

Mildly irritating: a WAP usability study¹

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The Internet is poised to go mobile. Much has been said about the technology that will make this possible, but little about what potential users expect from WAP and a mobile Internet. This article is based on the experiences of 20 test users who participated in a usability evaluation. The users were given WAP enabled phones to use for one week. The conclusion of the research was that WAP is not a user-friendly service. Connection times are far too long and even when the user is able to get connected to a WAP site their connection is often timed out even before any data is downloaded. When the test users were asked whether they thought they would have a WAP enabled phone within one year, 70% said no. However, when they were asked whether they would like one within three years the negative responses dropped to 20%. So there is hope for the service. Indeed the research shows that there is a market for data services delivered through a mobile Internet and gives a strong indication as to what the users would want from such a service.

Introduction

'The text is too small, the menus unwieldy and the interface is dull. If you're unconvinced that WAP phones are the engine for the fastest social change in modern times don't worry, your not alone...' [1] was the verdict at a major conference held in London last year. These sentiments echoed that of the users in this study who found the impact of WAP to be somewhat underwhelming. Not for the first time there is a gap between the expectations of what technology is said to be able to bring and the reality of what is actually delivered. In the case of WAP this is more than a 'Gulf of Execution' it is a chasm.

If WAP, in particular, and mobile telephony, in general, are to live up to their promise they will have to overcome current technological limitations and, at the same time, rise to the challenge of user expectations.

Aims

This article examines the usability of WAP enabled mobile phones from the users' point of view. Furthermore, it does so with the inten-

- tion of being able to identify key factors that
- will influence the future success and develop-
- ment of WAP enabled services. This entails
- looking beyond the functionality of the service
- to the data itself in so far as it is displayed to,
- and interpreted by, the user.

Scope

- There is no shortage of articles that focus on the
- technical aspect of the service and the underly-
- ing enabling technology, but few that look at
- how the service operates from the users' point
- of view. This article aims to go some way
- towards redressing this. Where issues related
- to connectivity are looked at, they are exam-
- ined from the users' perspective rather than a
- technical one.

- The suitability of the mobile devices them-
- selves is also a rich seam to mine – but these
- devices are being all but reinvented and re-
- designed on a daily basis. Tomorrow's phones
- will fit into the palm of your hand, slip into the
- smallest of pockets and have an increasingly
- wide range of functionality. This study looks at
- the phones only to the extent that the users
- themselves refer to their functionality – or
- lack of it.

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WAP and terminology

Although WAP is simply a protocol that allows mobile users to access data from a mobile handset, to the users studied here, in the usability evaluation, WAP meant rather more. They saw WAP as the whole mobile data service, as experienced in the UK. Since the users refer to it frequently in their comments there is a real risk of confusion in terms of terminology. In an effort to avoid this, the reader should apply the broadest definition to WAP. Where the reader's attention to technical aspects of WAP is required its full description will be used.

Methodology

Users

Test users were selected on the likelihood that they would feature in the 'early majority' category of uptake. This is the group WAP must attract if it is to have any chance of success in the future. In the light of the success of SMS (short text messaging) in the UK it is highly likely that this group will largely be made up of the younger population. Accordingly the test users were selected largely on the grounds that most of them were between 20 and 40 years old, that they had mobile phones and that they were interested in WAP phones but had not yet used one or seen one. A cohort of 20 users was chosen. Although this is a relatively small sample it is sufficient to allow broad conclusions to be drawn from their experience. Their average experience of the Internet was between one and two years. Half the group went online more than three times a day.

Data collection

The research was conducted during August and September 2000. The methodology is based on an observational evaluation of the users performing preset tasks on WAP enabled phones before and after they have spent a week using the phones. These tasks were timed. Questionnaires were also completed (before and after the week spent with the phones) to provide additional quantitative material. The bulk of the study's findings are expressed in the terms of the test users them-

selves. Their comments were recorded on audio tape during the debriefing sessions at the end of their week with the phones. The test users had been asked to keep a diary of their week. These diaries formed the basis of a debriefing when the users returned the phones. If they wished to quote directly from the diaries they were welcome to, otherwise they were used to jog their memories, when needed.

Reporting the findings

The style of the usability report is derived from two distinct disciplines. The first, as described above, is familiar to those versed in the evaluation techniques as currently practised by information scientists. The second approach gives much weight to personal testimony as a source in its own right. This owes much to the legacy of Studs Turkel and Tony Parker [2, 3, 4, 5, 6]. Although this report is by no means as comprehensive as their seminal works have been.

This somewhat unusual combination of approaches, familiar and somewhat less familiar to information scientists, is very much a reflection of the researcher's background as a television producer. In the course of a career stretching over ten years considerable experience has been gained in gathering testimony from a wide range of people. Techniques such as active listening and careful questioning have been honed to elicit testimony from individuals as naturally, impartially and accurately as possible.

