Measurement of Web Usability: An Approach

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Abstract—This paper is about usability of technology available in our lives. How easy it is to use the instruments available to us, how easily are we able to do tasks by using the gadgets available to us. It discusses the benefits of usability and discusses how to improve usability. This paper also has comparisons of the websites of two technology giants, Apple and Samsung. It discusses about each and every aspect of their sites and provides reviews about the ease of usability and the user experience. This paper also discusses the ways to make web more usable and the tools to make it more user friendly and easy to use.

I. INTRODUCTION

The Usability is the process of matching the user’s needs and requirements in order to enable them to use the product or system effectively and efficiently. It happens to be most important in the development of interactive software applications. People involved in this define it as the demand and use of a system [1]. The key benefits of usability are [15]:
- Higher revenues through incremented sales
- Increased utilize efficiency and contentment
- Reduced development costs
- Reduced support costs

Usability impact us in various way in our daily life [7]. First and foremost we design a product and then we try to know and acquire information about the product as to if it’s usable or not! Each organization will describe usability differently according to their perspective, basically we look at the product inability of the user whether it is efficient, easy to use or not. The product should be usable for the intended task it has to perform. Usability applies to everything not just technical products; we encounter usability issues every day. For e.g. you have a dryer and it has too many buttons, one button performs two tasks, so the question is which button performs which task…this will frustrate the user using your product and would switch to other alternatives available in the market. We perform usability testing to avoid such issues. We try to know what is the problem which the user is facing, is it individual issues or are they problems which really need to be fixed?

Different tests are involved in usability testing, some of them are diagnostic testing in which we just see if the product is working or is it not working? Or verifying if the goal is achieved? Or by doing a comparative study and asking the user if they like A, B or C and asking them which one is most useful to them out of all three. Whenever we perform usability test we need to keep in mind that we are evaluating the product and user interface and not evaluating the user, so there is no bad user!! We don’t look at the user’s ability to use the product but our efficiency to design a product. There are 5 E’s of usability- [13, 17] viz.
- Efficiency
- Engaging
- Easy to use
- Effectiveness
- Error tolerant

II. PLANNING FOR USABILITY TESTING

Create a test plan- work with our management staff and determine the plan.

Determine test goals- what to get out of it and determine our goal, whether it is verification test, comparative test etc.

Recruit participants- it is significant step and requires lot of time…who will recruit the members, what kind of recruiting we will do! We recruit members with different characteristics, User type/job- students vs. public patron vs. librarian, Experience using system- novice vs. expert, Technical savvy, disabilities etc.

Incentives—depends from organization to organization…some don’t allow their participants to accept incentives (while working with government) or some may ask you to give donations on their organization’s name. Mostly used for people who are not ready to help you [8].

Session Logistics- it includes the following—
- session length (usually 60 min)
- session schedule (introduction and tasks performed)
- observers (product managers, engineers)
- testing room (usability lab)
- Equipment (computer, network connection, special software, recording their expression or time taken to respond etc.)
- incentives in hand to give it to participants
- drinks and snacks
- Create test scripts
- Background questions - user background and its role
- Tasks - task should match the scenario. There should be 4-8 tasks in 60 min session
- Conclusion - name 3 things u found easy and difficult to use
- Consent forms
- Analysis and final report

III. WEB USABILITY

Web usability is a set of parameter which lets a user understand, learn and use any website faster and efficiently without any hindrances right through the first encounter to the end of the process. It plays very important role in no. of hits and revenue generation for example:

Every £1 investment for improvement of the website's usability returns £10 to £100. Also it can 100% increase in sales/conversion of a web usability is being redesigned [2].

There are various requirements of good websites for better usability. These are as follows:

i. Website has to be easy to navigate [20]: Over the period of time user have developed a particular habit of searching content as per their memory or previous experience For e.g.- Looking at contact us for companies contact info Searching for home page to go back to main page Expecting Navigation present on top of each page Ignores anything which popup or flashes like an advertisement

ii. Pages must download fast: Research has proven that no user will wait for more than 8.6 seconds for a website to load; instead he would find another alternative website for the required purpose. To fasten the process of downloading your website we can use CSS to form the WebPages of our website or to enhance the look of the navigation bar.

iii. Information should be easy to find [3]: The representation of images and texts are different during the process of designing your website, we don’t read texts line by line. So certain things are highlighted when you look through the webpage which consists of the following-

- Headings
- Link text
- Bold text
- Bulleted lists

iv. No Restrictions for users: Restrictions in terms of navigation should not be there but restrictions in terms of reuse of data should be subjective and should depend on the nature and type of the website.

