DESIGN OF A FRAMEWORK FOR TESTABILITY MEASURES DURING

THE MANUAL TESTING PROCESS OF A WEBSITE-CASE STUDY OF

SYCAMORE SOFTWARE SOLUTIONS PVT. LTD

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ABSTRACT

One of the challenges of testing web applications derives from their dynamic content and structure. As we test a website, we may discover more about its structure and behavior. This study consists of a framework for collection of testability measures during the manual testing process of a Website. The measures gathered in this way can take account of dynamic and content driven aspects of web applications, such as form structure, client-side scripting and server-side code. Their goal is to capture measurements related to on-going testing activity, indicating where additional testing can best lead to higher overall coverage. The current Web applications are in continuous evolution to provide new and more complex functionalities, which can improve the user experience by means of adapting and dynamic changes. Since testing is the most frequently used technique to evaluate the quality of software applications in industry, manual testing approaches will be necessary to evaluate the quality of future (and more complex) web applications.

KEYWORDS: Systematic Literature Review (SLR), Manual Testing, Systematic Mapping (SM)

INTRODUCTION

The quality assurance of any system depends on its test. To do manually testing is time consuming, expensive. In Web-site testing the site is completely tested before going production environment. This could help to address the issues in web Site before exposed to public like the Functional issues, web application security, web services issues, integrations issues, environment issues and its ability to handle traffic is checked. In this stage of Web site Testing making effort to find out the possible bugs in the system.

Manually a website can be tested using the steps as shown in the figure.

Figure 1: Manual Testing Lifecycle

NEED FOR THE STUDY

Complete testing of a web-based system before going live can help address issues before the system is revealed to the public. Issues such as the security of the web application, the basic functionality of the site, its accessibility to handicapped users and fully able users, its ability to adapt to the multitude of desktops, devices, and operating systems, as well as readiness for expected traffic and number of users and the ability to survive a massive spike in user traffic, both of which are related to load testing.

LITERATURE REVIEW

Manual Testing is a process carried out to find the defects. In this method the tester plays an important role as end user and verify all features of the application to ensure that the behavior of the application. The Manual Testing is very basic type of testing which helps to find the bugs in the application under test. The Test Plan is created & followed by the tester to ensure that the comprehensiveness of testing while executing the test cases manually. It is not necessary to have knowledge of any testing tool for manual software testing.

The main *Goal of Manual Testing* is to make sure that the application under test is defect free and software application is working as per the requirement specification document.

This type includes the testing of the Software manually i.e. without using any automated tool or any script. In this type, tester takes over the role of end user and test the Software to identify any un-expected behavior or bug. There are different stages for Manual Testing like Unit testing, Integration testing, System testing and User Acceptance testing.

A test plan document is created by test lead which describes the detailed and systematic approach to testing a software application. The test plan typically includes a complete understanding of what the ultimate workflow will be. To ensure the completeness of testing (100% test coverage) test cases or test scenarios are created.

DOĞAN, Serdar M.S., Department of Information Systems, The Web has had a significant impact on all aspects of our society. As our society relies more and more on the Web, the dependability of web applications has become increasingly important. To make these applications more dependable, for the past decade researchers have proposed various techniques for testing web based software applications.

As this research area matures and the number of related papers increases, it is important to systematically identify, analyze, and classify the v publications and provide an overview of the trends and empirical evidence in this specialized field. We systematically review the body of knowledge related to web application testing through a systematic literature review (SLR) study. This SLR is a follow-up and complimentary study to a recent systematic mapping (SM) study that has been conducted in this area. As part of this study, we pose three sets of research questions, define selection and exclusion criteria, and synthesize the empirical evidence in this area.

Benefits of Website Testing

Before launching a website, it is very important to test its usability. Usability testing involves evaluating the functionality and features of your site by trying it out with users.

The following are some of the benefits of website usability testing:

- Lower costs

- Enhanced retention rate

- Enhanced brand image

Your website is a very important element of your marketing strategy and overall brand image. If visitors have a pleasant user experience on your site, they will also have a favorable impression of your brand. Otherwise they will just click away to a competitor's site**.**

Site Phases

The project is assigned around 4-5 months before release. Then the site phases have individual release dates. Phases are listed as:

- Mini teaser site

- Teaser Site

- Main Site

- DVD Site

- DVD Updates

Each site phase diff ers other by the quantity of contents and functionality. Let's see how,

- **Mini teaser site: This** site is released to provide just an idea about upcoming movie by production house. This contains minimum content related to movie for highlight.

