NEC Group Tackles the Human Interface

The remarkable advances in Information Techonology (IT) and network (NW) technologies have resulted in the creation of diverse environments and terminals, and users - irrespective of age and gender - are demanding that this diversity be employed to achieve a variety of things. However, are application interfaces evolving in a truly “usable” direction?
In this special issue, we will explore what defines an interface that facilitates usability by wider range of users, the process for efficient development of such interfaces, and new approaches for the evaluation of human interfaces. In addition, the reader will be introduced to our new human interface technology which promises to make applications even easier to use.

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1 The Demand for Usability

In recent years, Information Techonology (IT) and network (NW) technologies have made astounding advances, making it possible for anyone to use devices (computers) anytime, anywhere for a diversity of applications. Consequently, providers of such devices and the services that employ them proceed with the assumption that users can, as a matter of course, use these devices and software. People at the frontlines of development are facing increasing diversification of the terminals that can be used to operate IT systems and the further “webification” of IT systems. As a result of terminal diversification, it also becomes necessary to deal with interface diversification as each terminal from the PC to mobile phones has its own interface. However, the lack of uniform specifications for IT system operational interfaces that are used via the web has resulted the creation of disparate interfaces by developers. Because of this, we have an environment that facilitates the development of different operational procedures and operational interfaces, even in the case of products possessing similar functions. As a result, there is growing demand to realize improved usability through the adoption of a common, uniform human interface.

In the past, usability in the case of consumer products has extensively been discussed, but when it came to industrial or specialty systems, this aspect has not been explored. However in recent years, as a result of major accidents caused by human error and issues related to work inefficiencies, the human interface is garnering increased attention. In addition, the formulation of standards for aspects of the interface such as accessibility have begun to appear and make their presence felt, fueling growing demand for usability from a variety of perspectives.

But what exactly is “usability”? According to ISO9241-11/JIS Z8521, it is defined as “Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” In other words, it is not a matter of only good efficiency. Usability requires the effective achievement of its purpose and, moreover, user satisfaction. As previously explained, if the reaction of the system and the intention of the user are not in synch, the user’s degree of satisfaction is diminished, and usability also decreases. In order to enhance usability, while good efficiency is, of course, a necessity, heightened user satisfaction including the operational procedure is also demanded.

2 Human Interface & User Interface

Fig. 1 shows NEC's definition for the Human Interface (HI) versus the User Interface (UI).

As shown in the diagram, the UI, of which the graphical user interface (GUI) is the most representative, deals with the subject of operation, while the HI comprises the structure handling the information exchange between the user and the system and the general interaction (Human-Computer Interaction: HCI). As explained in the first section of this article, in order to improve usability, it is necessary to not only enhance efficiency, but also enhance user satisfaction with the interface including the related operational procedure. To achieve this, we must tackle the development of the overall structure for interaction, in short, the human interface, and not just the single aspect of operation.

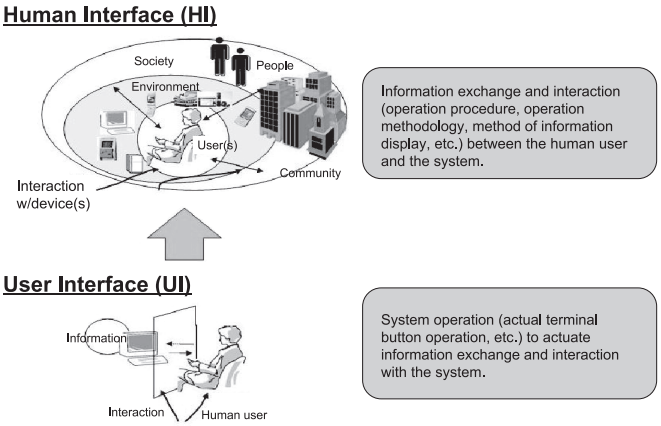

Fig. 1 Human Interface (HI) versus User Interface (UI).

3 NEC's Approach to Tackling Human Interface Development

NEC's approach to the development of the Human Interface can be seen in the map of technologies shown in **Fig. 2** .

This map broadly divides them into two categories: activities directed at realizing the "how" of creating the usable Human Interface (HI structural technologies, HI evaluation technologies, HI engineering, etc.), and "what" should be made usable system (input system, output system, interaction system and other elements of the interface).

Also as shown in **Fig. 3** , NEC pursues both functionality and operability as the objectives of HI development.

