

WAP Usability

Déjà Vu: 1994 All Over Again

Report from a Field Study in London, Fall 2000

By Marc Ramsay and Jakob Nielsen



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Executive Summary

In late 2000, Nielsen Norman Group sponsored a field study of WAP users in London. We gave 20 users a WAP phone and asked them to use it for a week and record their impressions in a diary. We also performed traditional usability tests with users at the beginning and end of the field study. We gave half of the users an Ericsson R320s and the other half a Nokia 7110e.

We ran this study in London because of the advanced state of the United Kingdom's mobile phone market relative to the United States. The U.K.'s WAP services have been under development longer than those in the U.S. and were also more widely deployed at the time of our study.

Figure 4 shows the bottom line of our study: When users were asked whether they were likely to use a WAP phone within one year, a resounding 70% answered no. WAP is not ready for prime time yet, nor do users expect it to be usable any time soon. Remember, this finding comes after respondents had used WAP services for a week, so their conclusions are significantly more valid than answers from focus group participants who are simply asked to *speculate* about whether they would like WAP. We surveyed people who had suffered through the painful experience of using WAP, and they definitely didn't like it.

At the same time, when users were asked whether they might get WAP within three years, the "no" responses dropped to 20%. Users obviously see potential in the mobile Internet. It's just not there yet.

We tend to agree with our users' assessment: Mobile Internet will not work during 2001, but in subsequent years it should be big. We thus recommend that companies sit out the current generation of WAP but continue planning their mobile Internet strategy. Don't waste your money on fielding services that nobody will use; as we document in this report, WAP usability remains poor. Instead, plan on launching mobile services as soon as the next generation of devices ships.

WAP DOESN'T WORK

Our conclusion that WAP doesn't work is based mainly on our examination of timed task-performance studies. We asked users to accomplish simple tasks with their WAP phones, both at the beginning of the week and at the end. Here are some of the findings (Figure 6 shows additional results).

<i>Task time in minutes</i>		
Read world headlines (from built-in portal)	1.3	1.1
Retrieve <i>The Guardian's</i> headlines	0.9	0.8
Check local weather forecast	2.7	1.9
Read TV program listing	2.6	1.6

In the above table, the first number indicates the mean number of minutes users needed to perform the task in the beginning of our study and the second number indicates the mean measurement at the end of the study.

As the table shows, our basic conclusion is that WAP usability fails miserably; accomplishing even the simplest of tasks takes much too long to provide any user satisfaction. It simply should not take two minutes to find the current weather forecast or what will be showing on BBC1 at 8 p.m. We informally asked a group of Internet experts how long they thought these tasks should take (before showing them our data), and most estimated a task time of less than 30 seconds. Considering that WAP users pay for airtime by the minute, one of our users calculated that it would have been cheaper for her to buy a newspaper and throw away everything but the TV listings than to look up that evening's BBC programs on her WAP phone.

A second conclusion is that good user interface design can alleviate some of the problems. It was notably faster to retrieve current headlines from *The Guardian* newspaper's website than it was to use the standard portal provided with the WAP phones. It may be that these built-in portals feel secure in their monopoly position and thus don't allocate as many resources to usability as an independent service. However, in the long term, users will go where they are well treated and they may decide to bypass the "walled garden" completely if it doesn't provide sufficient quality.

A final conclusion from the task times is that after using the system for a week, users' performance improvements were appallingly low. In most other user interface research, users typically perform poorly when exposed to a new design. After all, they have to learn it first. After a period of experience, however, users typically achieve a much higher level of mastery and accomplish the same tasks up to 10 times faster. In contrast, WAP seems to be so mysterious and impenetrable that users don't learn much even after substantial use. Of course, it may be that user performance would improve gradually over a period of several months and that they would eventually achieve tolerable speeds. However, in the real world, such delayed expertise is unlikely to develop since most users would give up completely after a few days of difficulty with the service.

DÉJÀ VU: 1994 ALL OVER AGAIN

It's striking how much our findings from this WAP usability study in late 2000 resemble several Web usability studies we conducted in 1994 (the age of Mosaic). It's truly déjà vu: Many of our conclusions are the same as those we reached at the dawn of the Web. Hopefully, mobility's evolution will follow that of the Web: When things got better in subsequent years (especially around 1997), many more users got onto the Web and commercial use exploded.

The greatest problem users had with WAP during our field study was the inability to connect to services because of a variety of failure modes—networks were down, the phones crashed, or the service itself was down. Users don't know and can't find out. All they get is an incomprehensible error message. This is quite similar to the state of the Web in 1994 when it was extremely common to get disconnected. It is *still* common to fail to connect to a website, and it is still hard for average users to find out what to do about these failures. Let's hope that WAP does better in the future. For now, it is too unreliable in terms of users getting *any* information. Connection failures are particularly annoying for WAP users since they are paying for airtime. If you spend two minutes trying to get something that is not there, you will still get charged for those minutes. Being charged for something that doesn't work seemed unfair and unacceptable to the users.

The usability of current WAP services is severely reduced because of a misguided use of design principles from previous media, especially principles of Web design. This

situation is exactly equivalent to Web design problems in 1994, when many sites contained “brochureware” that followed design principles that worked great in print (say, big images) but didn’t work in an interactive medium.

Figure 15 in this report shows an example of a WAP design from Excite that uses four screens to present two screens’ worth of material. Such lavish design may work well on the Web if users have a big-screen PC, but on a small-screen device, designers must boil each service down to its essence and show much less information.

Our users often faced unclear labels and menu choices written in special language invented by the WAP designer. NewSpeak was rampant in the Web’s infancy, and many sites invented cute vocabulary for their services in a misguided attempt to brand their site with proprietary language. This didn’t work. Users want no-brainer design that uses standard terms for standard features. The need for simple language is even stronger in WAP design, because there is no room to explain non-standard terminology with roll-over effects, icons, or captions.

Several WAP services that we tested were unnecessarily hard to use because of a mismatch between their information architecture and the users’ tasks. For example, TV listings were organized by television network, meaning that you would have to go to several different parts of the service to find out what was on at 8 p.m. (one screen for BBC1, another screen for BBC2, and so on in an annoyingly slow sequence of screens). Very precise task analysis will be necessary for WAP services to succeed. Unfortunately, task analysis is a black art as far as most people are concerned and it is the least appreciated part of usability engineering. The traditional Web also suffers from poor task analysis, with many sites structured according to how company management thinks rather than how users typically approach their tasks. Although poor task support is a serious usability problem for a big-screen website, it is a usability catastrophe for a small-screen WAP service. With the big screen, users can see many more alternative options, and thus it is not so critical that designers pick exactly the right ones at each step. For WAP: Be right or be dead.

On several occasions, we observed users failing at tasks because they did not scroll their WAP screens to see content and menu options that were “below the fold” (i.e., not visible on the first full screen). Again, this exactly duplicates one of our main findings from the 1994 Web usability studies. Back then, very few users scrolled the Web pages, so navigation pages failed if any important options were invisible. In later Web studies, we observed that users had begun to scroll, and thus it is no longer a usability disaster to have a home page that scrolls over two or even three full PC screens. It’s possible that WAP will evolve in similar ways. In a few years, users may start to appreciate the need to scroll and decide to check out multiple screens before making their choice. We can only guess as to what will happen in the future, but our assessment is that scrolling will be less common in WAP navigation than in PC-based Web navigation. It is simply less pleasant to scroll through many small WAP screens than to peek at what’s “below the fold” in Internet Explorer.

In the Web’s infancy, outdated content and incomplete services were a major problem as companies launched sites without the necessary commitment to maintenance or professional editorial support. WAP is hitting that same wall. Users were often disappointed by newspaper sites that displayed the morning headlines late in the afternoon, sports sites that didn’t have the scores of recent games, and services that provided sporadic, incomplete information rather than full listings of what users wanted. The Web still has many unprofessional sites that were apparently launched and forgotten about. But most big sites are now committed to frequent

updates and comprehensive content. Let's hope that mobile Internet services get to this point as soon as possible.

Can you trust what you read on the Web? On most sites, probably not. Users are justifiably cynical about trusting websites and often reject new sites after looking at their home pages for only a few seconds. The better sites have learned their lessons and work hard to gain user trust, and there are even services like Epinions that are based solely on offering trustworthy advice through independent reviews (disclosure: Jakob Nielsen serves on the advisory board for Epinions.com). In our study, WAP users expressed a similar need for trusted advice. They are not going to dine at a restaurant just because it is listed on a WAP service. They want someone they can trust to say how good the dinner will be.

It's not surprising that WAP users do not want to read a lot of text. After all, the screens have poor typography and it is painful to have to scroll through page after page of small snippets of text and try to piece them together in your mind. In several earlier studies, we also found that Web users don't want to read much on computer screens. Our typical advice is that when you write for the Web, you should cut an article's word count in half relative to what you might write for print. On WAP, brevity becomes even more important. Cut. The. Words.

One WAP usability finding that we have not seen on the Web was a lack of clear differentiation between services. As one of our users noted when comparing the *Financial Times* and *The Guardian*: In the real world, you will have trouble finding two more different newspapers. On WAP, however, you can't tell them apart. Websites usually suffer from the opposite problem: They are much too different. With WAP, the service's expressive power is severely reduced because of the need to squeeze everything into extremely short menus and present all content in ultra-short condensed versions. Service providers must cultivate a new appreciation for language and hire copywriters who can develop a distinct voice in a minimum word count. This will be the real way to distinguish WAP services.

KILLING TIME IS THE KILLER APP FOR MOBILE

Promising mobile Internet services seem to follow a bi-modal distribution with two dramatically contrasting approaches that both work well with users:

- Highly goal-driven services aimed at providing fast answers to specific problems. Examples include: "My flight was canceled; get me a new airline reservation" and "What's the weather?"
- Entertainment-focused services whose sole purpose is killing time. Examples include gossip, games, and sports services. Gossip is particularly suited for WAP because the content can be very brief and still be satisfying.

Mobile services must target users with immediate, context-directed content. General services like shopping are less likely to succeed in the mobile environment. Indeed, in our list of services bookmarked by users (Figure 11), shopping hardly figures at all; sports and entertainment are the two big categories.

Killing time is a perfect application for mobile devices because they are readily available when users are waiting around for something to happen. At the bus stop? Play a short game. In line for something? Read a paragraph of gossip. Stuck in traffic that doesn't move? Check the scores of your favorite teams.

HANDSETS HAD OK USABILITY

One thing that our study did *not* find was a series of horrible usability catastrophes in the WAP handsets themselves. Too bad. It would have been wonderful to simply report that Ericsson and Nokia were guilty of some design stupidity and conclude that WAP would work as soon as the companies started shipping redesigned phones.

In fact, people had no trouble using the phones.

This finding should come as no surprise. Both Ericsson and Nokia have long-established human factors groups that are heavily involved in the user interface design for their respective new devices. For several years, Ericsson even had one of its usability experts on the board of the Usability Professionals' Association (the leading professional society in the field). They know what they are doing, and it shows, especially compared to many of the shoddy consumer electronics products released by certain other vendors.

This means that the usability problems we found were inherent to WAP and cannot be fixed with a new phone design.

However, one issue should be addressed in future generation of WAP phones. The "back" feature should be fixed so that it immediately redisplay the user's previous location. It is unacceptable to expose users to further connection delays as they retrace their steps back through an unsuccessful navigation path. The phone must cache many previous page views and render them immediately. Also, when backtracking, users should be taken to their previous location on each page.

The main problem with the WAP phones was not their design but the very fact that they are telephones. The user experience will be much better on devices that are constructed with information display and manipulation as the main design goal. For example, direct manipulation is a dramatically better way to pick from menu choices and pop-up menus than a scroll wheel or indirect buttons that are placed away from the screen. Improved mobile devices with a deck-of-card form factor and the entire surface area dedicated to screen space will hopefully start shipping in 2001.

Introduction

This report looks at the results of a usability evaluation of WAP service in the fall of 2000—one year after its launch. It is fundamentally an observational evaluation concentrating on the users' experiences rather than the enabling technology itself. Technical issues, though of great importance, are largely outside the remit of this report. Where technical detail is useful, we offer it only to the extent needed to help the reader more fully appreciate the users' comments.

To a large extent, the report's structure follows the users' chronological experience of using the phones. The report begins with a brief overview of their overall comments about WAP and then goes on to look at when and where they used the phones, their comments about phone use, and the ease with which they were able to connect to the WAP service.

The first section describes our methodology for collecting user observations, which form the basis for our findings and conclusions. This is followed by a section discussing our general findings on usability issues in the current WAP technology.

The third section looks at navigation. We first look at issues related to the main menus found on the network portals' home pages, then examine issues related to how options are described to the user (labeling), the use of the "back" button, the availability of search facilities, and bookmarking.

In the next section, we focus on the information that users managed to download. For ease of reference, we subdivided the section to group similar types of sites together (news or sports, for example). The focus of each subsection is user comments on the quality of the information they found and the ease with which they found it.

The final two sections look at the users' expectations of WAP in light of their assumptions about its relation to the Internet. We first show how this aspect colored users' experience of WAP from the very beginning. In the section that follows, we expand on remarks users made early in the report and how those remarks relate to user expectations described in the preceding section. We end the report with a brief conclusion.

We make references throughout this report to a rival format that is more established than WAP, which is growing almost exponentially: NTT DoCoMo's i-mode data service. Although currently available only in Japan, this may change. I-mode's growth has been, and is, phenomenal. It was launched in February 1999 (seven months before WAP) and managed to get to its first million subscribers by the end of its first month online. By April 2000, i-mode's subscribers had risen to more than six million and, as of November 2000, its subscriber base is just under 14 million. Current projections are 21 million subscribers by the end of 2000 and 60 million by 2002 (the population of Japan is only 120 million!).¹ WAP's users are currently estimated at somewhere between half a million and two million (not all the networks publish their figures).

I-mode, however, operates very differently from WAP and we identify key differences throughout this report. Our object is not to compare the systems, but rather to show

¹ Dr. John Ricketts, OgilvyInteractive,

that some usability issues that currently undermine WAP have solutions that can be seen in how i-mode operates.

STYLISTIC NOTE

The report's structure and our extensive use of user comments inevitably leads to a sense of repetition. Although this is typically undesirable, here it is difficult to avoid without losing the authentic voice and experience of the users. We hope readers will accept this as a reasonable exchange and one that facilitates a good read.

Methodology

USERS

For any study, the selection of users should match the expected user population as closely as possible. In the case of WAP, the current user group is comprised of early adopters. However, our study was aimed at evaluating WAP's current usability *and* its potential. With this in mind, our user group includes types who would not be considered early adopters, but who would feature in the "early majority" category of uptake. This is the group WAP must attract if it is to have any chance of future success.

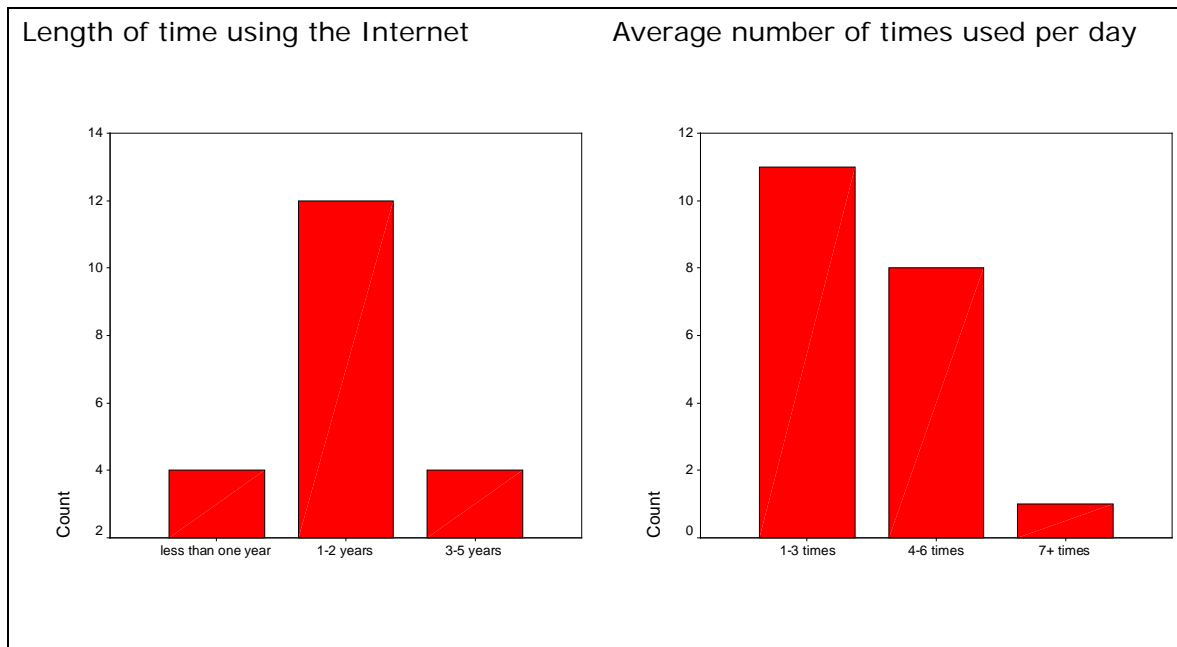
In terms of numbers, we chose a cohort of 20 users. Although this is a relatively small sample, it is sufficient to allow us to draw broad conclusions both from users' experience with the phones and from their answers to our questions.

Evidence from the success of i-mode² suggests that this group is largely made up of the younger population. Accordingly, we generally selected users based on three main criteria: they were between 20 and 40 years old, had mobile phones, and were interested in WAP phones, but had yet to use or see one. Because excerpts from individual testimonies form an important part of our report, we offer a profile of users below. The users were all volunteers and received no remuneration.

We originally selected an equal number of male and female users. However, one user dropped out at the last minute and the only replacement available happened to be male. All users had some Internet experience and were chosen to reflect an equal mix of naïve and experienced Internet users. Although the users described themselves as either expert or novice Internet users prior to their selection, their answers to questions during the study produced a rather more complicated split. This undermined our attempt to include even numbers of novices and experts in the study. As Figure 1 shows, nearly half of the users had been using the Internet one to three times a day for one to two years.

² Hartman, Ragnevad and Linden, Lessons from i-mode, Baskerville Corporation, May 2000

Figure 1: Internet experience of the study's users



We carried out our research in the field, which, in most cases, meant either the users' workplace or home. We did this largely on the grounds of expediency. Because all of the users were fully employed, we had to conduct usability sessions at times that suited them. Inevitably, this encompassed lunch hours, early evenings, and weekends. As a general rule, the field researcher always offered to go to the user. This was partly a matter of courtesy; it also permitted greater punctuality since it was incumbent on the researcher to arrive on time. This avoided the possibility of knock on effects should more than one user meeting be arranged on any one day (which was typically the case). An additional advantage was that, because most meetings took place in the users' environment, the sessions were more relaxed.

We invited users to describe their experience using the phones. Their testimony forms a considerable proportion of this report. We also used controlled experiments, such as setting tasks for the users to perform, to assist in collecting comparable results. However, we gained more subjective evidence by listening to and watching users perform tasks. We invited the users to comment on what they were doing if they wished and we noted any problems that the users had or other points of interest as they occurred. At the end of the session, we asked specific questions to clarify or expand on what had taken place. This information was very useful when it came to interpreting user comments.

STUDY USER PROFILES

Most of the users were between 30 and 40 years old. Figure 2 shows additional details to give the reader a sense of the individual behind the testimonial excerpts that follow.

Figure 2: Study user profiles

Richard. Media executive 50+ years old. Nokia 7110e/Orange
Nick. Marketing. 20+ years old. Nokia 7100/Orange
Anne. Solicitor. 30+ years old. Nokia 7110e/Orange
Anna. Mother. 30+ years old. Nokia 7110e/Orange
Gregory. Lecturer. 35+ years old. Nokia 7110e/Orange
Ben. Television executive. 39 years old. Nokia 7110e/Orange
Thomas. Solicitor. 35+ years old. Nokia 7110e/Orange
Belinda. Student. 19 years. Nokia 7110e/Orange
Jess. Marketing Manager. 29 years old. Nokia 7110e/Orange
Jo. Legal Secretary. 28 years old. Nokia 7110e/Orange
Ruth. Writer. 41 years old. Ericsson R320s/BTCellnet
David. Caterer. 40+ years old. Ericsson R320s/BTCellnet
Philip. Entrepreneur. 30+ years old. Ericsson R320s/BTCellnet
Charlotte. Doctor. 35+ years old. Ericsson R320s/BTCellnet
Mary. Journalist. 36 years old. Ericsson R320s/BTCellnet
Isabel. Administrator. 35+ years old. Ericsson R320s/BTCellnet
Lionel. Teacher. 50+ years old. Ericsson R320s/BTCellnet
Arthur. Lecturer. 35+ years old. Ericsson R320s/BTCellnet
Andrew. Marketing Executive. 24 years old. Ericsson R320s/BTCellnet
Casey. Hairdresser. 35 years old. Ericsson R320s/BTCellnet

DATA COLLECTION

The results of the study are shown in the report below. The results are based on the outcome of a usability study we conducted during August and September 2000. Our methodology is based on an observational evaluation of the users performing preset tasks on WAP-enabled phones before and after they spent a week alone with the phones. These tasks were timed. Users completed questionnaires (before and after the week spent with the phones) to provide additional quantitative material. However, the bulk of the report is qualitative, comprising the users' comments as recorded on a tape recorder during the debriefing sessions at the end of their week with the phones. We gathered this material by asking the users to keep a diary of their week. When we asked users to recount their experiences during the debriefing, we encouraged them to refer to their diaries. They could either quote from them directly or simply use them to jog their memories. We sometimes asked users questions along the way when clarification or elaboration seemed useful. When the users had finished their account, we asked them further questions if appropriate.

