

## Usability Testing on Design and Function in National R&D Information Navigation System

Byeong-Hee Lee\*, Kang-Ryul Shon\*\*

\*,\*\*KISTI, Korea

E-mail : bhlee@kisti.re.kr\* ; krshon@kisti.re.kr\*\*

### 1. Introduction

A usability test involves examining the website usage patterns of the users through direct observation in order to upgrade the usability of the site. Generally, it is most effective to perform the usability test in the early stages of a project and to repeat the process throughout its course to implement the necessary changes for improvement upon discovery of any problems. This study aimed to test the usability of the National R&D Information Navigation System (NRnDINS), developed by integrating 5 types of contents (research papers, patents, reports, technological trends and projects), as a means to orient the services to the actual users.

### 2. Related Works

Rubin [1] noted that the causes of reduced usability of websites include function-oriented designs by developers, failure to reflect user demands in the website design in a systematic and repeated manner, failure to consider the aspect of usability, lack of cohesiveness among the website developers, and insufficient expertise in the usability test. Usability test can be divided into two types depending on its implementation period and purpose:

- Exploratory design test in the early and intermediate stages of system development: Testing the design concept and effectiveness based on the following questions: What will the users imagine while using the website? Are the functions valuable to the users? Can the user interface (UI) be used intuitively?
- Functionality test in the later stages of system development: Testing whether the system operates within the designated time as well as the execution speed and accuracy, preferences, and discovery of flaws and defects.

The preceding studies on usability focused on different aspects: Jung et al. [2] stressed the risk of developing a system from the developers' perspective; Park et al. [3] the design of science and technology information system; Kim et al. [4] the visual aspects of information services; and Lee et al. [5] the mobile web usability.

### 3. NRnDINS and Usability Testing

NRnDINS, a new type of information system, is being developed by integrating the contents of the National Digital Science Library (ndsl.kr) and the National Science & Technology Information Service (www.ntis.go.kr) operated by KISTI. The purpose of this study is to prepare the necessary measures for a usability test that would enhance the usability of NRnDINS based on semantic and information visualization technologies. For this purpose, a usability test, taking into both the design and function of the system, was examined. The matters related to an information system that must be considered from the user perspective were derived based on a literature review and interviews with experts, and they are summarized below.

|  |   |
|--|---|
| <ul style="list-style-type: none"> <li>● Degree of usage of the information service and the cost of acquiring the information</li> <li>● Economic impact of the information service (time and cost saving)</li> <li>● Utilization and dissemination of information</li> <li>● Intention to continue using the service</li> </ul> | <ul style="list-style-type: none"> <li>● Information quality, information system and information service quality</li> <li>● Usage status of information service</li> <li>● Convenience of using the provided services</li> <li>● Effect of the information service</li> </ul> |
|--|---|

Of the aforementioned matters for consideration, the exploratory design test to be implemented in the early and intermediate stages of system development and the functionality test in the latter stages were examined in detail.

### 4. Design Usability

This study aimed to enhance the services provided through NRnDINS by diagnosing the service receptivity, usability and design preference based on user response analysis, deriving the potential problems and performing a cause analysis. Figure. 1 is the flowchart of the design usability survey.

The usability assessment was carried out with 10 participants, and the assessment divided into 8 stages took about 2 hours to complete for each participant. An eye tracking test was conducted to obtain data on the point of gaze of users and T120 equipment manufactured by Tobii was used for this test. Through each task that the participants were asked to perform, the inherent problems of the system were derived. Table 1 shows the processes of the usability survey conducted for NRnDINS.

