Unit – III Test Management

--test planning
-- test management
--test process
--test reporting

(14 marks)

Test Planning

- Goal : identifying testing strategy, resource utilization, responsibilities, risk and priorities.
- Methodologies ,techniques , tools required.
- it includes :
  - Items to be tested / not to be tested
  - Who will test
  - What will be pass / fail criteria.
  - training needs for team.

Test planning steps:

- **1.set objectives of test plan**
  - Eg: if the objective of s/w is to meet all user rqmts then a test plan is generated to meet this.
- **2.develop test matrix**
  - Components of the s/w that are to be tested
  - Testing methods .
- **3.develop test administrative component**
  - Specify time schedule and resources required to execute test plan.
- **4.write test plan.**
  - Documentation of test planning steps.

Test Planning activities:

- 1. preparing test plan
- 2. scope management
- 3. Deciding test approach
- 4. Setting up criteria for testing
- 5. identifying responsibility
- 6. Staffing and training needs
- 7. Resource requirements
- 8.Test deliverables
- 9. Testing task

1. Preparing test plan

- Test plan act as anchor for the execution , tracking and reporting of the entire testing project

- It includes :
- What need to be tested
- How testing is going to be performed
- What resources are needed for testing
- When each test occur.
- Time lines
- Risk

- Test plan types :
- 1. master test plan
- 2. testing level specific:
- -- unit test plan -- integration – System --acceptance
- 3. testing type specific :
- -- performance -- security

2. Scope management

- It include what items , features , procedures , functions will be tested.
- Pertain to specifying the scope of software project.
- For testing scope management needs:
- 1. understanding what constitutes a release of a product.(vital features for release)
- 2.Prioritizing the features for testing
- 3.Deciding which features will be tested and which will not be
- 4.Estimation of resources for testing

- Factors for prioritization of features to be tested:
- 1. features that is new and critical for release.
- 2. features whose failures can be disastrous
- 3. features that are expected to be complex to test.
- 4. features which are extension of earlier features.

3. Deciding test approach

- Deciding right type of test for each feature.
- After prioritizing features identify :
- 1. testing tools
- 2. special training
- 3. configuration / compatibility test
- 4. what metrics will be collected
- 5.h/w s/w

4. Setting up criteria for testing

- **Pass / fail criteria :** specify the criteria to determine passed or failed .
- **Suspend criteria :** specify criteria to be used to suspend the testing activity
- Some of the suspend criteria:
- 1. **team members report** that there are **40%** of test cases **failed**, suspend testing until the development team fixes all the failed cases. causing stoppage of testing
- 3. **Hitting show** stoppers that prevent further progress of testing
- 4. **Developers releasing** new version of product under test
- **Resume criteria :** specify criteria to be used to redone the testing activity

Test Completeness criteria

- Specifies the criteria that denote a **successful** completion of a test phase
- **Run** rate is mandatory to be **100%** unless a clear reason is given.
- **Pass** rate is **80%,** achieving the pass rate is **mandatory**

- Completion criteria for testing:
- At unit test level:
  - All test cases completed
  - Specified percentage of test cases completed
  - Code coverage done
- At master test level:
  - All lower levels plans completed
  - Specified number of plans completed without errors or with minor defects.

5. identifying responsibility :

- List responsibility of individual
- Responsibilities define who is responsible for what activity at each stage of development

	Team mgr	Program mgr	Developer team	Test team	client
Acceptance test documentation and execution	X	X	-	X	X
System /integration test	X	-	X	X	-
Unit test documentation and execution	X	-	X	X	-
System design reviews	X	X	X	X	X
Detail design reviews	X	X	X	X	-
Test procedure and rules	X	X	X	X	-
Screen and report reviews	-	-	X	X	X
Change control and regression testing	X	X	X	X	-

6. Staffing and training needs

- Staffing needs estimated based on efforts involved and availability of time.
- Provide number of individuals required for each role.
- Training needs to enhance skills , learn new technology , tools.
- Training needs for use of tools for test cases execution and for reporting.

Staffing needs

Task	Members	Estimate effort
Create the test specification	Test Designer	30 man-hour
Perform Test Execution	Tester, Test Administrator	50 man-hour
Test Report	Tester	10 man-hour
Test Delivery	Tester	20 man-hour
Total		110 man-hour

7. Resource requirements

- Estimation of h/w , s/w ,human resource , environment needs (support staff , office space)
- Resources required are :
- 1. RAM,Processor ,HD
- 2. s/w , OS
- 3. supporting tools
- 4. special testing tools : for load , performance test

8.Test deliverables

- Documents that are provided before testing phase , or during testing phase or after testing phase.
- Different test deliverables are :
- 1. test plan
- 2.testing strategy
- 3. test scripts
- 4. test cases
- 5. tools
- 6.Test summary report
- 7. defect report.

