

TEST ESTIMATION

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Abstract:

Introduction:

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.

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

Area of Application:

Testing Projects

Benefits:

Why good estimates are important?

- Testing is often blamed for late delivery
- Testing time is "squeezed"
- It promotes early risk assessment

* Test Program Manager

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

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

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.

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

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

1.0 Introduction:

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. This is a paper submitted in the Test Management Stream.

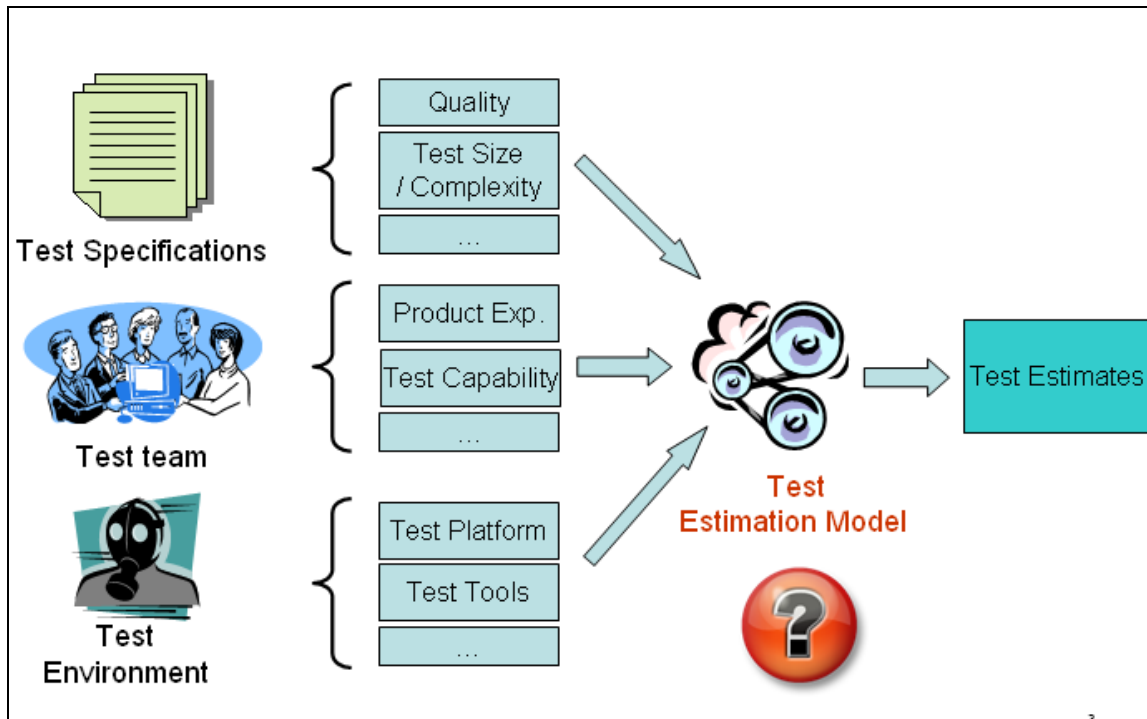
2.0 Content

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

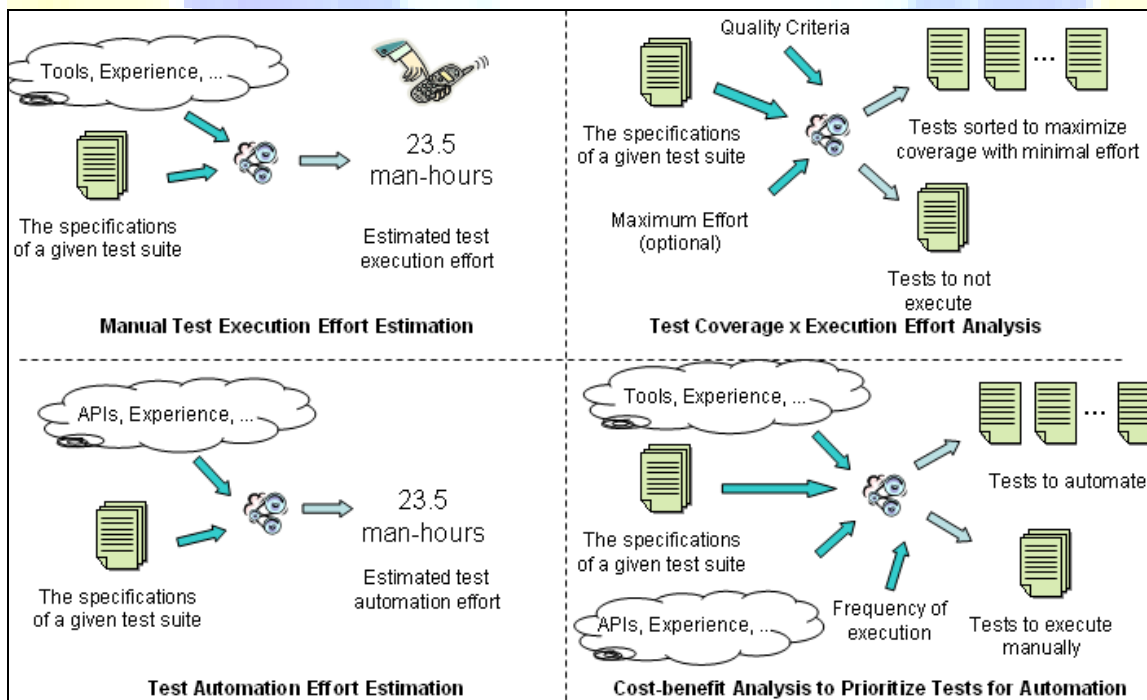
- Estimate size
- Estimate cost & effort
- Determine the schedule
- Assess risks