Through development from the directions of "how" and "what," NEC aims at realizing an interface that fits the way users

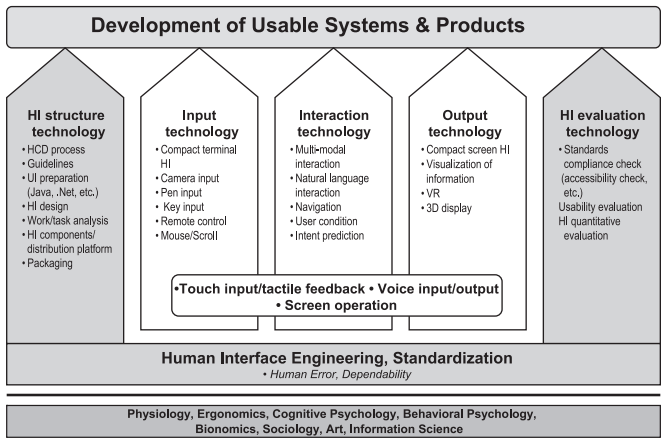

Fig. 2 NEC's map of human interface technologies.

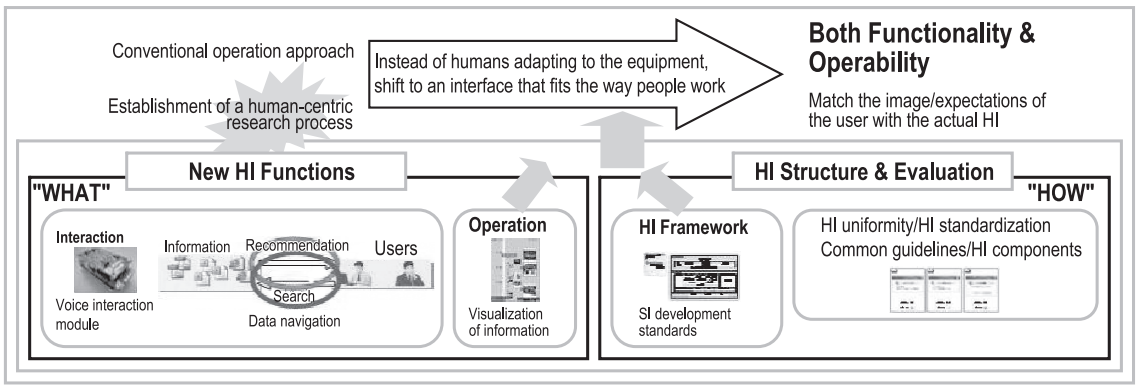

Fig. 3 Objectives of activities to enhance human interface.

expect to operate and interact with devices instead of an interface to which people must adapt. In order to mesh system response with user intent as mentioned in the first section of this article, this means consideration of the system-side design and enhancement of usability.

In order to synch system response with the user's intent, it is essential to understand the psychological model and behavioral model of the user, and then design the interface to fit them; however, in order to respond to the diversity of work, the variety of terminal environments and the many different types of users, it is necessary to make the interface more general. As the reader will discover in this special issue, it is for this reason that NEC puts a priority on tackling the unification of HI, componentization, formulation of principles into HI guidelines and establishing a development process.

Anyone can recognize the importance of enhancing usability and the merits that can be enjoyed by our approach to HI as outlined below:

1) User Merits

- Enhanced work efficiency and higher satisfaction for the end user.
- Reduced deployment and training time for customers (corporate customers, etc.)
- Improved interoperability between applications through HI consistency.

2) Marketing Merits

- Enhanced attractiveness.
- Improved image (= easier to use).

3) Development Merits

- Reduced man-hours required in the initial specification phase thanks to guidelines and componentization.
- Reduced man-hours in the HI design phase due to the establishment of a design process.With the aim of obtaining such merits, NEC is aggressively pursuing Human Interface development activities.

4 Aiming at Further Improvement of the Human Interface

With the aim of realizing the merits listed in the previous section, NEC is actively pursuing the development of the Human Interface. In 2006, NEC established the Human Interface Center and gave it the mission of applying NEC's vast human interface-related technologies and know-how in a broad range of areas including the field of IT systems and the domain of networks with the aim of facilitating the development of products and services with enhanced usability.

Working in close cooperation and collaboration with marketing, design, software development and other departments within NEC, the Human Interface Center engages in a variety of activities to advance the development of HI with a highly experienced staff covering disciplines from ergonomics and human interface research and development to user interface (UI) development, marketing, education and design.

