

Development of Web Consultation System for Cellular Phones

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Abstract

Recent diffusion of Internet-compatible cellular phones has increased the number of people using their cellular phones to access the Internet. However, the use of cellular phones to access online services is still far below the use of PCs due to problems in the operability and legibility.

This paper gives a summary of NEC's Web Consultation System, which promotes the use of online services from cellular phones by remotely supporting the web browsing operations of cellular phones from a PC.

Keywords

cellular phone, remote support, World Wide Web, Internet, online service, contact center

1. Introduction

The World Wide Web online service based on the Internet is widely used in the present day society as an everyday social infrastructure tool. Its scope has recently been expanded from providing a means of simple information inquiries to include various online services such as EC (Electronic Commerce), online banking and electronic applications.

Previously, these online services had mostly been accessed from PCs, but the recent enhancement of cellular phone functions and increases in circuit capacities have now made the online services accessible from Internet-compatible cellular phones.

According to a survey by the Japanese Ministry of Internal Affairs and Communications (Ref. Mat. 1), more than 90% of households possessed at least one cellular phone at the end of 2004. When the focus is placed on people in the 20's to 40's age group, about half of them use Internet-compatible mobile phones including cellular and PHS phones.

Nevertheless, when the purpose of Internet use is compared between PCs and cellular phones, the use of cellular phones is much lower in the field of online services. As shown in Fig. 1, the use of cellular phones for the purchase of goods and services (EC), online banking and electronic applications is less than 1/5th that of the use of PCs for the same purposes.

As for the reasons why a cellular phone user does not access the online service more, please refer to Fig. 2, which shows the results of a survey on the reasons for not using a cellular phone

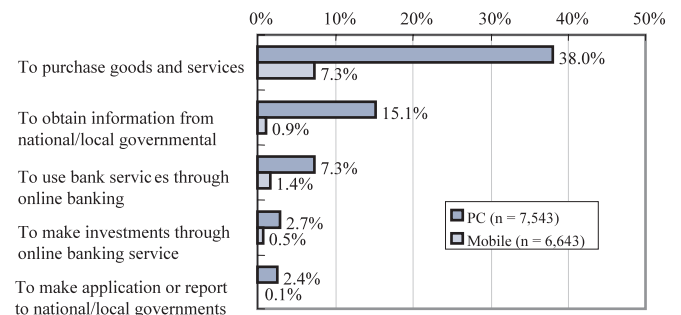


Fig. 1 Internet use per purpose (Extracted from Ref. Mat. 1).

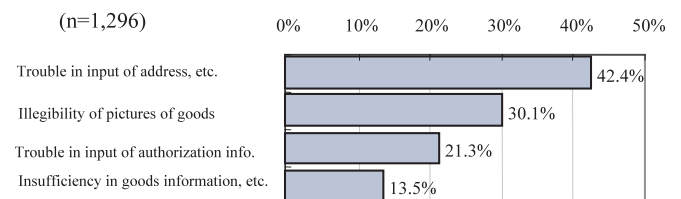


Fig. 2 Reasons of not using EC from cellular phone (Extracted from Ref. Mat. 2).

by focusing on EC services. The graph shows the four main reasons answered in the survey of Ref. Mat. 2. By excluding the top reason which was “PC is sufficient (73.6%).” The analysis of the four reasons has led us to the conclusion that the main problems lie in the following two points.

(1) Inputs Are Troublesome

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When a cellular phone user inputs the name and address to specify the delivery destination of goods purchased via EC, the user should use the cursor key to move across the input fields because the cellular phone does not have a keyboard and mouse like a PC. Also, the entry of characters can take a long time and tends to be troublesome because the user has to use the numeric keys designed for numeric characters or the soft keyboard on the touch panel.

(2) The Display Is Hardly Legible

During web browsing using the cellular phone, the web page is displayed on a 2 to 3-inch screen with a resolution of about 200 × 300 pixels, so the amount of information displayed at a time is considerably limited. The problem resulting from this arrangement is a mutual incompatibility between the legibility and the amount of information displayed. Increasing the legibility of the page reduces the amount of information on the product and vice versa.

The above problems are not exclusive to EC, but may also be applicable to general online services such as online banking and electronic applications to national/local governments.

2. Support for Cellular Phones Using the Web Consultation System

The problems of troublesome input and hardly legible displays described above may be solved by providing a more sophisticated cellular phone input system or by increasing the size or resolution of the display. However, these approaches will become practical only when the functionality of the cellular phone is improved further in the future.