We derived the style of the usability report from two distinct disciplines. The first, as described above, is familiar to those versed in the evaluation techniques practiced in traditional usability engineering. The second approach gives much weight to personal

testimony as a source in its own right. Direct observation of user behavior is the best method for analyzing the details of a user interface design and deciding how to improve the design in future releases. Personal testimony is better for collecting insight into lifestyle issues and analyzing the impact of a system on the individual. Because WAP and mobile Internet in general are inherently very personal, it made sense to make a large proportion of this study dependent on participant's use of the devices when they were on their own. We thus spent a relatively small part of our efforts collecting data under controlled conditions with set tasks. Even so, the direct observation of user behavior under controlled conditions was invaluable for getting a deeper insight into how the user interface impacted participants' use of WAP.

We selected this somewhat unusual combination of approaches for two reasons. First, the field researcher has a background in documentary filmmaking for British television and researched a book about the British police force using similar methods. This has given him considerable experience in gathering testimony from a wide range of people. He has honed techniques such as active listening and careful questioning to elicit testimony from individuals as naturally, impartially, and accurately as possible. The second reason arises from the researcher's studies exploring aspects of human-computer interaction design and methods of evaluating user interface usability. Bringing these contrasting approaches together is an unusual step, but provides a rich source of data for interpretation, both by our own team and by readers: we invite you to read between the lines. In an attempt to facilitate this, our comments must fulfill two functions at once: formal analysis and commentary that links user testimonies.

No interview between a professional and a layperson is entirely impartial. Even when interviewers pay close attention to impartiality, partiality returns when the material obtained is collated, edited, and presented. The researcher brought all of his experience to bear to at least reduce, as far as possible, his influence on the data collection. The user quotes are all direct, as recorded on audiotape. It is neither practical nor desirable to include everything users said or every word they used to say it. However, we have kept the extracts shown as close to the users' accounts as possible. Significant internal edits are shown as "... ." In all other cases, we've recorded here the words as spoken with only the odd word added (such as a missing preposition) or removed (usually when the user repeats a word or temporarily loses his or her way). The result is that the points sometimes take a little longer to make. However, we hope that by allowing the users' voices to come through, the report conveys a genuine sense of the users' experiences, thereby enriching the findings of this research.

A balanced number of quotes taken from each user would have been ideal. However, some users consistently put commonly held views better than others. This accounts for any numerical imbalance in the report. The sense of the extracts remain—in the researcher's view—true to the experiences of the user group as a whole. The emphasis of this report is the users' experiences. We gave considerable attention to preserving not simply what the users said but also the way they said it.

This qualitative data is underpinned by quantitative data drawn from questions we put to the users. We also gathered data from the records of how long it took users to perform preset tasks. The questionnaires were incorporated into two rather structured interview sessions. The advantage in this was that it let us conduct each session in a similar manner. This was important since the research period lasted two months. It also helped the users take their role more seriously by imparting a sense

of formality to the proceedings (though not so much as to make them feel unnatural). We applied unstructured interviewing techniques at the end of the second session. This was a useful exercise in that it allowed us to follow up on particular points or problems that users experienced in a little more detail where appropriate.

We framed the questions in a variety of ways, but most were closed and used Likert scales, ranked orders, or simple checklists (see Appendix 1). Some questions were open. The advantage here was that the users were left to make their own mind up about what qualities they identified, rather than being led by the available options. We assigned values to individual responses and then collated and assessed them in terms of the frequency with which the same responses occurred.

We created the two questionnaires to give a picture of user expectations before and after using the phones. Given the relatively brief time available, we kept the questionnaires deliberately short: the first was two pages long and the second, three pages. Each took about five minutes to complete. To the extent possible, we ordered the questions in a progressive manner that moved from the general to the specific in order to avoid having sequential bias affect the users' answers.

Once the questionnaires were completed, we converted the results to numerical values and entered them into an Excel spreadsheet. We then imported this into a statistical software package—the Statistical Package for Social Sciences (SPSS). We discussed the form and eventual use of the data with a statistician before the questions were finally framed. This also gave us an opportunity to try out the questions before they were put to the users and thus we avoided including inappropriate questions and resolved ambiguity in the ones that remained.

Our observation of the users took two distinct forms. First, we asked them to perform preset tasks (Appendix 2). We devised the preset tasks with two purposes in mind. The first was an attempt to see to what extent the users improved in efficiency after having had the phone for one week. To do this, we gave users six tasks, which they repeated in the final session. We also added three additional tasks to the final session. We designed these tasks to test how familiar the users had become with WAP over the week they spent with the phones. The tasks were chosen to provide users with information that was either locally or personally relevant to them. Hence, we asked users to find travel information for their journey home; a local restaurant; and a sports result from the previous evening. These were also features that we felt were important to the eventual success of WAP in the longer term.

The second reason we asked users to perform preset tasks was to attempt to get them to a similar standard of familiarity with the phones and ensure that they were confident using them. The reasoning behind this was that we wanted to see which types of services attracted the users. This would have been difficult if too many users failed to come to grips with even the most basic levels of WAP functionality. Because public perception of WAP was poor and expert opinion frequently pointed out WAP's poor service to users, this was clearly a potential problem.

In this research study, we could have chosen to look more closely into the problems of handset design and functionality. However, we decided not to because the imminent introduction of a higher level network (GPRS) and the constant re-invention of handsets indicates that these aspects of functionality are, to some extent, being addressed. What is not so obviously about to change, however, are the types of data users want; the way in which they want to see it displayed; and, more fundamentally, the way in which they find it.

During the user-selection process, it became clear that the users had only so much time to devote to using the phones. Our goal was that they use the phones between 30 minutes and one hour each day; we suggested that they break this time up into several smaller units. Our reasoning was that—given users' time limitations and the declared objectives of the study—it was better to break up the time than risk having many users stop using the phones before the week was up and thus fail to explore what WAP has to offer. While the initial exposure to the user interface of a new device is an entirely legitimate focus for research, our study was aimed at looking beyond this aspect of usability, toward the future of WAP. However, even though we helped users achieve a relatively equal state of proficiency with the phones by the end of the first session, this did not eliminate basic usability problems; far from it. Problems of connectivity and handset navigation existed throughout the study. Indeed, the very prevalence of these problems suggests that had we not given users a basic grounding in how to use the phones, they would not have gotten far at all in the week that they had them. The result would have been a lost opportunity to gather valuable data.

We showed users how to use the phones, demonstrating basic functions such as turning the phones on and off and finding world headlines from the home portal, which was the first preset task. The user was then given the phone and asked to repeat the task. The objective was to build user confidence early and then to build on that. Subsequent tasks introduced key techniques one by one.

Task two (looking for TV listings) was an everyday task that was accomplished in much the same way as task one. The difference was that the user had to select a different option from the main menu and follow it through to get the required information required (in task two, finding out what was on BBC1 that night at 8 p.m.).

Task three, looking for the headlines on a second portal, introduced the concept of moving away from the home portal and choosing a different portal to search from.

Task four, looking for the headlines on the *Guardian* WAP site, introduced bookmarking. The user saw how bookmarks could be used and how they could bookmark sites for themselves.

The fifth task simply asked users to type in a WAP address:

<http://somerwherenear.com>. We chose the site for two reasons: its name was long enough for us to judge differences in individual users' speed, and because it contains unusual characters (forward slashes). The objective of this task was to ensure that the user understood how to type in characters—something users would need to know when they used the phones on their own (there are often text boxes that users must fill in before sites will provide requested information). We could have left this for users to work out on their own, but again, we wanted users to penetrate as far into WAP services as possible. As it turned out, all users were able to do this quite easily and thus the task gave us an indication of how long it takes to type in data.

The final preset task required users to find the local weather forecast for that evening and to bookmark it. This summed up all the lessons learned in the previous tasks and was intended to leave users with a sense of confidence about using their phones. This proved successful. We gave all users contact numbers should they need help, but only one user called on one occasion to get help with what proved to be a technical problem with the phone.

Before leaving the users with the phones, the researchers asked them if they had any further questions. He then gave them a copy of the handset manufacturers' guidelines for using the phone's WAP facility and a brief crib sheet he'd written that detailed the key operations that they had just learned (Appendices 3 and 4). This approach clearly rules out any analysis of the basic handset operations. However, as stated above, there was only so much that users could achieve in one week. The aim of this study was to see what the users made of the WAP-enabled services rather than evaluate the reasons why they were perhaps never able to get that far. Indeed, had many users fallen at this first hurdle—and there is every indication that they would have—the value of the data collected from those who were able to penetrate the “delights” of WAP would have been severely constrained. Because our study's user group was already somewhat small (20 people), significantly reducing its size would have made it difficult to interpret the data.

Before moving on, it is also worth pointing out that if we'd left users to their own devices, the results would also have been difficult to read. Each user would have started with differing levels of initial experience to inform their first tentative steps using the WAP-enabled phones. This would have created significant methodological problems when it came to interpreting the results.

So, to summarize, while looking at the users' success and failure at understanding the most elementary steps of using the phones would have been a legitimate usability study, it was not our objective. For this reason, we prepared the users and brought them to a similar standard at the start; their progress thereafter became the focus of the evaluation. We were not focused on how to design an easy-to-learn WAP phone. We were interested in deriving user-centered lessons to drive companies' mobile Internet strategy.

THE PHONES

A total of four phones were used in this study. Since each user had one phone for a week, the whole research period spanned five weeks. Two different models of phones were used for this evaluation—the Nokia 7110e and the Ericsson R320s, which were two of the most sophisticated phones available at the time of the trial. Each phone cost £130 (US\$190) with a one-year contract with the telephone network. WAP 1.1 compliant micro browsers supported both phones. The screen sizes were relatively large. The Nokia displays up to 6 x 23 characters on screen (96x65pixels) and the Ericsson up to 5 x 15 characters on screen. Both screens are significantly bigger than cheaper models. The Ericsson R320s was selected for its high technical specification and because it had just been released to the general public. The Nokia 7110e all but selected itself since it has set something of a usability benchmark. It was released in November 1999 and has gained a reputation for being consistently intuitive to use.

We bought the phones from the retailer, preconfigured to dial into the telephone network's own WAP portals. All portals (sometimes called gateways) contained numerous WAP sites organized into categories such as News, Entertainment, Lifestyle, and so on. In essence, this is very similar to the way homepages such as Yahoo or Excite are arranged on the Internet. The users' phones were also given three extra preset bookmarks: the *Financial Times* newspaper, *The Guardian* newspaper, and Somewherenear (a local entertainment database). They also had a second portal, either Genie (BT Cellnet's portal) or Mviva (an independent portal provided by Carphone Warehouse). As noted above, we showed users each of these sites at the first meeting and demonstrated how to use them.

THE NETWORKS

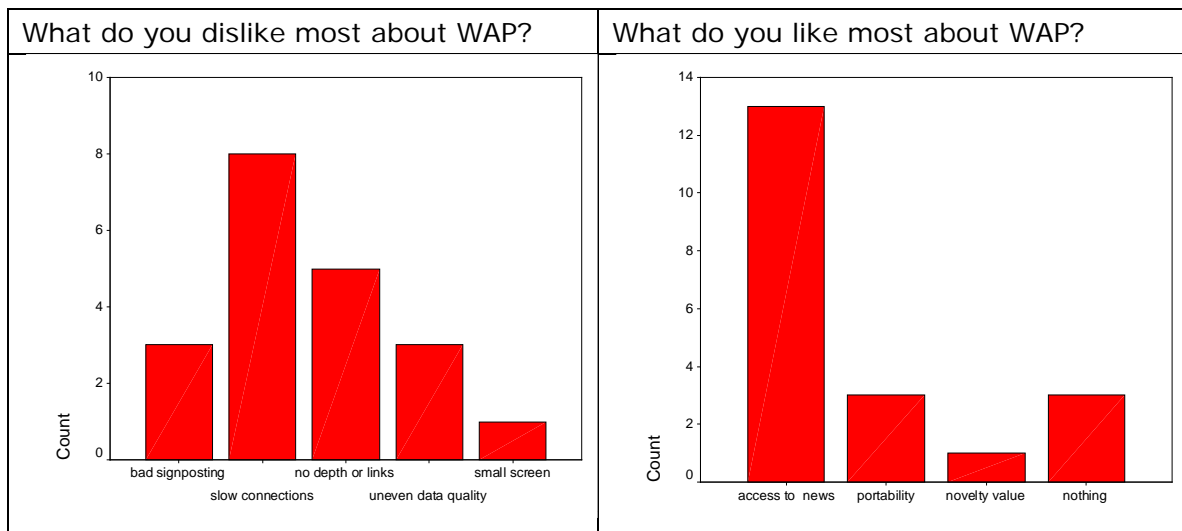
We used two networks: Cellnet and Orange, the second and third largest mobile operators in the UK. BT Cellnet claims to have the largest WAP subscriber base in the UK. We did not choose Vodaphone (the biggest network operator) because, although it was a seemingly obvious choice, at the time it was reorganizing its service following a link up with Vizzavi. One to One still lags behind in the development of its WAP services.

General Impressions of WAP

The users' overall impressions of WAP were largely negative. Accounts were dominated by expressions of frustration, of long journeys leading to dead ends and the poor overall quality of data. Fundamentally, connection times were too slow and the data quality too variable for the users to derive much pleasure from WAP. However, while users were quick to criticize WAP, they still identified aspects of the service that worked well for them or that were at least on the right track.

These comments were backed up by the users' answers to questions at the beginning and end of their time with the phones. Below, Figure 3 shows that slow data connections were the most disliked feature of WAP, followed by lack of depth and uneven data quality. On the plus side, users singled out access to news as the aspect they liked most—even though they were often unhappy with the quality of data that they found.

Figure 3: Users' overall opinion of WAP quality



The following section looks at some of the main issues identified above. We first take a brief look at the users' general feelings about WAP before moving on, in rather more detail, to the issues raised by the usability of the phones themselves and the impact of connection speeds.

OVERALL USABILITY

Users praised many aspects of WAP, but overall, their negative feelings undermined the positive. This is clear even when the users are trying to be upbeat about the service.

RICHARD: Its good points are that it's lighter than a book. If one trusts the databases, it is nice to get bang up-to-date information, when you want it and—signal coverage allowing—where you want it. That was nice.

ANNE: I think it's quite fun. It's entertaining. I think I would use it more than I use the Internet for certain types of information. I think, as it improved, I would use it more. I would use it for things like the latest news. I would use it for things like

gossip. I would use it for travel and weather—those sorts of things, when you suddenly need to be updated... I was pleasantly surprised, really. If you had asked me whether I would be a WAP user I would have said, “No.” But I think I would be WAP user.

DAVID: The advantages, basically, are a mobile Internet for a fraction of the cost of walking around with a laptop. The disadvantages are of anything that is mobile. It is very small and irritating to actually use and, at the moment, it is in its infancy which means it’s slow and liable to crash.

Interestingly, however, although the overall tone of the users evaluation was negative they could also see the potential of the service.

Figure 4: Users who would like to have a WAP-enabled phone

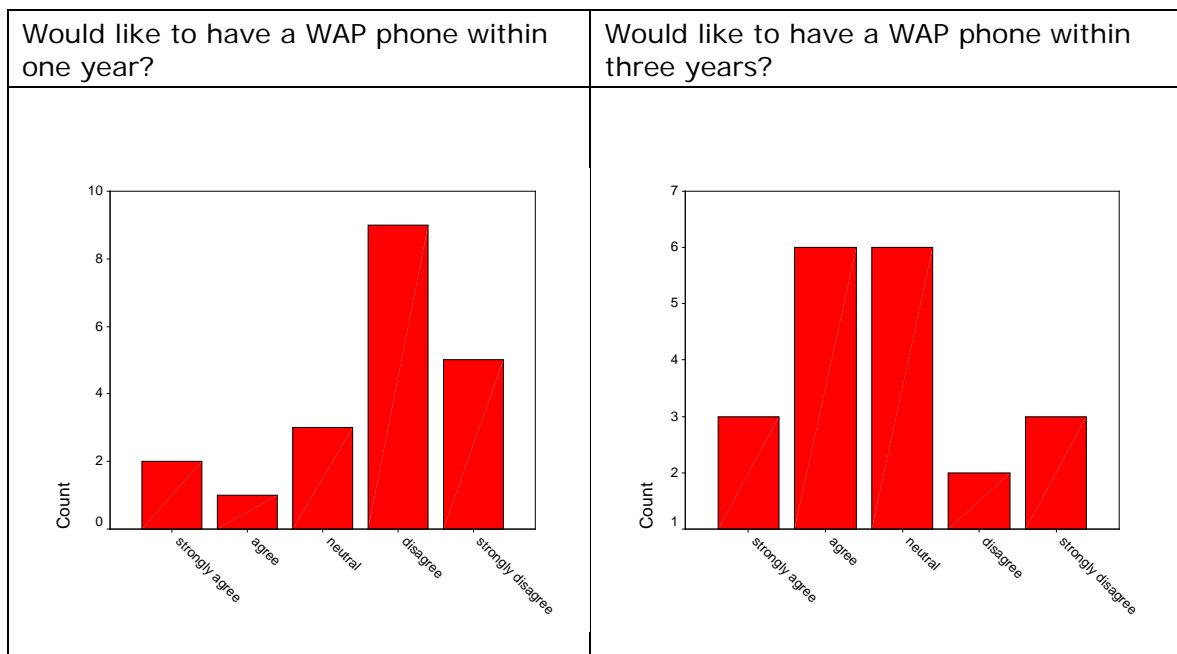


Figure 4 above shows that the users’ thoughts about owning a WAP phone change significantly over a comparatively short period of time. Although 70 percent of users said they would not have a WAP phone within one year, the number fell to 20 percent when the period was extended to three years. This gives some indication as to the latent potential that the users saw in the service.

Most of the users’ time on the phones was spent at home. This might seem surprising given the fact that WAP’s real selling point is that it is a mobile source of data. However, it should be remembered that our study’s users all had jobs and so were often better able to explore the service on their own time. When the phones were used while traveling to and from work, their connectivity was inhibited by the lack of signal in the London Transport’s underground network. Some users also experienced problems on overland lines.

BEN: One of the first uses was actually in a cab and I think in hindsight that’s probably one of the best uses, because most of the data that I actually got from it

I realized that if I was at home, I could have got quicker through things like teletext and so on.

CHARLOTTE: Logged on to the F1 grand prix news—it was qualifying, and I was so engrossed that I missed my bus stop!

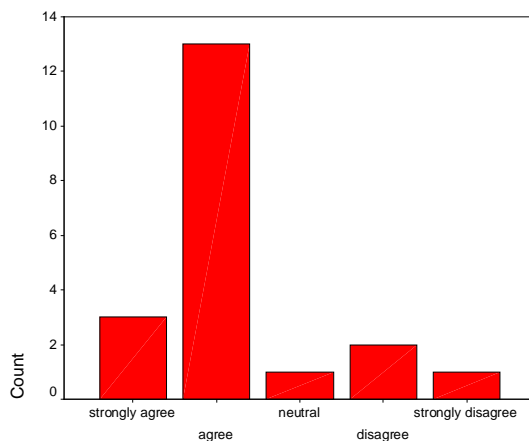
THE PHONES

As mentioned above, this evaluation centers on the users' WAP experience rather than the functionality of a particular phone or the relative functionality of the two phones. However, the influence of the phones cannot be entirely ignored—far from it. The comments below should not be read as anything more than a broad evaluation of a phone's functionality. The issues raised are more useful, in this context, as indicators of the general usability of mobile phones for downloading data.

The screen sizes of both phones were very similar, but their user interfaces were very different. Both phones presented text in black on a green background—color has yet to arrive on WAP (see Appendices 3 and 4 for a short description of the phones' main navigation buttons).

Despite the phones' obvious physical limitations, most users quickly got a basic understanding of their handsets and found their way around them with varying degrees of proficiency. Figure 5, below, shows that the users accepted, at least in principle, some of the limitations that come with the small size of the user interface.

Figure 5: Navigation on a mobile phone is not a problem once you get used to the phone.



RICHARD: I was surprised how easily I got used to this scrolling down with the thumb and using the same thumb to press when I reached the right point. You can get quite adept at that.

On the Ericsson phone, users rely on four centrally located arrow keys to navigate with. The phone's one concession is a scrolling button located on the top left edge of the phone. This is not a great location because it forces the user to change the way they hold the phone. It's also not that great for left-handed people.

LIONEL: It seemed ridiculous to me that you have to turn it on using the button that says "no." I think it's poor design. The scrolling mechanism was awkward to use so you had to sort of change the way you held the phone. You had to change

it in order to scroll using the best scrolling device, which is the one at the side. So as a piece of machinery, I don't think it was well designed.

