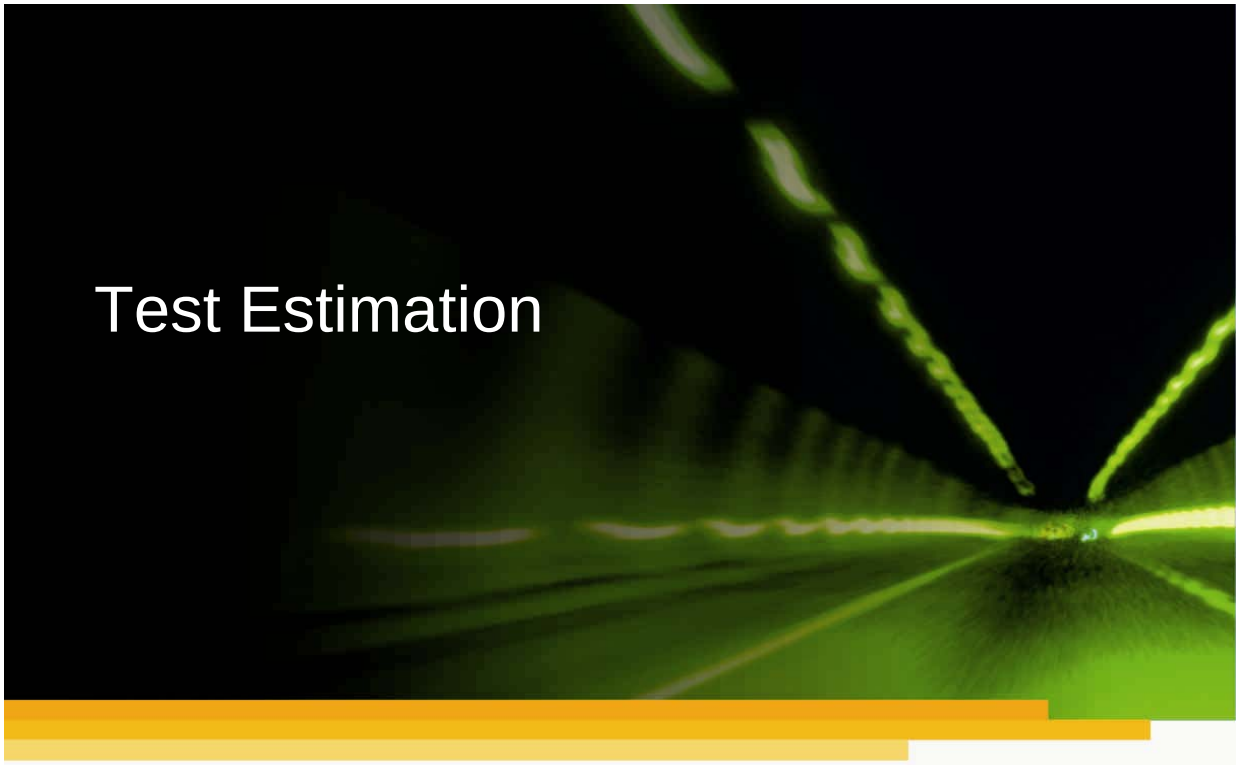

Test Estimation

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Contents

1.1 Abstract

We have executed many projects Large Projects, Small Projects etc. Sometimes we miss our testing deadlines because there is no defined criterion that is used to build our execution test plan. To help avoid such missing our deadlines we have prepared these Test Estimation guidelines. In this paper I present the various Test estimation techniques which will help us in proper execution of the Testing projects and also one estimation model created by me which is being widely used in my present organization. This is a paper submitted under **"Program Management Tools" track.**

1.2 Audience:

Test Management Professionals — Managers, Architects, Test Leads, Software Test Engineers

Quality / SEPG Management Professionals — Managers, QA Leads, Software QA Engineers

Project Management Professionals — Managers, Leads, Software Engineers

1.3 Area of Application:

Testing Projects

1.4 Issues and Challenges:

Major Issues : Estimation method / Process, Environment & Tools, Testing to be performed, Complexity of the application under tests

Minor Issues : Test Resource, Other factors

1.4.1 Issues While Estimating - Process

Requirement Stability, Change Requests, Finalize types of testing ,Follow the test process,Non-availability of test cases and test data, Timely reviews of the test cases and other artifacts, Coordination with various teams/modules/interfaces, Scope changes

1.4.2 Issues While Estimating – Environment & Tools

Separate Environment, Environment not similar to the deployment environment, Downtime of the environment available during testing, Availability of test management tools, Availability of test automation tools.

