# Software Quality Assurance & Testing

## TOPIC-6: TEST MANAGEMENT,

Prepared By:
Md. Minhaj Hosen, Lecturer, DIU

# Outlines

1. Test organization
2. Test planning and estimation
3. Test progress monitoring and control
4. Risk and testing
5. Incident management

# 1] Test organization

- Test Management as a part of the Test Process –
  - - Test management is project management of test projects
  - - Testing is a task covering the complete software development process
  - - The test management activities are needed throughout the entire test process:

| Activity: | Work Product: |
| --- | --- |
| **Test conception** | **Test Plan (Static)** |
| **Test Planning** | **Test Plan (Dynamic)** |
| **Test Control** | **Status reports, control action** |
| **Test Acceptance** | **Product release** |

# 1] Test organization

- Test teams should be independent
- Advantages
  - - unbiased, not personally attached to test object
  - - They may question facts on the test basis and verify assumptions made while designing tests
- Drawbacks
  - - Developers loose sense of responsibility

# 1] Test organization

Other ways of setting up test teams

- Developers test their **own** programs
- Testers are also members of the development team
- Testers are also members of the project team
- Specialists for individual tasks
- External test teams

The above order reflects the degree of independence

# 1] Test organization

Profiles of Test Personnel

- Testing requires persons with a wide variety of skills and qualifications
- The following roles within the test process will be explained in detail:
  - Test manager
  - Test designer
  - Test automation engineer
  - Test administrator/ Test system administrator
  - Tester
  - Technical Expert

Note: additional roles may be specified, e.g. database administrator, load tester

# 1] Test organization

Test leader (also : test manager or test coordinator)

- Plans, monitors and controls the test project
- Special skills required :
  - Software test and quality management
  - Test planning and test control
  - Experience as a project leader
  - Management abilities

# 1] Test organization

Test designer

Designs the necessary test cases and sets up in which order test case execution will take place

Special skills required :

- Development and testing knowledge
- Software Engineering knowledge
- knowledge about specification techniques (methods)
- knowledge of functional requirements

# 1] Test organization

Test automation engineer

Evaluates the possibilities for test automation and implements them

Special skills required

- Experience as a tester
- Know-how in test design and test automation
- Programming skills
- Excellent skills in operating the applied test tools

# 1] Test organization

Test system administrator

- Set up and operates the test environment
  - Is responsible to meet the requirements on the test system

Special skills required :

- System administration (or access to a system administrator)
- Knowledge of development and testing tools
- Database systems, if applicable
- Networks, if applicable
- Installation and operation of system software (e.g. operating systems)

# 1] Test organization

Software tester

- Executes test in accordance with the test case specifications
  - Special skills required :
  - Basic knowledge of Software
  - Basic testing knowledge
  - Operation of the used testing tools
  - Experience in conducting tests
  - Knowledge about test objects

# 1] Test organization

Technical expert

- Support the test team where necessary

- Special skills required :
  - Database administration or database design
  - Experts of user interfaces
  - Networking experts
- Depending on the type of problem or on the test environment, further test experts may became part of the test team
  - Sometimes special skills are required which do not relate directly to testing, e.g. usability experts, security experts, etc.