- Test cycle deliverables:
- **- Test plan**: test approach documents
- **- Test design specification**: test condition , expected results.
- - **Test case specification** : include i/p ,steps , preconditions , expected results
- **- Test procedure specification**: steps for execution of steps.
- **- Test log**: documents about execution of tests
- - **Test incident report** : include any event during test that may require further analysis
- **- Test summary report** : report after execution of test.

- **Before testing phase**
- Test plans document.
- Test cases documents
- Test Design specifications.
- **During the testing**
- - Test Tool Simulators.
- - Test Data
- - Test Trace-ability Matrix - Error logs and execution logs.
- **After the testing cycles is over**
- Test Results/reports
- Defect Report
- Installation/ Test procedures guidelines
- Release notes

9. Testing task(size n effort estimation)

- Task(effort) required to perform testing.
- All tasks for planning and executing testing.
- Identifying inter dependency among different testing related task.
- Eg : Example: Test environment should be ready prior to test execution phase.
- Estimation happens in 3 phases :
- 1. **size estimation**
- 2**. effort estimation**
- 3. **schedule estimation**

- **size estimation:** determine amount of testing that need to be done.
- Larger the product , greater is the size of testing.
- Following factors contribute size estimation:
- **1. size of product release:** Following are the measures of size of product
  - LOC (lines of code): depend on programming style , compactness .it consider only coding phase.
  - FP(function point):
    - estimate size of an application.
    - It include i/p , o/p ,interfaces.
    - Number of screens , reports.
- **2.Extents of automation required:** automation increases size of work to be done for testing.
- **3. Number of platforms:** if product is to be tested under several different platforms then size of testing tasks increases.

- **Effort estimation :it include:**
- **1. productivity data:** refers to the speed at which the various activities of testing can be carried out.
  - No.of test cases that can be developed per day.
  - No.of test cases that can be run per day.

- **2. resuse oppourtunities:** size of testing can come down.
  - Eg: if some of earlier tests can be reused , then effort of test development decreases.

- **3. robustness of processes :** existence of well defined way reduces the efforts.
  - Well documented standards for writing test scripts, specification.
  - Proven process for performing audit , review.
  - Consistent way of training people.

- **Schedule estimation:**
  - Schedule may be dependent on completion of milestone of testing.
  - Identify the schedule for each testing tasks.
  - Specific dates and time for each activity are defined.

Test Management

- Organizing test assets such as test requirements , test cases and test results to enable accessibility and reuse.
- Tools : pen paper , word processor , spread sheet.
- It includes:
- Choices of standards
- Test infrastructure management
- Test people management
- Integrating with product release

1. Choice of standard

- Standard Defined to provide exact meaning to any subject.
- Testing standard are mainly used to control activities .
- Two types :
- 1. **external std :**
- --made by entity other than organization.
- -- 3 types :
- **a. customer std:**
- →defined by customers based on business requirements.
- →enforced by customer to supplier (developer)
- **b. national std :**
- →defined by regulatory authorities.
- → applicable to both producer customer.
- → violating stds lead to legal actions.
- **c. International std:**
- →globally defined
- → applicable to all producer customer.
- → eg : ISO , IEEE

- 2. **Internal Std :**
- --defined by s/w development organization
- -- internal std are :
- **--naming and storage conventions :** eg test cases , test results have to be named meaningfully.
- **-- document std:** header level comment at the beginning of file , sufficient in line comment , up to date change history information
- **--test coding std :** consistency during scripts writing
- **--test reporting std :** timely view of the progress of test

2. Test infrastructure management

- Testing requires a robust infrastructure.
- Infrastructure made up of 3 elements
- 1. test code db
- 2. defect repository
- 3. configuration management repository

- **1. test case code db :**
- Captures all relevant information about test cases.
- Content of test case db:

Entity	Purpose	Attributes
Test case	Record static information about test	Test case Id , Test case name , owner , Associate files
Test case product cross reference	provide mapping between tests and corresponding feature	Test case id Module id
Test case run history	Provide history of executed test cases	Test case id , run date , time taken ,result , status
Test case defect cross references	Provide mapping between test cases and defects detected	Test case id Defect references Point to defect repository

- **2. defect repository:**
- -- capture all relevant details of defects reported for product

- **3. configuration management repository:**
- -- labeling , tracking , controlling changes in s/w element.
- --keep track of **change control** and **version control**
- --**change control ensure :** change made by one test engineer , each change produces a distinct version , have access to only the most recent version .
- --**version control ensure :** provide history of each s/w change , who did what , why ,when

3. Test people management

- Mainly defects found based on effective testing techniques , but it also depend on skills and knowledge of tester and team dedication.
- Test Team members with different expertise levels has to be integrated to maximize quality.
- Test leader :
- --lead team of testers.
- -- do test plan and approved by management.
- -- check skills required.
- -- if skill gap than plan training.
- -- create healthy environment
- --

- Activities of test team management:
- --**encourage team** : bridge gap between team and mgmt
- -- **monitor test progress** : delay in schedule.
- **--understand testers :** understanding that with experience , testers learn to break code and find defect
- -- **tester work environment:** create healthy work environment because
- →tester work in pressure due to deadline
- →frustration , since mgmt might not response +vely
- **-- role of test team** :
- → 100% testing is practically not achieved.
- → do not put question mark on tester role

4. Integrating with product release

- Success of product depend on effective integration of activities from development and testing phases.
- Product release related with schedule of testing phase.
- So , testing must work in integration with product release.

