

# Web-usability Assessment Methodology

Kamruzzaman Md

**Abstract**— It has always been a challenging undertake to build a user friendly website and make it a useful resource for the audiences. User satisfaction is related to usability of a product. Here with this paper my effort is to develop a methodology in order to provide a recommendation and guidelines of whether a website meets usability requirement or not. The methodology aims towards an assessment of a website and prescribe a remedial to achieve more usability. I have developed a simple excel spreadsheet to demonstrate the methodology that I have developed. In order to prove the concept and the methodology, I have considered a website as a case. How to apply the methodology on the case website has been explained and the case website has been assessed applying the proposed methodology. In order to assess the website, at first stage, usability factors have been identified. The usability factors are the key components of the assessment process. During the assessment process, based on the websites usability quality and availability, every usability factor gets a weight. The total value (the sum) of all the weights is the usability value of the website. At the final stage of the assessment process the study shows total usability value of the case website. This paper will also explain and describe what usability means to the web users and why it is very essential to focus on usability perspective of a website. Comparison study between websites and remedial guidelines are not in the scope of this paper though the original research work includes both of these area based on the Assessment Methodology. This paper merely focusses to the fundamental research of developing a 'Assesment Methodology'.

**Index Terms**— Web-usability, Web-assessment, Web-Remedial, Web-assessment methodology, Usability metrics, Usability Problem, Usability factors s.

## 1 INTRODUCTION

WHAT we see in technology arena is a radical revolution of software technology and this technology has integrated in to internet world which we call together ICT (Information Communication Technology). After couple of years working with internet and being an IT graduate I started realizing that usability perspective of a website is being ignored. Enough attention is not being paid to make a website more usable. As far as my study shows there are only handful researches have been accomplished over usability of website though there are about 346,004,403 websites [13] are hosted on the internet and 2,095,006,005 users [13] have access to these websites. Looking at the number of websites and users it has become essence that we invest more effort on the usability factors which have direct benefit for target users.

We still need many research studies in this field to achieve a benchmark so that websites become more consistent in terms of usability. My initiative is to study web usability in order to assess and remedy a website. This paper will review to assess the usability status of a website meaning how usable a website from end user perspective and remedial to take corrective measures. Indirectly this study will also indicate the user friendliness of a website. There are many studies on product usability and some standard definition for usability: "Usability is the measure of the quality of a user's experience when interacting with a product or system — whether a Web site, a software application, mobile technology, or any user-operated device" — US department of health and human service. [1] Unfortunately, Web site design and development is often driven by technology or by organizational structure or business objectives, rather than by user needs. In recent years however, Web site owners and developers have gradually be-

gun to acknowledge and address the issue of usability. This study targets to the problems that the web site is both useful and usable for the intended audiences. There are few studies on this similar topic however my study is different in a sense that it focuses on assessment and remedial aspect of a website whereas others focus on only guidelines of user friendliness.

## 2 IMPORTANCY AND RESEARCH STRATEGY

### 2.1 Importancy

This study is important since you have a web site that is presenting your organization or yourself to the world that what you can offer. It has a direct target to promote your organization or selling your product or service for community. When you produce your product or service you always think about the usability to ensure that your customers or user will be happy in using your product or service. This way you always think about product usability. On the other hand we need to consider the media you are depending on has to be usable that is user friendly and productive. So usability of your product as well as your media has value to your business. This business value brings to society therefore it becomes a social value since your customers are directly involved to social activities. This way my thesis will bring you a value to your business as well as society if you can ensure that your business website has a good usability i.e. user friendliness.

### 2.2 Overview of the research strategy:

By working several years with internet technology, I have gained a good know-how of the technology. Thus I have pointed in this paper some of the practical problem which I have experienced for example finding out the usability factors as a primary stage of the study.

• Kamruzzaman Md is an IT graduate and currently working for a multinational company in Brussels, Belgium as an EDMS specialist.  
E-mail: zaman.be@gmail.com

I have also gone through different publication related to this idea for example user behavior characterizing, Human factors and web, website modeling, tracking website, back button behavior on web, site map usability test, quality metrics for web pages, Augmenting information seeking. These publications helped me to enhance my findings which I have articulated in this paper too.