To some users, the phone was an irritating barrier that they were not able to successfully negotiate.

DAVID: I was a bit miffed because I had been on the phone for about 20 minutes and had not got a lot of information out of it all. I thought, maybe it's me, maybe I don't know my way around it. It's actually physically more demanding than the Net because you are staring at a very small screen, your fingers are quite awkward. It's not designed to sit and browse. I can't imagine sitting and surfing WAP. So, you are sitting there watching a very small screen. It's very irritating and very uncomfortable.

CONNECTIVITY AND DOWNLOAD TIME

This was the single most frustrating aspect of WAP. Time after time, connections failed to materialize or were cut short before users could download the requested data. This is clearly demonstrated by the difficulties users had in successfully completing the preset tasks. They were given a maximum of five minutes to complete the task successfully. The nature of the tasks varied from getting the world news headlines to finding the local weather forecast for that evening. Figure 6, below, shows the full results. User success rates (in terms of finding the information they were looking for) fluctuated between 70 and 95 percent. Surprisingly, there was no real improvement in user success rates after they had spent a week with the phones. Indeed, sometimes their performance was actually worse.

During the second session, users attempted new tasks: Their success rate was 80 percent for finding a local restaurant and 85 percent for looking up the previous evening's sports results.

Success rates of over 80 percent may seem quite high, but this does not tell the whole story. Even though the searches were successful in themselves, they were not immune to problems. Connections were lost along the way, forcing the users to start again from scratch. This was a source of repeated frustration.

The remaining task, looking for travel information, produced a very poor success rate (35 percent). We look at this result in more detail later in the report.

Figure 6: Time it took users to complete preset tasks

Task	Successful users (% of total users)	Minimum time (secs)	Maximum time (secs)	Mean time (secs)
Time taken to find world headlines from home portal	20 (100%)	36	189	76.3
Time taken to find world headlines from home portal one week later	17 (85%)	25	158	63.5
Time taken to find world headlines from different portal	19 (95%)	30	126	65.2
Time taken to find world headlines from different portal one week later	18 (90%)	35	280	113.9
Time taken to find headlines from <i>Guardian</i>	19 (95%)	26	96	52.8
Time taken to find headlines from <i>Guardian</i> one week later	19 (95%)	24	177	46.5
Time taken to find local evening weather forecast	18 (90%)	54	299	164.3
Time taken to find local evening weather forecast one week later	14 (70%)	49	270	114.9
Time taken to find a TV program	20 (100%)	82	242	158.6
Time taken to find a TV program one week later	17 (85%)	51	186	97.1
Looking for a local restaurant	16 (80)	68	278	137.9
Looking for local travel information	7 (35%)	39	262	152.3
Looking for a sports result	17 (85%)	30	230	106.5

Most of the users' negative comments were directed at connectivity, which had a major impact on their enjoyment of the service. The users' diaries frequently included detailed accounts of the paths they followed when looking for data and the problems they encountered along the way.

PHILIP: I'll take you on to last night, which was very interesting because I basically failed. These are the ones I tried. Unwired Sport—I was unable to connect. I then tried Genie XY—kept getting an internal server error. I was unable to connect to Mviva, which would go through saying "Connecting," then it would say "Loading" then it would keep loading, loading, loading and then it said

"connection timed out." I then tried FT.com, which is one of my bookmarks, and then I got "Downloading stopped due to time out." *The Guardian* I could not access last night due to an internal server error. I then accessed my Genie under Genie and it's fascinating: It says personal bookmarks for my Genie server will be available online soon! So that was that. I timed out trying to get on to BT Internet. I was quite angry about all that.

ARTHUR: I just pressed F1 sport and up came address error and I had only pressed yes. I went to Excite/Reuters/Sport—"internal error"; went to *The Guardian*—"communication error"; tried the sports feed—"no access." Tried inTouch sport and then finally I got the result. So it took me five minutes just to get that. The next night I sat down to get the television [listing]—that took eight minutes—to get the TV, which is useful but incredibly slow. It would have been faster to phone up a friend whose got a television book—and cheaper.

ISABEL: I went onto Genie—My Genie—and it said, "Not unavailable yet" and then I went onto the site "Money" to see what that had to offer. I assumed it would be shares that sort of thing, might have been a bit of financial advice, I wasn't sure. Anyway went on to "Visa ATM by City Street" got "communication error," tried again, no. I just kept getting communication errors the whole time. So then I went onto the Genie "share site" and it asked me to put in a share name so I did, I typed in "Abbey" and it was very, very slow and eventually I cancelled out of it. I couldn't get any information. And then I went on to the "Shopping" site, gave up on that, went on to the "Weather" site, gave up on that because it was too slow. Because I had waited for two minutes between each one. It's not a long time, but when you are waiting for the information it seems a very, very long time.

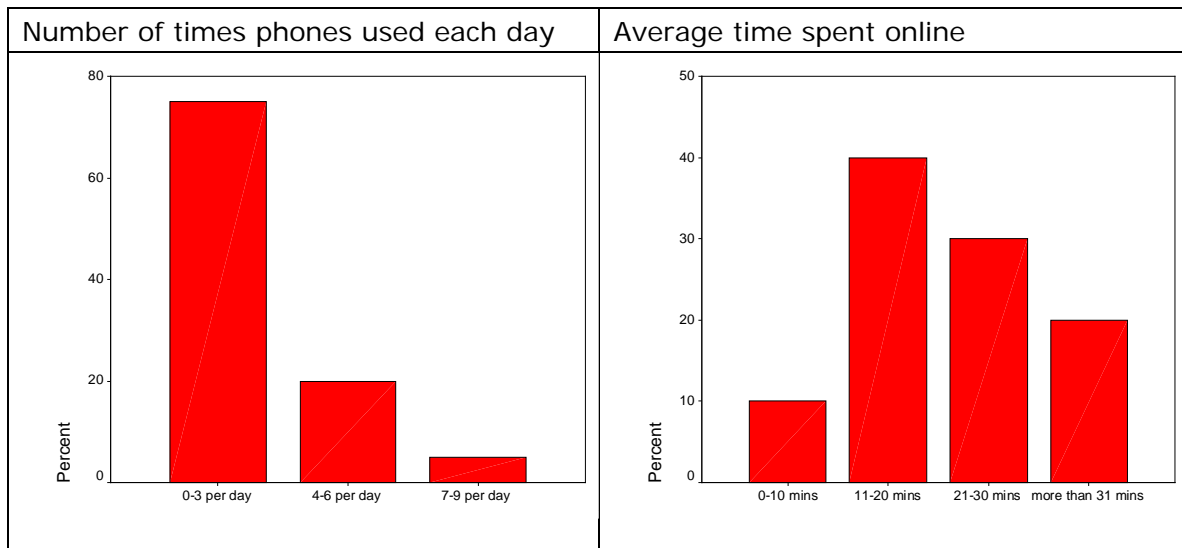
RUTH: It just seemed to take a long time so I would spend a lot of time waiting for it to connect to a site and then when you got something you had to press "More" if you want more information because they are such small pieces of information on the screen. So something that you would expect to take 5 to 10 minutes takes 20 minutes.

DAVID: Out of all this it was fine, if basically every time you actually ended up in a dead end they didn't charge you, but they are, so they are charging you for the slowness of the system and for the system failures, which is outrageous.

ISABEL: There should be some timer, maybe in the corner, like a clock and then you know you've been on there 30 seconds and then it would give you more control over the amount of time you were on there and how much money you are spending.

As shown in Figure 7, below, most users went online up to three times a day and spent between 10 and 30 minutes online each time.

Figure 7: Average time spent using the phones



Connectivity and the cost to the user of being online are critical to the future development of WAP. The move from GSM to GPRS could solve these problems at a stroke. Some industry experts³ point to the fact that i-mode's success could not have been achieved without GPRS (this is easy to believe given the current state of WAP—operating, as it does, on a GSM network). In the course of 2001, the UK's mobile network will begin to migrate to a GPRS network. The benefits should be immediate. The network's always-on nature will mean that users should no longer suffer long

waits to get online or lose their connections as often as they do now.

Furthermore, a completely new pricing structure can be applied to GPRS. I-mode's business model offers an interesting example. NTT DoCoMo's customers pay three ways: They pay a modest monthly subscription (£2, US\$3) to access the i-mode service; they pay for the volume of data they download (about £0.002, US\$0.3 cents, per 128-byte packet); and they sometimes pay a subscription fee to certain content providers. Contrast the first two payments with that of WAP users. On WAP, users must pay at least 5p (7 cents) per minute (Orange) or 10p (14 cents) per minute (BT Cellnet). This time includes all the time users spend searching, and the time they waste when they lose their connection and have to start again. Paying for what you get, rather than for time spent trying to get it, would remove at a stroke a consistent—and justifiable—cause of WAP user complaints.

³ Lessons from i-mode, Baskerville Communications Corporation, May 2000

The networks also stand to gain. In the case of i-mode, the cost to subscribers per transferred byte of information is two to five times as high as that for voice. NTT DoCoMo thus makes more money with i-mode calls than they can with voice.

In short, GPRS could transform WAP's current vicious cost circle into a virtuous circle similar to that enjoyed by i-mode. But not yet. GSM will remain the core operating system for the near future—and that means more time waiting to get connected, more dropped connections, and many more error messages.

ERROR MESSAGES

The users were universally unimpressed with the quality of the error messages that came up on screen when a connection was lost or dropped. Neither Orange/Nokia nor Ericsson/Cellnet prepared users for the realities of the WAP experience through supporting documentation that came with the phone (and which we copied and gave to each user). In its user handbook, Ericsson says⁴ “thanks to a new technology called WAP... a new dimension of mobility has been added to the Internet. Now you can find a lot of useful information by using the micro browser in your mobile phone, instead of using your computer. WAP is a standard specifically created for mobile communications devices and gives fast and easy access to the Internet information and services.”

No mention is made of any problems the user might have in getting that information. Orange's handbook did at least suggest that it might not always be smooth sailing. In their handbook⁵ under “Speed of Service” they say, “Navigation time on the phone can vary. Some content will come back in a matter of seconds other content may take a little longer. This is generally due to the complexity of the search.”

Neither party really gives a realistic sense of the experience that awaits the user. Certainly they do not offer any help regarding what to do or expect when things go wrong...and things often seemed to go wrong.

BELINDA: What does “No server access” mean? I just can't access it—for whatever reason—but it doesn't say why. It doesn't give me any other options. It's quite frustrating really.

RICHARD: On a Sunday, I could not get into the BBC news, which I could get into on the Saturday. It wouldn't let me in. It said “Server access denied” or something. Very frustrating. I did not know who to blame. Do I blame the BBC? Do I blame Orange? Do I blame this technology? And *that* I hated, actually, because I just couldn't get in, whereas the day before I got in. I'm not sure that I ever tried again.

In fact, the service had been withdrawn but it was not until several days later that the BBC put up a page telling users that the service was no longer available.

ANNA: It's good to know what's going on, but a little more detail, a little more friendly message like, “please try again later,” or maybe more of an explanation as to why a service is not available owing to “too many people dialing at the same time” or “it's your connection problem.” I think a little more detail would be helpful.

⁴ User's Guide Mobile Phone R320s, Ericsson Mobile Communications AB, 1999

⁵ Orange Personal Communications Services Ltd, 1999

ANNE: Looking up other things I got “Internal server error.” I found it a very, very unhelpful message. Not quite as unhelpful as the time when you are following instructions, clicking on the “yes” button and the up and down keys only to be told that you’ve got “an error in typing” when you haven’t done any typing whatsoever. “Please try again”—that was a very annoying message. “Internal server error” doesn’t tell you whether it’s a problem of what you’ve done on your phone or whether it’s a problem with the site that you are trying to access.

Some help was at hand for the users with the Ericsson/Cellnet phones – if they managed to find it. In fact, only one of the 10 users with a Cellnet phone did. However, the experience did not necessarily make him any the wiser...

LIONEL: Saturday 26th, 8:43. I decided to see if I could find out any information about the motor racing which is on today. I went to Yahoo first, went to Yahoo sport—interesting up-to-the-minute news but it was still tricky to scroll. I found the site Formula1.com and I excitedly went into it and it said “internal server error.” So I looked up what that meant and it said, “Digest is too large for device.” “What does that mean?” I wrote. So I thought I’d try Genie sport—nothing. I tried Unwired Sport—which took me to Planet F1. Now I’m getting statistics, which is great, and more news on Formula One, which is great, and then I get another internal error. This time it just said “Internal error was a complete error”—because it tells you. You can push something that says “Details” and the details of this internal error was that it was a complete error! I discovered how to do it because when I pressed “Yes” it gave me a little menu, which said, “Retry/Details/Exit” or something like that, so I looked at “Details.” I mean, this is from normal Internet knowledge.

Some sites did tell visitors that the site was temporarily offline. Although this is a step in the right direction, it is not in itself a solution. Users can easily spend two or three minutes getting to the site—which adds up to 15 or even 30 pence to get there.

ISABEL: I then tried Popcorn Cinema but when I went into it it had a message saying, “Upgraded and will be available soon.” I suppose the thing about Popcorn Cinema was at least it did say it would be back soon and at least I did know what was happening with that one. The previous one had said, “This page cannot be shown due to a temporary error, try later.” That’s reasonable communication with somebody—to let them know that there is a problem with the line. It would be good if they could give a timescale. When it said, “Upgrading and will be available soon” what does “soon” mean? One day, one week, two weeks? Why have Popcorn Cinema there at all, quite honestly? Why don’t they take the link down all together or put in tiny letters next to or underneath Popcorn Cinema “unavailable.” It would save you clicking into Popcorn Cinema. Fortunately, at that point, I got access to a text message very quickly but I could have been in the situation where I couldn’t access the message and I would have waited for maybe three minutes to find that it’s upgrading, which is not really acceptable...because WAP is providing a service to the consumers and they cannot really expect people to pay for a service that really isn’t working.

Who is responsible for these types of failure? It could be the portal or it could be the information provider. While it may well be the latter’s fault, in all probability, users will blame the former—the portal.

Regardless of where the fault lies, there is a very real problem here. The idiosyncratic performance of micro browsers and the software in individual phones means that the layout of a particular site can be fine in many cases, but go very badly wrong in others. Sometimes it can be the combination of one particular phone and one particular network that leads to a site failing to deliver its data to the user, whereas in all other combinations the results are fine. This is a very big usability problem that can only really be solved by all parties—including site designers and engineers—trying to agree to and then adhere to tried and tested design principles. These principles have yet to be hammered out, however.

For the time being, portals will continue to take most of the blame. As we shall see below, users view their home portal as a kind of guarantor of the quality of service they expect to receive. If the service doesn't work, or fails to come up to scratch, the users will blame the network. And that usually includes the portal. This poses something of a problem for the network or portal provider. To what extent should they try and provide a uniform standard of service to the user—and, in so doing—impose technical parameters on the information providers? Currently, networks seem content to hide behind error messages rather than take responsibility for efficient content delivery. How long they can continue such a stance is open to question.

JESS: The greatest selling point of WAP to me is speed. I will get frustrated if I get too many error messages or it says "Content is being updated" and it will be available in one week's time or something. I would think that was a waste of my time and get cross—and then they've definitely lost me. It's just the same with Internet sites. If their server is down on more than one occasion—and sometimes if it's only one occasion—I have very little patience because I expect speed. I have an ISDN line at home and I expect it to be quick. They will completely lose me if they disappoint me with that. And I think with WAP, I think it is even more important that they're quick because I think this phone bill is costing me more than my phone bill at home and if they are taking me down dead ends, I will get really angry and I won't go back.

There are an increasing number of portals available, and new WAP sites are coming online every day. For those that offer a good service, the future is promising. Users will come to them and stay with them if they are pleased with the service they get. For those that fail to address their own inadequacies, the future is uncertain.

Sadly, until an acceptable level of service is provided across the board, the user is destined to remain very frustrated. And there's more. In the absence of a help facility (a long established principle of Internet usability) the users are left to fend for themselves. The lack of information or assistance can encourage idle hands to try and hurry the machine up.

RUTH: It just seemed that with every site that I tried there was either an "internal server error" or it did not have the information that I wanted, and now I've got through to "weather" and it's saying this page is "Unavailable, try again later." So it's just like being blocked at every turn, and I am too impatient to keep on trying. And then I just start pressing any old button and getting irritated.

DAVID: The other thing, and the Net does this very well, is that you really don't know whether it's thinking or not. You don't know whether it's crashed or not. You don't know what it's in the process of doing. They really need to solve that. For someone like myself, who is incredibly impatient, there is nothing worse than not

knowing what's going on...and I think possibly a large percentage of the mistakes are made when the user, out of sheer impatience, hits the button another time and confuses it.

Sometimes the phone is waiting for the user to input more information, but doesn't make this clear to the user. Often, the reason is that the phone is waiting for the user to enter information into text boxes that can only be found by scrolling further down the page. And sometimes, there is no indication that there is any more text to scroll down to.

JESS: I didn't find it that intuitive because I kept on missing out on commands further down the page. I think that was all part of me getting used to scrolling and checking that there wasn't something further down the page.


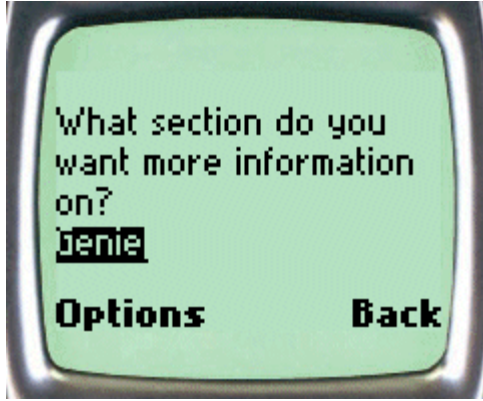


In fairness, Ericsson/Cellnet phones do display an arrow on screen to indicate when there is more text to found. But the underlying point is that WAP providers should pay much more attention to providing prompts for the users. Messages such as "pick from here" or "enter text into all three boxes" would go far toward helping users navigate more successfully around such a small screen.

Cutting down on the opportunity for users to make mistakes is also vital. One WAP site developer notes "in mobile phone interface design, every click loses half of your users."⁶ His solution is to provide selection lists as often as possible. This cuts down on the potential for error inherent in asking users to type in too much information themselves. The effectiveness of this approach can be seen below in our discussion of travel sites.

Another useful, if not vital, facility would be the ever-present availability of a help button. Leaving users high and dry with nowhere to go is bad for business. WAP service providers may not be ready to deal with all the technical problems that exist, but they cannot afford to simply pretend that they do not exist. A higher level of on-screen courtesy than currently exists would go some way toward keeping users on board, if not online. However, help functions are sometimes offered with less than reassuring consequences. While we were compiling this report, we noticed a help function on the Genie menu. Figure 8 shows what happened next.

6 Travelling Light, Nick Knowles (chief technical officer, Kizoom, www.kizoom.co.uk/dir/i.js)
What Mobile, November 2000

Figure 8: Genie's help function

<p>This is the help option on Genie's main menu—located conveniently at the end of long, four-page scroll.</p> 	<p>The first screen that comes up.</p> 
<p>Next, we scrolled down a list of preset, frequently asked questions, and highlighted the option below.</p> 	<p>Our result!</p> 

There is nothing to add to the situation illustrated by Figure 8 beyond the suggestion that, if you cannot provide the offered service, then it is far better—as far as WAP goes—not to offer the service at all.

Navigation

Navigation on WAP-enabled phones is based on the same principles as the Internet. Users select options from successive menus until they find what they are looking for. Alternatively, users can turn to a search engine or search facility to help them—if, indeed, they can find one. Whatever the route taken, users can bookmark a site they locate to make subsequent visits quicker. The success of these functions is critical to the efficiency of the system itself.

NTT DoCoMo claims that one of the core reasons that i-mode has been so successful is that the system is easy to use.⁷ One of the reasons for this, they say, is that the indexing system itself is straightforward. Menus tend to hold a small number of options, but, much more importantly, users can customize their own menu so that their favorite sites or interests come up automatically. This sort of functionality is also planned for WAP. Several users noted that Genie's main menu carries an option, "My Genie." The site was not working during our study and still wasn't available two months later. In its place were the same messages that users quoted, "My Genie. Very soon you will be able to use this space to store your favorite WAP site addresses. Genie will let you know when you can access your personal WAP space." While such notification is to be commended, it is questionable whether it is useful to display an option that is not, and never has been, available. It should be noted that this option might now, as of mid-November 2000, be functioning (some three months after the users first tried to access the facility).

Generally speaking, WAP users' navigational aids are restricted to menu options, search engines, and bookmarks. However, even these basic functions did not run as smoothly as the users expected.

A user's typical starting point is the main menu of the home portal provided by their network operator (Genie on BT Cellnet or Orange Multimedia, for example). These portals are, in effect, gateways to the WAP sites. These sites are typically clustered together in simple categories such as news, entertainment, lifestyle, and so on. As with the Internet, users find their way around by clicking through successive options as they move from sub-menu to sub-menu. However, little if any thought appears to have gone into laying out the screens in a consistent or intuitive way. Users had constant problems both with the indexing and layout of the portals and with the text labels that described the content. This created considerable user frustration.