IV. EVALUATION OF WEB USABILITY

By only applying the principles of usability is not enough to ensure the usability of the final product, we need to evaluate the website in order to check if it meets to the users requirements or not. Hence, evaluation helps in verifying such issues. The ultimate goal of this evaluation is to assess the application functionality and also to verify the effects of the interface on the user. Evaluation also helps to identify any problems with respect to the application such as the aspects which are showing unexpected effects when used. Evaluating web applications deals with verifying if the application design has allowed the users to retrieve and browse the contents easily, and invokes available services and operations.[18] This implies that application is to be made easy to reach to the users through appropriate hypertexts along with having appropriate contents and services. Depending on phase, evaluation can be of 2 types-

- Formative Evaluation - takes place during design. Its tasks are performed by the design team to understand the requirement of the users and also it collects and refers to choices of test design informally [14].

- Summative Evaluation - This is done after the development of the product. It consists of tackling all the issues faced by the user and further helps in the enhancement of the product designed.

The following steps can be performed during the various stages in the development of the product -

i. User testing - This involves the study of actual users and their behaviors. The users are told to perform some tasks and their behavior is recorded as per their performance to the assigned task (includes the task time, errors encountered and the satisfaction gained). On this basis the usability is found out.

ii. Usability inspection - Performed by specialists.

iii. Web usage analysis - In this process user’s behavior is being tracked and analyzed for reorganization of user’s navigation based on web access.

V. PROBLEMS ASSOCIATED WITH WEB USABILITY

The problems are as follows-

i. It is necessary to have a name, description and severity rating of the problem. If not then it would lead to frustration and cause delay in problem solving process and would prevent task completion.

ii. If we face a problem during usability testing with a small sample size then that problem will affect many users and not necessarily a few.

iii. There are averages taken from a particular sample, so that plays a major role in determining the usability problem. You should cover all the possible options in the sample taken but it is impossible to do so. Hence, this creates a problem.

iv. We should conduct both heuristics as well as user testing because there might be problems for which you don’t
have to disturb the users and it would be obvious to be identified and then rectified without user interference.

v. We might face problems during the working of the software so we should ask the users to identify the usability problems as this is the cheapest and easiest way to know about the problems although they are not substitutes to professional usability evaluators.

vi. The sample you take will only identify the most common problems but not identify all problems; since some problems are unidentified this harms the efficient functioning of the software.

vii. Frequency of the problem and its Severity are independent. The difficult usability problems can only be found out by a number of tests until you get the desired result.

viii. Different usability evaluators will find different problems based on their understanding of usability, different methods, and different users etc.

ix. Many people will have similar problems but their outlook towards that problem will be different, it leads to disagreement [10].

VI. BENEFITS OF MEASURING WEB USABILITY

There are various benefits of measuring web usability, whenever we create a website it will be of any use as long as it caters to the needs of its users. It will be successful only if user satisfaction is ensured. The studies have proven that it results in the following [5, 8, 9, 11, 12, 19]-

i. With usability measurement you get various statistics and useful data regarding your users experience with the website, this data will help you to fill all the loop holes in your website and will provide you with ways to improve your user experience.

ii. It only measures the behaviour of the user and not their preference. As by monitoring their behaviour we can come to a conclusion on their requirements.

iii. If your website is not good enough or usable then it will negative impact on your brand image and will make the user disinterested and will no longer surf through the website which results in lack of information about product and negatively affecting the branding.

iv. It will draw the attention of the website developer towards the issues which are of utmost priority.

v. It focuses on data which have a major impact on your business.

vi. It lowers support costs.

vii. It provides you with an opportunity to redesign.

viii. It maximizes user experience.

VII. TOOLS FOR MEASURING WEB USABILITY

There are various tools to measure website usability. Some of them are listed as follows-

i. **Page Speed**- It refers to the time taken to load a webpage, research shows that if your site takes more than 3-4 seconds to load then the users do not continue browsing. 

   **Solution**- Use GTMetrix, Google’s page speed tools, Pingdom’s online URL

ii. **Design And Navigation**- There is no use of your outstandingly informative information until or unless it is easily reachable to the users. Hug emphasis should be paid on the design of the website, which is supposed to be user friendly.

   **Solution**- test navigation with card sorting apps which can be provided by UXPunk, use Spur.

iii. **User Interaction**-This helps you to know on what all areas of your website your user is interested in.

   **Solution**- Use crazy Egg, ClickHeat (for free trial), Clickdensity (for analyzing number of clicks)

iv. **Error Testing**- No user wants to visit site which has errors, hence it’s important to ensure that there are no errors in your website as it will negatively affect the number of visitors of your website.

   **Solution**- Use Phostir (provides you with a report to find the errors and how to correct them)

v. **Landing Page Testing**-You can check how your website works for your visitors.