There is also an important strategy I followed is categorizing users/ visitor and website, differentiate between users (target audiences and visitors). This way you can be specific about user needs to a specific website that is called user-centered website. I have also introduced a new term on this issue is "customized website" which is purpose built in for intended audiences.

### 2.3 Conclusion (problem domain)

Through this study and strategy I have discovered twelve (12) factors which will be used to assess the usability of a website. I have chosen a website ([www.humanfactor.com](http://www.humanfactor.com)) as a case to proof my concept depending on these 12 factors. I have put these twelve factors in an excel spreadsheet as a tool to calculate a usability weight. This way I have been able to measure a usable value for a particular website. The details on how to apply the methodology and assign a value to a particular factor refer to the section 6.1

## 3 DEFINITION OF WEB USABILITY:

Usability itself has been defined with some standard definition by many organizations. Very common definition contains effectiveness, ease of learning, efficiency and satisfaction in using of a product. ISO has defined with Usability - ISO 9241: "The effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments. [2] Where effectiveness is the accuracy and completeness with which specified users can achieve specified goals in particular environments" Efficiency is the resources expended in relation to the accuracy and completeness of goals achieved Satisfaction: the comfort and acceptability of the work system to its users and other people affected by its use" Whereas web usability focuses on accessible, easy navigation, simple, easy to find expected information, accessible speed issues on the other hand software usability more concern about user interface, robustness and bug free and a general term user friendly. To put it simply, it is a measure of the effectiveness of your web site [3] Usability engineering for the Web grew out of the software development discipline of Human Computer Interaction (HCI). However, the Web is different from software, and the nature of the Web poses new challenges to designers and developers who are trying to incorporate usability into their sites. [3]

- Due to the global nature of the Web and the wide-ranging demographics of people accessing the Internet, a target audience can be difficult to define.
- Diversity in end user configurations (hardware, software, browsers, connectivity and bandwidth) means that users may have wildly different experiences of the same site.

- Inflated user expectations of Internet technology can be difficult to satisfy.
- The rapidly changing nature of the Web results in short development schedules, making it difficult to incorporate user-centered design techniques.
- Unlike a software package, the user has not made an investment in a particular site, and other options are easily available and accessible.

However, there is general agreement that a usable Web interface is one that is accessible, appealing, consistent, clear, simple, navigable and forgiving of user mistakes.

### 3.1 Common usability Problems:

Some very basic common problem of web pages that occurs and user/ visitors suffer from these problems. It is good to say usability doesn't only depends on these problem meaning it does not necessarily mean that by fixing those problem your website will have a perfect usability. Rather usability depends on your user satisfaction, experience and ergonomics issue. By this paper I try to find some standard factors that does really matter to have a user satisfaction that is usability for website in general. Problem also can have different behavior regarding the website type for example E-commerce, search engine problems might be not the same like general website. However it is related to discuss about the problems users commonly experience. [4]

#### Downright errors:

- Broken links or missing images.
- Firewall errors, server cannot be contacted, directory browsing not allowed (or even worse, allowed?).
- Scripting errors that pop up an error message, make the page unusable, or write strings of gibberish amongst the text.
- HTML/ XML coding errors that mean the page doesn't display properly, or at all.

#### Annoying or inaccessible page design:

- An "entrance tunnel" or splash screen - lots of flashy imagery but no real content that requires a click to get to the real home page.
- A home page that is entirely graphical and has no way for users of non-graphical browsers to get anywhere.
- A home page using frames with no way for users of certain older and specialized browsers to get anywhere.
- Pages with such poor contrast between background and text they are hard to read.
- Text in tiny or illegible fonts.
- Pages that take minutes to download (even worse if when they have finished, you weren't interested in the content anyway).
- Content that requires a specialized plug-in to read it.
- Pages that require a specific browser to display nicely.
- Links that lead to "under construction" pages.
- Links that don't look like links so you have to scan every line of text to find them.
- Link color schemes where you can't tell which ones you have already visited.

