

Development of Server Management Software “ESMPRO/Server Manager” Based on User-Centered Design

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Abstract

This paper introduces the efforts made at NEC in the user interface improvement project based on a user-centered design concept for the ESMPRO/ServerManager, which is the server management software that comes bundled with the Express5800 server. The project is being executed in four stages: 1) evaluation of the usability of current products, 2) feedback surveys of users, 3) arrangement of concept and development of prototype, and 4) application to the actual product. While some of the user interface improvements have already been applied to the actual software, the project is ongoing and the product is being improved continually.

Keywords

server, management software, user-centered design (UCD), usability

1. Introduction

The Express5800 server comes bundled with server management software called the ESMPRO/ServerManager (hereinafter referred to as the ESMPRO/SM) as standard. The ESMPRO/SM performs remote centralized management of multiple servers installed in arbitrary environments and enables easy identification of the server configuration and status and efficient support for management and maintenance throughout their lifecycles. For instance, it is equipped with various functions to support the work of IT system administrators, such as the management of hardware and software configurations for multiple management-target servers, the display of possible malfunctions and error details in the case of error detection, error recovery using power operation and remote console and the remote collection and execution of various data including CPU load factor, memory utilization rate, disk utilization rate and network traffic information. However, as our competitors have recently been enhancing their server management software to reduce administration and management costs, it is hard for us to maintain superiority by simply enhancing the functions of the current software.

Therefore, we decided not to limit the improvements to the functions from a technical viewpoint. We chose to aim at making the usability from the user's viewpoint as one of the appealing points of the Express5800 server by improving the user interface (UI) of the ESMPRO/SM based on user-

centered design concepts. In this paper, we will introduce the specific efforts we have made for improving the UI of the ESMPRO/SM based on these user-centered design concepts and the results we have achieved.

2. Project Outline

At the beginning of this project, developers defined the UI improvement targets as follows.

- Improvement of usability when managing multiple servers together.
- Improvement of intuitive usability.
- Attractive interface design that encourages use.

Next, in collaboration with the Human Interface TG of NEC Information and Media Processing Labs, who has achieved excellent results in the evaluation and improvement of software UI, and NEC Design & Promotion, who performs UI design based on the results of user evaluations, we decided to advance the project in the following stages.

- 1) Usability evaluation of the current ESMPRO/SM.
- 2) User feedback surveys.
- 3) Arrangement of concept and development of UI prototype.
- 4) Application to actual product.

Fig. 1 shows an example of the ESMPRO/SM display used before the start of the project.

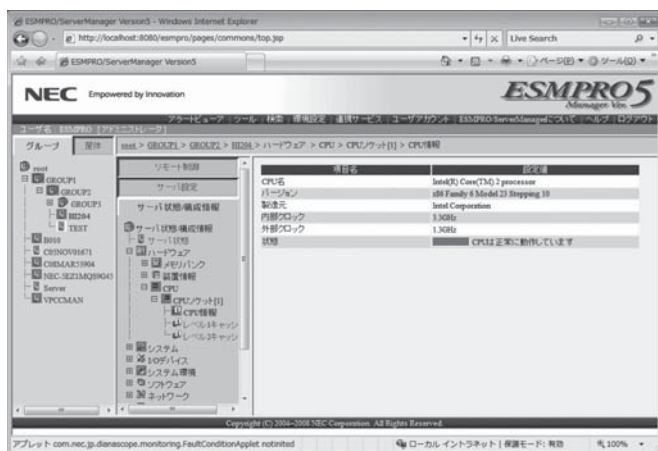


Fig. 1 Example of ESMPRO/SM display (Before start of project).

3. Usability Evaluation

We began the project with a search for the orientation of improvement by evaluating the way the ESMPRO/SM is used, the display transition and the display layout.

Nevertheless, objective evaluation was difficult, because evaluations by persons engaged in development contained a wide variety of individual opinions and subjective views. In addition, it was also difficult to find non-specialist participants for usability evaluation surveys because the ESMPRO/SM is not a consumer product but a specialized tool for use by IT system administrators.

So we commissioned experts of UI evaluation, the Human Interface TG of NEC Information and Media Processing Labs, to do a usability evaluation. Participants in the evaluation were asked to select four options, “good point,” “potential problem,” “problem present” and “weak point” for each of the factors listed below, and the points judged as “problems present” were subjected to focused discussions. For example, with the “operation navigation” factor, “concaved representation of non-selected tabs” and “inappropriate navigation in case of errors and lack of consistency in the flow of processing” were classified as “problem” points.

The usability evaluation allowed us to identify issues that had previously been overlooked.