THE PORTALS

Each network hopes to provide a walled garden for its customers. They do this by trying to offer all the services their customer might need in one convenient place—an approach not unlike that of a shopping mall. If they are successful, subscribers will return time and time again. The network portals gain revenue through connection time and, in some cases, by charging the content providers for access to the network's subscribers. There are also platform independent portal providers (such as Carphone Warehouse, which sells mobile phones and operates Mviva, its own WAP portal).

The relationship between the portal and the user is very important. Users provide a welcome revenue stream to the telephone companies. In the future, this client base

⁷ *Lessons from i-mode*, *ibid*

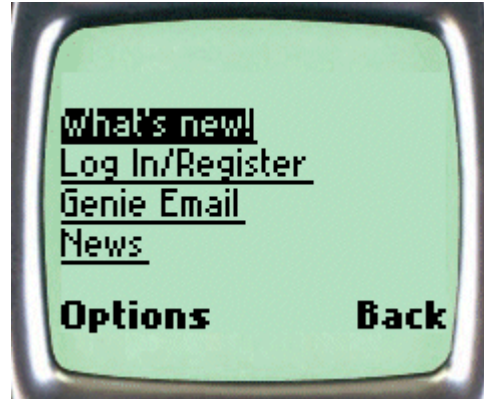
may represent major opportunities for mobile commerce ventures—that is, if they can get the users to keep returning to their sites. Currently, WAP is having great difficulty in creating a favorable first impression. Even the home portals—the network’s WAP flagships—are subject to considerable criticism.

Figure 9: Genie’s main menu as viewed on both phones.

Genie home page main menu viewed on Ericsson R320s connected by BT Cellnet.



Genie home page main menu viewed on Nokia 7110e connected by Orange.



On the Nokia, the user scrolls down Genie’s main menu to reveal further entries.





Final page of Genie home page main menu.

ANNE: Genie. I don't like their home page where you have to scroll horizontally as well as vertically.

Genie (when viewed on a BT Cellnet connection on the Nokia phone) lays out the menus across the screen line by line. The result is a screen awash with characters. However, when viewed on the Ericsson on the Orange network, the browser lays the Genie menu out for vertical scrolling only—a much better format for users. Figure 9 shows the Genie screen as it appears on both phones.

ANDREW: Genie feels cluttered because they have squeezed so much in. They've got, on one line, weather, TV, sport, then, on the next line, news, travel. On here [Excite] you have one section on one line. You know, give it the luxury of spare screen space. It's clearly divided. I like it. I also quite like Excite because they give the logo and they also give good menu options.

Figure 10: The first two pages of Excite's WAP site

Excite's splash screen.



First page on Excite's main menu.



If this walled garden approach is not successful, users will look for another portal. If they find one that they like, they can bookmark it. This was the case with Excite (see

Figure 10). Once users bookmark a new portal, they are unlikely to return to the home portal.

LIONEL: I bookmarked Yahoo because it seems to be extremely useful. You seemed to be able to navigate your way around better than in Mviva and in Genie. It had a slightly longer list very clearly marked out. Genie's are all written all in a bunch and it is difficult to read. [Yahoo] was written in a nice list and you clicked on one of those things and it took you to another nice list so, in other words, each time you thought you were honing in on what you really wanted. That was how I got the information on American football. (I don't think I would have been able to do that on Mviva and I don't think—well, I would probably have been able to do that on Genie), but it took me to America. It took me to American News. It took me to American Sports News; and it took me to the thing that I wanted to get to. That's why I felt that if ever I wanted to use a portal I would use Yahoo from now on...although the site was Yahoo UK and Ireland, one of the things that I could click on was Yahoo Worldwide and then from Yahoo Worldwide I could click onto Yahoo USA. So Yahoo was good. They look like they are a massive step ahead of everything. I liked their news better I liked their everything better.

WAP portals seem even more important to users' success in finding their way around than their Internet counterparts. This could be a consequence of the limited screen size, and might eventually be at least partially overcome by personalization. However, it is unlikely that portals' importance will be completely set aside. There is a real sense in which WAP users need a portal and a good one at that.

ANDREW: You get to Excite and the first thing you are getting is this reasonably done pixilated picture and from there you've got ten options along with an option to personalize your settings, which is the key thing with the Internet or the way it is going forward. You can have it how you want it because it is just information. Why should you be forced to have it the way they want it? It looks pretty clean to me, concise and user friendly.

LIONEL: The WAP seems to have no sense of humor. The portal should be like a friend who kind of has an understanding of what you like. So you say to your friend, "Just tell me something about the sports, about the weather." So a good portal would be the one that thinks the way that you do to a degree. That's why Yahoo was best for me because it was less tabloidy-orientated, more international and had a clear way of presenting itself, which was long scrolling menus. A portal or a search engine or any computer should be as friendly to you as possible, you should feel that it's an ally, that it will help you out. If you find one like that, you will forget all the others.

LABELING

Telling people what will happen before they click through to a new screen is a basic, long-established principle of Internet design. It should also be applied to WAP, where the screen real estate is particularly restricted. But it isn't. Simple descriptions are often forsaken for more enigmatic phrases that brand more than they inform. The result is that users simply cannot find the information that they are looking for.

MARY: I just wonder who invents the labeling and whether they actually do trials with anyone. Because it's not very clear to me what I will get when I press a certain item.

DAVID: So what does "Unmissable TV" mean to 99% of the population—other than highlights of TV? Whereas Excite just said "TV listings"—straight boring information. It gave me a choice, like Genie, of various things, one of which was news. So I went into news and then it gives you a choice, which is a pretty good choice of "World," "European," and others that I did not actually scroll down to. There was some real breaking news about some bombing in Spain. I was quite surprised that it is now, 10 [o'clock], whatever, and five minutes ago they posted some news, which was actually nowhere else. Logically, I would bookmark the site. But it probably wouldn't work tomorrow!

JESS: I get cross with labels that are unclear and I think I would like to see more signposting whether it's verbal, graphical, whatever. If I think back to when I first started to use the Internet, there was an awful lot of swearing going on about not being able to find the things that I want and not being able to use it, and I guess it's just going through that learning curve again and part of me thinks, well, I shouldn't have to do that because I've already learned how to use the Internet. I manage fine there. This should be just as intuitive. They've got a bigger challenge because they have got less space and less flexibility with which to draw your eye, but if I think about it, I was disappointed about the lack of instruction. There didn't appear to be any whatsoever. There's no "click here" or "try this" or, you know, "in this section you will find" and I would welcome it.

The result of this is as expected. Rarely will users return to a site that disappoints—if they actually find it in the first place.

RUTH: There just seemed to be certain routes that seemed to be very easy. They were obviously ones that they expect a lot of people to hit on, which is news, weather, sport. Anything more general seems to take a lot longer and is more difficult to find. It's annoying that if you look up UK travel, you then get a "flight to Reykjavik" advert and that adds to your time. So if I was paying for that I would be really pissed off by then. Sometimes you cannot tell from their abbreviations what they are suggesting, so then you have to try each one. Then you find out what's on each site but a) that's taking you a long time, b) it's expensive, and c) you've got to go back again if it's not the right place.

JESS: I know you don't want too much on a page because you are constrained, but it would be useful to have a short, maybe three-word command saying "type word here" or something like that. I did find it irritating that I would go round in circles. Even after I'd used the phone for a few days, I'd still be making the same mistake just because it wasn't flagged up...and also it would be really useful if there is more information on a page. Give me an arrow that tells me that there's more below, or that you need to fill in three search criteria: bang, bang, bang—more instruction.

Clearly, the message here is that portals and WAP sites should adopt a straightforward approach to the way they construct their indexes and word their labels. Clever titles may seem creative to the designers, but to users it's just one more barrier between them and the information they are looking for. And for users, time is money.

GOING BACKWARDS

The “back” button has become a fundamental part of the Internet. Users accept that they might find themselves on the wrong track and have to go back a few steps to choose a different path. All too frequently, the WAP users faced dead ends or error messages that blocked their path. Instinctively, most of them looked for and found a back button. But they were not always able to retrace their steps. Sometimes they had to wait to be connected just to go back one step; other times they were simply unable to go back any further or were forced to go back to the very beginning. This wasted a lot users’ time...and, of course, their money.

CHARLOTTE: Mildly irritated. Having to wait to connect to service when you are going backwards. It seems reasonable when you are going forwards but when it is going backwards it should have remembered the page before.

If users did manage to get back, they often found that they had to start all over again from the top of the page.

JESS: When I’ve tried to go back and gone to the wrong place, it’s irritated me intensely, especially if you’ve scrolled down six or seven news items and you’ve clicked on one of them. When you go back, it takes you back [to the beginning] again, and in fact you’ve already seen that the first six or seven are not ones that you want and you want to go further.

And sometimes, users simply cannot go back far enough.

LIONEL: Can’t use “back” button forever. It’s only got a limited memory I realize. When I got into something very complicated I tried to go back, back, back, and then it suddenly stopped and wouldn’t go back any further because, presumably, it has only got a limited memory of 10 steps or something.

SEARCHING

When the users were unable to find what they were looking for, some of them used their Net experience to look for a search engine or search facility.

ARTHUR: The Internet is frustrating if you have to search for search engines. The point of a search engine is that it does the searching for you. If you have got to search for the search engine, it is bloody boring, and on the WAP I did not find out how I could search for search engines. On the Internet, I know how to do that—there is a thing called Dogpile and that searches for search engines and I couldn’t find anything like that on here.

Again, it may be a consequence of the limited real estate on a WAP screen, but even when a search facility was available, its location was not clearly signaled on either of the two networks’ portals. The result was that users were frequently unable to find sites that might have given them the information they were looking for. There are at least six very good search engines already up and running, but only five of the users were able to find them (see Figure 11). That the users even found them at all was more luck than judgment. For the users who did find a search facility, there were still problems when it came to entering the search criteria.

JESS: It’s an art because it does not say “Type name in here,” anything as simple as that. You realize that when it’s got square brackets and dots, you click on it and you need to write something in or, actually, I’ve only just realized, when

it's already got a search criteria in, it means it's going to a list—that's not intuitive either. I am a quite quick learner, I use the Internet a lot, but I still felt really thick when I was trying to search for things because I kept missing things that were further down the page. I got frustrated when there were more than one search criteria and it sent me back and forth until I realized there was another one further down that I needed.

ANNA: I tried last minute by typing in "lastminute.com" and it said "No server access" although it is listed under Genie's list, so I thought that is strange. Why can you not get into lastminute.com? What would be nice is to get a directory of WAP-enabled sites. It would be a useful bookmark for someone to create. A sort of directory of the sites.

There is one. It was hidden away in Excite—but the only way Anna could have found it was to select Excite, which was on the submenus accessed by selecting any of the main options on Genie's homepage (Sport/News/ Entertainment etc.). All of these include Excite and link to the Excite main menu. If you scroll down far enough, you then come across "WAP Search." Easy! But finding the search facility was only the beginning. Next you must retrieve the data itself.

If you have not actually had occasion to use a WAP phone, it is difficult to convey a full sense of what it is actually like. This is one of the reasons that we emphasize users' own words in this report. While the following extract is particularly long, it conveys the realities of searching for information on a WAP phone so vividly that it deserves to be quoted in full.

LIONEL: Tuesday the 29th, 4:21 p.m. OK, could this machine be useful for any kind of research? I went into Genie. I went into "Directory"—whoops, phone numbers! Went back out of there. Went to "Freeserve" went to "Search," "Business search" comes up. "Whoops," I've written. Then I went to "Community"—dead end as it needs a password. Won't cancel. Back to menu. Loading Genie again. I tried "BT Internet"—same list: "News," "Shopping," etc. Found search engine. Found "Fast Search." Going to add it to bookmarks—might be useful. This is the first time that I could type in something, too. So I typed in "Chekov" and got an internal error message. So, all right, I thought, I'd try something a little more common. I typed in "Hitler." Got 45 hits. The first was in Italian; the second was in Polish; third, Italian, etc. Found one in English which was an historic "Hitler bottle for sale for £2995" and then the machine turned itself off! I went back and tried another and internal server error. Then I went back. All the rest were in foreign languages. Went back to "main menu." A laborious process. To "Fast search" again, and thought, all right, Hitler is international that's why I'm getting so many foreign sites here which are no use to me. It's taking me a long time to scroll down them, so I thought I'd do something that's more English, so I typed in "Shakespeare" and got 88 hits. The first was a book for sale, the second was the same book for sale, the third was a list of humorous quotes, including Woody Allen, Oscar Wilde, and Shakespeare and then went back to the main menu. Not by choice—it just did it! I wrote, "I am getting quicker at typing"—"Shakespeare" takes a long time! Back to the quotes twelve quotes not bad. It went back to the main menu again. I was getting fed up with it. It may have been that I pushed the button too hard. Then I suddenly got lots of—this is after Shakespeare—and I got lots of things called "Manifestations" and this was in Italian and I wrote, "Is this a report of ghost sightings?" I had no

idea. I don't read Italian. But although it got 88 hits for Shakespeare it would not go beyond 16. It just said "Internal error." This was my search, so I thought, "OK I'll go into Mviva" and I saw "mfun" so I thought, "All right, I'll have a bit of fun." So I went to "Games," then I went to something called "Cartoon Network" and I realized that it was all about a cable TV channel. Then I got a game, "Twintoon." It was like snap. I played one game of it and then the phone crashed... back to "Main menu" again. So I went to Mviva, I went to "mfun," I went to "Games," I went to "Game play." I found a game called "Arctic Love," I went to instructions on how to play the game and it said there were no instructions! So I thought, "All right, I'll play it." It's a multiple choice story, two choices each time. I got bored. So I went back to "mfun" and I found out that it all turns out to be a shop that sells games. There were some reviews and some games, but basically it was a shop. So I found out when I went into my research to try find out about Hitler and Shakespeare it was all to do with selling things. They wanted to sell me books, they wanted to sell to me. When I went into Games they wanted to sell me games, so I thought, "Right. Is this whole thing about people trying to sell me stuff?" It's not really. It's tabloid stuff and advertisements now, what I am getting. And I felt a bit insulted by that because I want to do some research and all you are doing is trying to sell me a bottle that Hitler had or a book about Shakespeare."

Less ambitious searches also lead to curious results.

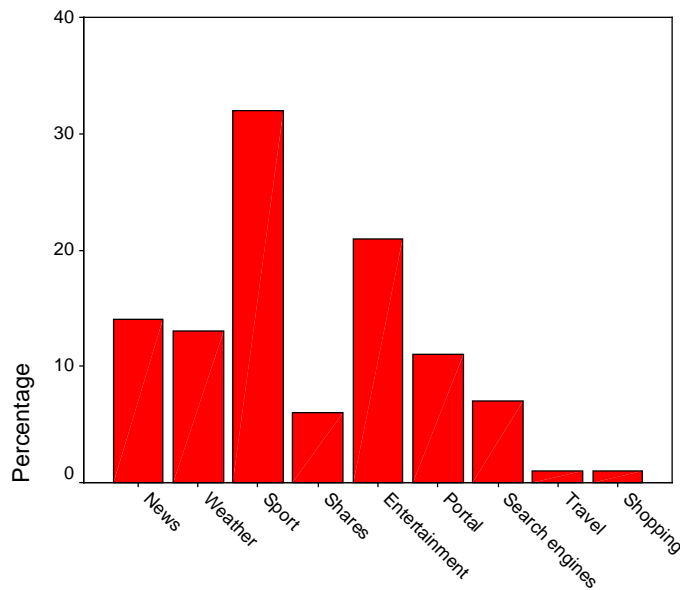
DAVID: I thought I would try something really wild so I went to search and put in something that I thought there would be millions of. So I tried "cat." It was quite slow looking, so I thought absolutely there is going to be an avalanche of stuff here. I got one site. Went into the site and the only information it had on it was how to get to a World Wide Web site! Which I thought actually summed it up. It was about cats. I put down: "Someone's got it right—great site available on the Web, here is our address!" And that was it.

RICHARD: I am not by instinct someone who is going to play around to find the right site for me, just because I get frustrated and don't like the technology. So if somebody I trusted or a magazine or whatever said "We surveyed 57 travel sites and the one that makes sense for people who want to do x is this," then I'd do it. I am basically not very adventurous at using this technology I guess.

BOOKMARKS

Bookmarks are critical to users efficient use of WAP. However, users were greatly frustrated that the Nokia 7110e can only store 10 selections at any one time. The Ericsson R320s stores 25, but even this number is too small to accommodate the number of selections a user is likely to need. Our users were keen to use bookmarks—indeed they generated more than 90 between them. Figure 11, below, shows that sport and entertainment were the main categories that users bookmarked, followed by news and weather.

Figure 11: Users' bookmarks according to category.






LIONEL: I went into “Excite” again, “WAP directories” and found “portals” and thought, “Ah, this is interesting.” And then I found Yahoo and I wrote, “Great!” Then I went into “Yahoo news” and that was great as well...I thought, I wish I knew how to quickly go to the Yahoo home page. Every time I wanted to get to that I had to go a long way round. Because I had gone from Yahoo to something to something to something to get to the news. In order to get back to the Yahoo home page, I would have to press no, no, no until each page loaded up each time or turn the whole thing off. I had not book marked it at that stage. So every route back to the Yahoo home page was a long route and then I added it to the bookmarks because I knew that would make it quicker.

Users display a comparatively sophisticated sense of how things should be laid out on the screen—they appreciate good design. Users will bookmark and return to well-designed sites; following are description of some of their favorites.

ANNE [Re: “LOOT,” a second hand/bargain site based on a print daily newspaper]: It just says, “Find a car/find a home/meet somebody/find a holiday.” “Place a free ad.” Terribly clear instructions. It may be that I want to find a toy, so I’ll think LOOT’s not going to provide it. But it is very clear as to what it does and does not provide. So press to “find a holiday” and again, holidays: “England holiday Ireland holiday Scotland holidays Wales holidays abroad” so I pressed “holidays abroad.” Again, terribly clear. Then region, select “anywhere” and then rather than having to type in things, it gives you “Andorra...dahdahdah...Cyprus.” So I press “Cyprus” and then just search: “Sorry, there were no ads that matched your search. There were three yesterday, but there would appear to be none today.” So even that “Sorry there were no...” very clearly done. I thought LOOT was a very good site.

Figure 12. Loot WAP site

<p>Loot's splash page</p> 	<p>First page of "Holiday" menu</p> 
<p>Result of clicking through to "Holidays Scotland"</p> 	

ANDREW: When you go onto Football 365 you get latest news, latest results, live scores, news on your club, latest fixtures, match reports, match previews, vote in our poll, and "have a laugh at us," which is a sort of a jokey footbally thing. For me, having been a regular surfer of football sites over several years, those are pretty much the options that are going to be there for any site. They've resisted the temptation from giving any headlines. It's quite clearly signposted. For instance, click "latest news" and it will give you 10 stories. It seems always to be 10. You can search closer under your club, there they are. They are quite nicely linked and the reporting is a good standard. Here we are, tour 10, and it all fits on the page. Some of the WAP sites I've noticed don't put that much on a page. Obviously there are data limitations, but some of them put huge amounts

on a page and I don't know why that is. I prefer that there is more there because it means that I do not have to wait for it to download again. So I think that's a positive element.

A new television series, "Big Brother," gained cult status during the time of this usability study. Based on a Dutch series (and similar to the U.S. show "Survivors"), "Big Brother" began to spill over into other media, including WAP.

JESS: My first experience ended up being nearly an hour long because I just found it really fascinating and I was lucky—the first thing I clicked on to just got me hooked, which was "Big Brother." It was something that I was already quite interested in, but as a first thing to look at it was really encouraging. I thought, "Wow, this is great" because it's a good site. You've got news, you've got biographies, and it didn't have any of these circular references or search things that you needed to put in, although you could search the archive. The news was clear and easy to read, biographies were good and I was surprised at how quickly I was flipping around it. There were only a simple number of things you could do. You could look at "today's news" you could look at the "biographies" and you could look at the "archive." And because it was nice and simple, I knew where I was all the time and I was really comfortable in there.

Getting the Information

During the debriefing, users singled out many different sites in various categories, and mentioned both highlights and access problems. In this section, we look at the main points users made about the different sites. For ease of reference, we organized comments by site type. However, many of the points made about one group of sites applies to others.

Following some general comments, we discuss sites focused on news, financial services, weather, and travel, followed by the more popular sites such as sports, entertainment, shopping, and lifestyle.

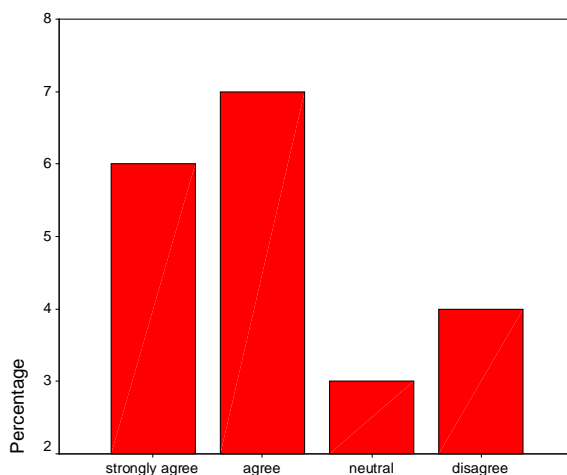
READING FROM THE SCREENS

Once users succeeded in finding a site that interested them, the next hurdle was to come to grips with the realities of reading text from such a small screen. Even these phones, which had bigger screens than previous models, were not that big. The Nokia 7110e can display six lines of up to 23 characters (96x65 pixels) and the Ericsson R320s displays five lines of up to 15 characters a line. Users had differing capacities when it came to reading a lot of text on these small screens.