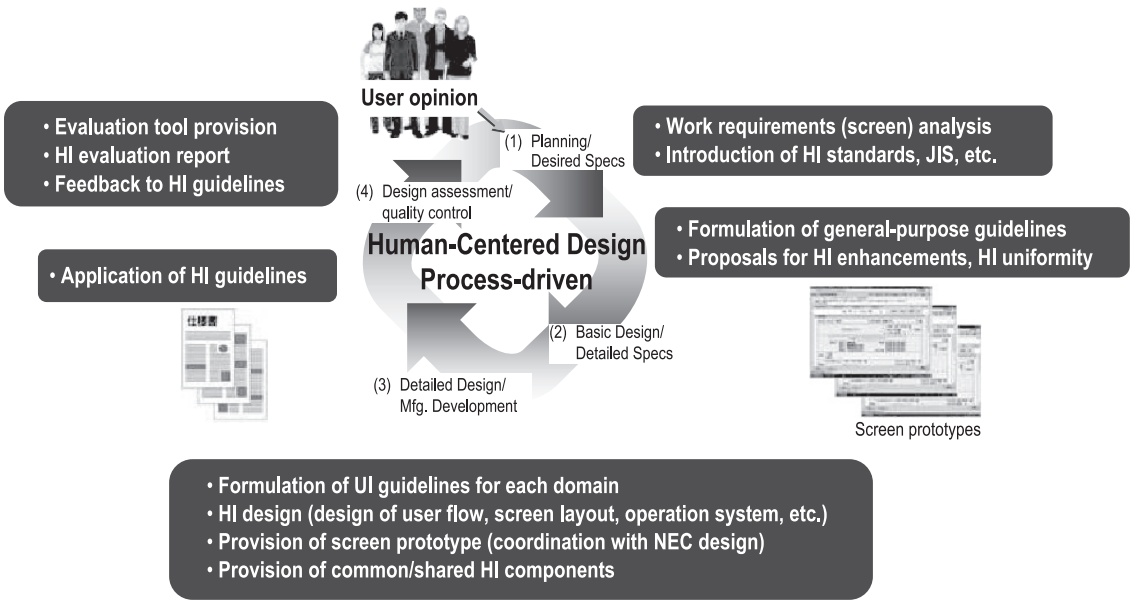

Fig. 4 HI Center role in the development phase.

The activities of the Center include:

- Support for HI construction for the improvement of usability and accessibility of NEC products
- HI intellectual property rights management
- Formulation of HI guidelines by product/service genre
- Formulation and implementation of HI-related international and domestic standards
- Development of Human Interface-related "shared" technologies
- Promotion of "Human-Centric Design Process (JIS Z8530)"
- Internal HI-related consulting

Through these activities, NEC is constructing usable HI, building HI with common components that can be shared between packages, and shaping an HI construction framework that uses HI guidelines formulated for each product/service domain. Our aim is the improvement of product and service usability, increased work efficiency through a common HI, and achievement of significant reduction of product development costs through the adoption of a "shared" HI.

Fig. 4 shows the support provided by the HI Center in the development phase and an outline of the output. In this way, the above-described activities are incorporated in the development phase and contribute to the improvement of product HI.

5 Outline of Special Issue Content

This special issue on the Human Interface will focus on the three areas: HI construction technologies, evaluation technologies, and HI engineering previously shown in Fig. 2 "NEC's map of human interface technologies." We have collected a number of treatises about approaches to this field (construction framework), followed by product application case studies, engineering approaches in this field, Universal Design, evaluation technologies, and finally technologies that enhance usability.

In the articles about the development process, we cover the building of frameworks for HI construction and incorporation of development standards in "Applying Human-Centered Design Process to SystemDirector Enterprise Development Methodology," and introduce "process" as it relates to package software in "Usability Promotion Activities of NEC Soft, Ltd."

In the area of platform technologies, we present the reader with "Toward Human Interface Engineering" and "Usability Evaluation Based on International Standards for Software Quality Evaluation," as well as various papers prepared in collaboration with universities, specifically, "For Usability Quantification," "Focus Graph - A Proposal for the Visualization of Inter-Community Relationships" and "Information Navigation Technology for Improved Search Efficiency."

Finally this special issue looks at Universal Design, which has become a keyword in interface design in recent years, through two articles: "Universal Design Initiatives and Measures Taken in the Field of PC Products" and "Development and Product Application of Web Accessibility Evaluation Tool 'WEBJUDGE'."