# 1] Test organization

Soft Skills

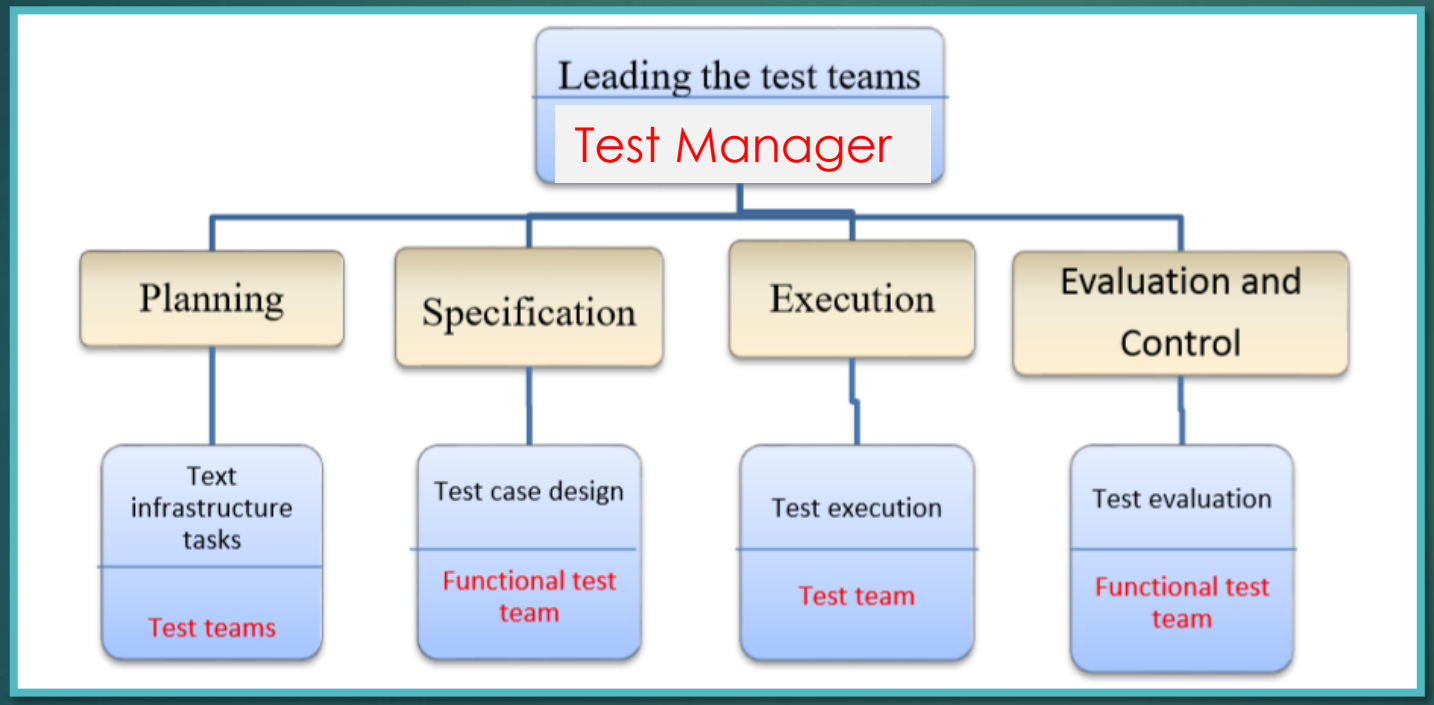
- In addition to their technical skills, test team members require the following qualification and experience :

- Team members :
  - (political and) diplomatic instinct
  - Willingness to question seemingly obvious facts
  - Persistence, strong standing
  - Exactness and creativity
  - Skillful handling of complex situations
  - Fast learning skills

# 1] Test organization

Organizations of the test teams

- Use an appropriate organization for each individual project



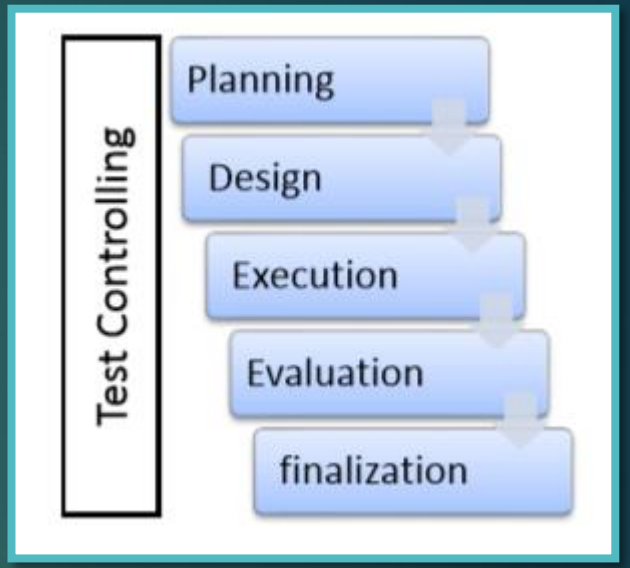

| Who |
| --- |
| What |

- Not every role must be filled in by a separate person. In small test teams one person may take an multiple roles

# 1] Test organization

Tasks of the leader/1

- Organization the test team
- Test planning (in accordance with the corporate quality plan)
- Test cycle planning (Activities of the test process)
- Test strategy incl. decision on test automation
- Test measurement and control
- Introduction of an adequate incident management system
- Introduction of a configuration management system
- Result/ progress reporting for the company management



Activities of the test process

- This is not a particular task of the manager, configuration management is needed in all phases of the product development.
- Tasks of test leader: Test management
- Writing the test plan (German: Testkonzept)
  - Creates a document which holds methods, resources and time tables for the test activities