DAVID: It's tortuous to read because you are reading a teeny little screen. Maybe I am old fashioned. It's actually quite painful to read, it's unpleasant. And, you are holding it and it's not designed to hold and look at you. Mobile phones have been designed to hold to your ear, which is actually quite comfortable. But not to sit and hold and it's actually quite thin. It's a pain. Basically I just found it irritating.

Most of users shared this view, albeit to a somewhat lesser degree, as Figure 13, below, shows.

Figure 13: The phone's limited screen size would prevent you from using WAP in the future.



Users were less accommodating, however, about the style of delivery and were critical about how little control they had when it came to scrolling.

ANNE: Interestingly, I was not so annoyed by the size of the screen as I thought I was going to be. It just carries four or five lines of text. I did not find that too annoying. Far more annoying is that they have not re-purposed the information to work on that size of screen.

Indeed, some users were prepared to read a lot of text when the story interested them.

RICHARD: Saturday afternoon, my first day at home. Surprise, surprise, checked out “sports” and “cricket.” There was a very detailed report on what happened, which was useful, but I only accessed it because I am a cricket nut (as you know) and I would have got just as detailed a report the next morning in the newspapers. It was frustrating having to spool down to get text on the screen. I found that clumsy and awkward, but after a couple of days of using that strange button [the Nokia scroll key] it does become almost second nature.

NEWS

Checking the news was one of the key tasks we gave users. All portals put “News” near the top of their main menus and, on the face of it, it seemed a simple enough task. However, users did encounter problems. They were asked to find news from three different sources. First, when we gave them the phones, and again when they returned them. Figure 14, below, shows the percentage of users who were successful. Users were given up to five minutes; after that they timed out. Figure 14 also shows the minimum, maximum, and mean access times.





Figure 14: Time taken to find news

Task	Successful users (% of total users)	Minimum time (secs)	Maximum time (secs)	Mean time
Time taken to find world headlines from home portal	20 (100%)	36	189	76.3
Time taken to find world headlines from home portal one week later	17 (85%)	25	158	63.5
Time taken to find world headlines from different portal	19 (95%)	30	126	65.2
Time taken to find world headlines from different portal one week later	18 (90%)	35	280	113.9
Time taken to find headlines from <i>Guardian</i>	19 (95%)	26	96	52.8
Time taken to find headlines from <i>Guardian</i> one week later	19 (95%)	24	177	46.5

As the table above shows, on average, it took users about one minute to access the news headlines. There is a clear, somewhat dramatic difference between the

minimum and maximum access times both the first time users undertook the task and the second time, a week later. However, it is difficult to interpret this one way or another since the connections can have such a dramatic effect on the timing. It is very surprising that the users were so poor at working through a different portal. This suggests that they follow tried and tested routes. Further research is highly desirable in this context. Overall, the ability to find data quickly is subject to dramatic variation. This characterizes the general usability of WAP itself.

Figure 15: Navigating through Excite's site to find the headlines

<p>1. Excite News splash screen.</p> 	<p>2. Scroll off splash screen to reveal news menu.</p> 
<p>3. First screen gives a short headline.</p> 	<p>4. Users click on headline to reveal source and time of posting, and Scroll down for the rest of the story.</p> 

Note how this design spends four screens on giving users two screens of information. The splash screen is useless and could be eliminated if the basic design of the service and the content were strong enough to communicate the brand on their own. The final screen contains no new information relative to the headline in the previous screen. When designing traditional websites, it is a guideline to repeat the user's choice on the destination page for confirmation. For a small-screen design, it is more important to conserve screen space and present as much new information as possible. Given the cumbersome and slow process for moving between WAP screens, it is even more important for WAP design than for other small-screen designs to optimize the communicative value of each screen.

Users who did succeed in getting the news had considerable differences in opinion in terms of how many lines of text they wanted from the actual stories themselves. Some sites provided headlines, which led to pages and pages of story; others settled for a headline and a short summary. There seems to be a need for both from the users' point of view. But the length of story was not the only issue; style was also important.

ARTHUR: Went to Excite and got the “news headlines.” Now the first time I found something I liked. I really liked the “European” headlines. I really liked the “World” headlines. I suddenly thought “Reuters.” I got excited about that and that to me was a real reason to use this. I can tap in, in the morning, and get the “World” headlines. You don't get them in the newspaper... I then decided to try FT.com. “Global news”—very brief one-page stories. Someone had written those knowing what was in mind. They had written them very well. They had put the right stuff in, they had written it for the WAP. The WAP is designed for the headline, and they had managed to get the story in just beyond the headline. If someone thought it through and gives you the opening I assume that's all they need to do—give you the opening paragraph of the story. If it's a well-written opening paragraph, it should summarize everything anyway. It's got to be one page and it's over.

MARY: The first thing I tried to do was to try to see the news headlines and compare them with what I heard on Radio Four. It was to do with the Omaha bombing and I got very irritated. I did not like having to click down to read. That's the screen size, too. It makes you dizzy. I was just thinking it was much easier to listen to the radio.

ANNE: I do not want to read the full story. What I would like is specially written sound bites or journalist pieces for the WAP so you get a properly crafted headline with just the bare minimum facts that would take about a couple of screens or three screens, where you do not have to press continue and have to wait for another 30 seconds to wait for it to download. I don't want the whole story I want a very brief update.

But brevity can lead to the newspapers' identity being lost.

DAVID: Went to *The Guardian* and *The FT* for the headlines for the news. I wrote down here that I kept thinking of faster and more pleasing ways of getting the news. There was no real difference. *The FT* and *The Guardian* you would have trouble finding two more different papers [in the real world], but if you actually

printed out what I was reading, you would never have been able to tell it was *The Guardian*. It is news as opposed to newspapers.

When users find a story they are interested in, they are prepared to scroll through several pages.

BELINDA: On the train, I read the Sky breaking news headlines, which I checked every day. I like that site. It's one of the sites that I checked every day. It's always updated and it's just easy to use. You can just scroll down and it's got the headlines, and the headlines you want to read you can just click on. It tells you just the right amount of information. You can usually scroll down about five pages, which really isn't that much. If you just want to know what's going on, it's quite useful.

JESS: When it's the right piece of news, I am quite happy to have a piece of news and I will scroll, and I will scroll, and I will scroll. And then, at the bottom, as long as it tells me one of however many, I know how many more there are and if it's something of interest to me I will read them all—you know, if the first page has been good. Where there were ones where there was a comment there would be just the headline at the top so you would understand what the article was about and the comment itself was really quite brief so that was literally maybe two or three flicks of the scroll thing—much shorter than the articles and I did like that variety.

However, news items that are really long stretched users' patience. Some users called for more sophisticated scrolling functionality (such as automatic scrolling).

ARTHUR: It was a brilliant article and I got to page 10 and I was really enjoying it. After 10 pages, I gave up, even though I wasn't at the end of the article. However, if I had been able to keep just pressing that button and having it running down, I would have read the whole article quite happily. The 10-second delay between each page means that you are not reading something. It stops you reading. It means that you are using a device that is only suitable for headlines and that's it. And that's what makes it even more important to be able to download something. It's a result, address, headline, and that's it. And that's not the sort of information that interests me.

BELINDA: 5:45 just finished work. Checked ITN world news. I checked that instead of the breaking news because it is more detailed because that other one was just quick points about each one. I read two full stories about the "Concorde runway not inspected" and "Talks continue to free British soldiers." That was quite long because you can go down and down. You can read a certain amount and you can carry on pressing more and then it would give you another five pages. But I don't think I will check that site regularly because if I wanted to read something in depth I'd get a newspaper because it's annoying looking at that tiny screen. So I would only look at that breaking headline one if I wanted to check a headline. There's no pictures. I thought I'd just get a newspaper because it's so cheap to get a newspaper and you've got so much. It's 40p and you've got all this information and it's not going to get cut off. I didn't worry because I am not paying the bill, but I know what I am like. If I was worrying about having to pay money and if it couldn't find something I would just turn it off right away because I

am quite stingy like that. I would not want to waste my money searching around for something when I could just get a newspaper.

Another problem with news coverage was its timeliness—or lack thereof.

BEN: I went to *The Guardian* breaking news and it didn't seem to be breaking news because it had a load of stories that I had seen before. I was a bit frustrated that that wasn't a way of catching up on the very latest news. And again... some of these things seem to be labeled incorrectly.

Demand for news was not restricted to serious issues. Sometimes the news can lead to unexpected sites.

BELINDA: I went to Genie news. I thought it actually meant news, as in news news but it didn't. It came up with a selection called “trash.” It just sounded kind of interesting so I clicked on it and there was quite a lot of gossip, but I have written quite useless because it's the sort of gossip you would like to read in the newspaper because you've got a photo to go with it. Without a photo it's kind of no good. It was Mel G's new tattoos—something like that, something really cheesy. It just said Mel G's got two new tattoos: one on her lower back which is a this this that and then it had other gossip.

ANNE: I noticed “Gossip” and I went into “Gossip” and I thought that that was quite a fun function. I don't buy a tabloid newspaper, and you can see that you might just log on and get a bit of gossip. So I looked about Madonna and her baby and it also seemed that that gossip had been written for the WAP . So it was just little sound bites. One little heading and then there was a read, which you click on. It's not downloaded from *The Guardian* or something, like it's not a story, just a little bit. And I think that was quite good, I would access it again.

The users clearly had different news requirements. Probably the only way to please everyone is to offer clear, concise headlines, a brief extract, and the option to click through to increasingly longer versions. Also, these pages should be numbered so that users know what they are getting into.

FINANCIAL INFORMATION

There are indications of a healthy demand for financial services. Certainly, many of the users took an interest in basic financial news about stock movements. However, the current WAP sites failed to please in all but the most basic particulars.

ANNE: Today I checked my share prices and it took me 2 minutes, 26 seconds to check one share price and I think that was partly because I was trying to do the typing fast and the faster I was doing the typing the more times I overwrote myself and therefore the longer it took me to do. I suppose 2 minutes, 26 seconds is quite a long time frankly, particularly since I have bookmarked the page. It's certainly a very expensive way to track several shares.

BEN: All I wanted was a simple way to get to UK and Dow Jones share prices, I was pretty versed about halfway through (four days with WAP phone) and I failed to achieve it, so—whether that was me or the WAP—that was pretty frustrating. I was really bemused at the inability to get simple data and I would have thought that that would have been its most useful function, to get something like a share price. I found it frustrating that I didn't get it.

As with the news, users want quick access to basic headlines and the option of going deeper.

ANNE: It would be interesting if I could be able to click the share price to find out a little more about the actual company. So making that link. I wasn't able to do that. I actually went in through FT.com and that did not have a link into actually giving you information about that company. That would involve linking into some kind of database. I presume they could do it. It would actually be quite useful.

But all information must be up-to-date.

JESS: I put in a client name and found latest articles and it was great, it was really good. And I liked also, in terms of content, if it was a longer article you'll get to the bottom of the first page and it will say one of three, so you'll know how much more there is to come, which is great. And that was really useful and I used it again the next day when I was waiting to go into a meeting, and I thought I would just go and check up on this client, too. I got a "page not found" a few times, but it didn't put me off because I really liked the site, I just tried again. I wrote, "This is a really useful succinct site for business."

DAVID: Decided to try *The FT* looked up Group Chez Gerard. You then have a choice between "up-to-date information," "full articles," and "archives." I went for "full articles." First attempt was a server error. Second attempt was a server error. Third attempt I got through. And again I was really surprised at how out-of-date it was. We are not talking weeks, we are talking months out of date and I know that because I track GCG and I know the articles that have been printed. So there was something that was at least three weeks old about the sale of some restaurants and it wasn't there. Totally useless—and I am not even a professional trying to get that information.

Financial services and banking services are potentially important applications for future WAP services. However, what is currently on offer is very basic. The lack of a secure connection, as can be found on the Internet, will continue to hamper such development until an acceptable standard is agreed on (such as using a secure electronic transaction card). The move to GPRS will also be required before these kinds of services can really take off. When this happens, it will have a potentially enormous impact, as is apparent with i-mode, which already offers banking services from more than 100 different banks.⁸

WEATHER FORECASTS

Even the widely recognized need of the English to look up weather forecasts for practical and conversational purposes is not well served by WAP. Figure 16, below, shows that even after a week of using the phones, 30 percent of the users failed to find the evening weather forecast for their area.

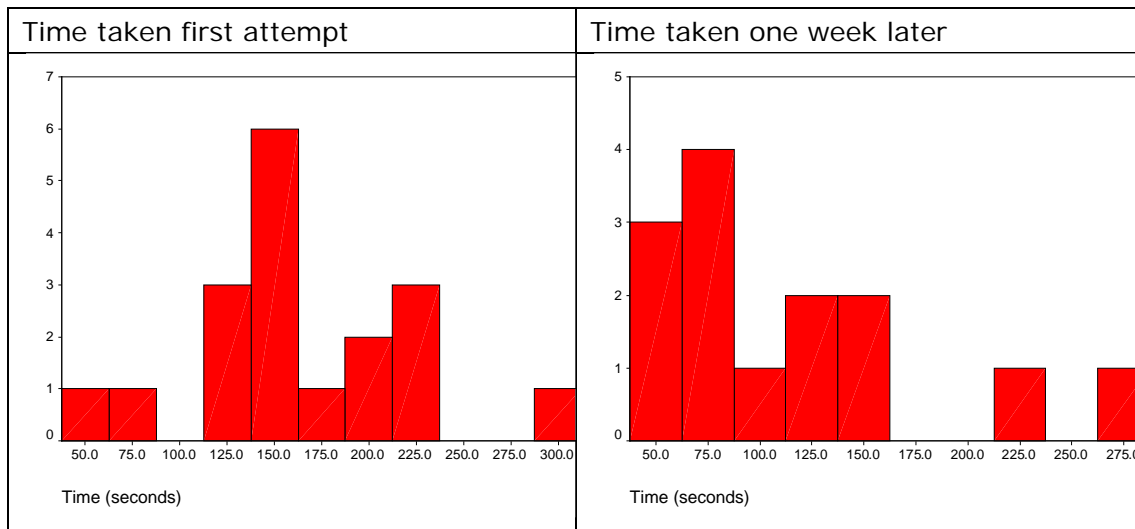
⁸ *Lessons from I-mode*, Baskerville Communications, May 2000

Figure 16: Time taken to retrieve weather forecast (1)

Task	Successful users (% of total users)	Minimum time (secs)	Maximum time (secs)	Mean time
Time taken to find local evening weather forecast	18 (90%)	54	299	164.3
Time taken to find local evening weather forecast after one week	14 (70%)	49	270	114.9

Again, the wide spread in user performance, in terms of time taken, bears witness to the frustrating nature of WAP as it currently operates. Figure 17, below, shows the time users took on an individual basis.

Figure 17: Time taken to retrieve the weather forecast (2)



Although there is a discernable decrease in the time taken overall by the users who did manage to find the weather forecast, this does not really make up for the poor success rate the second time around.

Most of the weather sites that users found gave them the impression that they simply hadn't been thought through at all. Certainly, they failed to please the users in any but the most basic terms.

ANNE: In terms of weather, I would want it to be more location orientated. So the Genie weather just simply goes into today's weather, whereas I would like to have a stage before saying "London," giving London's weather. Similarly, I actually would have liked to go into weather to find out the weather for Saturday—so I did not want to look at today's weather at all. So I had to scroll down the whole of the country's weather to the very end where there were a

couple of lines about what it might be like on Friday and Saturday. So I would like to have had something like long-range forecast, for example.

LIONEL: Friday, 2:57 p.m. I decided to check the weather in Spain. With my limited knowledge of it, I decided to go into Excite because I thought it would be better, but it turned out to be no good. So I tried Genie weather, which wasn't working, and I got lost. So I went to Mviva weather. I tried "search"—no! Trying "news"—yes! Then I got to CNN weather the page was unavailable so I got out of there. I tried BT Internet. It was now 3:13. That means I'd been a quarter of an hour on it at this stage. Continuing. Everyone was getting bored and had gone away. I tried "Directories." That was obviously the wrong thing to do. I tried "Freeserve" and everything was in Italian, and then it kept on giving me "Internal error." I gave up. Total time: 19 minutes, no success... At that stage, I was ambivalent. I thought I was an inexperienced user, so I wasn't blaming WAP—I was blaming my lack of experience.

BELINDA: On Sunday, I had basically had a 10 minutes break from work at four o'clock in the afternoon and I checked the weather for the carnival tomorrow, which was all right. I found that the weather is quite good, but when you check for the weather tomorrow you just get a map, which had little signs. If you want to like get a written report it takes quite a long time to actually just find it. But I just looked at the map, which said a bit of rain, which it was, so they got it right.

It would seem that from the users' point of view, the weather sites should be totally reorganized. No one seemed to be doing it right. The users want very simple choices. Main menus could be more direct, offering options such as regional, national, or international weather. Submenus could show options for now, later, or long-range forecasts. Maps are a nice idea, but the screen size does not really allow for accurate detail—information must also be delivered in text form.

SPORTS

Sports information is potentially a killer application for WAP. There is considerable demand among users for up-to-the minute information on games in progress and for post-game details. As Figure 10 shows above, users bookmarked sports sites more than any other category. Providing imaginative sport sites should deliver users to the networks in the hundreds of thousands.

ANDREW: This being Tuesday, with football going on, I then nailed it four times between 7 p.m. and 9.50 p.m., looking at scores. Each time "Football365"—each time live scores—seeing what the scores were and then turning off, two minutes each burst. Exactly what I wanted. Quick. You knew how to use it—that is ultimately one of the few reasons I would contemplate buying a WAP phone tomorrow, is just because I think: Yes. I want that.

But the service has some way to go. At present it is neither reliable nor timely, and there never seems to be enough detail.

RICHARD: Monday at the office, had a spare 15 minutes so I thought I would play and am very proud to say I managed to bookmark something, which was the Sky cricket live site. Because Gloucestershire was playing the semifinal, and so as I was moving around I managed to bookmark Sky cricket live, which—being the anorak that I am—was extremely helpful and I probably hit that site about 30 times during the day. If there was a ball-by-ball commentary, I would have done

it. Joking apart, it's only going to be in those sorts of circumstances that I would hit a site like that that often. You can get the cricket updates on Ceefax, if you need to, you can ring up that number and get the Gloucestershire cricket line or whatever. But it was kind of fun that day to keep on plugging—but again, all you got was the score and what I would have liked was the scorecard. You don't get that from that particular function. You literally just get the score, which is updated fairly regularly to be fair, which is good.

ARTHUR: I then got asked what the cricket score was, and I started doing this at 11 p.m., and fifteen minutes later I had found the live cricket report. Fifteen minutes later. That's a ridiculous amount of time to get there. I found the match but no one had actually uploaded the report yet. The game had been played that day but there was no result. So, something you could have got live, you could not get a report on.

NICK: I was checking the golf last Sunday evening trying to follow it up and one had as its latest news Thursday's scores, and this was on Sunday night. Which wasn't much use knowing what happened two days later. You get too many sites that do that. You get there and there is nothing there or it hasn't been set up yet.

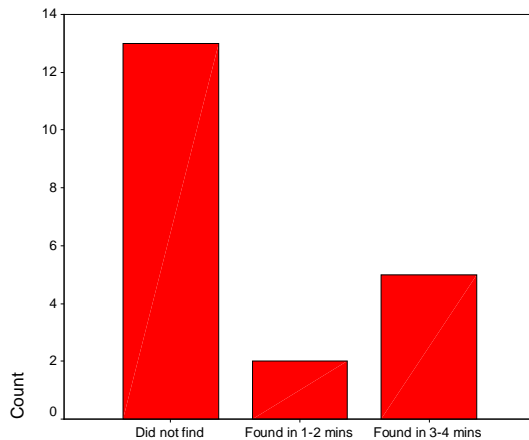
CHARLOTTE: Basically, in Formula One, the race is on Sunday. There is formal qualifying on Saturday and there are practice runs on Friday. The Orange sport just referred to the practice sessions the day before, but didn't actually put any date or time. I knew it was out of date because I knew that since then there had been proper qualifying...the Orange sports site didn't have dates or times on their update. I don't mind an out-of-date update as long as I knew when it was dated. So I tried Sky.com. There was no story about today's practice times, but at least they let you know that the last update was 22.43 yesterday—so you don't waste your time.

Most of the lessons to be learned here are common to the sections above and vice versa. However, in sports, there is an extra cache for up-to-the-minute information. The users expected sports news to as topical as possible. However, while they accepted that the stories might not always be “bang up-to-date,” they also expected to be told when stories were last updated.