[Usability evaluation factors]

- Display in general

- Display layout
- Display transition

- Operation navigation
- Information layout
- Data input/output
- Visual expressions
- Individual displays
- Login display
- Component list display
- Automatically scheduled operation display
- Alert viewer display
- Version management/updating-related display

4. User Feedback Surveys

As described above, the ESMPRO/SM is a specialized tool for use by IT system administrators and comes bundled with the Express5800 server. This has also made it difficult to find non-specialist participants for user feedback surveys.

Therefore, we decided to conduct surveys of specialists and selected in-house users introducing the ESMPRO/SM for their jobs. These user feedback surveys turned out to be very beneficial because they allowed us to more fully understand the precious experiences and needs of persons actually engaged in IT system management based on what they had noticed in the field. Particularly helpful comments related to the grouping of server management displays included: “it would be convenient if logical classification according to the purposes of servers were possible in addition to the classification according to the physical positioning of the servers in the machine room” and “it would be convenient if the generation of a large number of identical alerts could be classified and displayed as a single factor.” We were able to make use of these opinions that would only be available from the actual field when considering the improvement plans.

5. Arrangement of Concept and Development of UI Prototype

(1) Arrangement of concept

We arranged factors such as the expected effects, prospective target users, positioning in region/market, appealing points and necessary conditions for development and compiled them into a concept sheet (Fig. 2). These factors were selected by considering the profile of users and the way the software is used as recognized currently by the persons engaged in development as well as the results of function

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02. Concept Sheet	
<p>(1) Title</p> <ul style="list-style-type: none"> Next server management application. “ESMPRO-X” which is advanced but enables even first-time users to feel as if they have experience using this software. <p>(2) Expected effects (Merits for enterprise)</p> <ul style="list-style-type: none"> Increased sales, customer satisfaction and repeated purchase. Management software can also have an attractive appeal for the decision of server introduction/purchase. After the introduction of a new server, the software does an admirable job and satisfies the users. <p>(3) Prospected target users (Segment group)</p> <ul style="list-style-type: none"> Those that have already purchased NED Express series servers. From a few to around 1000 units. Persons in charge of system administration of systems configured exclusively with NED Express series. If other servers are integrated in the system, only the information is utilized and the UI is not necessary. Server administrators whose job is limited to checking of status while jobs are underway. Error recovery and maintenance are performed by separately contracted personnel. <p>(6) Positioning in region/market</p> <ul style="list-style-type: none"> Provided free of charge as standard software. Simple operation is required while covering the basic functions. Use of the features that can serve as appealing points for purchase are required. 	<p>(4) Needs & benefits (Appealing points)</p> <ul style="list-style-type: none"> Errors are strongly undesirable. Should one occur, we want to take countermeasures that can avoid the worst results, where countermeasures by the maintenance service may also be necessary. Even rarely performed operations should be easy to operate. Error-free operations are highly desirable because we do not want to hinder jobs due to our own mistakes. <p>(5) Necessary conditions for development (Specifications, functions, image, taste, price, etc.)</p> <ul style="list-style-type: none"> Ease of taking countermeasures in case of error detection. Capability of making the user feel like using after installation. Enhancement of expressions and functions of group management. Innovations to improve the intuitive sense of usability. <ul style="list-style-type: none"> → Easy-to-view displays according to the user's task → Easy-to-understand displays of the user's positioning Innovations to facilitate distinction. <ul style="list-style-type: none"> → At a glance differentiation from competitors for users considering purchase. Intuitive appeal of usability shown in the catalogue.

Fig. 2 Concept sheet.



Fig. 3 Design plan 1 (Easiness, friendliness).

comparisons with competing products in addition to information and issues extracted from the results of usability evaluation and in-house user feedback surveys described above.

(2) UI improvement points

In the study of the UI plan, we arranged the UI improvement points based on the concept for each of the development keywords identified in the usability evaluation and user feedback, including “group management,” “intuitive usability,” “alarm countermeasures” “safety and ease of understanding” and “attractive design.”

(3) Visual design plans for ESMPRO/SM

We developed three plans for the interface design for the overall software including plan 1 (easiness and friendliness), plan 2 (modernity and sharpness) and plan 3 (simplicity and clearness) and finally selected plan 1 (Fig. 3).

(4) Development of personas and user experience scenarios

Concurrently with the development of the visual design plan, we also developed a persona sheet and user experience scenario based on the five persona patterns identified by the persons engaged in development. Fig. 4 shows a part of the persona sheet.