- Links with badly chosen targets that display numerous hidden windows on the desktop, break the Back button, or display pages without the necessary menus to use them properly.
- Forms where you don't know what the site owners want to do with the information you are asked to supply.
- Forms that don't explain properly what you need to enter, or don't let you go back and amend any errors.
- Pages with typographical or grammatical errors, confusing and poorly written text, or inconsistent terminology.

The list above touches on things that most surfers will recognize from time to time. It doesn't include the more subjective issues of appropriate and up-to-date design, using the right tone for the intended audience and so on, as these are so individual to a given site. Nor does it mention sites that install, without warning you, small programs that lurk in the system tray (download assistants, update assistants, and other pesky little things). This might not decrease the site usability by itself, but it certainly makes sure that we won't visit again.

#### 4 EXISTING STUDY OVER WEB USABILITY AND ANALYSIS:

There are few studies have been conducted by some organization and individuals as well. One study from "Human Factors International" [5] points out some new methodology to show how usability can be archived in design phase of a website. It focuses more on corporate background and human factors in order to accomplish a precautions measure of usability. There I found an interesting example, which can give you an idea of making web navigation acceptable easily to everyone even to disable people.

It is about making a door handle. "Affordance is the match between the appearance and the behavior of things on Web pages, or more broadly, in engineering artifacts in the World. We all base our expectations of how something will work on our experience with similar-looking things. For example, consider the door handle below. You may never have seen a door handle quite like this one before, but based on your experience with the world, you can predict how to use it!"

Because it's attached to a door, you know it's probably lets you open the door. Its lever shape suggests pressing up or down on the thin section. The round area suggests an axis of rotation. Or, you can grab the thin section and pull. Thus, this structure affords turning, pulling, and other actions. One study over usability and web has described some useful points about target audiences. This research specifies some method on how to define target audience. In my opinion it is really important to define your target audience as it guides you towards user-centered website. It is because you will have an idea about your user character, experience, needs and may be their background.

Regarding this study here are some methodologies are suggested to define audiences:[6] "One of the most common ways

used to collect information for Web site audience definition is a user survey. On-line surveys can be posted on a pre-existing site, e-mailed directly to known users, or posted to news-groups and mailing lists. An audience definition survey may collect any or all of the following information:

user profile (demographic information, job or recreational preferences), surfing profile (how do they use the Web), site usage (likes, dislikes, task requirements), and level of technology (hardware, browser type, connection speed).

The survey method is relatively quick and inexpensive but the drawback to this method is that it may not result in a representative sample. For example, the respondents' may only be those dissatisfied with a current site or sophisticated enough to use an on-line form. For this reason, information gathered in an audience definition survey should ideally be supplemented by other sources"

One real life implementation of online technical support is at my work place. We have a web database where we receive customer's reported problem email and reply to customer back, put comments, attach file, incident search and assign incidents to support people and some more activities. Technical support people are users of this system. I am one of the users among them, for me it took more than one month to know and navigate all the option I need to work on (with the earlier version). I must not say it is a complicated systems rather I would say it had less usability value. Firstly, the mailbox outlook was not big enough to find the subject of the emails. You have to scroll to go to the subject for every email. You can imagine if you are on email duty meaning you have to log all emails into the database that you receive all day long and you have to scroll the every email for the subject heading. This means you loose approximately more than 1 hour every day just to see the email title. This means it gives you less production than expected. Now this online support tools has changed the screen style and where you do not have to scroll to see the subject rather you have a button called extended view. By this button you can have a bigger view of the total mailbox, which much easier to access the mailbox and all are easy to find. Thus this tool gets more usable to users. This proves usability can save your time; give you higher productivity and satisfaction in working environment.

"Another study which shows mostly user behavior in searching information through web. This study investigates what types of knowledge are relevant for Web-based information seeking, and which knowledge structures and strategies are involved. Two investigational studies are presented. First one is twelve internet expert interviewed about search strategy and perform a realistic series of search. From this study a model of information seeking on WWW is derived and then tested in a second study. In the second experiment effects of Web experience and domain-specific background knowledge are investigated with a series of search tasks in an economic related domain. This study concludes with a result that you need two combinations of knowledge- Domain expert and Internet experience for meaning information searching on the

web. In my opinion this result might not carry always the same consistent since more people becoming a good Internet users and while we are advancing towards knowledgebase Internet thus domain expert may not be an essential skill to find meaningful information on the web. Instead we would require internet experienced users”.