TRAVEL

We asked the users to look for travel information as one of their new tasks when they brought back the phones. Although there was information available, it proved very hard to find. Travel is a big subject and there seemed to be confusion as to just what the category should contain. For the networks and content providers, travel turned out to be mostly about holidays. But users were also hoping to find basic travel information. Travel news is—at least on the face of it—an obvious use of WAP. Providing up-to-the-minute travel information to commuters and travelers with mobile phones could be a very successful service. Unfortunately, as Figure 18 shows, 65% of the users were unable to find local travel information when asked.

Figure 18: Time taken to find local travel information



This does not, however, tell the full story.

MARY: What I find very difficult is that it makes me feel very stupid. I think that's why I get so annoyed. What I tried to do is find the right portal to start with. So you've got a choice there. I didn't know which one is best to choose. Then the problem was not knowing what to look under because "transport" does not come up and it doesn't seem to go into "News" or "Travel." Whereas on the radio, you would get travel news. So maybe it's a question of labeling.

THOMAS: What's new, news and weather, sports and games, entertainment. I'm scrolling through. "Travel"—"connecting to service." "Traffic information, Train timetables, Thomas Cooke, lastminute.com." Back to main menu. So I guess. I guess because I haven't a clue. Timetables won't help. Traffic information—try that. Road name. I don't think this is a very good place to be, so we will go somewhere else. Train timetables—unlikely. In fact, we'll give up altogether and see if we can find some travel news, so we'll go back to home. And we'll try "news and weather"—but I don't think that will be very successful. This is where I stop and pick up the phone.

BEN: My thought was that it might be in "Travel." Travel is a pretty broad term—it went through my head that it might just be worldwide information about locations and hotels around the world and so on. But I thought it might be travel news, so it was worth a try and because it does connect very quickly I didn't think there was anything to lose. That's when I got the "Traffic information, Train timetables, and lastminute.com." And lastminute.com I seemed to remember was a booking service, Thomas Cook was a booking service. "Train timetables" I assume was British Rail, and "Traffic," I assumed was cars. So none of them were straightforward options, so I decided to look elsewhere. I couldn't get into Genie so I tried *The Guardian*. I seem to remember thinking *The Guardian* wouldn't have it, but thinking it might have a link somewhere else. But, couldn't find it, basically.

Where the users were able to find travel information, it tended only to refer to problems. This did not help users whose chosen tube line was not specifically mentioned in the text. They needed to see explicitly that there were no problems on their particular line.

RICHARD: It didn't have a Bakerloo line, it only had "information found for the following lines and stations please select one—Jubilee line, London Bridge Station, London Transport, Piccadilly Line. Back to Travel." So I don't know whether that means that there are no problems with the Bakerloo line because it doesn't report it? It doesn't give you enough information about whether there is a problem or whether it's just covering those specific sites.

GREGORY: Had a look at the tube in "Travel," which seemed to bring out the very fascinating information about the absence of down escalators, and no matter how much you prompted it, it seemed to provide no information about potential delays, and indeed seemed to suggest that there were no delays at all and that down escalators were the only problems.

However there were some successes. Users who looked for road traffic information were provided with an unexpectedly sophisticated service—but they had to find it first.

ANDREW: I am going to go Genie. It's still connecting now. It's telling me it's loading. OK, I will go down to "Travel." There we are, all sorts of stuff—probably not the right stuff. It looks like a travel agent. I've got things like "lastminute.com" here. I could try Excite. I'll just click on Excite and see if it comes up with some options beyond that. OK, It's gone straight to the Excite portal instead. I'm clicking down the options and I've found "Travel" and I'm going to click on that. I should probably be looking for something that says "Travel news." I've got "Travel directory." Got "lastminute.com." I'm going to go the "Travel" directory, but I have a feeling that I may be on the wrong track because it's giving me hotel guides and stuff like that, so I am going to go back to the beginning. It wasn't really clearly marked "travel news" or "travel" so I am going to go back to menu, rather than go back and clicking. But if Genie doesn't give me anything this time I am going to go back to a search engine... I'm going to try BT Internet this time round. There's nothing there that is giving me the option that could be it. So I am on BT now and clicking up and down the options. It's still not showing anything yet—travel, travel news. You'd expect that to be under the travel umbrella of sorts, but instead it seems to be offering services. OK, so I'm on to there and I've got ITS road info which is perfect and by London postcode. Excellent...

Travel information is a service that the users saw as useful and one that they would like to be available to them.

BELINDA: It might be useful if it actually sent you messages like transport problems or if there was news that was really important, instead of you having to go and look for it. Just to give you the option, maybe like, you could go into a certain section and it would just flash up like "Breaking news" or "Delays on the District line," something like that. That might be quite useful. You've just got it there and if you do want to look at it you can. If you don't want to, you don't have to. It would be just like a text message and you would get a little beep. Let's say I was travelling quite far on the train. I could just program it in, that I want to know just between that date and that date, and it could give me a little beep if anything was wrong. Or maybe I wanted to know about if there were any cheap flights to Stockholm between December and whenever, then it could just tell me instead of having to waste my time really just looking for ages—that would be quite useful.

Things like the weather and the news are quite useful, but again you could just get a newspaper.

Users expressed doubts as to whether truly up-to-date information would be available at all.

RICHARD: I wonder if it ever could be so up-to-date as to be useful. Sometimes, on the line that I use to get into work, at very, very short notice the line is late by half an hour. Doesn't happen very often, not the end of the world, but presumably the same would apply with, say, the West coast line from Euston. You think that everything's fine until 10 minutes to go—I remember this very well—and then suddenly you are told the next train to Manchester will be an hour late. Well, if you only get that news at the station 10 minutes before you are due to go, quite how you get it on this new technology I do not know. In principle, I would use that sort of function if I trusted it and if it was up to date,

This kind of service is not as far off as it might seem. One user found a site that was very up to date and listed trains that ran between her destination and departure points.

ANNA: There's lots (of new WAP sites) coming up every day on the "What's New" Page. I looked up Kizoom travel. And I found this was the first useful thing—train service info—the first excellent thing. It said service provided by Railtrack and you can type in the name of your destination and it's very easy. It says what date and it's got all the dates for the next two weeks and you click. What it doesn't give you is the prices and you can't book it. But at least I know that a train exists. I then tried to bookmark it. But again, is it useful? Really you want a one-stop service, I think. You don't want to find the information one place and then make another call to book it. If it had a facility able to book online, like you can on the Internet, I think that would be very good.

The Kizoom site is primarily a service that gives out rail information that can be downloaded by whoever needs it, wherever they need it. It is not as good or comprehensive as a website, but it was not intended to be. The site can be personalized so that the system recognizes the user. To do this, users register with the site and the system, then store details of their route to work; Kizoom automatically tells them whether their lines are clear or not. Figure 19, below, shows how users find train connections on the site. In this case, the user entered Ely and (London) Paddington.

Figure 19: Train timetable site (Kizoom)

Having chosen the "Train timetables" option from the opening menu, users can type in the places they wish to travel between.



The next screen usefully says, "Pick" and invites users to select the date from a scrolling menu. This saves users time, since they do not have to type in the data.



"Today" was selected; a further screen (not shown) then asks for times of intended departure.

Next, this screen appears. Further options (not shown) offer earlier and later trains.



It's worth noting that in this case the choice of text entry is flagged in various ways. The page title says "Pick from" and the options say "Pick Placemark," "Pick Major Station," and so on. Some pages, as above, display the word "pick" to indicate that a preset option must be selected. This is both simple and clear to the user. The approach should be standard practice in an environment where screen real estate is so limited and the potential for error so big.

In time, Kizoom may well be able to deal with the additional functionality of issuing tickets. But even as it is, this is a site that really knows what it is doing and can teach many other sites useful lessons.⁹

⁹ Kizoom, (www.kizoom.co.uk). Also see "Travelling Light", *What Mobile*, November 2000, Blah Publishing Ltd. for a full account of their site and its development.

PHILIP: I did successfully conduct a fast search because I was interested to know if I could get a channel tunnel timetable, which I couldn't at all. I could get a phone number for channel tunnel either for their Paris, London, or Brussels office. But wasn't able to access anything like a timetable. All it would tell me was that it was running a one-hour service. Once again, I met a brick wall where you could not actually get the information that you needed.

In reality, network operators' perspective on travel is less focused on consumer service than on its potential as a point of sale for travel agents.

ANDREW: I suppose there's a lot that goes under travel. It probably needs to be marked clearer whether you want travel news or local travel news. You go into travel and, this is WAP, but the whole Internet system anyway has generally attracted people or companies that want to make money by offering services, so what they're putting under "Travel" is travel agents and stuff like that, which is not necessarily what you would want to do over the phone. But you do want to get travel news and it didn't seem to be that clearly marked, so you had to hop from portal to portal to find exactly what you wanted and you were at the mercy of the site in terms of whether they had actually thought, "Well... we'll give them travel news as well as travel agents."

But even the travel agents who did have a WAP presence were not always ready to take on new customers.

JESS: Then I went to travelchoice.com through Genie, wanted to have a look at flights and things. Server access kept knocking me out. I tried "Special Offers" and it said "Special Offers will be available soon." And just basically everything I tried either wasn't ready or I had no server access and I have written "Rubbish!" I just thought: Don't put it up there. Either you're ready with your WAP stuff or you're not, and don't waste my time by making me go to your site when it's not useful. And I won't go back again.

RICHARD: I also looked at the travel function or whatever you call it and arbitrarily ended up looking up air flights and it was done in a way that I did not find particularly useful in that I seemed to have to enter a specific airport rather than where I wanted to go. I find that frustrating. I would need to play with it much more to find out how you would use the travel bit in that way. The first prompt I was given seemed to be "which airport do you want to leave from" rather than "where is it that you want to go," which struck me as being rather curious... I can't imagine saying: "I know what! Let's fly somewhere from Luton airport today." I suppose you might, but I found that frustrating. I put tomorrow's date in to find out where I could go to and got Gibraltar and somewhere else. I wasn't quite sure what it was doing for me, because I knew I could fly to more than two destinations. I was probably doing something wrong.

Users got a real sense that some sites are simply put up to provide a WAP presence for the company and that no real thought has gone into the site's actual functionality. The result is that an opportunity to convert users into customers is lost.

BELINDA: I wanted to find a flight to Stockholm. I typed in "Stockholm" and it said there were no flights for that destination, which I couldn't really understand because later on when I tried it for a different day there were flights. But they didn't tell me that there weren't flights for that day, so try another day. They just

told me there weren't any flights. Then I tried Sydney and it said "No server access." I don't know why it flashed up, I didn't know why. I did not know what it meant at all, it just said "No server access." Then I tried Singapore and it did find two flights for me. And then I tried Bangkok and they found three flights for Bangkok. I was quite impressed. When they did find the Bangkok ones, they had all the details and when the flight was taking off, and then a number I could ring if I wanted to book it, where I was flying into, what time I would arrive in Bangkok, how much it was—plus the VAT. It had everything there. I thought it was quite good.

When considering travel in its broader context, the users experiences were varied but the overall sense was that here was another test on which WAP simply failed to measure up. It wasn't just the variable quality of information that drew most criticism, but the difficulty users had in finding any at all.

Perhaps asking users to find local travel information on WAP was, at this point, too much to ask. Some information was available, if users managed to find it. But when they did, it typically turned out to be so badly drafted that users had difficulty believing what they were being told. If it is possible to tell motorists what is happening on a particular junction of a particular road (and we have seen that it is), then the challenges of providing useful and up-to-date rail, tube, and bus travel information should not be insurmountable—even now, in WAP's early days. As to where the information should be located, the users were quite clear that it should be labeled "travel news" and be filed at the top of the travel menu.

TV LISTINGS

Most portals offer TV listings, but they all seem to do the same thing: list the programs channel by channel. This didn't meet the needs of most of our users because it meant looking up every channel one by one and page by page—a truly tortuous process. Figure 20, below, shows the time it took users to find out what was on BBC 1 that evening at 8 p.m. Although the times improved significantly between the two sessions, 15 percent of the users actually failed to find a listing the second time around.

Figure 20: Time taken to retrieve TV listings

Task	Successful users (% of total users)	Minimum time (secs)	Maximum time (secs)	Mean time
Time taken to find TV program	20 (100%)	82	242	158.6
Time taken to find TV program one week later	17 (85%)	51	186	97.1

The reason for this poor performance was largely because users forgot where they found the listing in the first week and they couldn't find it again a week later. This may seem like a user failing, and that may well be the case, but the greater failing is that of the architecture itself. WAP sites cannot expect users to find them; rather, they must make sure that users can't miss them. Also, WAP sites should be considerable simpler to navigate than they are now.

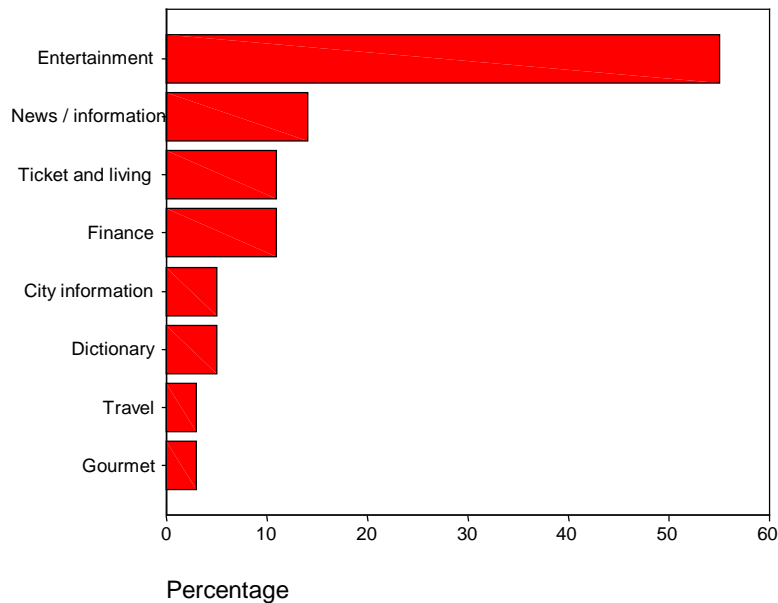
ANNE: I basically thought it was a rather long-winded way of finding out what was on television. It's doable, but it's the comparison. I think what you would need to do is like, to plug in the time I'd want, and then for it to tell me what's on on all the different channels at that time. For example, if I was to put in 8.30 p.m. and that happens to be in the middle of something, then it would tell me that it was on and in brackets what time it started.

RICHARD: What would be quite nice is if you could press the time zone between 9 and 11 what's on. And on one screen you get BBC1, BBC2, ITV. Now that—that, then maybe you're talking. Having to go "what's on BBC 1 tonight" "what's on BBC 2" etc.—forget it. You'd wait until you could buy the evening paper or something.

ENTERTAINMENT

NTT DoCoMo claims that as much as 55 % of the i-mode traffic is to entertainment related sites. I-mode traffic breaks down as Figure 21 shows, below.

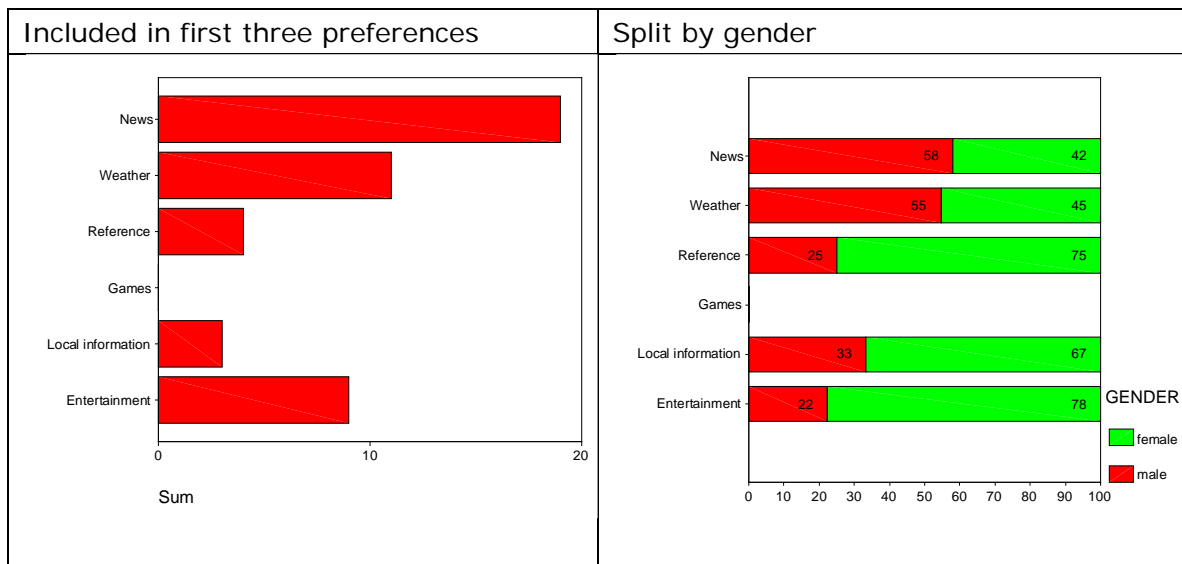
Figure 21: Percentage of total traffic by category on i-mode (source NTT DoCoMo)



The emphasis on entertainment may be partly explained by i-mode's comparatively young clientele, but in any case, it is a popular area.

The story is quite different with our WAP study users. Figure 22 shows their clear preference for news and weather sites. Entertainment comes third.

Figure 22: WAP site categories preferred by study users



Interestingly, further analysis by gender suggests that females were more open to entertainment-orientated sites than males. However, given the size of the sample (20 users) this breakdown is not in itself reliable. Further research would be needed

before drawing any detailed conclusions. In the light of the i-mode experience and some of the comments below, such research would be very useful since there are clear indications that games and entertainment may be currently under exploited on WAP. Although there are some games sites, they do not provide the content that users seemed to be looking for.

CHARLOTTE: The Gameplay annoyed me because you couldn't actually play any games, you could only buy. With a site called Gameplay, you should be able to sample games or play some. Most mobile phones have some basic games. It's probably available. It's probably on the menu of the phone itself. I suppose that that's misrepresentation of a site to me. And then it has something about top 10 games—and this is about the quality of the information—it doesn't say how all these were selected. It could be top 10 of the engineer who built the website. Very limited specifications on the games, sort of the kind of memory you might need to run them.

ARTHUR: I then spent another 25 minutes in here. I managed to get to Fantasy Football. I then managed to get to the page where the rules were described and I saw that I would then have to go to about seven or eight pages to get the rules. And that was the end of my desire to play fantasy football on the WAP, because I knew that if the rules took that many pages then playing it was going to take too many thousands of pages, and clicking, and typing in the name of each player that you wanted to select for your squad was going to be insufferable. I could well be wrong. They might have come up with a better system, but I had become so negative about the whole experience by now that I was not even willing to give it the opportunity to work.

The potential range of entertainment sites is enormous. The following selections illustrate the current range of WAP entertainment sites. Sadly, all too often, the sites fall short of user expectations.

ANNE: I went into the mobile Internet on Tuesday and found a thing like Melody composer, which I thought would be quite fun. You go in and it has an alphabet. I went to the category P-S and I selected Scarborough Fair and it went to download and I couldn't get anything, so that slightly irritated me. I was hoping I might get a bit of music. I just felt that anything kind of complicated and it's just not going to work. So it tantalizes you with things, although they are never going to be of any use. It doesn't make me feel cheated as such, it just makes me feel unimpressed by it. People are wasting time and money on these things when they should make the basic things work.

JESS: I did click "Music." I thought the news was really poorly written—it was like double Dutch to me. Whether I am not young enough to understand, but, don't know. I thought the charts were interesting and I actually dialed up and listened to Mel B's latest single and I thought that was great, and I said "Andrew! Andrew! Listen!!" I thought that was good fun.

BELINDA: I had a look around to try and find a new site and found a music site under the other site's category on the home page. I read three album reviews, which I thought was quite good actually although a lot of the albums were really old albums, like I read about the Eminem album. I've got that album, but it's been out for about eight months now. It really was like, quite old. Bookmarked that. Read the album charts. Found the Wailer gig at the Astoria last night, which I

went to. But I also wrote that it took quite a lot of scrolling to find the bit I wanted, and half way through I got off because I was on the train. So I had to start all over again

CHARLOTTE: I checked out movies that were showing in Bath. I found out that “X Men” was showing in the Movie House in Bath within about eight minutes—and the time, that’s fantastic. I didn’t bring my *Time Out*. I didn’t bring a guide. Entertainment. Cinemas. You can do it two ways. You can either go through the cinemas in a certain place or you can search for the movie...didn’t give you price, but it did give you a telephone number.

RICHARD: You go to the wine guide and there’s a function that says “Find a wine.” So finally worked out how to get the box up to type in the wine and pressed it and it gave me a one-line description of the wine. Well, fine. I knew that’s what it was—I assumed it was going to be varieties which were good years, off licenses that were doing a good deal, which travel companies were organizing a special wine travel holidays in that area. It all seemed to be based around Hugh Davidson’s ABC wine book, which I’ve got. The book’s fine, but I can find that out from the book. It just felt like the same information in a different medium, and I could not quite see the point of that. For me, to use a wine page and call it up on this, it would have to be more than just a reproduction of stuff I can get in a book, because I would rather read it in a book anyway while I am sipping a glass of wine.