(5) Operating procedure prototype

Using the new display UI designs, we developed prototypes for simulations that can allow viewers realize the transitions of the operation procedure displays for checking the server running status and for dealing with alerts, and submitted them for review to the persons concerned. At the

07. Persona Development		Persona Sheet (Basic format)
<p>Life-stage profile (Basic attributes)</p> <p>Name: [Redacted], [Redacted]</p> <p>Age/Sex: Male, 31 years</p> <p>Family configuration: Father, mother, brother</p> <p>Address (Region/form of housing): Honcho, Wakayama-shi Standalone house</p> <p>Profession (place of work): Mikami-no-oka Shinin Bank (200 branch offices) Information Center</p> <p>Job type, etc.: In charge of business systems at data processing and hardware systems construction departments. Number of employees: 200 *Graduated from the faculty of engineering of a public university.</p> <p>Server environment, etc.: 7 group servers (Head Office): Accounting and business systems. 3 group servers (Branch Office): 20 branch offices. *Branch offices are divided into 4 groups.</p>	<p>Lifestyle profile (Sense of value, etc.)</p> <p>Qualifications, skill, etc.: *One home-made PC and one store-bought PC (for family) at home. High skill in PC.</p> <p>Character: *In charge of business data processing such as financial management in the bank and of system construction. Also performs as isolated hardware administrative management operations. *Before the actual maintenance that is commissioned to a maintenance firm, performs the work required for avoiding system shutdown. This user is a busy person because he is also entrusted with odd jobs. *The company climate is earnest but unoppressed. The company holds events involving families of employees. This user is often busy with odd jobs delegated to him because of his abundant knowledge of the PC and IT and because he is still a relatively young employee in the Head Office. *This user is fond of anime and often buys DVD and game software online. *His sometimes goes fishing with his father and/or brother.</p> <p>Role at office: [Redacted]</p> <p>Hobbies/Orientation: [Redacted]</p>	<p>Image of user</p> <p>Photos, illustrations, etc.</p>
<p>Benefits & needs (Targeting goal: High-level and detailed)</p> <p>*Concrete explanation of the ideal self-image and lifestyle of the user.</p> <p>* This user is often busy with odd jobs because he is entrusted with server administration management and management of the local network in the Head Office in addition to his original job, the construction of business systems. As there is a severe overtime situation in the company, and the user hopes to reserve time for himself, he wants to eliminate waste from his work and improve his work efficiency in order to finish the work early.</p> <p>* Considering that the company climate is free and proposals are easy to make, he wants to improve the current system and build a more comfortable environment. Particularly, he believes that work efficiency can be improved if the work done at branch offices can be reduced by integrating the servers in the Head and branch offices and controlling the branch office servers from the Head Office.</p>		

Fig. 4 Persona sheet.

same time, we conducted checks from the virtual user's viewpoint based on the persona sheet. Fig. 5 shows an example of a prototype for use in checking the server running status.

6. Application to Product

(1) New UI for server working status checking

We started application of the new UI based on the UI prototype to the actual ESMPRO/SM with the operation displays for use in checking the server running status, which are

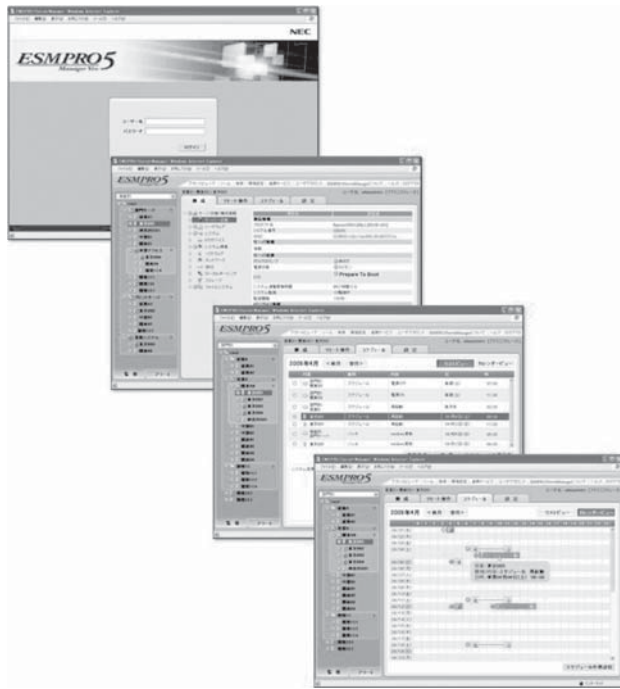


Fig. 5 Operation procedure prototype (Checking the server working status).

the displays most often used among the normal server management jobs.