## **5 IDENTIFIABLE USABILITY FACTORS:**

The factors that are mentioned in this paper are found from different similar research which I have studied extensively in order to find out important factors for my methodology. The factors that I have identified are more related to user usability aspects which concerns target audiences. The below identified factors have been categorized in to higher level and lower level factors. Thus I have grouped lower level factors (sub-factors) into higher-level factors. Identifying sub-factors have direct relation to Remedial process which has been discussed more in the Methodology section of the paper.

### **5.1 List of the identified Factors and Sub-factors**

#### **1.0. Consistency of presentation and controls:**

1.1 Underline: avoid mixing underlined text with underlined links

1.2 Link label: different links pointing to the same resource should have the same label

1.3 Email label: labels associated to a given email address should be consistent color 1.4 Color consistency: colors used for background/ foreground/ links should be consistent among pages

1.5 Background consistency: background images should be consistently used nav-bar consistency: links included in navigation bars should be consistent among pages

#### **2.0 Adequate feedback:**

2.1 Freshness: pages should be time- and author- stamped

#### **3.0. Natural organization of the information**

**4.0 Contextual navigation: In each state the required navigation options are available**

4.1 NOFRAMES validity: NOFRAMES should be present and it should contain equivalent navigation options

4.2 Link to home: each page should contain a link to the home page

4.3 Logical path: each page should contain links to each intermediate page in the path connecting the page to the home

4.4 Self-referential pages: pages should not contain links to themselves

4.5 Frame titles: frames should set the “title” attribute

4.6 Local links validity: links that are local to the website should point to existing resources

4.7 External links validity: links to external resources should be periodically checked

### **5.0 Efficient navigation:**

5.1 Site depth: the number of links that need to be followed from home page to other pages should not exceed a threshold

5.2 Table coding: table components should have explicit width and height

5.3 Image coding: images should also have explicit width and height

5.4 Download time: pages should download within given time threshold

5.6 Recycled graphics: images used in the website should be shared (so that browsers can cache them)

5.7 Hidden elements: pages should not contain elements that cannot be shown (like maps not associated to any image)

### **6.0 Clear and meaningful labels:**

6.1 Informative link labels: links pointing to heavy/ plug-in dependent resources should specify that in the label

6.2 Explicit mailto addresses: labels of “mailto:” links should contain the actual email address

6.3 Missing page title: pages should have a title

6.4 Table headers: tables should have headers and summaries

6.5 Form prompts: within forms, text input fields should have a label

**7.0 Robustness: Robustness of the site with respect to the technology used by users**

7.1 Browser compatibility: HTML code should not use proprietary structures

7.2 Safe colors: page elements should use web-safe colors

7.3 Link targets: avoid “\_blank” target in frames; use correct targets for links leaving the frames

7.4 HTML validity: only standard HTML code should be used

7.5 Portable font-faces: standard font faces should be used in addition to desired ones

7.6 Color contrast: background and foreground colors combinations should provide sufficient contrast

### **8.0 Flexibility:**

8.1 Image ALT: images should have alternative textual descriptions

8.2 Other media ALT: videos, audios, applets and other objects should have alternative textual descriptions

8.3 Imagemap links: links embedded in images should be available also in textual format

8.4 Auto-refresh: duplicate auto-refresh links in the page body (both forward and backward ones)

8.5 Forced downloading: links embedding an image in their label cannot be followed without downloading the image

8.6 Tables/ frames/ font resizing: relative sizes should be used

### **9.0 Support of users' goals**

9.1 Form coding: forms should have "submit", "reset" buttons

### **10.0 Support of User profile**

10.1 User profile: Supporting user profile would be an important factor if a website has certain target users. Users can save their profile with their required settings so every time they work with the website, do not have to move their eyes over whole page.

