Usability Evaluation on Websites

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Abstract

As the development of information society, the use of the Internet and other forms of information and communications technology becomes increasingly popular. Nowadays, millions of websites have been built and placed into service. More and more designers have begun to focus their attention on whether these websites can be used easily. Therefore, how to measure the usability is an important question in website design. With the help of evaluating methods, designers can understand their users better, and make their works meet their users' needs. The quality of the usability evaluation lies on evaluating techniques. This paper describes how to use these methods to evaluate a website. First, the common evaluating procedure is introduced in this paper. Secondly some usability evaluation techniques are introduced, which are usability testing, heuristic evaluation, cognitive walkthrough, focus group, thinking aloud and questionnaires. In the end, how to use these methods will be discussed.

Keywords: Usability, Usability Evaluation, Website Design.

1. Introduction

Usability is defined as the extent to which the product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (ISO) and it is an important factor in human-computer interaction. As the development of information and knowledge-oriented society, more and more websites have been created and used. Surfing online is a kind of interactional behavior, so usability can be seemed as an important factor in the use of websites too. Users' tasks should be supported efficiently on a usable website. How to judge whether a website is usable or not? The answer is applying usability evaluation methods. Usability evaluation is defined as "systematical process of collecting data, in order to have a better understanding of users and how user groups use the product to perform a specific task under specified conditions"[1]. Much useful information can be gained through usability evaluation, this information can help us to improve our websites on the basis of users' demand instead of our conjecture, only in this way, our websites can meet the need of users.

2. Evaluating procedure

Generally speaking, there are 5 steps of evaluating a websites, they are:

2.1. Decide when we should evaluate our websites.

Generally speaking, the process of website designing can be divided into 5 stages: to understand users' requirements (requirements), to complete the framework of the site (design), to construct the website (construction), to test the usability of the site (testing) and to put the site out (production). In the past, usability evaluation was usually applied in the later stages, such as testing and production stage. In fact, it can be used in every stage in designing. In the later stages, less improvement can be made and the cost to implement changes will climb up, as figure 1 shows:
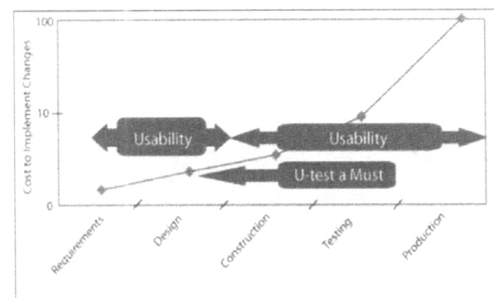

Figure 1. Cost to implement changes [2]

In order to save money, usability evaluation should be applied in earlier stages.

2.2. Gather information

Gathering information is an essential stage in the evaluation, these can be followed when we gather information:

2.2.1 Observe users in their natural environments.

In the nature environments, users will behave without any affectation and designers can learn users' demands easily. In the use of this technique, be sure to avoiding observer's infection, in another word; don't try to affect users' behavior.

2.2.2 Learn from existing sites.

We can evaluate the usability of existing sites and figure out advantages and disadvantages of these sites. This information is very useful, it provide us reference.

2.2.3 Use Usage logs.

Usage loges will help us a lot if we are going to do some follow-up user research or review our design. The advantage of usage loges is that they provide amount of information for us and reveal some questions. However, some important information cannot be reflected from usage logs.

In addition to what I have mentioned, many other techniques can be used to gather information, such as questionnaires, interview and brainstorm. We should gather information as much as possible, only in this way; we can clear our goals of evaluation, and get better evaluation results.

2.3. Choose the right technique.

There are many techniques that we can choose. Some frequent ones will be introduced in the following text.