- **Teaser Site:** Next version to mini teaser is teaser site. This has some more information about movie. Some release dates and some more added features.

- **Main Site :** Next to teaser site, site becomes main site with lots of contents and activities on it. It adds lots of functionalities in backend too. This phase is generally 1 month before movie release date.

- **DVD Site:** This phase is quite late from the actual release date of the movie. This keeps the content of main site as is and adds some extra content. After main site let's have a look on other marketing sites related to production houses. World wise release needs a lot to market.

Applications

These are related or based on the famous character or famous activity in the movie. Technologies other than HTML are used to create those applications. They may be some trivia, photo applications, card creators, games or FB applications. They will need input from users.

- **Portals:** Portals are sites which give brief information about upcoming products, or upcoming movies or upcoming phases of movie websites of particular production house. These also have information about some old milestone movies by production houses.

- **Games:** These are small multimedia games based on famous character or activity in the movie.

These games are hosted on so many games sites also.

- **Banners:** These are little informer of the movie. They are multimedia advertisement created to host on other websites.

- **ITunes tie ups:** This is for the promotion of the trailers of the movie. Trailers are hosted on ITunes sites.

OBJECTIVES OF THE STUDY

- To understand manual testing in detail and Differentiating the Phase of the Site

- Logging the defect report by Manually Testing the Site

- Comparison of Manual Testing & Automation

- Design of a framework for collection of testability measures during the manual testing process

RESEARCH METHODOLOGY

Quantitative Research Methodology

The Testing of the Tumblr Site http://clients.homebrewagency.com/bvs-tumblr. The site is tested from the staging period to it being on Live. Various defects are logged by opting the Manual approach for Testing.

The rounds of QA done manually shows the efficiency of manually testing the Site.

Source and Methods of Data Collection

The source for the data collection is the defect Report where the defects are logged while testing the site manually. The defect report consists of the Bug reported in the Podio. The bugs have follow the lifecycle until they're closed.

Methods of Data Analysis and Statistical Techniques

After uncovering a defect (bug), testers generate a formal defect report. The purpose of a defect report is to state the problem as clearly as possible so that developers can replicate the defect easily and fix it. A defect reporting tool, Podio is used and the elements of a report are Bug ID, Title, Description, Steps to be reproduced, Status, Priority, Type, etc.

After logging the reports one can generate various graphs in order to track the efficiency of the work. The Description of the Bug is written in detail so the developer can understand and reproduce it in order to fix it.

Limitations of study

- Manual testing is a laborious activity that requires the tester to possess a certain set of qualities; To be patient, Observant,Speculative,Creative,Innovative,Open-minded,Resourceful,Un-opinionated,Skillful.

- GUI objects size difference and color combination etc is not easy to find out in manual testing.

- Load testing and performance testing is not possible in manual testing.

- Running test manually is very time consuming job.

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- Regression Test cases are time consuming if it is manual testing.

- Use of Automation tools increases the performance & the coverage of maximum test cases is possible in time critical projects

Data Analysis and Interpretation

- The following table gives the number of bugs found out by manually testing the tumblr Site.

- It also tracks the further development of the site and logging more 'New Bugs'.

- The number of Fixed Bugs are given in the last column.

- The tumblr Website is Manually tested throughout the entire phase giving the below defect report.

- Thus, the rounds of QA done can be more efficient if few things are automated.

- The below graph explains the Life cycle of the Manual Testing.

Table 1: Defect Report

Bugs Founded	New Bugs	Fixed Bugs
22	7	8
29	5	7
34	2	11
36	0	10
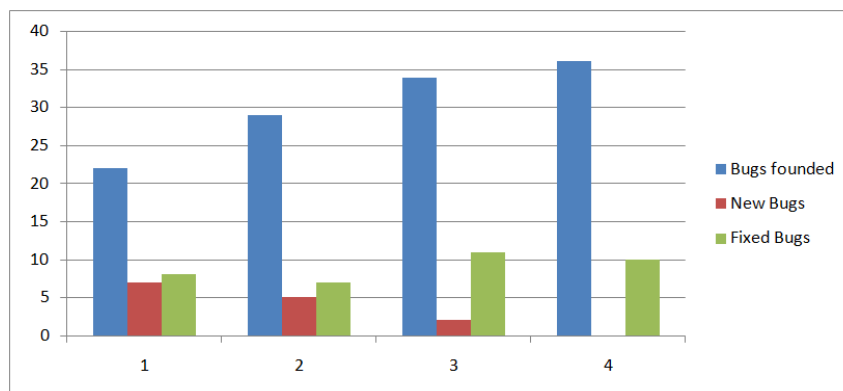
Figure 2: Graph of Defect Cycle

FINDINGS

- We are able to log in all 36 bugs in 3 rounds of Manual QA.