### **11.0 Maintainability**

11.1 Relative links: URLs that are local to the website should be relative

## **6 PROPOSED METHODOLOGY:**

Usability factors that have been identified as mentioned in the section 6.0 are the main elements to develop the assessment methodology.

In order to demonstrate the methodology I have developed a simple demo tool using excel spreadsheet which is shown below in section 6.2. There are twelve main factors have been identified to assess the case website. Every major factors have their sub-factors. Thus the sub-factors have been grouped into a major factor. The weight of usability values is distributed to the sub-factors. The sum of the sub-factor weight is the total weight for a particular factor. I suppose every sub-factor here

has a maximum weight of '4' and minimum weight of '0'. By giving a weight to a factor against the websites usability quality and availability, it is easily recognizable which factors is more or less sufferer in terms of usability. Once we have the weight on each sub-factor the remedial steps can be taken to cure the particular issue that is found in a sub-factor with low weight. Thus it may not have to redesign or recoding the whole website rather than a module corresponding the sub-factor which gets low weight. This is a good reason to identify the sub-factors and distribute the weights among the sub-factors. In terms of weight calculating there are two categories of sub-factors identifiable- Positive and Negative. The Negative sub-factors (in red color) has negative value and positive sub-factors (in black color) have positive value. For example under major factor "Maintainability" the sub-factor 'Data Structure Complexity' has negative value. If the 'Data Structure Complexity' is high for this sub-factor, it gets higher negative weight. This means the major factor "Maintainability" will receive less positive weight when the sub-factors are summed. Depending on the nature of a website new factors can be added or existing factors can be modified. Application of the methodology has been explained in further extend in the next section.

A web based tool can be developed to weigh the usable factors in more convenient way. As my targets is not to develop a tool but assessing a website I have used here an excel spreadsheet to present my methodology with a demo assessment.

### **6.1 How to apply the proposed methodology:**

It is necessary to mention that this methodology would not be a suitable approach for ordinary users or internet visitors. Rather internet experts or highly experienced users would be suitable person to apply this methodology. It is because there are some technological term that need to be understood very well before applying the methodology for assessing a website.

In real life application it is recommended to develop an automated tool in order to implement the methodology. It will be very convenient to use an automated tool while applying the methodology. It would not be very difficult to develop a tool as I have demonstrated the required functionality and mathematical calculation in a spreadsheet that is shown in section 6.2. When applying this methodology it would be suggested to involve more than a single person in order to achieve a more appropriate outcome. This is because the sub-factor weight given by somebody may vary from somebody else depending on somebody's knowledge in the domain of the sub-factors. Therefore I would suggest at least ten persons input into the tool when assessing a website against the factors. Once all input from different expert is found the result can be averaged to obtain a consistent usability value for a website. The automated tool which takes the input according to the sub-factor should be capable of producing different kind of statics concerning the methodology. For example the tool should be able to produce the average value of the 'navigational' usability which has been given by the all participants who have as-

essed the website. Thus the assessment can be granulized as per sub-factors and the major-factors. This way the proposed methodology can be implemented to perform a real life web assessment.

## 6.2 Factor matrix (an example):

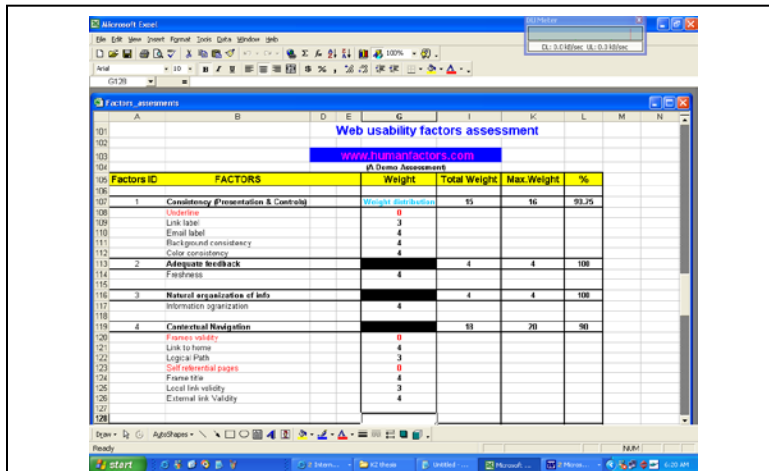


Fig. 1. The figure illustrate the values in factor-wise. The illustrated 12 factors are categorised as main and subfactors. The value (%) of the factors are determined by applying the methodology on the Human Factors International website.