1.4.3 Issues While Estimating – Testing Resources

Management commitment towards completion and following the test life cycle, Common and realistic expectation toward the testing goal from all the stakeholder in project, Availability of key resources, Application knowledge among the test team, Connect / Attitude between the development and testing team, Correct resolution on the defect fixes, Clear Communication

1.4.4 Issues While Estimating – Others factors

Complexity of the application under tests, incorrect assumptions during estimation, Ownership of testing, Independent \ Development Vendor\ Customer

Timeline assigned for testing, Development timeline and release of code for testing, Availability of correct test data during test execution, Geographical location of testing team involved, Not doing periodic re-estimation.

1.5 Content

Test Estimation is a prediction based on probabilistic assignments and is a continuous process, which should be followed and used through out the project life cycle. Effective software estimation helps track and control cost/effort overruns. Estimations cover following broad areas

Estimate size

Estimate cost & effort

Determine the schedule

Assess risks

Now this brings us to a basic question that how can we do Test Estimations?

Test Estimations can be done as shown in the **Fig 1.**

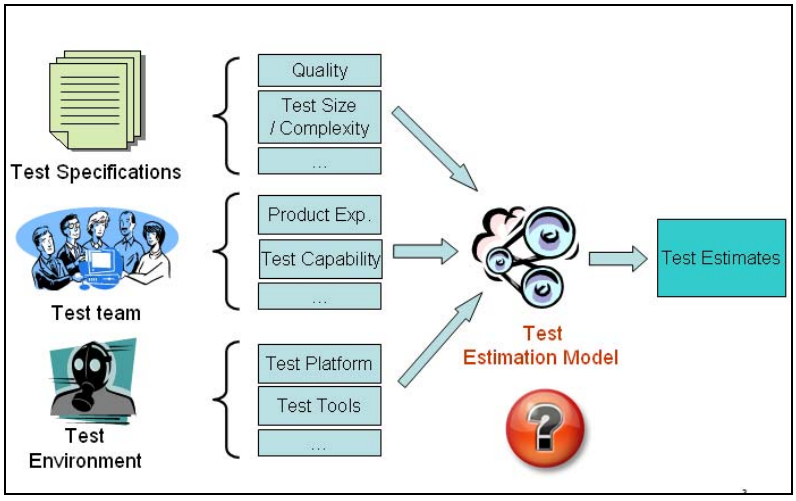

Fig. 1

There are various types of Test Estimations as shown in **Fig. 2**:

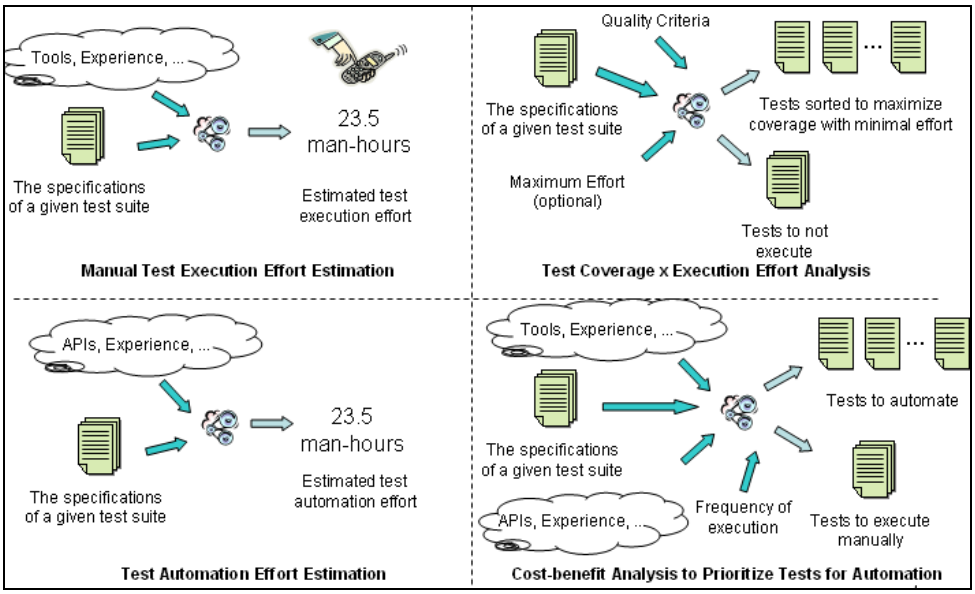

Fig. 2

Software Test Estimation – Overview as shown in **Fig 3**

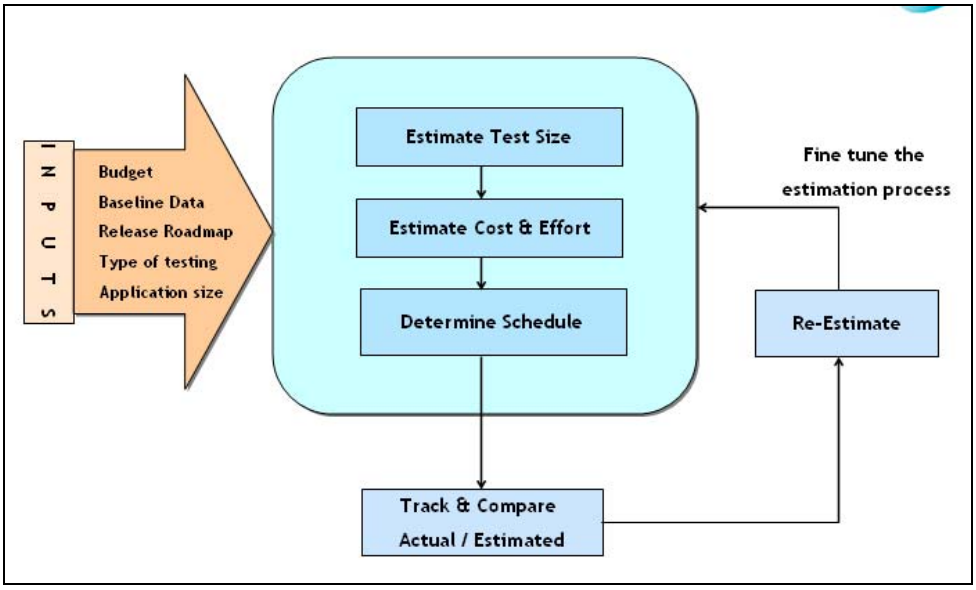

Fig. 3

1.5.1 There are various issues which creep up while estimating

Major Issues

Estimation method / Process

Environment & Tools

Testing to be performed

Complexity of the application under tests

Minor Issues

Test Resource

Other factors

1.5.2 Issues While Estimating – Environment & Tools

Separate Environment

Environment not similar to the deployment environment.

Downtime of the environment available during testing

Availability of test management tools

Availability of test automation tools

1.5.3 Issues While Estimating – Testing Resources

Management commitment towards completion and following the test life cycle

Common and realistic expectation toward the testing goal from all the stakeholder in project

Availability of key resources

Application knowledge among the test team

Connect / Attitude between the development and testing team

Correct resolution on the defect fixes

Clear Communication

1.5.4 From the above we have got a basic idea about the facts related to Test estimations.

There are various software test estimation techniques:

Simple Medium Complex(SMC) Method

Top Down Method

Bottom Up Method

Test Point Analysis(TPA)

1.6 Now in the following sections I'd be explaining the above mentioned estimation techniques in detail.

1.6.1 SMC Method

This model will consider the test functions / test conditions and their Complexities (Simple, Medium, and Complex) as the basis for estimation and the effort involved for the following test activities can be estimated using this model. Following test activities could be covered

Test Initiation

Test Planning & Design

Test Execution

Test Closure activities

1.6.2 Test Initiation:

Effort estimate for the following activities can be done using SMC model under Initiation Phase:

Knowledge Transfer

Application Familiarity

Requirements Analysis

Functional Decomposition

1.6.3 Test Planning and Design:

Effort estimate for the following activities can be done using SMC model under Test Planning & Design Phase:

Test Plan

Preparation of Scenarios, Test Cases, Test Data.

Test Case, Test Data Reviews

Preparation of Execution Plan

Test Ware Re-work & Reviews

Prepare and Review of Zero-day checklist

1.6.4 Test Execution:

Effort estimate for the following activities can be done using SMC model under Test Execution Phase:

Verify zero day check list

Creation of test bed

Test Execution

Review of Incident logs

Update the Incident report

1.6.5 Test Closure:

Effort estimate for the following activities can be done using SMC model under test closure Phase:

Closure Metrics Preparation

Closure meeting

Archive project data (Project Closure Activities)

Test / Project Management

I'm attaching a Sample SMC Sheet which I had used for one of my test projects.


SMC.xls

1.6.6 Top Down Method

In this method, the Overall effort estimate for the project is determined first in FP or Line of code method. The estimation procedure is as follows:

Get the total size in FP

Define the lower level project test component.

Based on experience and productivity data from previous projects,
obtain the effort estimate

Overall effort estimate = productivity *size

1.6.7 Bottom Up Method

This is also known as "divide and conquer" technique. It is hierarchical decomposition of the test effort into stages, activities and tasks.