# 1] Test organization

**Tasks of the test leader and tester:**

- **Test leader tasks may include:**
  - Coordinate the test strategy and plan with project manager
  - Write or review a test strategy for the project, and test policy for the organization
  - Plan the tests
  - Initiate the specification, preparation, implementation and execution of tests, monitor the test results and check the exit criteria
  - Setup adequate configuration management of test ware for traceability
  - Introduce suitable metrics for measuring test progress and evaluating the quality of the testing and the product
  - Decide what should be automated, to what degree, and how
  - Select tools to support testing and organize the training in tool use for testers
  - Decide about the implementation of the test environment
  - Write test summary reports

# 1] Test organization

- **Tester tasks may include:**
  - Review and contribute to test plans
  - Analyze, review and assess user requirements, specifications and models for traceability
  - Create test specification
  - Set up test environment
  - Prepare and acquire test data
  - Implement tests on all test levels, execute and log the tests, evaluate test results and document the deviations from expected results
  - Use test administration or management tools and test monitoring tools as required
  - Automate tests
  - Measure performance of components and systems
  - Review tests developed by others

# 2] Test planning and estimation

- Test plan according to IEEE 829
  - 1. Introduction
  - 2. Assumptions
  - 3. Test items
  - 4. Features to be tested
  - 5. Features not to be tested
  - 6. Approach
  - 7. Item pass/fail criteria
  - 8. Suspension/ resumption criteria
  - 9. Test deliverables
  - 10. Testing tasks
  - 11. Environments needs
  - 12. Responsibilities
  - 13. Staffing & training
  - 14. Schedule
  - 15. Risk & contingencies
  - 16. Approves

# 2] Test planning and estimation

Test estimation – influencing factors (extract)

- Characteristics (e.g. complexity) of the product
- Quality of the test basis
- Requirements on reliability and safety of the product
- Complexity of the development process
- Stability of the organization, maturity of used processes
- Personnel involved, time pressure

– Methods to estimate test effort

- Expert based estimation (also: task based approach)
- Analogy based estimation
- Ratio based estimation

# 3] Test progress monitoring and control

## a) Test progress monitoring

- Percentage of work done in test case preparation (or percentage of planned test cases prepared).
- Percentage of work done in test environment preparation.
- Test case execution (e.g. number of test cases run/not run, and test cases passed/failed).
- Defect information (e.g. defect density, defects found and fixed, failure rate, and retest results).
- Test coverage of requirements, risks or code.
- Subjective confidence of testers in the product.
- Dates of test milestones.
- Testing costs, including the cost compared to the benefit of finding the next defect or to run the next test.

# 3] Test progress monitoring and control

## b) Test Reporting

- What happened during a period of testing, such as dates when exit criteria were met.
- Analyzed information and metrics to support recommendations and decisions about future actions, such as an assessment of defects remaining, the economic benefit of continued testing, outstanding risks, and the level of confidence in tested software.
- Metrics should be collected during and at the end of a test level in order to assess:
- The adequacy of the test objectives for that test level.
- The adequacy of the test approaches taken.
- The effectiveness of the testing with respect to its objectives.

# 3] Test progress monitoring and control

**c) Test control**

- Test control describes any guiding or corrective actions taken as a result of information and metrics gathered and reported. Actions may cover any test activity and may affect any other software life cycle activity or task.
- **Examples of test control actions are:**
  - Making decisions based on information from test monitoring.
  - Re-prioritize tests when an identified risk occurs (e.g. software delivered late).
  - Change the test schedule due to availability of a test environment.
  - Set an entry criterion requiring fixes to have been retested (confirmation tested) by a developer before accepting them into a build.

# 4] Risk and testing

- Types of typical project risks:

## Organizational risks

- Qualification and availability of stuff
- Personal problems between teams/team members
- Insufficient cooperation between departments/ conflict of interests
- Unrealistic project schedule estimates

## Technical risks

- Wrong, incomplete or unrealistic requirements
- New or uncertain technology, methods, tools, etc, for software development
- Short falls in the quality of the work products
- Availability of complex test environment

## Environmental risks

- Shortfall in externally provided components (time, quality, cost)
- Acceptance problems and other contract issues with vendors
- Concurrent access to external resources
- Changes regarding legal requirements

# 5] Incident management

Tracking of the error is done using an incident management system(error / defect manage)

*Throughout this chapter error and incident are used synonymously

Structure of an incident report (error report)

– The incident report describe the failure, not its cause

– Template of incident report is found in IEEE 829 (Anomaly Report)

– Detail of an incident report may include:

- Incident data
  - – Unique error number (usually automatically generated)
  - – Test object (name, version), test step
  - – Test environment
  - – Name of incident report author
  - – Date of first occurrence
- Classification of incident
  - – Error class(also: error severity)
  - – Error state (new error, retest etc.)
  - – Priority(assignment of urgency)

Error state

– Typical states and transitions for incident management work flow