   **Solution**- Use Google content Experiments or Optimize.

vi. **Surveying Users** - A survey should be done when the user is about to leave the website in order to know their experience and the errors they found out etc. 

   **Solution**- Try UserEcho, iPerceptions, IntuitionHQ.

vii. **Accessibility**- The site should be accessible,

   **Solution**- Use BrowserShots, W3C Markup Validation Service, check my colour

viii. **Multiple Tool Providers**- There are various tools which test various aspects of the user experience of a website. Some of them are Usability Hub, Zurb, and Optimal Workshop [16].

VIII. CASE STUDY

To measure the web usability, web sites of Samsung and Apple are considered as case study. The business of Samsung is highly diversified with various activities including construction, consumer electronics, financial services, ship building etc. Whereas Apple is mainly a consumer company and sells hardware, like iPod, Mac computers etc. Basically the target of its site is concerned with marketing, selling and providing support to its consumers. In case study, we have taken these two sites to compare both of them based on the various factors of web usability and determine which of the two is more usable? Various factors are analyzed and given the point of view of the user, manager and developer based on their experience of the website and described the outcome. These factors are presented in appendix as in the forms of Tables.
IX. CONCLUSION

After comparing the two websites on various usability metrics, various results and conclusions found. As far as Samsung’s site is concerned, they have a big splash screen taking up almost the entire screen showcasing their latest news and products. It’s extremely useful for keeping the users updated with what’s new in Samsung, but users might have to hunt around for the information that they need. The site is efficient in what it aims to achieve, by keeping all the bigger and latest information on the homepage, and having their social media links as well. The aesthetics might not be as appealing as Apple’s, but they get the job done. Samsung is little behind Samsung. Apple’s website keeps it quick and simple, providing a lot of pictorial aid to the user to keep all the products on one page. This allows for all the information to be accessed through a type of web portal instead of having brief information on each topic and making the homepage bigger. The better organization allows for greater efficiency as the user can go to the part of the website that he needs to use by simply using the main page. As far as the aesthetics are concerned, the site has a beautiful minimalistic look which keeps it simple and yet looks appealing to the eye. Thus, overall Apple is better than Samsung.

REFERENCES

APPENDIX:
Factors Used To Measure Web Usability

**TABLE I. HOME PAGE**

<table>
<thead>
<tr>
<th>Attributes</th>
<th>User's View</th>
<th>Developer's View</th>
<th>Manager’s View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Important</td>
<td>He will keep it in consideration.</td>
<td>Not so important.</td>
</tr>
<tr>
<td>Ease of Navigation</td>
<td>Important</td>
<td>Not so Important</td>
<td>Important</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>Important</td>
<td>Important as it works in enhancing it.</td>
<td>Not Important</td>
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</tbody>
</table>

**TABLE II. NAVIGATION**

<table>
<thead>
<tr>
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<th>User's View</th>
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</thead>
<tbody>
<tr>
<td>Hyperlink</td>
<td>Important</td>
<td>Important</td>
<td>Not so important.</td>
</tr>
<tr>
<td>Connected pages</td>
<td>Important</td>
<td>Not so Important</td>
<td>Important</td>
</tr>
<tr>
<td>Search options</td>
<td>Important for the easiness of the user.</td>
<td>Not Important</td>
<td>Not Important</td>
</tr>
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</table>

**TABLE III. READABILITY**

<table>
<thead>
<tr>
<th>Attributes</th>
<th>User’s View</th>
<th>Developer’s View</th>
<th>Manager’s View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Font</td>
<td>Important as it enhances readability</td>
<td>Not much of concern.</td>
<td>Important</td>
</tr>
<tr>
<td>Size</td>
<td>Important, size should be appropriate. Not too big or small.</td>
<td>Does not put lot of emphasis</td>
<td>Important for managing the website</td>
</tr>
<tr>
<td>Background of Text</td>
<td>Important as it facilitates the user.</td>
<td>Not Important</td>
<td>Important to make sure users are comfortable with it</td>
</tr>
</tbody>
</table>

**TABLE IV. CONSISTENCY**

<table>
<thead>
<tr>
<th>Attributes</th>
<th>User’s View</th>
<th>Developer’s View</th>
<th>Manager’s View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple User Interface</td>
<td>Important so that they can easily use it at one go</td>
<td>Important as he needs to ensure this aspect</td>
<td>Important</td>
</tr>
<tr>
<td>High Response Time</td>
<td>Important as the users request need to be met as soon as possible.</td>
<td>Not so important</td>
<td>Important for efficient managing</td>
</tr>
<tr>
<td>Aesthetics</td>
<td>Important as it needs to be appealing</td>
<td>Important while designing the website</td>
<td>Not important</td>
</tr>
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</table>


