Test Result Reporting

Indira R

Abstract:

This paper is intended to highlight the importance of result reporting in the context of software testing. Result reporting can be at various stages of testing like system, integration etc... This document addresses some of the areas of result reporting at a high level involving independent system testing (Black box testing) keeping in mind, the customer as one of the audience.

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1. Introduction

One of the important facets of software development life cycle is **Testing**. Software testing is an area that is being considered and given utmost importance in the world of fast changing technology. There are various stages at which testing is done to ensure quality of delivery.

Result reporting is a mechanism for presenting to the customer, from different angles, the state of the product[1]. Reporting format varies depending on the

- ❖ Stage of the testing in the development life cycle
- ❖ Audience[2] at each stage
- ❖ Transparency involved during testing - white box or black box testing.
- ❖ Type of testing involved like Functional, Performance/Load/Stress, Disaster recovery etc…

Independent system testing takes about 20 to 50 % of the development time depending on various combinations of the types of tests conducted on a product. The complex the testing gets, more would be the effort required. Of course, **the more a product is tested, the better the quality would be**. Typically, test result reporting would consist of about 5 to 10% of this effort.

2. Importance

Is it sufficient to give a single line certification that, the product is **ready/not ready for implementation**?

My belief is **Not at all**.

- ❖ **Result reporting** is very important and even more so when the product has **failed** testing.
- ❖ There are various aspects that the customer would be interested in knowing about the product like its performance, platform dependence etc… and **just not** the compliance to functional requirements.

- ❖ Giving an **unbiased opinion** about the product and **analysis details** is what any customer would appreciate most. This should not be an issue with the testing team having a first hand knowledge of the state of the product tested.

- ❖ A detailed result reporting bring in transparency to testing which the customer would appreciate most. This could help the customer to look for alternate solutions sometimes.

- ❖ Reporting could include highlighting the **Strengths, Limitations and Recommendations**. This certainly would help the customer to take important decisions about the release of the product in question thus adding value to the customer.

- ❖ It definitely gives a boost to customer confidence both in terms of the product and the reliability on the test team.

3. Result Reporting

What is so important about the contents of the report?

- ❖ Any report should have enough information about the product so that anyone going through the report should be in a position to understand the product, its purpose and its current state.

- ❖ Report format should highlight the tested aspects both quantitatively and qualitatively. Though both are related, the effects are different depending on the audience.

- ❖ Required granularity should be maintained for the development lead/project manager to understand the efficiencies/deficiencies.

- ❖ Graphical representation using charts, tables and other mechanism would make the presentation better and easy to understand.

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[1] The term "Product" is a generalized reference which includes an application also apart from commercial software products.
[2] "Audience" can be the Customer, Senior Management, Project Manager, Project Lead, any reader of the report

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Why such format?

❖ The format should be in such a way that one should be able to get the high level picture of the product at a **glance**.

❖ It should also cater to different audience. For e.g.

   ➢ A project manager who is responsible for the release of the product would be more interested in knowing at a high level what would be the state of the product during delivery in terms of performance, compliance, strengths, limitations etc…

   ➢ A development lead, apart from knowing the state of the product would be more interested in looking at the type of defects reported and the corresponding numbers, based on which some analysis could be done for improvement during future developments.

The following sub sections briefs about some of the aspects that could be covered in a report. Please note that these aspects are not complete in all sense and they are provided here to give an idea about the effectiveness of such reporting.

3.1   Introduction

One could begin the report with an introductory note describing the product that was tested and the purpose of the report. It could also include highlights of some of the important functions and features that were tested.

❖ Importance – Gives the reader an idea about the product being tested.

3.2   Scope of testing

It is very important to communicate to the reader of the report the scope of testing. One could provide

❖ In scope of testing

❖ Out of scope of testing

❖ Any deviations from the planned scope

❖ Known issues related to software/hardware used.

A product could be tested for various aspects some of which are listed below. It makes a lot of difference to handle each of these aspects while reporting the results. Each of them has its own impact on the state of the application. Strengths and Limitations of a product could be better presented to the customer only if they are handled individually.

Sl. #	Type of Testing	Priority(High/Med/Low)
1.	Functionality	
2.	Regression	
3.	Security	
4.	Performance (Load, Volume, Response, Endurance etc…)	
5.	Scalability/reliability	
6.	Usability/ Graphical User Interface (GUI)	
7.	Conversion/Migration	
8.	Platform	
9.	System Interoperability	
10.	I18N/Localization	
11.	Certification/Compliance	
12.	Disaster Recovery	
13.	Installation/Upgrade	

3.3   Acceptance Criteria

Testing is never complete if acceptance criteria are not defined. This should be an integral part of any report.

❖ Importance – These are deciding factors for test completion and conclusions.

3.4 Test Strategy

It is essential to describe the strategy adopted for testing. This could also highlight the basis of testing. i.e. the input documents that the testing team received based on which the test plan preparation and the testing itself was conducted.