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

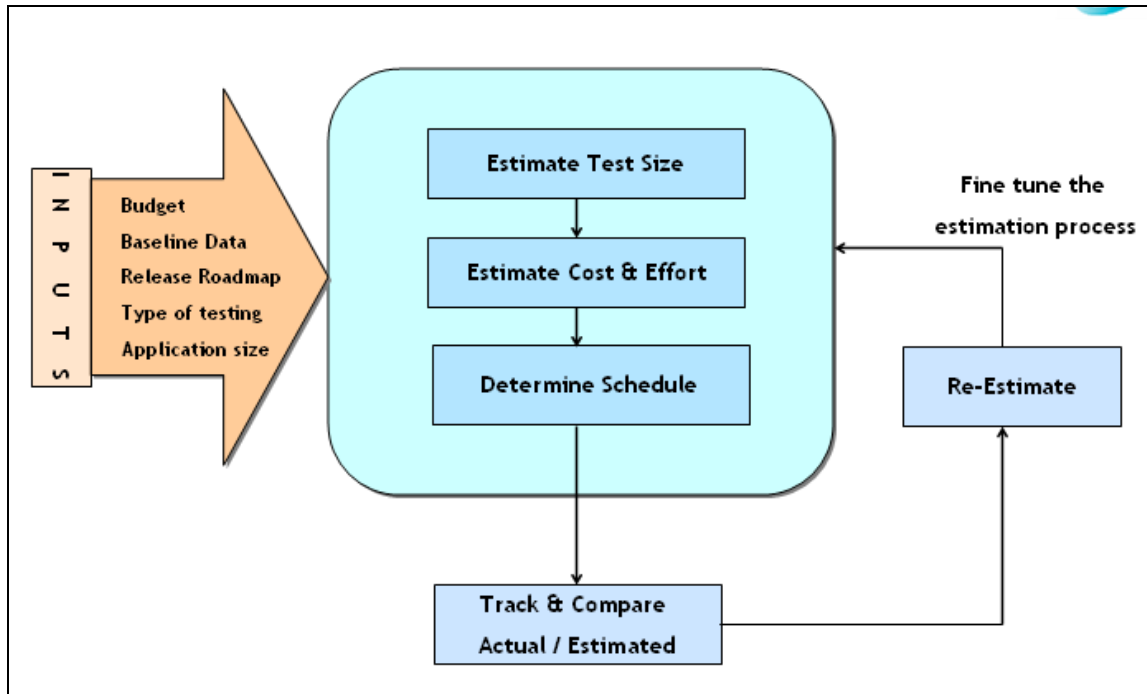
Test Estimations can be done as shown in the below figure.



There are various types of Test Estimations as shown below:



Software Test Estimation – Overview



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

Issues While Estimating – Environment & Tools

- Separate Environment
- Environment not similar to the deployment environment.
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Issues While Estimating – Testing Resources

- Management commitment towards completion and following the test life cycle
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From the above we have got a basic idea about the facts related to Test estimations.

There are various software test estimation techniques:

- a) Simple Medium Complex(SMC) Method
- b) Top Down Method
- c) Bottom Up Method
- d) Test Point Analysis(TPA)

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

a) SMC Method

This model will consider the test functions / test conditions and their Complexities (Simple, Medium, 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

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

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

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

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.



C:\Sample SMC.xls

a) 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

b) 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.

c) 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.

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.

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.
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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

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 than testing on one browser.

3.0 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.

4.0 Definitions, Abbreviation and Acronyms

Acronym	Description
QA	Quality Assurance
SEPG	Software Engineering Process Group
SMC	Simple Medium Complex Method
TPA	Test Point Analysis
FP	Function Point
UAT	User Acceptance Testing

5.0 References

None.

The whole content has been written based upon my past experiences in various organizations. The views may differ based upon circumstances.

6.0 Biography of the authors

Shyam Sunder



Shyam Sunder is a PMP® Certified Senior Test Manager working in Dell Services and is working in Dell's prestigious Account "Sidra" as the Test Program Manager. Shyam has got total IT Testing Experience of 14.9 Years and has worked in various reputed organizations like United Health Group, HCL Technologies, IIS Infotech etc. before joining Dell. 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 Dell 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) etc. with his papers, presentations and workshops.

Shyam has received excellent Client testimonials which can be seen in his linked-in profile.

Linked in Profile: <http://www.linkedin.com/in/sundershyam30>

Shyam's Professional Certifications

- PMI Certified PMP®.
- 6-Sigma Green Belt Champion.
- KPMG Certified ISO 9001 Internal Auditor.
- Brainbench Certification in Project Management.