approach towards the testing, still when the Project schedule pressure takes significance, the approach towards testing takes a back step. The testing team either spent extra effort or carries the risks of incomplete testing cycle.

**Challenge in hand:**

Let’s look at the common challenges faced by any testing project and categorize them based on the responsibility and focus area.

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Above are some of the major challenges faced by the testing project, there are many more as each project is unique. Now let’s look in details some of this challenges and solution for this challenges. Understanding these challenges in the beginning will help the Project Test Team to better manage the testing project.

**Challenge: 1**

**Description: Inadequate Testing Planning**

**Issues:**
1. Testing activity is taken up late during the Project Execution.
2. Inadequate Planning for Regression Testing Activity.

**Solution / Improvement Opportunity:**
1. Understand the Project Development life cycle (Incremental, RAD….)
2. Define the Scope of Testing. (What to test? )
3. Explain and concur on the defined scope of testing with the management and development team
4. Start the Testing Activity from early (Requirement Stage)
5. Develop the Test Assets in parallel with the Development Activity.
6. Insist on including the development of prototype to start the test automation activity early
7. Identify the milestone where the test execution can be started based on the Project life Cycle.
8. Define the milestone for Regression Testing activity in consultation with the Development Team
For Example refer to the Below Diagram shows when the Testing Activity should start

<table>
<thead>
<tr>
<th>Requirement</th>
<th>HLD Design</th>
<th>LLD Design (Prototype)</th>
<th>Coding &amp; Unit Testing</th>
<th>Coding &amp; Unit Testing</th>
<th>Coding &amp; Unit Testing</th>
<th>Integration / System Testing</th>
<th>Production / Maintenance</th>
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<tbody>
<tr>
<td>Test Requirement</td>
<td>Test Case Generation</td>
<td>Test Script Development</td>
<td>Test Build1</td>
<td>Test Build2</td>
<td>Regression</td>
<td>Regression</td>
<td></td>
</tr>
</tbody>
</table>

**Challenge: 2**

**Description:** Inadequate Testing Effort

**Issues:**

1. Lack of focus on testing activity during estimation usually it’s the ballpoint estimation 30 – 40 % of the Total Effort.

2. No Formal Test Estimation Process

**Solution / Improvement Opportunity:**

1. Define Test Estimation Technique based on the scope of the Project

   For Example the Estimation technique can consists of the following steps.

   1. Identify different stages of the test life cycle
   2. Identify the work product for each stage
   3. Size estimation for each work product
   4. Effort estimation for each phase
   5. Effort estimation for regression cycle
   6. Compute total testing effort
Based on the Testing Life Cycle, the following estimation model is derived for calculating the Testing:

2. Measure the Testing Effort during the defined milestone and Re-Estimate if the variation in the testing effort is more than the 10% of the Baseline Planned Effort or the scope of the testing is changed.

3. Use Historical Data

4. Document the Criteria and Assumption for estimation and revisit this criteria and assumption when re estimating the test effort.

5. Monitor the Effort variation for development activity and impact it has on the testing effort and schedule.
Challenge: 3

Description: Ineffective Testing Process

Issues:

1. Lack of focus on Testing Process
2. Continuous Improving the Existing Process

Solution / Improvement Opportunity:

1. Consider testing activity similar to any software development activity and identify the WBS for the Testing Activity.

For Example refer to the below table for WBS for Testing Project

<table>
<thead>
<tr>
<th>WBS - Testing Project</th>
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<tr>
<td>Develop Test Plan</td>
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<tr>
<td>Develop Test Requirement</td>
</tr>
<tr>
<td>Develop Initial Test Cases and Trace ability Matrix (TC vs TR)</td>
</tr>
<tr>
<td>Generate Functional Test Cases</td>
</tr>
<tr>
<td>Generate Test Data</td>
</tr>
<tr>
<td>Develop Final Trace ability Matrix</td>
</tr>
<tr>
<td>Develop reuse plan</td>
</tr>
<tr>
<td>Generate Reuse libraries</td>
</tr>
<tr>
<td>Develop Test Scripts</td>
</tr>
<tr>
<td>Develop Trace ability Matrix (Test Cases Vs. Test Scripts)</td>
</tr>
<tr>
<td>Perform Testing / Regression Testing</td>
</tr>
<tr>
<td>Test Analysis</td>
</tr>
</tbody>
</table>