### TABLE V. CREDIBILITY

<table>
<thead>
<tr>
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<th>User's View</th>
<th>Developer's View</th>
<th>Manager's View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redirecting to trusted web pages</td>
<td>Important to ensure security</td>
<td>Not Important as it is not its area of work</td>
<td>Important</td>
</tr>
<tr>
<td>Personal Information visibility</td>
<td>Important to ensure their privacy</td>
<td>Not Important</td>
<td>Important to manage the privacy settings</td>
</tr>
<tr>
<td>Up to Date Software</td>
<td>Important to be up to dated</td>
<td>Not Important</td>
<td>Important</td>
</tr>
</tbody>
</table>

### TABLE VI. SECURITY

<table>
<thead>
<tr>
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<th>Developer's View</th>
<th>Manager's View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password encryption</td>
<td>Important for ensuring that there is no leakage of private data</td>
<td>Not so Important</td>
<td>Important</td>
</tr>
<tr>
<td>File Uploads</td>
<td>Important</td>
<td>Not Important</td>
<td>Important</td>
</tr>
<tr>
<td>Error Messages</td>
<td>Important to prompt the users about the error</td>
<td>Not much of concern</td>
<td>Important, as it ensures that error message is shown</td>
</tr>
<tr>
<td>Server Side Validation</td>
<td>Important</td>
<td>Important</td>
<td>Important</td>
</tr>
</tbody>
</table>

### TABLE VII. MEANINGFUL CONTENT

<table>
<thead>
<tr>
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<th>User's View</th>
<th>Developer's View</th>
<th>Manager's View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequenced Content</td>
<td>Important for users feasibility</td>
<td>Not so Important</td>
<td>Important for him</td>
</tr>
<tr>
<td>Proper Heading</td>
<td>Important for making it easier to scan pages</td>
<td>Not Important</td>
<td>Important</td>
</tr>
<tr>
<td>Concise Content</td>
<td>Important as no user wants to read a lot, he wants to quickly know about the information provided there. If it’s not in concise form he will ignore it.</td>
<td>Not much of his concern</td>
<td>Important as he needs to make sure users get what the want.</td>
</tr>
</tbody>
</table>
### TABLE VIII. CONTROLLABILITY

<table>
<thead>
<tr>
<th>Attributes</th>
<th>User’s View</th>
<th>Developer’s View</th>
<th>Manager’s View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Issues</td>
<td>Important as no user will want to give their details to a website which has security issues.</td>
<td>Important aspect for developer to keep in mind.</td>
<td>Important to build trust on your website</td>
</tr>
<tr>
<td>Availability</td>
<td>Important as all information should be available to the users at any point of time.</td>
<td>Not so Important</td>
<td>Important for him so as to cater to the needs of the user.</td>
</tr>
<tr>
<td>Integrity</td>
<td>Important</td>
<td>Not Important</td>
<td>Important</td>
</tr>
</tbody>
</table>

### TABLE IX. USER INTERFACE

<table>
<thead>
<tr>
<th>Attributes</th>
<th>User’s View</th>
<th>Developer’s View</th>
<th>Manager’s View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meaningful Graphics</td>
<td>Important as it stands out in text</td>
<td>Not Important</td>
<td>Important for developing interest in users to surf more</td>
</tr>
<tr>
<td>Quality of Interface</td>
<td>Important for easy navigation</td>
<td>Important while designing it</td>
<td>Important for manager as well</td>
</tr>
<tr>
<td>Screen Resolution</td>
<td>Important, it should be appropriate</td>
<td>Not Important</td>
<td>Important</td>
</tr>
</tbody>
</table>

### TABLE X. EFFICIENCY

<table>
<thead>
<tr>
<th>Attributes</th>
<th>User’s View</th>
<th>Developer’s View</th>
<th>Manager’s View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplicity</td>
<td>Important as the user doesn’t experience any trouble while surfing through the website.</td>
<td>Important as it should be easily learnable</td>
<td>Important as the user can easily find whatever he’s looking for</td>
</tr>
<tr>
<td>Filtered Search</td>
<td>Important for easily finding the information searched</td>
<td>Not Important</td>
<td>Important for helping the users</td>
</tr>
<tr>
<td>Click Count</td>
<td>Important aspect as there should be minimum number of clicks</td>
<td>Not Important</td>
<td>Important for managing such a page which requires least no of clicks.</td>
</tr>
<tr>
<td>Minimal Scroll</td>
<td>Important as the page should not be very big</td>
<td>Not so Important</td>
<td>Not Important</td>
</tr>
</tbody>
</table>