2.3.1. Usability testing.

Usability testing which is defined as "observes real target users performing real tasks with the interface in a controlled setting" [3] is one of the most common techniques in evaluating the usability of a website. Some argued that it only can be done in the testing stage when the website has been already constructed. In fact, it can be done on paper prototypes when the website is still in the mind of designers. Specialists hold different opinions on how many testees should be involved. Generally speaking, the representation of samples depends on the amount of testees, the more testees we have, the higher the representation will be. However, it is almost impossible to invite a large number of testees in the actual design process. Nielsen and Landauer (1993) claim that "5 users are enough to catch 85% of the problems on practically all websites" [4]. Domas and Redish argued that 5 to 12 testees are enough in a test (Dumas & Redish, 1999). Because tests should be done in a controlled setting, many unassociated variable should be controlled, and the test should be meticulous in design and construction.

The strong point of usability testing is that the relationship between the dependent variable and the variables can be better understood. The shortcoming is that it cost a lot of time and money.

2.3.2. Heuristic evaluation.

In heuristic evaluation, evaluators assess whether a website complies with recognized usability principles or heuristics. Jakob Nielsen has identified 10 recommended heuristic principles from 249 usability questions, they are [5]

- visibility of system status
- match between system and the real world
- user control and standards
- consistency and standards
- error prevention
- recognition rather than recall
- flexibility and efficiency of use
- aesthetic and minimalist design
- error recovery
- help and documentation

Since the heuristic evaluation is based on the assessment of experts, the experts should be selected carefully. Some research shows that the background of experts directly affects the number of evaluators*. Heuristic evaluation is easy to apply, besides, usability problems can be identified quickly and efficiently in Heuristic evaluation. However, many of these problems may be of secondary importance.

2.3.3. Cognitive walkthroughs.

This technique gathers a team of people to step through the defined tasks with the websites to uncover process and workflow flaws and inconsistencies. People from different background is involved in the team, they are designers, programmers, managers and users. Cognitive walkthrough focuses on how easy the website is to be learned. It generally applies to the initial stage of designing. The main course of cognitive walkthrough is: identify typical users, find walkthrough tasks, break those tasks down into a series of steps, inspect each task step by step and record.

One of advantages of cognitive walkthroughs is that problems, especially some specific problems, can be identified in the early stage of design. Besides, this method can be learned easily. However, the amount of problems that cognitive walkthroughs method can identify is limited, and the process of walkthrough can be time consuming, compare to usability testing; only about 40% problems which usability testing find can be revealed by cognitive walkthrough [6].

2.3.4 Focus groups.

When using this technique, experts chat with a group of target users. The degree of satisfaction and some existing problems of the site can

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* "For heuristic analysis, Nielsen and Mack (1994) recommends using 3–5 evaluators if 'single expert' usability specialists were utilized. They recommend using 2–3 evaluators if 'double expert' usability specialists were used. Double experts found 60% of the usability problems, making them 2.7 times as good as novices and 1.5 times as good as single experts. A 'double expert' evaluator is defined as a person with a usability background and a specific application area. A 'single expert' evaluator is defined as a person with general usability experiences. The level of expertise of the evaluators is a very important factor, as there is a systematic group difference in evaluator performance in addition to individual performance", Tan, Wei-siong, et al., Web evaluation: Heuristic evaluation vs. user testing. International Journal of Industrial Ergonomics (2008)

be learned in Focus groups. The host of the interview should be very professional. First of all the host must be good at communicating with others so that they can get users' trust quickly. Secondly, they should ensure that their discussion focus on the design of the site. Finally, before the interview, the host must ensure that the topic is organized properly. In an interview, more than 6 users are required, it is better to have numerous interviews with several groups of users, for the result will be more representative.

One of advantages of focus groups is that much information can be learned, including those which are vulnerable to be neglected; besides, some deep-seated problems can be easily exposed. However, the host should be very skillful, and target users who are willing to participate in the interview are not always easy to be found.

2.3.5. Thinking aloud. Users state their thinking process loudly when they complete various tasks on the website. Only a few of users are involved in this technique. In thinking aloud, users' cognitive and behavior processes can be learned. In this way, we can identify the usability problems of our site. Which is noteworthy in this technique is that testees often stop the acts of their statements when they carry out a difficult task. At this moment, hosts should reminder testees timely. Another solution is asking two testees to complete a task together, so that they can help each other and discuss how to solve the problem.

