The MF Usability Evaluation Processes for Interface Design

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1. Introduction

There are many methods invented to evaluate the usability of digital products. Selecting the most effective one is on dispute. Evaluators usually tend to use a series of 3 to 4 evaluation methods to define one single problem, which is time-consuming. And also the possibility of leading to prejudiced results still exists. The evaluator's preferences can distort the evaluation process because there are no absolute standards to which we select appropriate combination of methods. Therefore, this research suggests a new usability evaluation method that effectively eliminates personal preferences and that's economical. This method is based on satisfaction, effectiveness and efficiency, the three major elements of usability stated by ISO. Different evaluating methods were designated depending on which element is being evaluated.

It is called "MF(Multi-faceted) Method" in order to encompass all these three methods at one attempt. It is an improved evaluating model which lets designers address interface problems more quickly and more precisely. The two steps of MF, the evaluating step and the design problem-solving step share the identical data collected. The MF Method saves time and expenditure. It also helps designers apply guidelines to their designs more effectively.

2. The Methods of Interface Usability Evaluation

To select the optimal method for usability evaluation, one has to consider the time necessary, evaluating target and work scope. There are many methods proposed and used by today's researchers such as Nielson, Hom, Gray, and Kim, and they are different from each other to a great extent in such aspects as purposes, applying manners, etc.[1)]

1) Goodwin N., Function & Usability, Communication of ACM, pp.76, 1993.

Table 1) Nielsen's Classification of Usability [2)]

Type	Description
Automatical	An evaluation method based on calculation of the degree of usability with automated programs.
Empirical	An evaluation methods based on actual experiments with target user group
Formal	An evaluation method which uses accurate mathematical formula to calculate the degree of usability
Informal	An evaluation method based on written descriptions about experiences which testee have to go through

3. Proposal for Multi-faceted Interface Usability Evaluation

A number of new models and strategies for efficient usability evaluation have been devised based on numerous theories of usability. Each evaluation model designated bears a specific factor of usability in mind. So choosing one single evaluation method potentially can miss out some crucial problems which otherwise will be practically valuable for 'more usable' products. The output data might not be as objective as the evaluator has expected them to be. On the other hand, carrying out several evaluation methods simultaneously will require far more time and expenditure although it might produce more abundant data. Creating an appropriate mixture of evaluation methods also requires standards in deciding whether or not the methods are relevant.

In terms of criteria within which a certain task is executed, in 1993 ISO(International Organization for Standardization) stated, in the course of defining usability, that usability is the degree of accessibility possessed by users to execute their willing tasks with Satisfaction, Effectiveness and Efficiency.[3)] [4)] This sets a new point of departure for what usability should inherently achieve in that it provides fundamental criteria for creating a

2) Nielsen, J., Usability Inspection Methods, Proceedings, ACM CHI Conference, pp.152, 1995.

3) ISO/IEC9241-11, Software Product Evaluation; General Overview, International Organization for Standardization, p.107-108, 1993.

4) Nielsen, Jacob, Usability Engineering, Academic Press, p.26-33, 1993.

consolidated and practically applicable evaluation method. The optimal evaluation methods were selected out of most widely used ones depending on how each ISO factor is closely attributed to and easily measurable and demonstrated by those usability criteria: the degree of satisfaction is heavily related to and easily indicated by heuristic evaluation, the effectiveness by performance measurement, and the efficiency by cognitive walkthrough.

Table 2) An example of the application of MF to a digital camera

Shoot Images and Playback				
	Action	Display	Performing Time	Problems
1	Select Shooting Mode by dialing multi-function dial 		5 sec. ××○ (33%)	Hard to find the right button
2	Push the Shutter 	The view of image is on the display.	2sec. ○ (100%)	
3	Select Playback Mode by dialing multi-function dial 	The display shows the image taken. 	25sec. ×××××× ○ (14.3%)	Select button cannot be pushed
Total			32 sec.	

As we can see in table 1, the Multi-faceted Method can minimize the defection of data, and many influential problems can be extracted according to crucial elements of usability. It lets the evaluators logically stress problems noted more times than the others.

What this research cover up to this point can be arrayed clearly on one single table. Each step of tasks is arrayed in the left column. Indexes from usability evaluation methods are arrayed in the top row.

First of all, enter control action and control reaction which belong to cognitive walkthrough. Control action is how the user controls interface, and control reaction is how the interface reacts to the action executed. Series of control actions and control reactions are listed in the leftmost column.

Then, enter success rate and performing time in the column which represents performance measurement. Enter the time taken and then enter whether or not a specific task was successful after each task. Success rate is the result from control action and reaction and is marked as ○ or ×, and tasks with more × might suggest more problems. If the measurement of time for each task is finished, measured values will be summed up to the total performing time for the task.

Lastly, enter the advantages and disadvantages from user's opinions based on observation in the last column for Heuristic Evaluation, and we can add more problems extracted from previous evaluation processes such as cognitive walkthrough and performance measurement.

MF Usability Method can economically, integrally and yet concisely satisfy the three crucial factors of usability; effectiveness, efficiency and satisfaction. All problems from the tested interface are listed in a single table for a fast application to interface design. To further slim down the evaluation process, the choice of specific tasks and the number of task execution times can be planned from the beginning using statistical experiment planning and variance analysis techniques.

4. Conclusion

First of all, Multi-faceted Method lets designers evaluate interfaces fast, easily and precisely, and the designed product will fit better to user's needs. Existing methods waste not only time and expenses but also cause lack of consistency in data collected. The collected data are often turned out to be too abstract. Multi-faceted Method saves time and expenditure. It also helps designers easily apply guidelines to their designs.

Second of all, Multi-Faceted Methods exclusively focuses upon three major elements of usability; effectiveness, efficiency and satisfaction. Common usability methods are a combination of three to four kinds of existing methods. The lack of standards in selecting methods causes inclination of the result. For the evaluation of effectiveness, this research extracts the tasks which are commonly used by users and presents references to support accuracy. For the evaluation of efficiency, it keeps the data objective and quantitative to verify clearly the problems which users face in the middle of practicing tasks. For the evaluation of satisfaction, many additional problems which have been hidden from previously extracted problems and evaluator's subjective opinions can be extracted at this point.

- Reference -

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