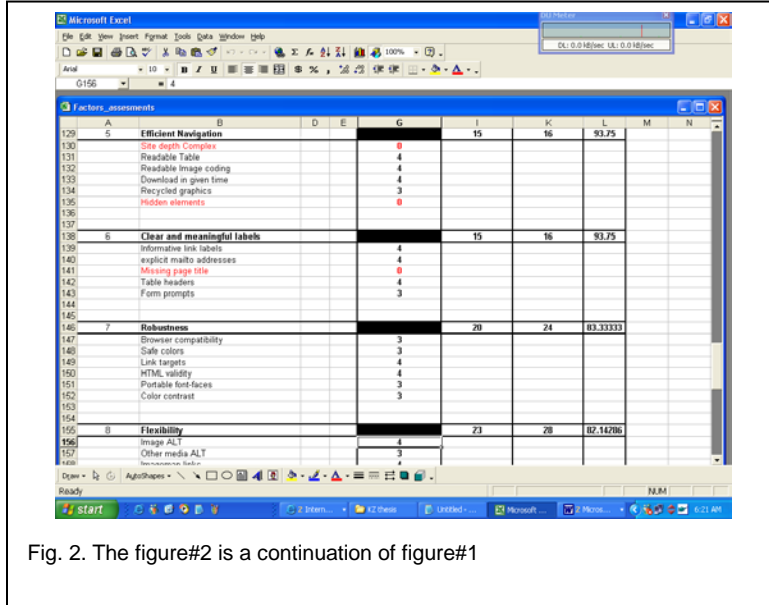


Fig. 2. The figure#2 is a continuation of figure#1

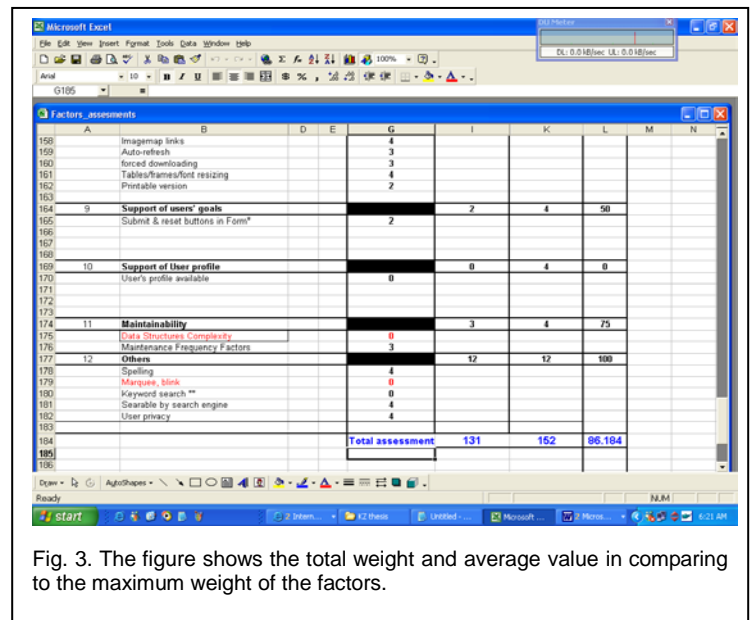


Fig. 3. The figure shows the total weight and average value in comparing to the maximum weight of the factors.