Bringing these contrasting approaches together is an unusual step, but one that promises to provide a rich source of data which can be interpreted by the researcher and by the reader who is invited to read between the lines for themselves. In an attempt to facilitate this, the researcher's comments have to fulfil two functions serving as a formal analysis, and as a linking commentary, at one and the same time.

The users' quotes are all direct, as recorded on audio tape. The extracts have been kept as close to the users' accounts as possible. Significant internal edits are shown as (...). In all other cases these are the words as spoken

with only the odd preposition added to enhance narrative flow.

This qualitative data is underpinned by quantitative data drawn from questions put to the users. Data was also gained from the records of the time the users took to perform preset tasks. Questionnaires were completed in two largely structured interview sessions. The questions were framed in a variety of ways but most were closed and related to Likert scales, ranked orders or simple check-lists. Values were assigned to individual responses and then collated in terms of the frequency with which the same response occurred. The data was then analysed using SPSS (Statistical Package for Social Sciences).

The observation of the users took two distinct forms. Firstly they were asked to perform preset tasks. The preset tasks were devised 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 six tasks were set which the user repeated in the final session. The tasks were chosen with a view to providing them with information that was either locally or personally relevant to the individual user. Hence the users were asked to find travel information for their journey home, a local restaurant and a sports result from the previous evening. These were also features the researcher felt were important to the eventual success of WAP.

The second reason for asking the users to perform preset tasks was to get the users to a similar standard of familiarity with the phones and to ensure that they were confident using them. The reasoning behind this was that the researcher wanted to be able to look at the types of services that attracted the users. This would have been difficult if too many users failed to get to grips with even the most basic levels of WAP functionality. Since the public perception of WAP was poor, and expert opinion frequently pointed to the poor service offered to the users, this was clearly a potential problem.

Problems of connectivity and handset navigation were present throughout the whole study. Indeed the very prevalence of these problems suggests that had the users not been

given a basic grounding in the use of the phones they would have failed to get very far at all in the week that they had the phones. Users were shown how to use the phones, in the first instance, by the researcher. Basic functions (turning the phones on and off) were demonstrated by the researcher, as was the first preset task – finding the world headlines from the home portal. 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. The 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 information required (in this case what was on BBC1 that night at 8 pm). 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 from which to search. 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 the user to type in a WAP address (in this case <http://somenewhere.com>). This was selected because it was long enough to see differences in the individual timings and because it involved unusual characters such as forward slash. The objective of this task was to ensure that the user understood how to type in characters – something they would need to know when using the phones for themselves (there are often text boxes that need filling in before sites will provide the information being sought). This could have been left to the user to work out, but again the researcher wanted the users to penetrate as far into the services of WAP as possible. In the event all users were able to do this quite easily and in doing so the task provided an indication as to how long it takes to type in data. The final set task required the user 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 help the

users leave with their phones with a sense of confidence.

The phones

Two different phones operating on two different networks were used in this study. The Nokia 7110e was chosen because it is seen by many as setting the benchmark for other phones. The Ericsson R320s was selected for its high technical specification and because it had only just been made available to the general public. The phones were bought, from the retailer, pre-configured to dial into the telephone network's own WAP portals. All portals (sometimes referred to as gateways) contained numerous WAP sites organised into categories such as News, Entertainment, Lifestyle etc. In essence this is very similar to the way home-pages 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; Somewherenear (a local entertainment database); and a second portal, either Genie (BT Cellnet's portal) or Mviva (an independent portal provided by Carphone Warehouse). As noted above these were shown to the users and their use demonstrated.

The networks

Two networks were used – Cellnet and Orange. These are the second and third largest mobile operators in the UK. BT Cellnet claim to have the largest WAP subscriber base in the UK. Vodafone would have been a natural choice but they were re-vamping their WAP facility at the time of the study.

The phones and the networks

It was hoped that some comparison could be drawn between the different phones and the different networks. However, the vagaries of connection times and frequent loss of connections during a call were so common that any comparison between the relative advantages of either phone was difficult to make with any certainty.

The timings of the preset tasks

A last word about the timings yielded from the preset tasks. These timings were subject to considerable variation owing to the operation of three critical variables: the user's ability; the connection speed at that particular moment; and the software inside the handsets. With this in mind some caution should be exercised when considering the data obtained.

Results

The structure of the results section follows, to a large extent, the users' experience of using the phones in the order that they themselves experienced it. That is from trying to get connected to downloading the information they were looking for.

General impressions

- 40% cited slow connections as the most disliked aspect of WAP.
- 25% cited lack of depth of content as the most disliked aspect of WAP.
- 65% cited access to news as the best aspect 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 get very much pleasure from WAP. However, while users were quick to criticise 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 put to them at the beginning and at the end of their time with the phones. Slow data connections were the most disliked feature of WAP, followed by lack of depth and the uneven quality of data. On the plus side users singled out access to news as the most liked attribute – even though they were often not happy with the quality of data that they found.