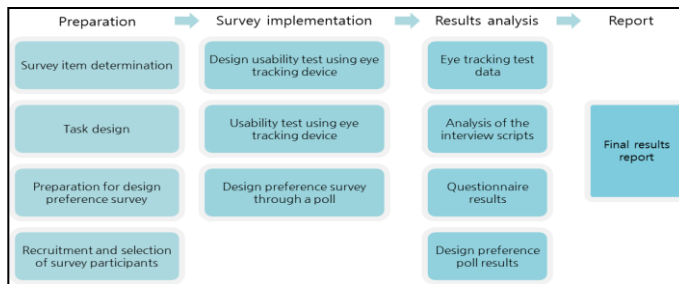


Figure 1. Flowchart of the design usability survey

[Table 1] Design usability survey processes of NRnDINS

|   | Description  | Time (min.) |
|---|--|-------------|
| 1 | Warm-up & Intro  | 10          |
| 2 | Check the receptivity and usability of the main page   | 20          |
| 3 | Check the appropriateness and usability of the information on the search results                     | 20          |
| 4 | Check the receptivity and usability of the page details on the 5 types of contents                   | 15          |
| 5 | Check the service receptivity and usability in relation to the design                                | 15          |
| 6 | Collect opinions on the overall experience (interview)   | 10          |
| 7 | Questionnaire: Level of difficulty, consistency, clarity, appropriateness of each step, satisfaction | 10          |
| 8 | Design preference voting   | 2           |

### 5. Functional Usability

To test the functional usability, the items on the checklist developed from the user perspective were examined through the collection of expert opinions, in-depth interviews with heavy users, a pre-test and a main test, and a regression analysis was conducted for verification of reliability. Table 2 shows the checklist used to examine the matters related to the quality of the information, information system and information service, and each of these items was rated based on a score between 1 and 5.

[Table 2] Functional usability checklist for the development of NRnDINS

| Information quality  | Information system quality  | Information service quality   |
|--|---|---|
| <ul style="list-style-type: none"> <li>● The information system is reliable.</li> <li>● The information is appropriately classified into their respective categories.</li> <li>● It is easy to obtain information related to my work.</li> <li>● The information is provided in a timely manner.</li> <li>● It is differentiated from other information services.</li> </ul> | <ul style="list-style-type: none"> <li>● It does not take too long to retrieve information.</li> <li>● The information loading speed is quick.</li> <li>● It is easy to go to other information websites using the links.</li> <li>● It is well-equipped with systems that users need.</li> </ul> | <ul style="list-style-type: none"> <li>● It is easy to follow the usage procedure.</li> <li>● Information is provided quickly.</li> <li>● The message board is functional.</li> <li>● It has a sophisticated design.</li> <li>● It responds to user demands in a satisfactory manner.</li> <li>● There are no issues related to privacy (personal information protection).</li> <li>● Web 2.0 concept is well-reflected.</li> </ul> |

### 6. Conclusion

In this study, a comprehensive method of assessing usability of NRnDINS was proposed, taking into account both the design and functional usability, in order to improve the convenience of accessing and using the information provided through this system. The results of this study are expected to contribute to the improvement of the service quality of NRnDINS in the future.

### 7. References

[1] Rubin J., Handbook of Usability Testing, John Wiley & Sons, 1994.  
 [2] Han-Min Jung, Pyung Kim, In-Su Kang, Seung-Woo Lee, Mi-Kyung Lee, Won-Kyung Sung and Do-Wan Kim, "Evaluation of Usability on OntoFrame System", Journal of the Korea Information Management Research, Vol.38, No.2, pp.153-173, 2007.  
 [3] Minsoo Park and Mihwan Hyun, "Usability of the National Science and Technology Information System", Journal of Korean Biblia Society for Library and Information Science, Vol.22, No.4, 2011.  
 [4] Teahong Kim, Jinhee Lee, Mikyoung Lee, Hanmin Jung and Dowan Kim, "Suggestion and Evaluation on Information Services in Viewpoint of Visualization Attributes", Journal of the Korea Contents Association, Vol.11, No.5, pp.489-499, 2011.  
 [5] Myungsun Lee, Hyoungyong Oh, Byoungwon Min and Yongsun Oh, "Improvement of Mobile Web Usability for Mobile Cloud Computing", Journal of the Korea Contents Association, Vol.11, No.9, pp.85-95, 2011.