- The tumblr Site above is in the 'Main' site phase

- Various Bugs are found such as Functional, Usability, Social, Legal, SEO

- It is found that manually testing the Site is Time consuming & expensive.

- By automating few things the coverage of the Test cases can be covered early.

- The defect report gives some light on the Bug Life cycle as well.

- The Manual testing Lifecycle is repetitive.

DESIGN OF A FRAMEWORK FOR COLLECTION OF TESTABILITY MEASURES

Web Application Testing Checklist (Prepared based on actual Practice in Sycamore Software Solutions Pvt. Ltd

Let see what all testing is to be carried out on in *software web testing*. The testing is totally based on your web testing requirements but following is the standard checklist of web testing:

FUNCTIONALITY TESTING

In Functional testing we need check the each component is functioning as expected or not, so it is also called as "Component Testing". Functional testing is to testing the functionality of the software application under test. It is to check the basic functionality mentioned in the functional specification document. Also check whether software application is meeting the user expectations. We can also say that checking the behavior of the software application against test specification.

In this testing activities should include:

- **Link Testing:** Check for all broken links on your web pages & all links are working correctly. Along with you can check the different links on you web pages:

Internal links, Outgoing links, Mail to Links, Anchor Links,

- **Web Form testing:** In the web application testing the "Forms Testing" is the essential part of testing any web site. The main purpose of Form is to get the information from user & store into the database. And keep on interact with them. Below are the test cases which should be considered while doing form testing:

First thing to test in the form is the Validations on each form fields. Here two types of Validation need to be consider – "Client side" & "Server side" validations.

Check default values are being populated

Check for all Mandatory fields. Check if a user not entered a required field showing mandatory error message. Add information using form & update information using form. Tab orders. Check for the default values of fields. Forms are optimally formatted for better readability To optimize web site in the search engine then testing of HTML and CSS make important role. In this testing check that different search engines can crawl your site without any error. You should check for all Syntax Errors, Color Schemas in the readable, check for Standard Compliance and the standards are followed.

Usability Testing

Now a day's the Usability testing is playing an important role of any web application. This testing is to be carried out by testers to ensure that cover all possible test cases which targeted audience of the web application are doing regularly.This would include – Navigation testing of the web site:

All possible options like Menus, Links or buttons on web pages should be visible & accessible from all the web pages. Web pages navigation should be Easy to use Help instruction content should be clear & should satisfy the purpose. All options on header, footer & left/right navigation should be consistent throughout the pages.

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Content testing of the web site: No spelling or grammatical errors mistake in content throughout the page. Alt text should be present on Images No broken images. Your task is to validate all for UI testing

Follow some standard on content building on web page. All content should be legible & easy to understand. Dark color infuriates the users, so avoid using dark colors in the theme. Proper size images should be placed on web page All the anchor text links should be working properly.

Compatibility Testing

In software application testing the Compatibility testing is the non-functional part of testing. It is ensuring that how application's working in the supported environments. Customers are uses web application on different Operating systems, Browser compatibility, computing capacity of Hardware Platform, Databases and Bandwidth handling capacity of networking hardware. The Compatibility testing is to make sure that "Is web application show correctly across different devices?"

This would include-

- **Browser Compatibility Test:** Web applications are rendering differently on different browsers. The objective of browser compatibility testing is to ensure that no any errors on the different web browsers while rendering the sites. In Browser Compatibility Testing you need to ensure that your web application is being displayed properly on different browsers. Also check AJAX, JavaScript and authentication are functioning correctly.

- **OS Compatibility:** In new technology newer graphics designs are used & different APIs are used which may not work on different Operating systems. Also on rendering of different objects like text fields, buttons may display different on different Operating System. So testing of web application should be carried out on different OS like Windows, MAC, Solaris, Unix, Linux with different OS flavors.