❖ Importance – Gives the reader an idea about the adopted strategy/methodology for testing. This could be used for verifying if the adopted strategy/methodology for its correctness and completeness.

3.5 Test Summary

Have a section to address at a high level the test details like the test start/end dates, the tool used for defect reporting, the number of builds released for testing, the number of bugs reported and importantly the **certification** part of the testing. This section could be used to present the conclusion about the readiness of the product.

❖ Importance – Gives the reader an idea at a very high level the efficiency of the development and also about the state of the product.

3.6 Qualitative grading

This section should follow immediately after the test summary as this again presents the reader at a high level a qualitative picture of various parameters. The table below could list all the parameters related to a software so that the reader is able to get at a glance an idea about those aspects which are working as expected and those which are have issues.

❖ Importance of presentation – Thousand words cannot beat a Pictures.

#	Attribute	Grade		Remarks
1.	Conformity			
	• To Standards		10	
	• To Requirements		10	

#	Attribute	Grade		Remarks
2.	Consistency		10	
3.	Supports Concurrency		10	
4.	Graphical User Interface		10	
5.	Usability			
	• Ease of use		10	
	• User Manual help	Not Applicable		
	• Ease of Learning		9	Requirements not documented well.
6.	Performance			
	• Query		7	Refer to ticket # 2673240
	• Data Capture		7	Refer to ticket # 2673241
7.	Security		7	Refer to ticket # 2673201
8.	Robustness		10	
9.	Error Handling		10	

3.6.1 Analysis

Provide at a high level, some analysis of the kind of defects found during testing. Describe the basis on which the conclusion of readiness/non readiness was arrived at.

❖ Importance – shows transparency in analysis and methodology followed for concluding the readiness.

3.6.2 Strengths, Limitations, Recommendations

Important aspects that any report should cover. As a testing team, one would get to know a great deal about the product being tested. It is the duty of the testing team to highlight the strengths and limitations that it has found during the course of testing. As part of testing team, one would have had exposure to various products and hence would be having a fair knowledge of various implementation

and their benefits and loopholes. This experience could be utilized to weigh the given product and recommend to the customer for alternate solutions and implementations.

❖ Importance –

➢ This would definitely be a value addition to the customer from the point of marketing the product. Depending on the criticality of the points, the customer could even decide to defer the release and work on the limitations and recommendations and release a better product.

➢ Unsaid benefits are, increased customer confidence in the testing team and hence increased business for the vendor.

3.7 Quantitative Analysis

In order to present the findings of the testing to the customer, the team has to anyway do a lot of analysis on the various data collected during the testing. So wouldn't it be better that they be presented in the report to

❖ Support conclusions

❖ Reduce rework effort on the same kind of analysis that the development team may end up doing

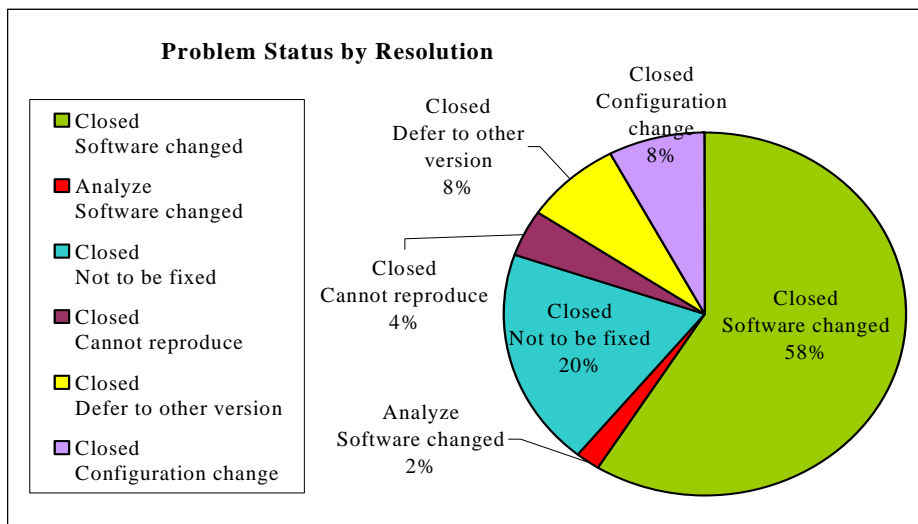❖ Implicitly suggest the areas/process that require improvement

Some of the aspects that could be reported under various types of testing are given below.