We therefore propose the Web Consultation System as a suitable support system available for cellular phones at the current level of technology. The Web Consultation System implements remote consultation between users in remote locations by allowing them to perform operations on Internet web pages through web browsers (web sharing) and to communicate with each other via video or audio.

In the Web Consultation System, the web sharing is a technology for sharing the control operations of web pages displayed on the browser and is composed of the following two functions.

(1) Input Operation Synchronization

This function synchronizes the input in the text fields, such as the name and address fields, on a web page and other operations on a displayed form, such as list selection and option checking, between the web browsers in real time.

(2) Page Change Synchronization

This function synchronizes changes to web pages, caused by clicking on a link or pressing a button, bidirectionally between the users, in order to ensure that the same web page is always displayed on the browsers of the users.

When the Web Consultation System is applied between a user who accesses an online service using a cellular phone and an operator who supports the online service using a PC at a contact center, etc. the operator can assist the operation of the cellular phone user on the web page by solving any problems in cellular phone usage for online services as described in Section 1 of this paper.

2.1 Proxy Input Based on Input Operation Synchronization

One of the biggest problems in the use of EC services using the cellular phone is troublesome input. The Web Consultation Service supports the input operations of cellular phone users by combining the input operation synchronization function of web sharing and the voice communication function of the cellular phone.

All the cellular phone user has to do is to orally communicate the desired entries for the input fields in the web page to the operator. Then, the operator inputs the entries communicated

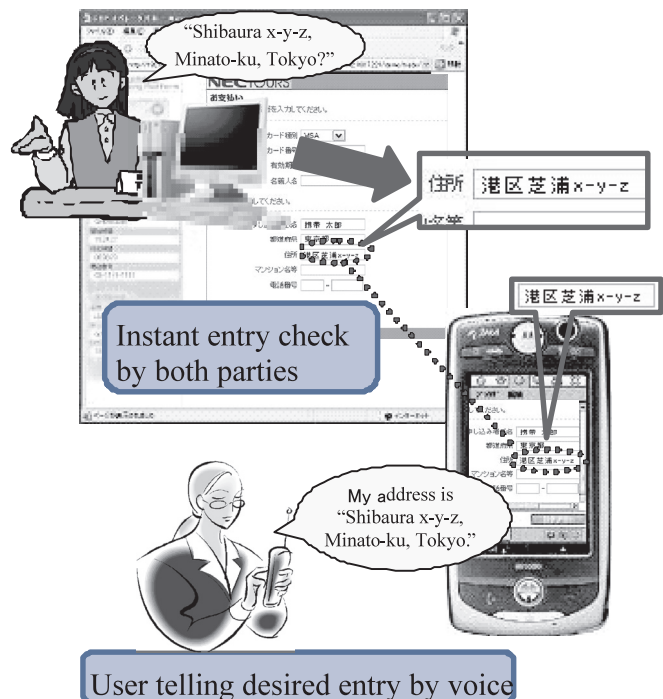


Fig. 3 Proxy input.

by the user in the applicable input fields in the web page, using mouse and keyboard (Fig. 3).

The proxy input by the PC operator, in this way reduces the labor of information inputs on cellular phones and reduces the time required for entries on the form, thereby solving the problem of troublesome input.

To ensure that the user benefits with confidence from this service, the entries by the operator are reflected instantly in the web page displayed on the cellular phone, so that the user can also instantly confirm the actual input made by the operator.

2.2 Web Page Navigation by the Operator

The cellular phone has difficulty in showing detailed information because its display can show only part of the information in a web page. To deal with this problem, the Web Consultation System uses the web sharing function to display the web page displayed on the cellular phone and also on the wider screen of the PC. In this way the PC operator can verbally provide the cellular phone user with the follow-up information on the web page information of the part that is not shown currently on the cellular phone screen.

One of the unique facilities of the web sharing function between the PC and cellular phone is that it displays the display area being shown on the cellular phone screen in a frame in the PC screen. The operator can confirm the actual information viewed by the cellular phone user by referring to this frame (Fig. 4).