Planning

Test environment & configuration

Test case creation

Test execution

Again decompose the above activity in smaller packages which can be estimated in short period of time.

Estimate the total effort by understanding the duration and effort of each activity.

1.6.8 Test Point Analysis(TPA)

Test Point Analysis can be used to objectively prepare an estimate for black box testing (excluding performance testing). Test Case Point Analysis methodology is based on Test Case Points. Test Case Point is a Verification Point used to verify that the value on AUT matches with the expected value. This O/p value can be I/p data for other verification points. Following factors will have influence on number of Test Case Points:

Complexity: It relates to the number of conditions in a function. More conditions almost mean more test cases and therefore a greater volume of testing work.

Interfacing: The degree of interfacing of a function is determined by number of data sets maintained by a function and the number of other functions, which make use of those data sets.

Uniformity: The extent to which the structure of a function allows it to be tested using existing or slightly modified specifications, i.e. the extent to which the information system contain similarly structured functions.

1.6.9 Details about Test Case Point are as follows:

Low Complexity Test Case Point: A Test Case Point having 1 to 3 Steps is considered as Low Test Case Point.

Medium Complexity Test Case Point: A Test Case Point having 3 to 4 Steps is considered as Medium Test Case Point.

Critical Complexity Test Case Point: A Test Case Point having 5 to 6 Steps is considered as Critical Test Case Point.

1.6.10 Test Scripts can be defined in following three Complexity Levels:

S. No.	Level	Definition
1	Critical	If a Test Script is having 6 to 8 Test Case Points Or Verification Points.
2	Medium	If a Test Script is having 4 to 5 Test Case Points Or Verification Points.
3	Low	If a Test Script is having 1 to 3 Test Case Points Or Verification Points.

1.6.11 Breakdown between Testing Phases:

	Testing Phase	% age
Test Scripting	Preparation (includes Functional Understanding)	10
	Specification (includes Test Conditions, Test Data identification, Test Script preparation)	40
Test Execution	Test Script Execution and Defect Management (includes Smoke, System, Integration, End to End and Regression Test)	45
	Completion (includes UAT)	5

1.6.12 Factors affecting Test Estimation

Productivity Figure: It is based on knowledge and skill of test team members and is therefore specific to the individual organization. Productivity figure mentioned in these guidelines needs to be verified for couple of projects before implementation across GSI.

Environmental Factor: Following environmental factors should be consider for test effort estimation:

Test Tools: It reflects the extent to which testing is automated, or the extent to which automation tools are used for testing.

Development Testing: It reflects the extent to which the development testing is down, a development test plan is available and test team is familiar with the actual test cases and test results

Test Base: It reflects the quality of system documentation upon which the test under consideration is to be based.

Test Environment: It reflects the extent to which the test infrastructure in which the testing is to take place has previously been tried out.

Testware: It reflects the extent to which the tests can be conducted using existing testware.

Multiple Browsers: Effort estimation for testing on multiple browsers is more then testing on one browser.

1.7 Conclusion

The estimation technique guidelines explained in the earlier section can be enhanced to cover the various environmental factors. Pilot these guidelines for couple of projects in your organization and compare the estimated effort and actual effort. As we get proficient with its implementation we'll find that Estimated and Actual efforts are getting closer which will result in better execution of the testing projects.

I'm also attaching a sample Testing Estimation Sheet created by me and which I've used extensively. This estimation tool has been successfully implemented in my previous organizations also.

Test Estimation Tool.xls

[Note: The attached template is just a snapshot of the actual tool.]

1.8 References:

The whole content has been written based upon my past experiences in various organizations. The views may differ based upon circumstances. Feel free to get back to me at sundershyam30@yahoo.com in case of any clarifications.

1.9 About the Author

Shyam Sunder is a PMP® Certified Test Manager. Shyam has got total IT Testing Experience of 12.5 Years and has worked in various reputed organizations like IIS Infotech, HCL Technologies, Sapient etc. Shyam is strong in the area of Test Management, Software Testing areas and Client relationship management. He is well versed in testing areas and has been actively involved in IV&V along with his testing delivery projects. The strong testing background which Shyam inculcated in previous organizations is being put into forte in Sapient which is reaping rich dividends of his testing acumen and expertise. Shyam has a consistent track record of successful product introduction and implementation. And is Productive as both individual contributor and Project Manager. Shyam also possesses excellent communication and relationship-building skills.

Shyam has been a regular contributor in Testing Forums like Quality Assurance of India (QAI), Software Testing Conferences (STC), Step-in-Summits etc with his papers, presentations and workshops. Shyam's recent presentation was in STeP-In Summit Feb'10 and his topic was "Test Estimation"

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