Since perfect reproduction at the product level of the UI prototypes in the web UI provided by the ESMPRO/SM is hard from a technical viewpoint and that the development resources are limited, we determined the optimum web UI implementation method based on close discussions between NEC Design & Promotion, the UI designer in the NEC Group, and the persons engaged in development.

Eventually, the ESMPRO/SM featuring the new UI was made public on the web as Ver. 5.3 in November 2010. The ESMPRO/SM featuring this new UI is bundled with the Express5800 servers released since that date.

Fig. 6 shows part of the new UI of the ESMPRO/SM Ver. 5.3 featuring improvement for checking of the server running status.

(2) Future enhancement plan

For the UI prototypes, we are also developing specific operating procedure prototypes for the “improvement of operability of integrated management of multiple servers” and the “improvement of operability in the case of alert detec-

tion” in addition to the improvement of server running status checking that has already been applied to the software. At present, we are advancing work targeting the implementation of the “improvement of operability of integrated management of multiple servers.” The method of implementation based on the UI prototype is being examined by NEC Design & Promotion and the persons engaged in development in order to include it in ESMPRO/SM before the end of FY2011. **Fig. 7** shows part of the group operation/setting display plan currently under study.

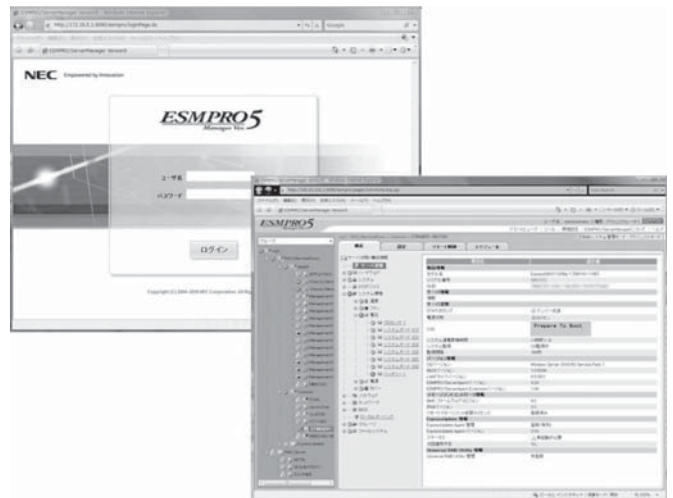


Fig. 6 New UI of ESMPRO/SM Ver. 5.3.

Improvement Plan: Group operation/setting – Operation/Setting Display –

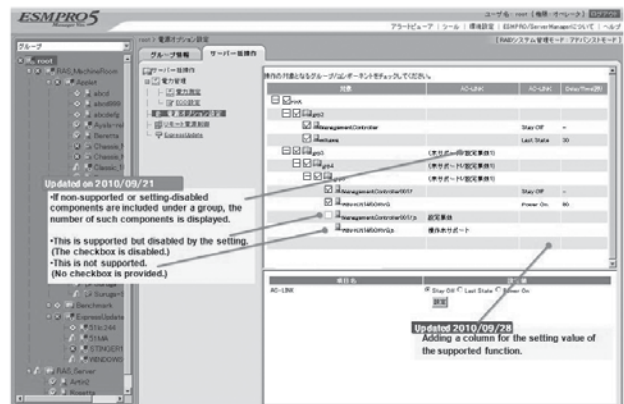


Fig. 7 Example of group operation/setting display screen plans.

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7. Conclusion

The new UI used with the ESMPRO/SM Ver. 5.3 was evaluated as having a better appearance and higher usability than before by persons familiar with the Express5800 server, which uplifted the morale of persons engaged in developing further improvements. It has been decided that the new UI will also be adopted as the web UI provided by the firmware embedded in the Express5800 server. The provision of common UI is expected to improve the usability of the Express5800 server as well as to ensure its consistency.

The concept of user-centered design that studies UI carefully from the user’s viewpoint is taking root among persons engaged in development who had previously focused on the development of functions rather than on the UI, and this trend is expected to bring about great results in the future. We are determined to improve our skill in the design process based on the user-centered design by continuing to collaborate with persons concerned in the NEC Group such as the staff of NEC Design & Promotion.

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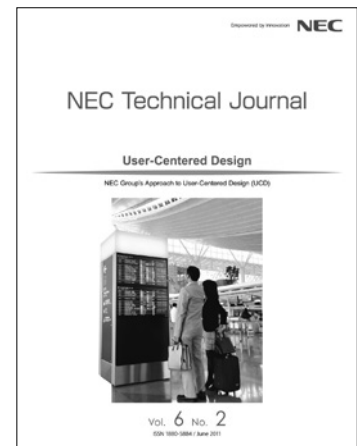
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