Testing Concepts

Lesson 4: Test Management & Test Case Execution

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Lesson Objectives

To understand the following topics

- Test Planning
- Test Plan Contents (IEEE 829)
- Test Planning Activities
- Entry Criteria for Functional Testing
- Test Case Execution - Pre-execution activities
- Types of Test Environment
- Before starting Execution
- Test Case Execution
- Exit Criteria for Functional Testing
- Test Estimation Techniques
- Factors affecting Test Effort
- Independent Testing
- Roles & Responsibilities - Working as Test Leader
- Roles & Responsibilities - Working as a Tester

Test Planning

The Purpose and Substance of Test Plan

- The Test plan guides our thinking and forces us to confront the challenges that await us
- The Test plan itself serve as vehicles for communicating with project team members
- The Test plan helps us manage changes
- The Test plan becomes a record of previous discussions and agreements between the testers and the rest of the project team
- There can be different Test plans for different Test levels

Test Plan Contents (IEEE 829)

1. Test Plan Identifier
2. References
3. Introduction
4. Test Items
5. Software Risk Issues
6. Features to be Tested
7. Features not to be Tested
8. Test Approach (Strategy)
9. Item Pass/Fail Criteria
10. Suspension Criteria and Resumption Requirements
11. Test Deliverables
12. Testing Tasks
13. Environmental Needs
14. Staffing and Training Needs
15. Responsibilities
16. Schedule
17. Planning Risks and Contingencies
18. Approvals
19. Glossary

Test Planning Activities

- Determining the scope, risks and identifying the objectives of testing
- Defining the overall approach of testing, definition of the test levels, entry and exit criteria
- Integrating and coordinating the testing activities into the SDLC activities
- Making decisions about what to test, what roles will perform the test activities, how the test activities should be done, and how the test results will be evaluated
- Scheduling test analysis and design activities
- Scheduling test implementation, execution and evaluation
- Assigning resources for the different activities
- Defining the amount, level of detail and templates for the test documentation
- Selecting metrics for monitoring and controlling test preparation and execution, defect resolution and risk issues

Entry Criteria for Functional Testing

Functional/System Testing Entry Criteria
▪ Integration Testing is complete and sign-off is received by Project team
▪ Integration test results are provided to the QA team within the Integration Execution & Signoff artefact.
▪ Development team provides a demonstration of application changes prior to promotion to QA Environment
▪ Code is delivered and successfully promoted to the Functional/System Test Environment as described in Master Test Plan
▪ Functional/System Test planning is detailed, reviewed and approved within the Master Test Plan

Entry Criteria for Functional Testing (Cont.)

Functional/System Testing Entry Criteria
▪ Smoke /Shake down test has been completed to ensure test environment is stable for testing.
▪ Functional/System Test planning is detailed, reviewed and approved within the Master Test Plan
▪ Test cases created are traceable back to SRS, and any approved change requests, using HPQC
▪ Functional/System Test Cases are created, reviewed and approved within the RBC Enterprise approved tool (HP QC)
▪ Test data is ready for Functional/System Testing

Test Case Execution

Pre-execution activities

Setting up the Environment

- Similar to production environment
- Hardware (e.g. Hard Disk, RAM, Processor)
- Software (e.g. IE, MS office)
- Access to Applications

Setting up data for Execution

- Any format (e.g. xml test data, system test data, SQL test data)
- Create fresh set of your own test data
- Use existing sample test data
- Verify, if the test data is not corrupted
- Ideal test data - all the application errors get identified with minimum size of data set

Test Case Execution - Pre-execution activities(cont.)

Test data to ensure complete test coverage

Design test data considering following categories:

- No data
  - Relevant error messages are generated
- Valid data set
  - Functioning as per requirements
- Invalid data set
  - Behavior for negative values
- Boundary Condition data set
  - Identify application boundary cases
- Data set for Performance, Load and Stress Testing
  - This data set should be large in volume

Types of Test Environment

- Unit Test Environment
- Assembly/Integration Test Environment
- System/Functional/QA Test Environment
- User Acceptance Test Environment
- Production Environment

Before starting Execution

Validate the Test Bed

- Environment
  - Hardware (e.g. Hard Disk, RAM, Processor)
  - Software (e.g. IE, MS office)
- Access
  - Access to the Application
  - Availability of Interfaces (e.g. Printer)
  - Availability of created Test Data
- Application
  - High level testing on the application to verify if the basic functionality is working
  - There are no show-stoppers
  - Referred to as Smoke/Sanity/QA Build Acceptance testing

Test Case Execution

Run Tests

- Run test on the identified Test Bed
- Precondition
- Use the relevant test data

Note the Result

- Objective of test case
- Action performed
- Expected outcome
- Actual outcome
- Pass/Fail (according to pass/fail criteria)

Compare the Input and Output

- Validate the data (e.g. complex scenarios, data from multiple interfaces)

Record the Execution

- Test data information (e.g. type of client, account type)
- Screenshots of the actions performed and results
- Video recording (HP QC Add-in)

Test Case Execution (Cont.)

