

# Usability Considerations for a Cellular-based Text Translator

**Leslie Barrett**

Transclick, Inc.  
New York, NY 10012  
Lbarrett29@hotmail.com

**Robert Levin**

Transclick, Inc.  
New York, NY 10012  
Robert.Levin@transclick.com

## Abstract

This paper describes a cellular-telephone-based text-to-text translation system developed at Transclick, Inc. The application translates messages bi-directionally in English, French, German, Italian, Spanish and Portuguese. This paper describes design features uniquely suited to hand-held-device based translation systems. In particular, we discuss some of the usability conditions unique to this type of application and present strategies for overcoming usability obstacles encountered in the design phase of the product.

## 1. Basic Application Functionalities

Transclick, Inc. has recently developed a text-based translator designed for implementation on hand-held devices. While such a system is put through many rounds of testing for translation quality, it must also be tested to assess its function as a portable communication device. The idea of evaluating a translation system's deployment environment is a topic that has received little attention, mostly because of its novelty. The focus of this paper will be the usability considerations involved in designing a translation device for use on portable hand-held systems.

In the initial design phase of the Transclick Mobile-Device-based text-translation system<sup>1</sup>, three main usability issues were of concern. These were *manipulation of the keypad* for text-entry, *screen scrolling* for long messages, and *lag time* in translation. Because this application is used for translation, and users are expected to type extensively into the text window on the interface, this application represented a unique usability challenge for mobile-device-interface design. Not only was scrolling a concern, since users would want to check the entire input text before translating, but actual lag-time was a concern as well, since translation was remote-server-based, not local.

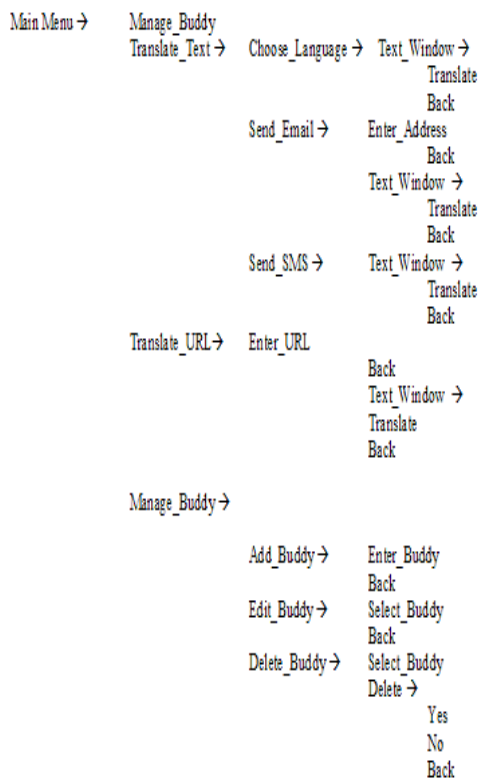
The Transclick cellular application was created in BREW (Binary Runtime Environment for Windows) and loaded onto a Motorola Web-Enabled cellular phone with Verizon cellular service. The Transclick translation application appears as a screen icon, which, once activated, allows translation in three modalities: Basic Text Translation, E-mail Translation and SMS translation. We found, after usability testing, that the main usability problem was navigation among various sub-applications, but that issues involving scrolling and keypad manipulation were minimal.

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<sup>1</sup> Patents pending on dictionary selection and other features of the translation algorithms.

Transclick used three usability testers <sup>2</sup>who were given the Transclick User Manual while using the device. Testers translated text messages, email, and SMS in the languages of their choice. The subapplication taxonomy for the Transclick mobile translator is shown in Figure 1:

Figure 1. Transclick Sub-application Hierarchy



Due to screen size, the Main Menu is scrollable, as is any submenu (e.g. the Buddy List) containing 5 or more items. The BREW/Qualcomm developer’s guide, based on a study by Norman (1991) suggests limiting levels to 2 or 3. This guideline was followed in general with the exception of the Translation action, which takes 4 steps to complete (if the translation is being transmitted via email or SMS). Since other

<sup>2</sup> In this study, the Transclick staff, rather than naïve testers, were the main source of usability value judgments, although the testers were not part of the development team.

studies have also shown a user preference for pagination over scrolling (Tscheligi et al. 2002), we were careful to design a text window at least adequate for completing short paragraphs.<sup>3</sup> This, of course, compromises utilization of maximum font size, but testers did not record font size as a usability problem. The current font-size for most items approximates 8-9 point font.

An example of the text-translation interface, showing the text-input window is in Figure 2.

Figure 2. Text Translation Interface



Testers also reported little trouble with keypad manipulation when following the User Manual closely.

## 2. Hardware vs. Software Functionalities

The Motorola Web-enabled phone has four main functionalities programmed to a circular “mouse” located above the keypad. Figure 3 shows the phone with Mouse functions labeled.

<sup>3</sup> The screen will hold about 100 characters before scrolling is necessary.

Figure 3. Motorola Web Phone



One of the most frequently used actions, scrolling, is found on the “mouse”. Task selection, equally important, is found on the uppermost key, simply called the “select button”. Pressing this key will select an activity highlighted by the scrolling action. Testers found the mouse easy to manipulate, and physically easier to manipulate than the keypad. Some testers expressed a preference for both scrolling and selecting on the mouse.