In addition, the PC operator can move the frame to the de-

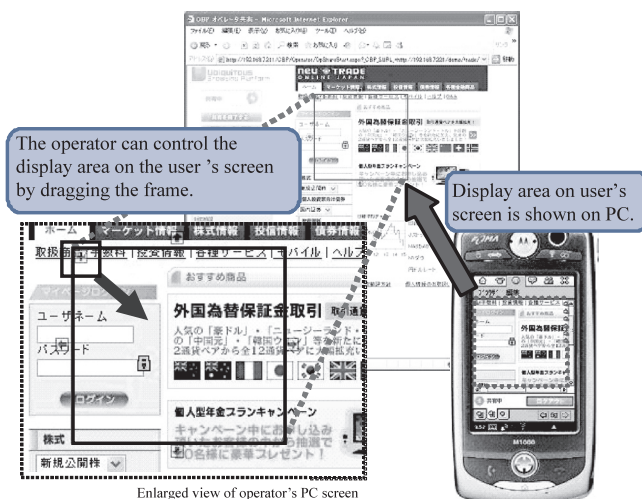


Fig. 4 Display area check.

sired position by pushing or dragging a button on the frame, and the display area on the cellular phone screen is scrolled according to the operator's action. This facility allows the PC operator to scroll the cellular phone screen display area according to the verbal explanation and explain to the user about the information, even for a very complicated web page.

As described above, the Web Consultation System makes it possible for the operator to offer accurate navigation on a web page that cannot be displayed simultaneously on a cellular phone screen, thus enabling the user to obtain detailed information during browsing.

3. Configuration of the Web Consultation System for Cellular Phones

As this system holds the voice communication using the voice call of the cellular phone user, it is essential that the cellular phone is capable of executing voice call and web browsing simultaneously so that the system can be utilized effectively.

To implement web sharing, it is also required that the operation synchronization modules are running on both the cellular phone's web browser and PC's web browser. Also, that both the cellular phone and PC are able to intercommunicate via the web sharing module on the web sharing server, for synchronization of the input operations in the form being displayed in the web page. As the current system describes the operation synchronization module of the cellular phone using JavaScript, it is also required that the cellular phone's web browser is compatible with JavaScript and has a full browser that can access any website.

The following sections describe other functions packaged in the Web Consultation System.

3.1 Web Page Acquisition

The web sharing module receives the web page request from the web browser and transfers it to the website that holds the requested web page. The web sharing module temporarily receives the response from the website and sends it to the respective web browser. The requests from both web browsers are unified in this way in order to prevent the same product from being doubly purchased and to ensure that the same web page is displayed on both browsers.

As the web sharing module works like a proxy Internet, it enables the introduction of web sharing with few modifications actually needed on the website.

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3.2 Security Considerations

The security considerations are indispensable for a technology that implements synchronized remote communications like web sharing. To implement such a remote synchronization technology, it is necessary to consider two aspects of security; the network security and security against malicious operations.

(1) Measures for Network Security

The communications between the web browsers and web sharing server are encrypted by SSL encryption based on HTTPS. This makes it possible to hide the entries in the form and session information from third parties.

(2) Security against Malicious Operations

The system can be set to exclude operations from being shared that are related to the items that should not be known by the operator, such as passwords and credit card numbers. The exclusion of password sharing is set in the default of the system, and other items can be excluded from sharing by inserting a specific keyword in HTML.

4. Applications of the Web Consultation System for Cellular Phones

One of the main applications of the Web Consultation System for cellular phones, which are described in the above, is the goods sale service for cellular phones.

When a user wants to buy goods via a cellular phone, an inquiry can be made to the operator at the call center to obtain more detailed information about the specific goods. The final ordering can be performed by an operator who performs proxy input of the entry form for the user, thereby making it possible to prevent the user from losing the motive for purchase due to complicated, troublesome operations required in the cellular phone input operations.

Other fields of application of the system may include the following:

(1) Online Banking

The system enables the handling of more complicated financial transactions that have hitherto been difficult for traditional cellular phones. As the operator can give optimum follow-up to information that is difficult to explain on the screen alone, the system can support the user in completing the execution of the purchase procedure up to its conclusion.

(2) Support Job

When providing user support to a PC user, who's PC has failed, or to a cellular phone user who has a question on

phone usage, the system can make the support information easier to be understood by the user by offering a verbal explanation at the same time as the web manual display.

(3) Electronic Applications

When a user wants to make an electronic application in the website of a national or local government, the person in charge can provide the user with optimum follow-up information to increase the usability of the national/local governmental service.

(4) Business Support Tool

For example, when a businessperson needs to modify an estimate during presentation by a customer, immediate contact with his or her superior in the office can be made in order to modify the estimate document on the web and then present it again instantly to the customer.

5. Conclusion

In this paper, the authors have identified the problems associated with the provision of online services via cellular phones and propose a Web Consultation System for cellular phones that can solve or reduce the impact of such problems.

At present, the pilot implementation and evaluation of the Web Consultation System for cellular phones has already been completed on FOMA[®] M1000. In the future, we aim to expand the range of the cellular phone models compatible with the system and to apply it in an environment in which dissimilar terminals such as PDA and set-top boxes coexist.

^{*}FOMA is a registered trademark of NTT DoCoMo, Inc.

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