Report deviation

- Log Defect for Failed Test Cases
- Defect logging
  - Project
  - Summary
  - Description
  - Status
  - Detected By
  - Assigned To
  - Environment (OS, Release, Build, Server)
  - Severity
  - Priority
  - Steps to recreate and Screenshots

Exit Criteria for Functional Testing

Functional/System Testing Exit Criteria
➢ All high and medium risk tests identified in the detailed test plan are executed, including interface testing
➢ All planned testing is complete and documented
➢ Functional/System test execution results are captured
➢ All known defects have been entered into the defect tracking tool
➢ There are no known severity one or severity two defects
➢ Action plans have been created for outstanding severity three and four defects

Exit Criteria for Functional Testing (Cont.)

Functional/System Testing Exit Criteria
➢ Appropriate signoffs are obtained
➢ Location of test cases, automated test scripts, defects and Functional/System Execution & Signoff artefact are detailed within the SCM plan.
➢ Any known deviations from the BRD and SRS are documented and approved

Test Estimation Techniques

Estimating the efforts required for testing is one of the major and important tasks in SDLC

Correct estimation helps in testing the software with maximum coverage

Software Testing Estimation Techniques :

- Work breakdown structure (WBS) – Breaking down the large activities and tasks into smaller, more manageable tasks.
- Bottom-up estimation - Estimate for efforts, duration, dependencies etc for lowest level tasks from WBS and roll-up to arrive total estimate
- Top-down estimation - Deriving estimates from similar projects
- Parametric technique – Estimating based on some parameters. E.g. average effort per test case

Factors affecting Test Effort

Characteristics of the product:

- The quality of the specification
- The size of the product
- The complexity of the problem domain

Characteristics of the development process:

- The stability of the organization
- Tools used
- Test process
- Skills of the team members
- Time pressure

The outcome of testing:

- The number of defects
- The amount of rework required

Independent Testing

Independent testing is the degree of independence to which testing is performed.

Levels of Test Independence:

- Independent testers within the development teams.
- Independent test team or group within the organization, reporting to project management or executive management.
- Independent testers from the business organization, user community and IT.
- Independent test specialists for specific test targets such as usability testers, security testers or certification testers
- Independent testers outsourced or external to the organization

Independent Testing (Cont.)

Advantages

- Independent testers uncover different defects, and are unbiased
- An independent tester can verify assumptions made during specification and implementation of the system
- Usually a Cost saving
- Better skills, more effective testing and fewer defects getting into production

Drawbacks

- Isolation from the development team (if treated as totally independent).
- Can be the bottleneck as the last checkpoint
- Developers lose a sense of responsibility for quality
- Can be a greater cost – need to consider viability
- For Third Party test outsourcing, the project carries the risk

Roles & Responsibilities - Working as Test Leader

Strategy & Management

- Write and review the test strategy
- Plan testing effort – context, risks & approach
- Proactive representation in project activities – ensure testing has correct focus
- Ensure proper configuration management of Testware
- Determine what should be automated and select most appropriate Test Tools
- Management and definition of the test environmental requirements
- Define the test schedule based on the delivery of code in to test

Monitor

- Define, record and continually review the testing project metrics
- Monitor test progress against the test schedule
- Write the test summary reports

Control

- Adapt testing effort based results and progress

Roles & Responsibilities - Working as a Tester

- Review and contribute to test plans
- Analyze, review and assess user requirements, specifications and models for testability
- Create, review Test specifications
- Set up the test environment
- Define, prepare and acquire test data
- Implement tests on all test levels, execute and log the tests
- Evaluate the results and document the deviations (defects/issues) from expected results
- Use various test tools as required
- Automate tests

Summary

In this lesson, you have learnt:

- Test management is covered from a skills perspective, focusing on test execution and defect reporting and handling.
- Managing the Test Activities
- Role of test leader and testers
- Test planning activities
- Template of Test document artifacts such as test plan and test case designs
- Entry and exit criteria of tests
- Test execution activities

Review - Questions

Question 1: The degree of independence to which testing is performed is known as _____.

Question 2: there can be different test plans for different test levels

- Option: True / False

Question 3 Exit criteria are used to report against and to plan when to begin testing

- Option: True / False

Question 4: Which of the following are Test Environments

- Unit Test Environment
- QA Test Environment
- Simple Test Environment
- Product Environment

Review – Match the Following

1. Entry Criteria	A. Consultative approach
2. Exit Criteria	B. Acceptance criteria
3. Test Approach	C. Methodical approach
4. Failure based testing	D. Completion criteria