3.7.1 Defects related

1. Defect distribution by

   ❖ Status (Closed, Analyze, Build, etc…)

   ❖ Build

   ❖ Severity (Critical, Major, Minor, Cosmetic etc…)

   ❖ Resolution (Software changed, deferred to future version, Not to be fixed etc…)

2. Defect analysis based on stage injected (Requirements, HLD, DLD, Build etc…)

3. Defect analysis based on defect category (like functional, regression, performance, GUI etc…)

Sample:

Sl #	Closing Resolution	State	Count
1.	Software Changed	Analyze	1
2.	Software Changed	Closed	30
3.	Defer to next version	Closed	4
4.	Not to be Fixed	Closed	10
5.	Cannot reproduce	Closed	2
6.	Configuration change	Closed	4
Total			**51**

3.7.2 Performance related

1. Response time Vs Execution time

2. Response time Vs Load

3. Throughput Vs Execution time

4. Throughput Vs Load

5. Database transaction time Vs total response time

6. Load Vs Execution time

7. CPU utilization Vs Load

8. Memory utilization Vs Load

9. Comparison of actual response time with that of the target

Sample:

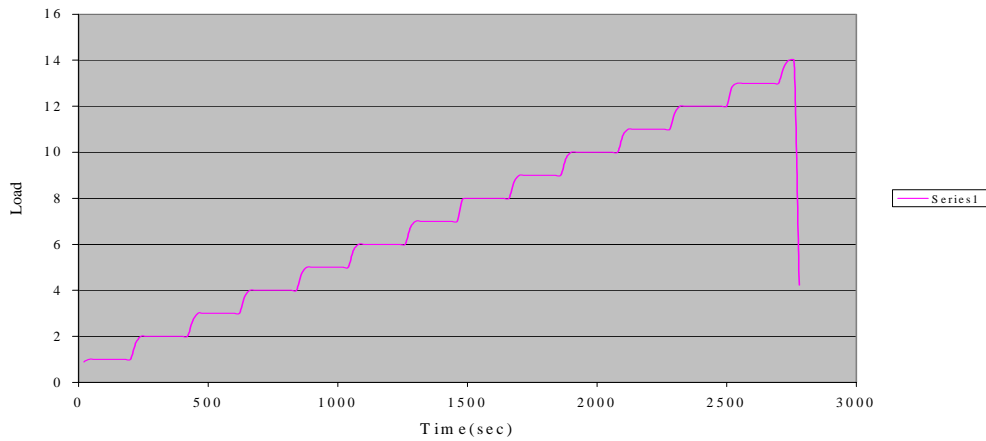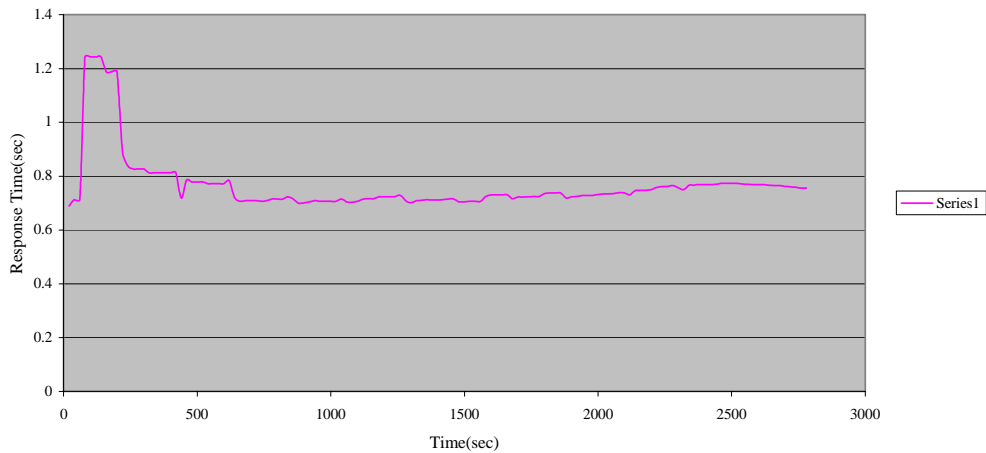| Case Ref	Load	Execution Time	Memory
Case 1	Concurrent user - Goal = 25, Achieved = 14 Response Avg. = 0.766 Secs	60 minutes	Instance = 90 MB RAM = 512MB

Chart 1 - Load Vs Execution Time

Chart 1 - Response Time Vs Execution Time

Server side details

Time (Min)	Load (# users)	% CPU utilization	% Mem Utilization	Virtual Mem free	Swap Mem free	Response time (secs)	Throughput Bytes
1	5	20	10	500 MB	64 KB	0.525	4786
2	10	25	12	480MB	64KB	0.648	4675

3.8 Test Bed Definition/Architecture

❖ Test architecture is something which is important in case of performance, scalability, disaster recovery testing etc… a key aspect in deciding production architecture.

❖ One of the key components of testing is the test environment itself. Configurations of the software(s) and hardware(s) are essential part of result reporting as they have a lot of bearing on the test results.

3.9 Other Aspects

Some of the other important aspects that could be handled as part of result reporting -

❖ Build - Provide the build release details for testing. Mention all the version release of the development software used for each build if there are any changes.

❖ Highlight the known differences between test and production environment.

❖ Assumptions - Assumptions play an important role in testing. Test results could vary with various assumptions as they influence the test strategy in various ways.

4. Conclusion

❖ There is no end to the value addition that one could provide with good result reporting.

❖ It helps development team achieve better quality in future releases.

❖ It could help customers with key decision making with respect to release of products.

❖ It could probably open up areas/aspects that the customer probably never thought about.