- **Mobile Browsing:** In latest Mobile technology you test out Mobile Browser Compatibility too. It may be possible of Compatibility issues on Mobile browsers. So in the new Mobile technology age you testing of web pages on mobile browsers should be carried out.

Database Testing

Data reliability is key part in the Database testing. So for web application should be thoroughly tested. Testing activities would include-

Check if queries are executed without any errors. Creating, updating or deleting data in database should maintain the data integrity. More time should not take to execute the queries, if required tune the queries for better performance. Check load on database while executing heavier queries & check the result. Collect data from database & represent on the web pages correctly.

Crowd Testing

Crowd testing is when a large group of perfect strangers tries your product then gives you phenomenally helpful feedback on usability, bugs and features.

To test the software application Crowd testing can be used. It not limited to web applications, but for all kinds of applications including mobile application testing. Crowd testing is dependent on the quality of the crowd. Also it depends on a crowd that is composed out of a large group of diver's people. *It used do system tests for performance and usability testing. Simply this* is complementary to 'normal' testing. The mainly complicated job of crowd testing is determining a good enough crowd.

Interface Testing

In the Interface testing mainly three areas should be covered: Web Server, Application Server and Database Server. Ensure that all the communications between these all servers should be carried out correctly. Verify that if connection between any servers is reset or lost then what is happing. Check if any request interrupts in-between then how application is responding. On returns of any error from web server or database server to application server then error should be Errors are handled properly & display such errors to the user.

Web Server: Check if all web requests are accepting and not any requests are denied or leakages.

Application Server: Check if request is sending correctly to the any server & displayed correctly. Check if errors are catch properly & displayed to admin user. Database Server: Check if database server is returns correct result on query request. Check if all three servers are connected to each & test request is processing correctly. And any error in between then error should be displayed to user.

Performance Testing

Performance testing is to check the web application is working under the heavy load. Performance testing is categorized into two parts: Web Stress Testing, Web Load Testing

This would include-

Check if response times of Website application under different speeds of connections

Check if site handles many simultaneous user requests at same time.

Check if how your web application sustain under the peak loads

Check if large input data from users.

Check the behavior of web application if simultaneous connection to Database.

Check if how the web site pulls through if crash occurs due to peak load.

Check if optimization methods such as reduce load times by enabling cache on browser client and server side, gzip compression etc Check if any hardware memory leakage errors

Security Testing

The security testing is carried out to ensure that is any information leakage in terms of encrypting the data. In e-commerce website the Security testing is play an important role. In this testing check if secure information is to check

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whether how to store sensitive information such as credit cards etc. Testing Activities will include- Check if unauthorized access to secure pages, if user changes from "https" to "http" (secure to non-secure) in secure pages then proper message should be display and vice versa.

Check if accessing internal pages directly entering URLs in browser. If login is required then user should redirected to login page or appropriate message should be displayed. Most of the information related to transactions, error messages, login attempts should be logged in log file. Check if restricted files are able to access for download. Check if internal Web directories or files are not accessible unless & until not configured for download. Check if CAPTCHA is added & working properly for logins to prevents automates logins attempts. Check if try to access others information by changing parameter in query string. For example if you are editing the information & in URL you are seeing UserID = 123, try to change this parameter values & check if application is not providing the other users information. It should display Access denied for this user to view others users information.

Check if sessions are got expired after pre-defined amount of time if user not using session.

Check if user not able to pass login page for invalid username/password combination.

Check if user is navigated to encrypted SSL pages for secure website.

SUGGESTIONS

- Test automation may be able to reduce or eliminate the cost of actual testing.

- It is a onetime investment. Initial cost of automation testing is more than manual testing but always useful.

- For long term projects Automation Testing should be opted for instead of manual Testing.

- The automated tests run quickly & efficiently.

- Automation testing is very much helpful regressions in testing where code changes frequently.

- Automation testing can also be done on different machine with different OS platform combination, concurrently

- Automation runs test cases significantly faster than human resources.

CONCLUSIONS

As the focus on automation continues, manual testing will remain dominant for the next few years. As the urge to utilize automation grows the urge to uncover the complex paradigm shift necessary to increase automation and reduce manual testing still needs attention. It is clear that a careful and structured approach is necessary to increase the rate of automation. Since multiple variables affect automation, a strong foundation followed by a focus on excellence in execution is necessary for succeeding in automation. Very soon, the automation of test execution will become inevitable. An organization's preparedness will dictate its testing cost structure and future competitiveness.

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