2. Identify the Test Phase based on the WBS
For Example

1. Test Requirement
2. Test Design
3. Test Development
4. Test Execution

3. Identify the Risk Specific to testing activity
4. Develop guidelines and checklist for review process

**Challenge: 4**

**Description: Identifying Test Metrics**

**Issues:**

1. Lack of focus on identifying the Testing Metrics
2. Goal Setting for the Test Metrics

**Solution / Improvement Opportunity:**

1. Define Metrics specific to the Testing Metrics apart from the Project Metrics (Effort, Defect and Change)

For Example

Process Metrics in terms of Size

1. No. of Test Cases / Test Script Executed
2. No. of Test Cases / Test Script Passed
3. No. of Test Cases / Test Script Failed
4. No. of Test Cases / Test Script Unexecuted
5. Total SLOC developed – Test Automation
6. Total SLOC Modified – Test Automation
7. No. of Reuse Component
8. No. of Change Request

Process Metrics in terms of Effort

1. Planned / Re-planned Work Effort / Rework Effort
2. Actual Work Effort / Rework Effort
3. Effort Variance (Derived)

Process Metrics in terms of Schedule

1. Planned / Re-planned Start / End Date
2. Actual Start / End Date
3. Schedule Variance (Derived)

Process Metrics in terms of Defects

1. In Process Review Defects
2. Out of Phase Review Defects
3. Categorization of Review Defects

Derived Metrics:

1. Test Efficiency and Effectiveness
2. Productivity
   i. Manual Testing – No. of Test Cases / Total Effort
   ii. Automation Testing – Total SLOC / Total Effort
3. Test Progress Chart
   i. Cumulative No. of Test Cases (Planned / Actual ) vs Duration
   ii. Cumulative No. of Test Script (Planned / Actual ) vs Duration
4. Defect Density
5. Defect Tracking
6. Test Coverage

Product Metrics

1. No. of Product Defect
2. No. of Delivered Defect
3. CPU Utilization vs Duration
4. Reliability
5. Performance

2. Define and concur the set Goal with the Project Team
3. Use Statistical Tools to define the UCL/LCL for Goals.
4. Track and Reset Goal based on the Project Performance

Challenge: 5

Description: Test Automation

Issues:

1. Identifying the right automation tool for the Project based on the Application under Test / Project Requirement
2. Evaluating the Test Automation Tool
3. Convincing the Management and Project Team the ROI on test automation

Solution / Improvement Opportunity:

1. Develop a Evaluation Report on the Test Automation Tool

For Example the Report should address following points

1) Identify the Ease of Use
2) Tool Scripting language
3) Development language / Architect of the AUT
4) Third party controls of the AUT
5) Training Requirement
6) Coverage Report Generation
7) Maintenance Effort for Script Maintenance
8) Tool Cost
9) Market Rating on the Product / Support

2. Based on the Project needs, define the no. of regression cycle required for Product Stability during the development and maintenance phase.


4. Define a Effective Test Automation Process

   For Example

   1) Use Reuse Concept

   2) Use Data Driven Approach

   3) Configuration Management for Test Script

**Challenge: 6**

**Description: Testing Resource / Test Organization**

**Issues:**

1. Lack of Focus in identifying the right resource for testing project
2. Lack of Organization focus on defining the career path for testing
3. Defining the role and responsibilities for each Test Team member
**Solution / Improvement Opportunity:**

1. Based on the Project, identify the Test Team Member based on the Application knowledge, Testing Skills, Technical Expertise, and Experience. Usually a combination of this will help build an effective test team.