The success of i-mode illustrates that entertainment sites can be far more imaginative than those WAP currently offers. One of the most popular games on i-mode is called Dwango. A brief account of this game gives a flavor of what game playing can be like. Dwango is a virtual fishing game. The concept is simple, and not unlike the principles of fantasy sports, which have become very popular in the UK. The user goes online and chooses where to “fish” today. The user is in competition with all other people fishing virtually. Complex databases take into account variables that you must consider, including the weather, choice of fish to pursue, the place to fish, the relevant current conditions, and the choices made by your competitors. High scores are given to people who succeed in landing a rare fish, or a heavy one under difficult circumstances. Low scores are given to those who stand shoulder to shoulder trying to hook a more common fish. Hundreds of thousands of users play this game each day and the results—displayed as league tables—are published for all to see.¹⁰

SHOPPING

Many entrepreneurs see m-commerce as the next big market. But, in the absence of an agreed method of taking payment, shopping by WAP is very much a thing of the future—although users expect it now.

DAVID: Because there is a lot of talk about shopping on the Net, I thought there must be some sort of shopping and it would be interesting to see if, in such a limited medium as that little screen, it actually sells you stuff. I looked for “shopping” and sure enough there it was, and something called “Loot.com.” I thought, “interesting.” First attempt, failure. Second attempt, went in. It was an auction site. It was the only shopping I could find. And it was interesting, but only interesting because you are talking about billions of pounds invested in this thing

¹⁰ Details given by Dr. John Ricketts, Regional Director (Japan), OgilvyInteractive

and there was an auction site—a shopping site—and there were three items for sale. Some cyber geek has put his, I think, a beta max video there. You could not imagine anyone whatsoever tortuously finding their way through WAP to buy this BETA max video recorder, second hand, from some unknown Philip on a phone that you'd hardly learned to trust.

ANNA: I looked at “Freestore shopping.” Tried to buy a book. Their book choice was lousy under “featured titles.” Looked at the top 10 books list instead. We got the four Harry Potter's, and *The Naked Chef* at a very good price £9.49, which is well under half the price. Very cheap. Was asked for my WAP ID and pass code. Do I have one? No. Pressed “Help” at that point. Told me that I would have to set up an account by going to streetsonline.com during working hours...

DAVID: What I found amazing was that none of the big sites were there. I couldn't find Amazon, you know the big boys, bol.com. You could imagine buying a record would be easy—it's the sort of thing you don't really need to hear because you have already heard it. You certainly don't need to see it, and it would be easy sitting at some traffic lights saying, “Oh, must buy the new whatever record,” and you can go straight in, bookmark it. Just the stuff you go through with Amazon...what you want is your book or record delivered. But I couldn't find it. Still having real problems and it was really irritating having gone down that whole ladder of finding an auction site. I then wanted to go back to shopping and I couldn't so I had to go all the way back to Genie and start all over again.

Once again, it is useful to look to Japan to see how this area of service content might develop. As we discussed above, transaction-based traffic is already well developed with i-mode. Hundreds of banks already offer their services through i-mode. Other services range from hotel bookings to airline ticket reservations. It is estimated that more than three million airline tickets were sold on i-mode between February and December 1999.¹¹

For NTT DoCoMo, i-mode enabled transactions represent an extra revenue stream. It takes 9% of the traffic value as a handling fee.¹² This may seem steep, but the telephone billing system is a very cost effective way for people to pay for goods and services. It is also very efficient for the suppliers. WAP has a long way to go before it can even begin to compete in this arena.

LIFESTYLE

Lifestyle is a category that seems to sweep up anything that does not easily fit into entertainment or anywhere else. Users found sites that demonstrated life-saving techniques next to ones offering the chance “to meet a friend.” Food itself seemed to bridge both categories: WAP seems uncertain as to whether eating should be categorized as an entertainment or a lifestyle choice!

DAVID: Go through Genie, thought I'd look up restaurants just out of pure interest. I thought I'd look for Chinese restaurants. Had “an invalid address”; thought, “fine.” Tried every single other food that I could [think of]. None of them worked. What's amazing is, if you actually go through Genie and look through the

¹¹ Dr Ricketts, OgilvyInteractive, op cit

¹² *Lessons from i-mode*, Baskerville Communications Corporation, May 2000

menus, the list of foods is mind-boggling. It's got Botswanan food, East Botswanan food. It's got a lot food I had never even heard of—but there's nothing behind it. So, it's either a site in progress or there's something wrong. But I can't see how there is something wrong, because you get the list of everything. But it's literally as if someone gave you the index to a guide and then ripped all the pages out, but you are impressed by the guide because they really have absolutely everything! But there's nothing behind it so you feel a bit aggrieved.

CHARLOTTE: Menus.com—that was fantastic. That's where I could find the menus for my local restaurants and figure out what was for pudding at Leith's. It makes me think about going out to restaurants more when you actually can see what's on the menu. I assume it's up to date...I didn't think of ringing Leith's to see if they had a chocolate bavaois tonight! But it got my taste buds moving. Rather than a review of what the décor and service is like, the food actually made me feel like, "God, it's just round the corner. I could just go for a pudding!" To a chocoholic like me, that definitely could do. It made me feel like going out more. It would definitely, if I was looking up to two restaurants and looked up what was on the menu that day, that would be the decider.

The two reviews above are for the same site. Each user accessed the site the same way—Genie/Lifestyle/Menu.com. Further research into these sites showed that Nokia/Orange connected and gave the restaurant details, whereas the Ericsson/Cellnet phone failed to connect, saying "wrong address."

This illustrates a considerable challenge to the site engineer when it comes to WAP usability testing. WAP relies on the consistent interpretation of WML-coded instructions to successfully complete a data transaction. But the software that underpins the site, the portal, and the phone does not always interpret the code in the same way. This can lead to simple display problems such as different layouts or total failures that result in an error message. The users, of course, do not care, nor should they. WAP sites should work properly or be removed from the scene until they are functional.

NEED FOR ACCREDITED RECOMMENDATIONS

Most users felt that offering service listings was not enough in itself. They wanted inside information and they also wanted to be given a reason to trust the source of the information. In both respects, most users were consistently disappointed. This was particularly noticeable with restaurant listings.

JESS: It's more important that someone's got an opinion, and somebody's telling me this is how much it costs to go here and this is what we think of it or this is the kind of thing that we get on the menu.

THOMAS: It's got to have an address, telephone number, a short review, some kind of recommendation, and an average price. I suppose what you are looking for is partly a function of what you anticipate spending. If there was enough information and it was doing it by locality, then maybe it would be good enough. A map, I guess, would be very useful, but the screen is always going to be a limiting factor... A book is much more flexible. More information, more quickly, more flexibility. But then you are not asking it to be as efficient as a book. You are asking it to be more convenient. It's a trade off.

This need for extra information and an indication as to who was providing it stretched across other services.

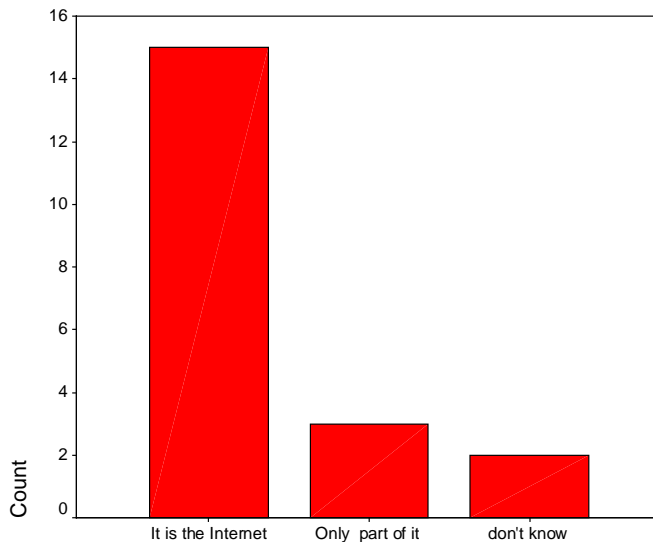
ANNE [looking for tourist attractions]: It's no point in just having the location. You want to know if it's worth making the trip. You need some information about it more than the location reference. So in this case, it was something like a mill so I wanted to know either opening times, or what's on or some kind of very short statement about it. Otherwise, basically, I am not going to risk my time to go and visit it.

ANNA: I would never type in "Mexican restaurant" and book a table at a Mexican restaurant that I had not read a review of or someone had told me to go to. So I am not looking for that kind of information. Say I'm looking for cranial osteopath in south London. I would probably only go to a cranial osteopath that someone had recommended to me, so I would be looking for that person's phone number. I'm not looking for a star rating of a cranial osteopath or something. I wouldn't trust it. It totally depends who is giving it its star rating. If it's Orange's food critic, well I don't know who they are so why would I believe them? It's the same when I looked at top 10 products. I looked up buggies. Well, three-star buggy—who's decided it's a three star buggy? Is it *Which?* Magazine or is it some kid whose never had a baby whose gone and pushed a few buggies around? So I would never use those ratings.

WAP and the Internet

WAP was aggressively, if not seductively, marketed by BT Cellnet as a means of surfing the Net (others followed, but BT led the way in this respect).

Figure 23: Users views about the relationship between WAP and the Internet



As shown in Figure 23, above, the marketing ploy hit a spot. Consumers instantly recognized the value of such a service and bought into the dream—at least at first.

But surfing the Net was never really in the cards. The effect was the creation of a market for a service that didn't exist and a consumer base whose expectations simply could not be met. In addition, and this is in stark contrast to Japan, we have come to expect—and get—a great deal of very high quality data from the Internet. The nature of this data is highly diverse. In our study, users transferred much of this experience to their expectations for using the WAP phones. They were inevitably disappointed.

LIONEL: The advertisements are that you can get the Internet on your telephone. And that's why I expected to get the Internet on my telephone. Of course, I did not expect it to be colored with loads of pictures and stuff, but I did expect to get the same amount of information that I could get on the Internet—despite the fact that it would take longer and I would have to scroll through something—I expected to get on the Internet, which I don't feel I did.

MARY: I find it difficult, and depending on your mood it can become a fixation and a challenge. Because I thought that finding something obscure like the Riga Stock Exchange, I never thought I'd find it, so I was very impressed and felt very triumphant because I felt that I was winning a battle. And when I clicked on the site, it said "Communication error" and I could not get into the site after all that, and that was very, very irritating.

JESS: I think it's for almost everything the Internet is for, I think there is that capability. Personally, speed is always important to me and I will look for short

news articles. It's a fantastic way to do research that you've not had time to do at your desk before a meeting. And there might be certain entertainment things that I'll be interested in. I'd perhaps go back to the charts and listen to some music, or something like "Big Brother," sort of topical interest. And it's kind of a novelty, too. I would use it for that. Restaurants and stuff and searches and where are you, where's the nearest restaurant that will probably be interesting to me in time, but I think it needs to be developed first. I want more content. I'd like them to tell me where I am. I don't want to have to put, you know, "I am looking for a Curryhouse in NW6".... or I can put in a district that I am looking for, but that is of no use to me at all without some kind of comment like, why I should go to that restaurant or whatever. Unless it's a dire emergency and you are standing in the middle of nowhere and you desperately need to know where a cash point is. But that's a kind of different use.

ARTHUR: We think of this as a computer but it's not, it's a telephone. There are far more things that can go wrong on this with its tiny little memory.

ANDREW: I don't think that it gives you enough on that screen. Say if you equated it to a level of, say, I am at home on my Internet paying my phone bill, or I'm on my mobile phone paying my phone bill. What do I get in terms of value for money? It's a key driver. You are getting a lot more out of your landline based Internet so unless you actually really want to get a quick bit of information and you don't have home Internet, you've got to use WAP. But if you've got home Internet or work Internet you are going to use that because it just beats it hands down. It's not in my pocket, but most of my Internet surfing isn't meant to be in my pocket. It's not a surfing device it's an information-providing device.

Few companies have been able to resist the blurb. WAP continues to be oversold. During the Olympics, handset manufacturers advertised services that implied that the Net could be delivered to you wherever you were—if you had one of their handsets. Expectations continue to be fueled, as hardware providers promote a service that does not yet exist, fueled by the fear of being left behind by rival suppliers. It's another vicious circle, which simply adds to the disillusion of the very people they need to satisfy if they are to secure a revenue stream in the future.

Final Verdicts

The shortfall between the marketing hype and current WAP realities has colored the public perception of WAP. The users, in this evaluation, came with some expectations, but also with open minds and a certain amount of goodwill. The service is new and they were curious. But they were not that impressed with what they found.

Most users were able to catch a glimpse of what WAP could become—providing they could get past WAP's current performance.

THE DOWNSIDE

LIONEL: It seems too hard to navigate. It seems an incomplete service. It's like being on holiday in a half-built resort. The signs to the beach are OK and other major tourist attractions, but if you try and get to the tennis courts they haven't finished building it yet and the bar only serves beer, no cocktails.

ARTHUR: It never kept me interested and it always hurt. I think WAP should actually stand for Want A Physiotherapist because it is seriously a repetitive strain injury situation, and much worse than using a mouse. And a mouse is bad enough.

PHILIP: It was so user-unfriendly I would rather wait until I was at my computer and look it up on the Internet. So far as accessing Genie, then it was all right, but then I hit this brick wall—internal server errors, time outs. Had I not been doing this exercise I would have given up far sooner than I had. In fact, I would probably have thrown the phone out of the window. I think one thing is that you get to the end of a site and you can't ultimately find the information you need, but at least you have had a fairly successful search. But not even being able to get past the threshold—I find that very irritating.

ISABEL: I don't think it should be on sale because you have paid for the WAP package up front and then you are paying for the line time. If that was mine, and I'd had it for a month, I would definitely take it back to the shop at the end of the month and say "inadequate service." I don't know if other people have had that experience like I've had or if they've had more luck. I think to have to wait two minutes at 10p a minute—so, hang on. Five minutes, it cost me 50p to get the TV listings. Most of those things I did I would say seven out of 10 took me five minutes definitely, so that 50 pence and a newspaper costs what, 35p?

WAP is in its infancy. In some ways, it is at the same stage of development as PCs were when the standard programming was in DOS: screens were green, the text was white, and Gopher was a state-of-the-art revelation. Now that we have the World Wide Web, user expectations are high and far exceed what WAP can currently deliver.

What is disheartening is that so many lessons that have been learned as to what it takes to design a good website for the Web have not been taken on board when designing the relatively few WAP sites currently available. Most WAP sites appear not to be designed at all, in the strictest sense of the word. They are simply recoded in WML. But that should not mean that no attention is given to how the site actually looks on a WAP phone when it is downloaded, if indeed it gets that far. As we

showed here, some of the problems are caused by software incompatibilities. While this may well be the case, the fact remains that it is incumbent on site designers to take such things into account and to test the results before unleashing their sites on unsuspecting users.

This is another strength behind the i-mode model. NTT DoCoMo was able to impose uniform standards on all parties between the content and the screen display. This solution is unlikely to hold in Europe, where diversity rather than homogeneity is preferred. Nonetheless, WAP will have to solve these design problems if it is stand up as a viable alternative to i-mode.

ARTHUR: I wrote down, “If you are incredibly bored and you have nothing to do, this might be of interest to you.” This was the day you gave it to me.... I was 40 minutes into having used this telephone and I decided that this was something that I hated. Which is fairly impressive. It was useless. It was unfriendly. The material it was giving to me was completely irrelevant to my life and my thumb was starting to hurt.

LIONEL: That day I had spent an hour and twelve minutes on it. I spent so much time on this and I got so little out. At the end of the day I wrote this. “I find that I am beginning to hate this thing because it doesn’t work properly. I get continual error messages, difficultly getting where you want when you want. Minimal information.” Then I have written “I have no use for one. It’s an expensive and reward-free way of killing time. Give me a Game Boy for that, or a copy of the *Sun*. PCs have taught us to expect much more sophisticated technology and much more varied and detailed information. It also has no sense of humor and is slow. Would you want to spend time with a person if they were poorly informed, slow, humorless, colorless, and expensive?”

Despite these harsh words, there is hope for WAP. The study users were remarkably patient, all things considered. But network operators cannot rely on this forever. They cannot continue to provide what appears to be an indifferent service without risking alienating the users whom they expect to pay for the right to download data to their mobile phones. The users saw the potential. It’s now time for the networks to deliver, and the users are quite clear as to what they expect.

THE UPSIDE

DAVID: The advantages are basically a mobile Internet for a fraction of the cost of walking around with a laptop. The disadvantages are of anything that is mobile. It is very small and irritating to actually use, and at the moment it is in its infancy, which means it’s slow and liable to crash.

PHILIP: It needs some functionality. It can’t just be an information service. You are going to have to be able to communicate with it. The really useful things would be to be able to do last minute payments with it—booking tickets, booking train tickets. You are on the move, you want something done.

RICHARD: For me, it would only become a must-have when it becomes much more tailored to the things that I might want. I suppose what I am saying, in a way, is that it needs to be semi-programmable so that I can say, “Here are the things that I want.” And within those things, I want it to go down in enormous detail when I want it, but I do not give a monkey’s about the other 85% of the stuff. Don’t worry about me. I don’t even want to get film reviews. The stuff I do

want [it to] give me is (a) the wherewithal to give me lots and lots of detail and (b) get it very, very, very quickly and (c) allow me to absolutely know that it's absolutely up to date and trustworthy. So a very narrow range of interests, but mined quite deep. If that was doable—then, yeah, I could see I'd go with that, particularly combined with an ordinary mobile phone. Anyway, if I am going to have a mobile phone and I can get some added bits to it for not too much extra money, then of course I would do it. But I would need convincing.

DAVID: It's like anything. It is the future. You can imagine that when the Wright brothers were talking about flying, I don't think they probably imagined taking jumbo jets across the Atlantic. And we are talking about the Wright brothers at the moment of this technology, and one day there will be jumbo jets, but right now I would not spend a penny on it. Just as I wouldn't get on the Wright brothers' plane to cross the Atlantic!

JESS: I imagine I will get a WAP phone quite soon and I will use it for a finite set of things. I will use it for the news. Actually, I will only use it for news because I wasn't really impressed about anything else I really did!

BEN: If I was in France, then rather than buy an exorbitantly expensive British paper just to see how QPR did, I might look at it. But as I have put in my results, it has not encouraged me to purchase one within the next year.

ANDREW: If you are sitting on a train—a mundane situation—and you have nothing to do, then obviously it comes into its own. It can entertain you or it can educate you. It really depends how you want to use it.

JESS: I would probably be more likely to check latest news on the WAP phone than the Internet. I tend to go to the Internet for specific things, but if I am waiting to go into a meeting or doing something last minute, I'd do that, I'd prefer to use a WAP phone. I really enjoyed the business use of this phone because it's quick and it's so mobile and it's so easy to do—that really sold me.

Conclusions

The comments found in the section above amount to something of a conclusion in themselves. The users' frustrations are well articulated and their basic needs made clear. Taken together, they add up to a usability guide in their own right.

In terms of the five attributes of usability¹³—learnability, efficiency, memorability, errors, and satisfaction—WAP did not perform very well. WAP-enabled phones are not that difficult to learn to use and, to a relatively large extent, once users learned them, they remembered key functions easily. But, for higher levels of performance, the story is rather different. Users encountered too many cul-de-sacs, lost connections, and poor signposts to be able to come to grips with using the system itself with any real efficiency. Errors, rather than being “few and far between,” plagued the system. In terms of being pleasant to use, WAP generally failed to satisfy.

Users also seemed unable to quite get over the fact that WAP is not the Internet made portable. Whether it was ever meant to be that is open to question. It is tempting to lay much of the blame for this misconception at the door of the marketing departments who want to exploit mobile telephony. Nevertheless, there was, at the same time, a clear demand from users for a portable version of at least some of the Internet. So what does this mean for WAP?

Our report points to some of the possibilities for squaring WAP's current vicious circle and creating something rather more virtuous. The users spelled out basic requirement loud and clear.

The phones themselves are not as big a problem as one might have imagined. The users accepted the screen's limitations and realized that there has to be a trade off between portability and ease of use. The lack of good advice in the owner's handbooks was disappointing. This is particularly true of Orange, which took the unusual step of customizing and branding the phones to work on their system. This completes the link between phone manufacturer, network operator, and user. Yet Orange does no more than tell you how the buttons work. It could have taken a little time to tell users how to get the most out of the service. Its failure to do this suggests, to us at least, that people at Orange had little idea themselves about how this service might be successfully used.

Poor connectivity is the Achilles' heal of the current service. It will not be transformed overnight. Until the arrival of GPRS, the networks, content providers, and site engineers must do better when things go wrong. Sites that are not working should not be online. Users cannot be expected to pay their way through a series of links to a page that is simply unavailable or temporarily out of order. It may be that a default page, as found on the Internet, is needed. This could at least minimize the amount of time users waste.