- Points related to planning:
- **1. sync point:**
- -- between development and testing
- --provide schedule for each type of testing.
- --eg : start , commence date for integration , system testing.
- **2. service level agreements** :
- --between developer and tester team
- --total period required by testing team to complete testing job.
- **3. consistent definition:**
- -- consistent defn of defect among developer and tester team.
- -- also define severity and priority of defects.
- **4. communication channel :**
- -- communication between testing and documentation team to keep documentation in sync with the current growth of product

Test process

- Testing is not a single activity instead it’s a set of number of processes.
- Testing is a process of execution of a work product with intent to find a defect
- 1. **base lining a test plan**
- 2. Test case specification
- 3. Update of traceability of matrix
- 4. Executing Test Case

1. **base lining a test plan**

- **--base line:** form the base for performing further activities.
- Baseline may be defined by: The names of the physical item(s) which constitute the baseline (e.g. test plan, design document, code unit)
- **Test plan :** is a single document that act as an anchor point for entire testing project.
- Test plan developed by competent people and approved by higher authority.
- After this , test plan is based line into configuration management repository and then it become base for running testing project.
- If any change occur than it first reflected in test plan

2. Test case specification

- Test plan specify :
- -- unit to be tested , approaches , tools
- Test case specification done separately for each unit.
- Deals with details of testing a unit.
- Testing team designs test case specification which then becomes the basis for preparing individual test cases.
- It state :
- -- item being tested
- --environment need to run test case
- --input data
- --steps to be followed to execute the test
- --Expected results
- --relation with other tests

3. Update of traceability of matrix

- It is a tool to validate that every requirements is tested.
- It associate requirements to its work product and test cases.
- It is created during rqmt gathering phase (unique identifier) is assigned to each.
- Than in design and code phase , unique identifier for design and code is entered in traceability matrix.
- When test case specification complete , Identifier of corresponding rqmts which is being tested is entered
- This ensure two way mapping between rqmts and test cases.

Template of rqmts traceability matrix

Unique number	Requirements	s/w rqmt specification	Program module	Test specification	Test cases	Modification of rqmts	remarks
101	R1	X	M1,M2	X	X	--	
102	R2	X	M3,M2	X			

4. Executing Test Case

- Has following major task:
- Follow test procedure.
- Do retesting
- Log result of execution
- Comparison of actual with expected
- Report defect if any
- Defect db updated

Test report

- Providing information about testing result.
- It include: --defect
- --impact , severity
- --risk of releasing of product with existing defects.
- Test summary report include:
- **1. summary of test activities:**
- -- variance between planned and carried out activities.
- -- test that could not be run
- --modification to tests from what was in original tests.
- -- additional tests that were run
- --Difference in effort and time.

- **2. summary of results:**
- --tests that failed –with root cause descriptions.
- --severity of impact of defects.
- **3.assessment and recommendation for release:**
- --”fit for release” assessment
- --recommendation of release

Types of reports

- **1. test incident report :**
- -- testing report when defect encountered.
- -- entry made in the defect repository.
- **2. test cycle report :**
- -- test project take place in units of test cycles.
- --running certain tests in cycle.
- --each cycle using a different build of the product.
- -- through cycles , the product expected to be stabilize.
- It include :
- -- a summary of the activities carried out during that cycle.
- -- defect summary
- -- progress from previous cycle in terms of defect fixed.
- --outstanding defects that yet to be fixed.

- **3. test summary report:**
- --final step to recommend suitability of a product release.
- two types of test summary report:
- 1. phase wise test summary.
- 2. final test report.

Test report

- 1.recommending product release
- 2. matrix executing test cases
- 3. collecting and analyzing metrics
- 4 preparing test summary report

1.recommending product release

- Based on test summary report , organization decide whether to release the product or not.
- Senior manager consult customer support team , development team , testing team for decision.
- Product release recommended based on :
- -- market pressures.
- -- low priority/impact defect.
- Test report summarize following , in order to decide product release:
- -- what defect the product has.
- -- what is impact / severity of defect?
- --risk of releasing product with existing defects?

2. matrix executing test cases

- Test cases has to be executed at appropriate times during project
- Eg : system testing test cases will be run during system testing
- As test cases executed , defect repository updated : it contain all information about defects un covered by testing
- Defect repository is updated :

  -- Defect from earlier cycle that are fixed in current build

  --new defect that get uncovered in current run of test.

- **3. collecting and analyzing metrics**
- Information about test execution gets collected in test logs
- And converted into meaning full metrics by formulas.
- **4. preparing test summary report :**
- Handover to senior management about the fitness of product release.
- It is prepared at the end of testing project.