For Example:

   1) Application Knowledge – Subject Matter Expert
   2) Technical Expertise – Development Language Knowledge
   3) Test Skills – Expertise in different areas of Testing (Functional, Security, Configuration testing….)
   4) Test Automation

2. Define Test Organization structure for the test project with clear definition on Roles and Responsibilities for each member

For Example refer to Organization structure for the Testing Team at the Project level

<table>
<thead>
<tr>
<th>Role</th>
<th>Functions / Responsibilities</th>
</tr>
</thead>
</table>
| Test Manager          | Prepare Test Specification
                      | Test Strategies
                      | Generate Test Plan                      |
| Test Leader           | Schedule Test
                      | Maintain Reusable Scripts
                      | Configuration Management             |
| Test Configuration Manager | Prepare Test Cases and Data
                             | Generate Test Scripts and Library Functions
                             | Review Test Assets
                             | Execute Test                        |

3. Develop a Rating mechanism for measuring the tester’s effectiveness
**Challenge: 7**

**Description: Training Requirement**

**Issues:**

1. Identifying Training requirement specific to the Test Team

**Solution / Improvement Opportunity:**

1. Develop Training plan based on the Role performed in the Project during the Planning Phase.

For Example, following training will be required for the tester.

   a. Specific Area of Testing like Security testing
   b. Training on Test Automation
   c. Configuration Management
   d. Test Planning and Management

2. Track the Effectiveness of this Training

**Challenge: 8**

**Description: Configuration Management Process**

**Issues:**

1. Lack of Focus on Configuration Management Process

2. Identifying and implementing the configuration management process for Test Asset specifically for test script

**Solution / Improvement Opportunity:**

1. Define Configuration Plan for Test Assets. Its is essential when the project uses Automation tool.

2. Identify team member to perform Configuration Management activities
3. All the Changes to the Test Assets should be tracked using the configuration management process

4. Identify the configuration item based on the Project needs. Test Asset like Test Result need not be defined as configurable item.

**Challenge: 9**

**Description: Intra Group Coordination / Improving the Existing Test Process**

**Issues:**

1. Ineffective intra group coordination with the development / other Support team

2. Identifying the Area of Improvement to continuously improve the existing test process

**Solution / Improvement Opportunity:**

1. Involve the Tester’s from the Requirement Stage for common understanding between the Testing team and development team.

2. Across Functional Review. For example the development team can be part of the review activity of the Testing project. Tester can be part of the unit testing activity of the Development.

3. Identify the Communication Channel Areas to resolve the Issues between the Testing and Development Team.

4. Clear demarcation of the Environment / Test Beds used by the development and Testing Team.

5. Identify the Area of Improvement in the Existing Testing Project

   a. Based on the Goals Set, conduct process improvement meeting with the test team on regular basis
b. Identify and document the lessons learnt based on the AUT / Test Automation etc.

c. Identify the Areas in the existing project, which can be automated.

For example

1) Develop productivity improvement for verifying the script-coding standard

2) Tool to track the Training attended and Effectiveness

3) Trace ability between the Test Case Vs Test Requirement, Test Case Vs Test Script / Test Result

**Conclusion:**

We have discussed in details the some of the challenges faced by the testing team. Based on the Project Duration and Complexity, these challenges may differ but the need for identifying these challenges and solution during the inception stage of the project will reduce the risk involved during the later phase of the Project. As testing is considered the last phase of the project, there is a tremendous pressure on the testing team to release a quality product to the end customer. Focus on these challenges will bring better management practice to the Testing Project. In this White paper, we focused on solution and benefit for each challenge at the Project and Organization level.
Profile:

Vinod Suvarna has an experience of over 8 years in Software Processes and Software Testing. Vinod joined IBM as technical Lead, and is currently working in test planning, development, and execution for the software products. Vinod has extensive experience in automated testing for web based and client/server application. Vinod is a Certified Software Test Engineer (CSTE)

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