Navigation and labeling all too frequently resembled a dialogue of the deaf. On the one side, the networks and content providers offered long lists of sites and services providing pretty much everything a WAP user might want. But to users, this was a recipe for disaster. The long menus required thumb-numbing scrolls. Categories in

¹³ Jakob Nielsen, [*Usability Engineering*](#), Morgan Kaufmann Publishers, 1994.

themselves were a good start, but once the user clicked through, the guiding role of the screen was often abandoned. This left users with a bewildering array of sites that frequently were not quite, if at all, what they wanted. The result? A mildly irritated user slowly and surely becomes increasingly more fractious and disenchanted with the system as a whole.

It is clear that, as things are, mobile phones are not places from which to surf anything, let alone the Internet. This is hardly surprising. The device was originally designed for the ear, not the eye. In time, audio streaming could convert the difficult-to-read material into sound. This is, after all, the natural medium to receive information on a mobile phone.

However, there are clear pointers as to how to better offer users data to read. Offer the users' clickable options that go deeper into areas that users want to know about. This means thinking ahead for the user. Create search paths that make sense to the user. Too many paths seemed to be for the benefit of the witty site designer rather than the busy user.

Time on WAP is money—big money—and users will not thank you for wasting theirs. A site that is easy to mine and that presents information clearly is one that the users will return to again and again. Sadly, such sites are rare.

Displaying data on a small screen is never going to be easy. But our users made the basic principles clear. Use short openings to sum up everything that lies beyond. For news, this means clear one- or two-line headlines. Provide the source and date of posting. This is as true for news as it is for a restaurant listing. WAP is not like the Internet in this respect. Users do not bring trust to the table—quite the reverse. They must be given reasons to believe what they are reading.

In terms of depth, let the users go deeper if they want (in which case, tell them how many pages they are letting themselves in for). Most users, most of the time, are online for a handful of minutes. Given this, the data must be easy to scan at a cursory level or quick to drill through. Certainly, both facilities must be offered. Lastly, do not simply lift your information from a different media. Print or Internet copy does not transfer well to WAP. The small screen makes it all but impossible for users to scroll or scan with any comfort.

Fundamentally, WAP is there to keep a mobile user up to data, so to speak. This can mean news and useful information, but it can also be rather more frivolous. Users viewed gossip about Madonna, Mel B, or "Big Brother" as delights in an otherwise disappointing service. Indeed, the i-mode model recognizes this need for a lighter touch. This suggests that far more attention should be paid to providing sites that can be explored in a handful of spare moments. Users, young and old, have escapist needs, and WAP sites could be developed to meet these.

Travel information, or the lack of it, brings into focus two very significant failings of WAP: the lack of personal and localized services. Apart from entertaining someone with time to kill, this is where WAP should be able to make an impact. The current GSM network can provide a reasonably accurate geographical location for a phone, so localized information should be a possibility even now. But there is little sign of it. Providing a user with an unsolicited message that their usual tube line has just been stopped should already be a killer application, rather than yet another thing to put on the wish list.

Fundamentally, WAP should quickly provide personal and locally relevant information to a user on the move, but it is simply not up to this. It seems as if the service is

offered with little or no thought as to why it is being offered, and what it will take to get, and keep, people online. Many of the answers are found in the extracts above. Only when these basic needs and standards are met will m-commerce become a reality. There is no point in pretending that it is useful or even possible to offer banking services, or simple shopping opportunities, until the basic infrastructure is in place. When it arrives, the new GPRS operating system will solve many of the underlying problems. But until the issues identified here are dealt with, there is a real risk that the new, faster system will simply deliver poor quality data more quickly. This is something that must be addressed in the future development of site design.

There is little doubt that these teething problems can eventually be overcome. It's just a question of how long the user must wait. However, there may not be that much time. As has been seen above, there is a specter on the horizon: i-mode. In this report, i-mode has provided a source of comparison and encouragement. But it is also a rival. NTT DoCoMo are beginning to invest in America and Europe with a view to providing an adapted i-mode service in the West. With this in mind, the future of mobile telephony would seem secure, but WAP's place in that future is far from certain. Signs of good, or at least better practices are beginning to appear. The question is, in the face of such a powerful rival, whether it's too little too late.

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Appendix 1: Interview Questions

USER ATTITUDES TOWARDS WAP PHONES (initial interview)

FIRST SOME FACTS

1. Sex Male ☐ Female ☐
2. Age group 16-24 ☐ 25-34 ☐ 35-49 ☐ 50+ ☐
3. What is your occupation?

QUESTIONS ABOUT YOU AND THE INTERNET

4. Do you use the Internet?
- Yes ☐ No ☐
5. How long have you been using the Internet?
- Less than one year ☐ 1-3 years ☐ 3-5 years ☐ 6+ years ☐
6. On average how many times do you "surf" the Internet per day?
- Up to once a day ☐ 2-3 times/day ☐ 4-6 times/day ☐ 7+ times/day ☐
7. Do you connect to the Internet at home on a PC or at work?
- Home ☐ Work ☐ Both ☐
8. If both, where do you mostly connect to the Internet?
- Home ☐ Work ☐ Equal ☐
9. What are the activities you most like to do when on the Internet? (Rank in order of importance)
- News ☐ Sports results ☐ Weather ☐ Reference ☐ Chat ☐
- Play games ☐ Shopping ☐ Other ☐ Travel ☐

10. Do you use a mobile phone?

Yes ☐ No ☐

11. What does the term "WAP-enabled phone" mean to you?

12. Have you used a WAP-enabled phone before?

Yes ☐ No ☐

13.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to have a WAP facility on my mobile phone.					

14. How long do you think it will be before you get a WAP-enabled phone?

Never ☐ within one year ☐ 1-2 years ☐

more than 3 years ☐ don't know ☐

15. What kind of data do you think you would want a WAP phone to provide?

USER ATTITUDES TOWARDS WAP PHONES (FINAL INTERVIEW)

USING THE PHONE

1. Did you use the instruction book?

Yes ☐ No ☐

2. If yes, what did you use it for?

3. Were there areas that you needed to look up, but that were not covered? If so, what?

4. How many times did you use the phone each day?

Once ☐ 2-3 ☐ 4-6 ☐ 7-9 ☐ more than 10 ☐

5. On average, how much time did you spend on the phone each time?

0-10 mins ☐ 11-20mins ☐ 21-30 mins ☐ more than 31mins ☐

6. What do you dislike most about WAP?

7. What do you like most about WAP?

8. What kind of data do you think you would use a WAP phone for? (Order of preference)

News ☐ Sports results ☐ Weather ☐ Reference ☐ Chat ☐
 Play games ☐ Local information ☐ Entertainment ☐

9. What kind of data do you think it is missing?

SOME OPINIONS ABOUT THE FOLLOWING STATEMENTS

(For each statement please indicate whether you: agree strongly, agree, are neutral, disagree, or disagree strongly. Tick the appropriate box.)

10. What would a reasonable price per minute be—in your opinion—to be able to receive WAP data?

11. Attitude to general statements about using WAP?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Navigation on a mobile phone is not a barrier once you get used to the phone.					
Quick connection time is important to enjoyment.					
The size of the screen is a critical factor influencing whether you would use WAP.					
The quality of WAP data is important to using the phone.					

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Current data quality is high quality.					
I will have a WAP phone within three years.					
I will have a WAP phone within one year.					
Assuming 20 minutes of data calls each day and the current rate of 10p (Cellnet users) OR 5p per minute (Orange users) per minute, the weekly bill for your data calls would have been £14 (£7 Orange) for the week. Would you still consider getting a WAP-enabled phone?					
New technology will allow your phone to offer you personal and locally orientated services. This is will encourage you to use WAP data services in the future.					
Mobile phones will soon be able to locate you wherever you are—this could be intrusive and may stop you taking advantage of WAP services.					

Appendix 2: Set Tasks

SET TASKS (REPEATED AT THE END OF THE WEEK)

Timing 1: World headline retrieval from home portal

Timing 2: Searching for today's TV listings

Timing 3: World headline retrieval from second portal

Timing 4: Domestic headlines from bookmarked Guardian WAP site

Timing 5: Manually entering a URL — <http://somerwhere.com>

Timing 6: Local weather forecast for tonight + bookmark

SET TASKS (NEW ONES)

Timing 7: Find out what the travel info says about your journey home tonight

Timing 8: Find the telephone number of a suitable local restaurant to go to for a meal

Timing 9: Find the results of last night's football games

Appendix 3: Ericsson Phone

USERS' CRIB SHEET (ERICSSON 320)

VERY IMPORTANT: WITH THIS PHONE AND ON CELLNET THE PHONE CONNECTION IS MAINTAINED UNTIL YOU CANCEL THE CALL—EVEN IF THE OTHER PERSON HANGS UP. SO MAKE SURE YOU END YOUR CALL. A CLOCK IS USUALLY ON SCREEN SHOWING YOU HOW MANY SECONDS/MINUTES YOUR CALL IS TAKING.

It is possible to crash the phone (the buttons stop working). When this happens, simply slide the battery down and back up and then turn on the phone again.

Underlined text in menus are clickable options...no underline usually means the text is explanatory rather than functional.

Explore what WAP has to offer. Look at the bookmarked sites if you want to. Bookmark any pages you like so that you can find them again and we can talk about what interested you. Do the same for bad ones—we can talk about those, too.

Recharge the phone every night.

General notes

The service is being evaluated, not you! Try and use the phone several times a day.

Sometimes you might get lost in the site. If you do: first try the BACK button. If that does not work, try to get back to the home page using OPTIONS. If the whole keyboard freezes (it has done this to me) slide the battery (clipped to the back of the phone) down and then back up. This breaks the power connection. Then you will need to restart the phone. IF THESE THINGS DO HAPPEN, RECORD THEM IN YOUR DIARY.

Recharge the phone every night if you think you will remember to take it with you. Otherwise, keep an eye on the charge indicator on the right of the screen when you turn it on.

THINGS TO DO FOR ME:

1. PLEASE VISIT AS WIDE AN ARRAY OF SITES AS POSSIBLE.

Use the opening menu of the main portal as a contents page. Look at as many contrasting categories as possible. Visit the bookmarks at least once. Specifically, look at least one site in each of the following categories:

- Sports
- Entertainment
- TV
- Travel
- Lifestyle
- Shopping

If you like a particular page or site, bookmark it! Visit it regularly to see how it changes over time. When you visit the other portal, spend a little time there. Does it offer better services in certain areas? Which ones? Or, are the portals pretty much the same?

2. KEEP A DIARY

Please try and write down when you go online, where you are, what you are looking at, what you find, what you think about it, where you go next, why, and so on. Then note what time you log off. I am interested in your thoughts about how the phone helps or hinders you, how long you feel it takes to get the information, and what you think of the information when you get it. So, write about these kinds of things in the diary.

GETTING STARTED:

The phone is password protected: The password is DATA, or 3282 (which is the same code numerically). REMEMBER THIS CODE EITHER AS THE WORD OR AS THE FOUR-DIGIT NUMBER. Tap it in and then press YES.

THE MAIN NAVIGATION IS DONE BY USING THE THREE ARROW KEYS FOUND IN THE MIDDLE OF THE PHONE—LEFT/RIGHT/UP+DOWN. When you have the right bit highlighted, press the YES button. If you get it wrong, press the NO button. This is in effect a BACK button. If you press it for too long, you may go so far back that you turn off the phone!

TO GET TO THE HOME PORTAL:

Press the LEFT ARROW twice (or the RIGHT ARROW 5 times—there is a row of icons at the top). The arrows simply scroll across, highlighting each one in turn. Once WAP SERVICES is highlighted, use the DOWN ARROW to scroll down to GENIE. This will then become highlighted. This is the home page for the Cellnet portal. Press YES to connect.

USING BOOKMARKS:

Press the LEFT ARROW twice (or the RIGHT ARROW 5 times—there is a row of icons at the top). The arrows simply scroll across, highlighting each one in turn. Once WAP SERVICES is highlighted. Use the DOWN ARROW to scroll down to BOOKMARKS. This will then become highlighted. Press YES. Use your DOWN/UP ARROW to scroll.

Highlight the one you want, and then press YES. A new menu appears. Select GO TO. Press YES.

CREATING BOOKMARKS:

When you are on the page you want to bookmark, press and hold the YES button. A menu will appear. Use the DOWN button to scroll down to ADD BOOKMARK and then press YES. Screen will say "bookmark saved."

ENDING THE SESSION COMPLETELY:

Press (and hold down) NO. This ends the call.

ENDING THE SEARCH WITH A VIEW TO CONTINUING:

Press (and hold down) YES. Scroll menu and select EXITWAP or whatever you want.

TO FIND ME:

1. THE EASY WAY – Marc at home: Press YES twice.
2. IF I AM NOT THERE—DIAL MOBILE NUMBER + SCOTLAND NUMBER.

Press RIGHT ARROW once—the phone book should be there. If not, keep pressing until it is there. Select FIND AND CALL. Type M (for Marc). Select the number you want to try. Press.

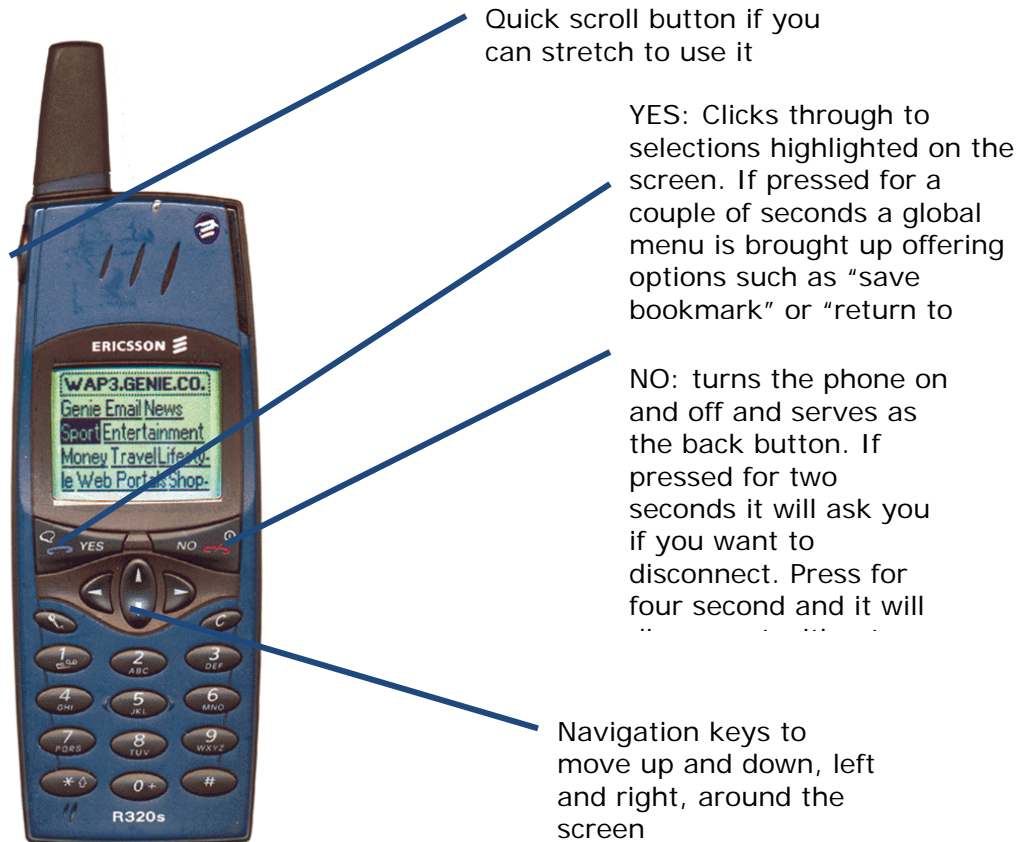
ENDING YOUR CALL:

Press NO.

TURNING OFF THE PHONE:

Keep NO pressed until you hear a little beep.

THE ERICSSON R320S



The Ericsson R320s uses four arrow keys to provide the functionality of the Nokia's roller key. There is also a scrolling button located on the top left-hand corner of the phone. The "No" and the "Yes" buttons work in largely the same way as the Nokia's soft keys. These also perform the vital back button operation.

Appendix 4: Nokia Phone

USERS' CRIB SHEET (NOKIA 7110e VERSION)

It is possible to crash the phone (the buttons stop working). When this happens, simply slide the battery down and back up and then turn on the phone again.

Underlined text in menus are clickable options...no underline usually means the text is explanatory rather than functional.

Explore what WAP has to offer. Look at the bookmarked sites if you want to. Bookmark any pages you like so that you can find them again and we can talk about what interested you. Do the same for bad ones—we can talk about those, too.

General notes

The service is being evaluated, not you! Try and use the phone several times a day.

Sometimes you might get lost in the site. If you do: first try the BACK button. If that does not work, try to get back to the home page using OPTIONS. If the whole keyboard freezes (it has done this to me) slide the battery (clipped to the back of the phone) down and then back up. This breaks the power connection. Then you will need to restart the phone. IF THESE THINGS DO HAPPEN, RECORD THEM IN YOUR DIARY.

Recharge the phone every night if you think you will remember to take it with you. Otherwise, keep an eye on the charge indicator on the right of the screen when you turn it on.

THINGS TO DO FOR ME:

1. PLEASE VISIT AS WIDE AN ARRAY OF SITES AS POSSIBLE.

Use the opening menu of the main portal as a contents page. Look at as many contrasting categories as possible. Visit the bookmarks at least once. Specifically look at least one site in each of the following categories:

- Sports
- Entertainment
- TV
- Travel
- Lifestyle
- Shopping

If you like a particular page or site, bookmark it! Visit it regularly to see how it changes over time. When you visit the other portal, spend a little time there. Does it offer better services in certain areas? Which ones? Or, are the portals pretty much the same?

2. KEEP A DIARY

Please try and write down when you go online, where you are, what you are looking at, what you find, what you think about it, where you go next, why, and so on. Then note what time you log off. I am interested in your thoughts about how the phone helps or hinders you, how long you feel it takes to get the information, and what you think of the information when you get it. So, write about these kinds of things in the diary.

GETTING STARTED:

The phone is password protected: The password is DATA, or 3282 (which is the same code numerically). REMEMBER THIS CODE EITHER AS THE WORD OR AS THE FOUR-DIGIT NUMBER. Tap it in and then press OKAY.

TO GET TO THE HOME PORTAL:

Press MENU/use roller key/SERVICES/HOME... press the roller key and off you go!

USING BOOKMARKS:

Press MENU/then roller key/SERVICES/BOOKMARKS/roller key to select which one... press roller key and off you go!

CREATING BOOKMARKS

Press MENU/then roller key/SERVICES/BOOKMARKS/OPTIONS/OPTIONS (again)—the left key/then choose SAVE to automatically save the place where you are, or select ADD BOOKMARK to type in the details yourself.

TO FIND ME:

Press NAMES/LISTNAMES/MARC—either one—number comes up; click roller. Call is highlighted—click and the phone rings me.

ENDING YOUR CALL:

OPTIONS/scroll to EXIT/QUIT BROWSING—YES.

TURNING OFF THE PHONE:

Push top red button

THE NOKIA 7110E



The current function is displayed on screen. If the soft keys are pressed, menus offering further options (such as "Exit" or "Go to main menu," etc.) are displayed. To a large degree, these soft keys provide macro navigational assistance, whereas the roller key provides the micro navigational capacity needed to move toward a specific WAP site. The key pad is behind the cover, which can be slipped down when needed.

Appendix 5: Author Biographies

Marc Ramsay is a producer, writer, researcher and independent usability consultant. He is currently working as a producer at the BBC with the BAFTA award winning New Media (History) team. He has worked for over ten years as a freelance producer and director of factual television programmes for British television. Programme credits range across many subjects notably the arts, health and consumer affairs. He has also researched a critically acclaimed book on the British police, *Talking Blues*, with fly on the wall filmmaker Roger Graef. The book followed a narrative tradition set by Studs Turkel and Tony Parker. These authors take their subjects' own voices as the focus of their books. He has also worked for the European Media Development Agency as a script analyst.

Last year, he took a year out to develop new media skills and has just completed a Master's degree in Electronic Publishing, at City University, London. He used this opportunity to research into usability issues related to mobile telephony and the Internet. This work became the basis of his dissertation and formed a substantial part of his final degree. During this period of study he was also part of an award winning student team devising a website and chat area aimed at Formula One racing enthusiasts for Sony.

Dr. Jakob Nielsen is a principal of Nielsen Norman Group. He is the founder of the "discount usability engineering" movement, which emphasizes fast and efficient methods for improving the quality of user interfaces. Nielsen, noted as "the world's leading expert on Web usability" by *U.S. News and World Report* and "the next best thing to a true time machine" by *USA Today*, is the author of the best-selling book *Designing Web Usability: The Practice of Simplicity* (2000), which has sold more than a quarter of a million copies in twenty-two languages. His other books include *Usability Engineering* (1993), *Usability Inspection Methods* (1994), *International User Interfaces* (1996), *Homepage Usability: 50 Websites Deconstructed* (2001), *Prioritizing Web Usability* (2006), and *Eyetracking Web Usability* (2007). Nielsen's Alertbox column on Web usability has been published on the Internet since 1995 and currently has about 200,000 readers. From 1994 to 1998, Nielsen was a Sun Microsystems Distinguished Engineer. His previous affiliations include Bell Communications Research, the Technical University of Denmark, and the IBM User Interface Institute. He holds 79 US patents, mainly on ways of making the Internet easier to use.