

Development and Evaluation of New User Interface for Security Scanner with Usability in Human Interface Study

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Abstract. In this paper, we propose methodology for improving usability of security tools based on human interface study. Today, users in general cannot use or operate presently available security tools effectively because they lack interface with high usability making them difficult to use or operate. However, if the security tools are effectively used, it is possible to find potential vulnerability information of a client computer. Therefore, we consider security scanners, and develop an interface for them with high usability based on human interface study, so that even general users can use them to find and fix vulnerability of their computers. We perform usability evaluation based on human interface study to the interface we have developed and we show that high usability has been realized from an objective viewpoint.

Keywords: Usability, Security Scanner, Human Interface Study.

1 Introduction

Today, Internet users with constant connection are increasing explosively [1], and the hosts are becoming diverse. On the other hand, the number of illegal accesses are also increasing, and becoming tricky and wicked, and targets can be anybody, from an individual user to large corporations [2]. Recently, most users are connected to Internet by high-speed line with constant connection directly or via internal networks, but it is not always true that the users have sufficient knowledge of security.

As for the basis of our claim, in [3], corporate users which reply “We believe that we have taken sufficient security measures for organized cyber crime” are only 15 percents. It indicates how diffident even corporate users are about security. It is reasonable to suppose that individual user’s percentage is lower than that of corporate users. However, if the networks are not secure, users must protect their own computers, even though they do not have sufficient knowledge of security.

Additionally, about 50% users do not understand meaning of “vulnerability” at all [4]. Even if we provide them with presently available technology and information about security, almost all users cannot implement security measures properly.

Furnell, et al. in [5] have reported usability test on operation and configuration of security features for Microsoft Windows XP and three applications with 340 subjects.

They have reported that almost all subjects have found it considerably difficult to operate and configure the security features for them.

To resolve the above mentioned problems that the users cannot use or operate security tools and implement security measures without sufficient knowledge of security, we investigate methodology of how to improve usability of currently available security tools for general users so that they can use or operate the security tools easily. To attain the goals, as a working example, we consider security scanners that can find vulnerability in end-user's client machine easily and develop a security scanner with enormous improvement in usability.

Almost all security tools are developed without considering users' ability to operate them, and thus users cannot use these tools exhaustively. The security scanner we developed is in accordance with User Centered Design (UCD) which was proposed by IBM in [6]. In UCD, software is designed from user's viewpoint, and frameworks of developing processes are followings:

1. Determining user's *availability*
2. Determining user's *needs* from availability
3. Making *solution* for fulfilling user's needs
4. *Evaluating* solution
5. Feeding back result of the evaluation, and *improving* the solution
6. *Alternating* between evaluation and improvement

We develop our security scanner by conducting usability evaluation based on human interface study, and finally compare it with the presently available security scanners. We demonstrate methodology for improvement of usability based on human interface study.

First, in order to grasp the problems related to usability that exist in presently available security scanners, we perform formative and summative evaluation on them. Based on the problems that we find, we propose and develop a user interface for a security scanner and conduct formative evaluation as we develop it. Finally we conduct summative evaluation on it to show the enormous improvement of usability of the security scanner from an objective viewpoint.

The paper is organized as follows. Section 2 shows process of formative evaluation and summative evaluation of presently available security scanners. Section 3 describes points for improvement of the user interface in response to the results of the evaluation. Section 4 describes the formative evaluation and summative evaluation of the proposed user interface, and also presents the evaluation results.

2 Formative Evaluation and Summative Evaluation of Existing Security Scanners

In this section, we conduct formative evaluation for receiving feedback in intermediate step of development, and conduct summative evaluation for numerical results to evaluate whether presently available security scanners fulfill user's requirements or not.