## 7 LIMITATIONS OF THE RESEARCH:

This thesis work is an individual effort and it is not sufficient to establish a benchmark in terms of web-usability. We need a collective effort to achieve a matured shape of the web usability areas. Since this is a new growing field, there are not much available resources, documentation and white papers yet to study in depth of this issue. So far, I found only one publication, which is directly related to the web-usability domain. In most cases publication about usability focus on usability of mechanical engineering (machineries) and product usability and in combination of human factors in philosophical aspects. But there are only a few number of organization and individuals who are working over web-usability. Therefore in most cases, I had to rely on the Internet resources to investigate any issue like user behavior, human factors of web, general usability and usability factors. This is one of the reasons you might find many references mentioned in this paper are Internet based resource. If I could have more resources and enough time to study in depth I would be able to offer a better methodology and guidelines in web-usability domain in general.

## 8 CONCLUSION AND FUTURE WORK:

With this research work, I have developed a method of assessing web usability factors as well as to provide a prescription in order to increase the usability that I found through my assessment methodology. To provide a remedial prescription I did a comparison study between two websites though I have not included the comparison analysis in this paper. This way it was possible to point the usability lacks and to be more pragmatic in referring the assessment methodology as well as remedial standpoint. In terms of different websites and its different purposes, it is not always apparent to follow the usability factor I found in my methodology. The usability factors may vary from website to website. This means assessment factors or sub-factors depend on the nature of the website and target or current audiences of the business. In case you would like to follow my methodology (assessing) and remedial for a particular website, you would need to define the website in terms of its purpose and define the target audiences. Assessment of Human Factors International website in this paper is a demo implementation of my ideas through the proposed methodology and it is an effort to give a mathematical value of web usability for a website.

I hope to work further in the similar research field while this paper would be a baseline to move forward. This research is a partial accomplishment of my ideas and thought regarding web-usability. Next step would be to develop a hybrid tool for assessing web quality and usability. To develop such hybrid tool it would require a lot of effort in defining website nature as well as requirements of target users. I would emphasize again that we need a collective effort to build any standard approach or methodology in this field. Nielsen Norman Group (NN group) is the pioneer organization that has already approached towards a success achievement in the same field [12]. We need more initiatives on this area and more research organization to conduct the research and develop a world of users.

## REFERENCES

- [1] U.S department of health and human services- Usability, <http://usability.gov/basics/index.html>
- [2] The World Wide Web Consortium (W3C) [www.w3.org/2002/Talks/0104-usabilityprocess/slide3-0.html](http://www.w3.org/2002/Talks/0104-usabilityprocess/slide3-0.html)
- [3] Murray, George and Costanzo, Tania (1999), ISSN 1201-4338, Information Technology Service, Library and Archives service, Canada [www.collectionscanada.ca/9/1/p1-260-e.html](http://www.collectionscanada.ca/9/1/p1-260-e.html)
- [4] Siteusability.com, A online company <http://siteusability.com/mistakes.html>
- [5] Dick, Rubinstein, Ph.D. CUA, (2003A) Successful Approach to Implementing a Corporate Web Design Standard.[5] Rubinstein, Dick Ph.D., CUA, May 22, 2003
- [6] Library and Archives service, Canada [www.collectionscanada.ca/9/1/p1-260-e.html](http://www.collectionscanada.ca/9/1/p1-260-e.html)
- [7] Hölscher, Christoph & Strube, Gerhard (2000) Web Search Behavior of Internet Experts and Newbies, [www.w9cdrom.com/81/81.html](http://www.w9cdrom.com/81/81.html)

- [8] Chinarel.com, Online Reliability Resources and Services [www.chinarel.com/knowledge/rel\\_glossary.htm](http://www.chinarel.com/knowledge/rel_glossary.htm)
- [9] M4C- A strategic marketing consulting company [www.meta4creations.com/smallbiz/2website-types.htm](http://www.meta4creations.com/smallbiz/2website-types.htm)
- [10] W3C- Web accessibility initiative, [www.w3.org/WAI/Resources](http://www.w3.org/WAI/Resources)
- [11] Cabinet office, UK, [www.cabinetoffice.gov.uk](http://www.cabinetoffice.gov.uk)
- [12] NN/ G Nielsen Norman Group, A usability pioneer company [www.nngroup.com](http://www.nngroup.com)
- [13] Internet World Stats <http://www.internetworldstats.com/stats.htm>