

Browsing on Mobile Phones

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1. Introduction

The popularity of mobile browsing varies between countries. In South Korea and Japan, the mobile browser is widely used for mobile specific services. In Europe, the popularity of WAP services is increasing all the time, but they still are not in everyman's use. In the U.S., mobile phones are not used for browsing, but people access the full Web with PDA browsers.

Although mobile browsing is not popular everywhere today, it is very likely that ten years from now, most users will connect to Internet and use a mobile browser as an everyday tool. This requires that the mobile browsing user experience improves: connection speed, number of services, and usability must increase, while cost per byte must decrease.

In this paper, we shortly present some aspects of mobile browsing usability.

2. Mobile browsing usability

The mobile browsing usability consists of several layers (Fig. 1), but the user cannot distinguish which

layer causes a usability problem. For the end user, mobile browsing is a holistic experience, and all layers should work seamlessly in order to be usable.

When designing a mobile device, the importance of the browser application dictates how much the hardware design and general user interface style is browser specific. If the design includes a large touch screen and a stylus, interaction with the browser is a lot easier. Also a full QWERTY keyboard would help entering Web addresses and filling in Web forms. If browsing is not the key application, it is more important to provide a compact device, which can be used with one hand. On some non-touch-screen devices, there are specific keys for accessing the browser home page, leds for showing the connection status, or a hard key for Back functionality.

Designing a mobile browser for a small screen and with limited input mechanisms is a challenging task. Because most devices are used in various countries, it is important to understand the different mobile browsing cultures and the earlier mobile browsing experience of different target user groups. A good



Figure 1. Three layers, but holistic usability

mobile browser should function smoothly with all types of content, both with the content optimized for mobile devices and with the Web content designed for PC screens.

When designing services for mobile use, one needs to know which content is relevant to be used on the move, and the principles for a good site structure and user interface [1,2].

Both content and browser developers should understand the nature of mobile context and user needs in mobile situation. They should also be able to test their product in a mobile context, which is much more laborious than doing it in the lab. It is important to realize which features can be tested in the lab, and which in the mobile context. We have run a user study in mobile context where we wanted to monitor user's attention to the mobile phone and the interaction with a mobile browser [3,4].

3. Browsing the full Web while on the move

Services optimized for mobile use require content developers to identify the services that people would use on handheld devices while on the move. Many services that would be most relevant for mobile use are location dependent, such as tourist information or maps, time dependent, such as train timetables, and/or very personal, such as information about hobby club meetings. This means that a service should be very

flexible depending on these different factors. Often, it is too expensive for service providers to build these context sensitive mobile services. As long as the target user group is not big enough, this leads to lack of services that would best serve a mobile user.

The reason for using the Web is simply that people know Web addresses that they use on the PC, but do not know the addresses of corresponding mobile sites. So they go to the URL they know with a mobile browser and find a link to the mobile site from there. If the browser is not capable of showing the Web page, the user never reaches the mobile site.

We believe users in most countries need to get access to the full Web, and the 3G network together with relatively good phone screens makes it possible to gain a fairly good user experience on full Web browsing even today. We hope mobile optimized content will increase after content developers notice that the population of mobile browser users grows and that their Web site is accessed with mobile browsers.

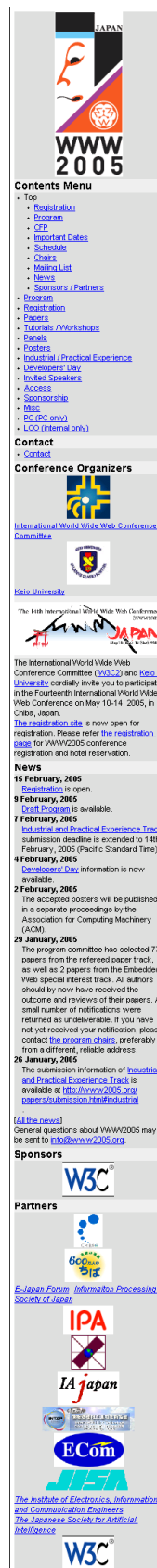
3.1 Narrow layout

Special information visualization methods are needed when showing large Web pages on small screens to solve the keyhole view problem. The current state of the art Web browsers on mobile phones use a special narrow layout as the default viewing mode. Opera calls it Small Screen Rendering and NetFront browser calls it SmartFit. We call it narrow layout, since the content forms a narrow and tall tube. In all solutions, the content is shown in the order it appears on the markup file, and all content is typically scaled to fit the screen width.



Figure 2. Original layout on Opera (up)

Figure 3. Narrow layout on Opera (right)



We have run several user studies on narrow layout, one documented in [5]. The main benefit of the narrow layout is that text is easy to read: if a text column were wider than the screen, it would be all too hard to read it. Also, it is simple just to scroll down and eventually the content you are looking for comes to the view.

Unfortunately, according to our usability tests, there are also several problems with the narrow layout of Web pages. The worst problem is that when wide images that contain detailed information are scaled to fit the screen, the details in the image cannot be seen any more. For example, texts in wide images become unreadable. A second nasty problem is with data tables, e.g. timetables. When a row does not fit onto the screen, it flows to the next row, and it is hard for users to interpret which data goes together.

Also the order of the content in the narrow layout causes difficulties for end users. It is hard to foresee at which point of the long tube the wanted information is located, so one constantly needs to spot some keywords or items in the content on the screen while scrolling. This means the scrolling cannot be too fast. On the other hand, because the content tube may be really long, scrolling should be fast. The faster scrolling, the more probable it is that the user misses the needed information and has to scroll back and forth to locate it.

On typical Web pages, the leftmost column contains a list of links, and the main content is located in the middle of the page. On the narrow layout, the user has to scroll through the list of links before getting to the main content. When moving within one site, the list of links is soon irrelevant and scrolling through it on every page becomes irritating. A related problem is that because the beginning of the page on a site looks very much the same, the user does not know on which page s/he is. If the link list provides the link that the user already selected, users think that the selection did not succeed and select the link again. We have seen many users giving up the test task because of this problem; they claim that the browser does not work and has got stuck.

3.2 Original layout

Because of the severe usability problems of the narrow layout, the narrow layout browsers also provide a mode where the page is shown in the original designed layout, very similar to that on the

PC. The user typically needs to switch the viewing mode during the browsing session depending on the content being viewed. In original layout, it is easier to see the details also in large images and interpret data tables. Also, if the user knows the page from the PC, s/he can navigate to the wanted piece of information with minimal scrolling effort.

The original layout is not problem-free, as you can imagine. The worst problem is that reading wide text columns is all too laborious, if the user has to scroll back and forth each line. Also, because all content is as big as on the PC, the page size is big and scrolling effort may increase. Getting to the main content on a typical Web page requires less scrolling, however.

The usability problems of viewing Web pages in original format are very much the same as with any 2-dimensional content that is larger than the screen, no matter what the screen size is. Several information visualization techniques have been invented for these cases, but only some of these focus & context methods are applicable for the tiny displays, modest input devices, and limited CPU power of mobile phones.

3.3 Optimal layout

It is clear that improvements and inventions are needed to make Web pages easily viewable on the small screens of mobile phones. We believe a modified original layout will provide the best user experience for browsing the full Web with limited devices.

If Web site authors want to have their sites viewable also on small screens, we recommend the following top 3 guidelines:

1. Avoid large objects that need to be visible at one glance
2. Avoid using small text in images
3. Keep the pages light

4. References

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