One issue related to scrolling that some testers found confusing was the scrolling directionality. Drop-down menus in the case of language-pair were scrolled by right-click, whereas other drop-down messages were scrolled by down-click. A unidirectional scrolling function is probably preferable if possible in this type of multi-task hand-held application. Details of the scrolling functionalities are shown in Figure 4.

Figure 4. Scrolling and the “Mouse”



There was some additional concern among all three testers that the green “start” button, a feature provided by most cellular phone hardware makers, was a more natural choice as the “select” button. Testers did not mention the same issue confusing the red “end” button with the “back” button on the top right, however.

In sum, testers found the programming of functionalities to the various keyboard hardware elements relatively intuitive overall. We did not find any usability obstacles in this aspect of the application. In the next section, we will address navigation and discuss why this represented the greatest usability obstacle in the Transclick translation application.

### 3. Problems in Navigation

Bergman and Haitani (2000) contrasted usage patterns between mobile and static devices, concluding that interfaces on mobile devices needed to optimize navigation, reducing the number of steps required to access frequently used items.

As the previous section showed, we programmed frequently used functionalities, like “scroll”, “back” and “select” into the “mouse” (or “joystick”), the uppermost left key and uppermost right key respectively. Back-navigation could also proceed via selection of the bottommost menu item on any action. Two things that our application lacked, however, which are present on most Web interfaces, were a site map and a “main menu” link.

The W3C recommends a site map and a navigation bar as essential elements of easily navigable websites. Because of the space considerations of a mobile device of this kind, however, we decided to omit these and simplify, to the greatest extent possible, the number of elements present on each screen.

Testers noted the greatest usability concerns with differentiating between navigating back one screen and navigating back to the main menu. In the case of Text Translation, when the user has received a translated text, the menu presents the item

“done” on the bottom, which will return the user to the main menu. There is, however, no “back” in this case to return to the previous, untranslated, screen.

This particular issue is actually unique to the translation application. We did not choose to allow the user to save untranslated text due to space/storage considerations, and server use. Users of typical web pages, however, are accustomed to being able to return to any previous page.

Another, related issue that testers noted was the inability to remain in translation mode. That is, they felt that once a particular translation was completed, they should be prompted for another, or, at least returned to a blank text window and not the main menu.

Thus page caching is a desirable web-user function that cannot be included here due to the unique storage-capacity obstacles presented by the phone, but future versions may allow a screen-back rather than full-back “back” function.

### 3.1 Lag Time and Issues in Quantitative Testing

The developers experienced usability lag times curiously not reported by testers as a usability concern. However, reliable data was difficult to gather because the lag times varied considerably and causes could range from cellular transmission in a local area to server problems.

Other more general quantitative usability tests including those discussed in the U.S. Department of Health and Human Services usability testing site (see [http://usability.gov/methods/type\\_of\\_test.html](http://usability.gov/methods/type_of_test.html)) were considered, such as the time to complete a task, the number of errors or problems in completing the task and the number of requests for assistance. Many other usability considerations on this type of device are very similar to considerations of general usability in websites, including issues pertaining to navigation, scrolling and font size.

We found that task-completion time was so heavily affected by turnaround time that testers did not report any factors other than turnaround time as having an effect. No

errors other than translation errors and “no service” transmission errors were reported. Finally, because our testers were equipped with a User’s Guide, as real-world users would be, we counted a “help” request as a failure to complete a task *after* consulting the User’s Guide, rather than the failure to complete a task with no written instructions. None of our three testers requested assistance following this procedure.

## 4. Conclusion

This small study was intended to qualitatively assess basic usability of a text-based translator deployed on a hand-held device. The results were intended to motivate pre-release design modifications. We expect further modifications going forward following real-user feedback. As a result of our three testers feedback implemented a redesign of the “back”-navigation component to perform three different functions. First, it will have a “back-one-screen” option for all actions, second, it will have a “back-to-text-window” option for the Text Translation Output window, and third, it will have a “return-to-main-menu” option for all actions. We look forward to further research by other service providers and usability-based design standardizations focused on hand-held translation devices.

Finally, we were surprised that testers did not report a usability problem with translation times, despite the fact that they can be up to 1 minute for long texts. This may be due to the (comparatively) slower method of data entry on the phone pad, which could consequently slow user expectations of a quick response. We have not exhaustively studied the word/lag-time ratio, but note that it does not increase in exact proportion. That is, a single-word input has a response time of about 3 seconds, but a 10-word input has a response-time of much less than 30 seconds. We note that response times for longer inputs vary greatly, and mostly according to internal considerations of our server’s translation code, not the wireless device or connection.

## References

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BREW/Qualcomm User Interface Guidelines

[http://www.qualcomm.com/brew/developer/developing/docs/80-D4231-1\\_A.pdf](http://www.qualcomm.com/brew/developer/developing/docs/80-D4231-1_A.pdf)

U.S. Department of Health and Human Services Usability Guidelines for Website Design:

[http://usability.gov/methods/type\\_of\\_test.html](http://usability.gov/methods/type_of_test.html)