The advantage of thinking aloud is that testees may offer a lot of information, including the process of users' cognition and their behavior patterns. However, some studies show that thinking aloud is not suitable for all situations; compared to natural environments, participants may behave differently in labs.

2.3.6. Questionnaire. This is a very common method of investigation because a wealthy of information can be gathered quickly. Questionnaires are effective tools for reaching a wide audience. It works great on a live site or on a prototype site. It can be used to gather information in the early stage of designing and can be used to evaluate an exiting website. Electronic questionnaire can be used on a site, which can help designers to investigate their users regularly. The cost of questionnaires is low, and it is quite timesaving.

One of shortcomings of questionnaires is that it often shows some general questions in stead of in-dept problems, so it can be used as an auxiliary method in the usability evaluation. Besides, it will be quite difficult to sample in electronic questionnaires. Some subjects may submit the questionnaire repeatedly, which will bring deviation in the result.

Which technique should be chosen in the designing depends many factors, such as the phase in which the evaluation applied, problems which can be found in the method, people participated in the evaluation, required equipment, cost of the evaluation and the way the result represent.

2.4. Evaluate the web site

After choosing the appropriate technique, it is time to evaluate the web site. We must pay attention to the followings:

2.4.1. Don't evaluate too much times. Although the usability evaluate methods help us a lot in designing, it doesn't mean that the more we evaluate web site, the better the site will be. On the one hand, too frequent evaluation of the web site will generate additional expenses; on the other hand, excessive evaluation will reduce users' sense of trust. Someone argued that in e-commerce, questioning users during usability testing frequently shows they do not trust the web site especially the online transaction web sites [2].

2.4.2 Moral issues. This is a very important issue in the evaluate process, which is not only the requirements of professional ethics, but also an important step to gain the trust of subjects. Before the evaluation, evaluator should sign an agreement with subjects, in which two things are mentioned: first, the personal information will not be leaked, second, what we are going to evaluate is the site rather than subjects' behavior. In the evaluate process, subjects have the right to quit at any time.

2.5 Analysis in depth, and apply results to actual designing.

The analysis of data impact to the evaluate results directly; sometimes we have to invite experts in this field. For example, we need statistical experts' help in a large-scale usability testing.

How can we apply evaluate results into design is an important issue, on the one hand, designers should participate in the evaluation and design their web site in accordance with the evaluating results, on the other hand, the result of the evaluation should be clear and detailed so that it can be followed by designers easily.

3. Conclusion

Usability evaluation has increasingly become a part cannot be ignored in web site design. Designers should learn these techniques and use them in practice so that we can evaluate our web sites skillfully, generally speaking, we can evaluate a website as follows:
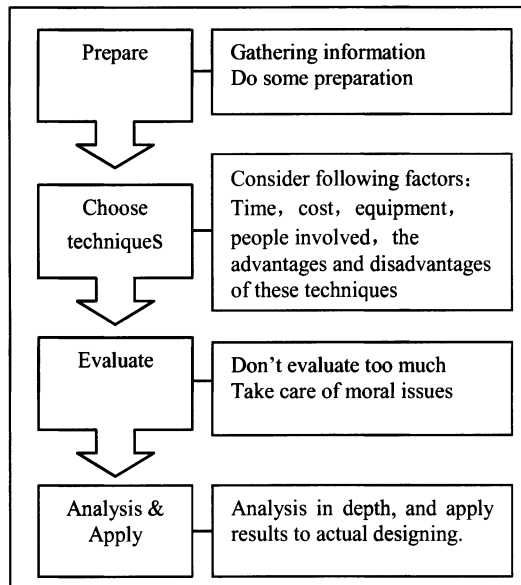
Prepare	Gathering information Do some preparation
Choose techniqueS	Consider following factors: Time, cost, equipment, people involved, the advantages and disadvantages of these techniques
Evaluate	Don't evaluate too much Take care of moral issues
Analysis & Apply	Analysis in depth, and apply results to actual designing.

Figure 2. How to evaluate a website

Usability evaluation is an emerging field; theory in this field is not perfect. It means that there are many problems deserved to be explored. Designers should sum up their experience in the process of designing and consummate the techniques of usability evaluation.

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