Before looking at the experience of the test users it is useful to get a sense of what the users were expecting. Even though none of

them had had direct experience of the service they largely shared a common view.

Great expectations

- 75% of the test users thought WAP gave mobiles access to the Internet.

WAP was aggressively, if not seductively, marketed by BT Cellnet as a means of surfing the Net. But surfing the Net was never really on the cards. The effect was the creation of a market for a service that did not exist and a consumer base whose expectations simply could not be met. They were always going to be 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 coloured 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.

The first barrier the test users had to overcome was to get connected. This proved neither easy nor reliable and all too frequently took longer than the users were prepared to accept.

Connectivity and download time

- Time taken to retrieve news headlines 1'16 (1'03).
- Time taken to check local weather forecast 2'42 (1'55).
- Time taken to find television listing 2'44 (1'37).

The timings given above are the mean times the users took performing set tasks given in minutes and seconds. The figures in brackets give the time taken after one week using the phone. Although there is an improvement over time it still took a long time for the users to get the data – if they managed to get it at all (see Table 1).

This was the single most frustrating aspect of WAP. Time after time connections failed to

materialise or were cut short before the requested data could be downloaded. This is clearly demonstrated by the difficulties the 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 or finding the local weather forecast for that evening. The full results are shown below. User success rates (in terms of finding the information they were looking for) fluctuated between 70% and 95%. Surprisingly, there was no significant improvement in success rates after the users had spent a week with the phones. Indeed, sometimes, their performance was actually worse.

News sites were popular with the test users and most portals put 'News' near the top of their main menus. So, on the face of it, retrieving the news headlines seemed a simple task to set. However the users found this to be far from the case. They were asked to find news from three different sources. First, when they were given the phones and, again, when they returned them. The users were given up to five minutes to find the information at which point they were timed out.

Table 1 shows that, on average, it took the users about one minute to access the news headlines. There is a clear, not to say dramatic difference, between the minimum and maximum times taken both when undertaking the task for the first time and again for the second time, a week later. However, it is difficult to interpret this since the connections can have such a dramatic effect on the timings. It is somewhat surprising that the users were so poor at working through a different portal. This suggests that they tend to follow tried and tested routes rather than explore. Overall the ability to find data quickly is subject to dramatic variation – no matter which preset tasks are considered. This characterises the usability of WAP itself.

Connectivity is a key variable and the source of most of the users' negative comments and had a major impact on their enjoyment of the service. The users' diaries frequently included detailed accounts of the paths they had chosen when looking for data and the problems they encountered on the way.

Table 1. *Time taken by users to complete preset tasks*

Task	Successful users (% of total users)	Minimum time (seconds)	Maximum time (seconds)	Mean time (seconds)
Time taken to find world headlines from home portal	20 (100%)	36.0	189.0	76.3
Time taken to find world headlines from home portal one week later	17 (85%)	25.0	158.0	63.5
Time taken to find world headlines from different portal	19 (95%)	30.0	126.0	65.2
Time taken to find world headlines from different portal one week later	18 (90%)	35.0	280.0	113.9
Time taken to find headlines from <i>The Guardian</i>	19 (95%)	26.0	96.0	52.8
Time taken to find headlines from <i>The Guardian</i> one week later	19 (95%)	24.0	177.0	46.5
Time taken to find local evening weather forecast	18(90%)	54.0	299.0	164.3
Time taken to find local evening weather forecast one week later	14(70%)	49.0	270.0	114.9
Time taken to find a TV programme	20 (100%)	82.0	242.0	158.6
Time taken to find a TV programme one week later	17 (85%)	51.0	186.0	97.1
Looking for a local restaurant	16 (80%)	68.0	278.0	137.9
Looking for local travel information	7 (35%)	39.0	262.0	152.3
Looking up a sports result	17 (85%)	30.0	230.0	106.5

Philip: 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 was quite angry about all that.

Arthur: The next night I sat down to get the television... that took eight minutes – to get the TV, which is useful but incredibly slow. It would have been faster to phone up a friend who's got a television book – and cheaper.

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 five to ten minutes takes twenty minutes.

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.

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 the event only one of the ten users
- who had one did. But that did not necessarily
- make him any the wiser.

- **Lionel:** I found the site Formulal.com. I
- am going into it. 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'.

- Some sites did tell visitors that the site was tem-
- porarily offline. Whilst 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 means they will have spent up
- to fifteen or even thirty pence to get there. This
- points to a fundamental usability issue. Users
- are divided in terms of the quality of data they
- expect, but they share the expectation that
- they should be able to get it quickly.

- **Jess:** 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.

- Until an acceptable level of service is provided
- across the board, the user is destined to
- remain very frustrated. But there is more. In
- the absence of a help facility (a long estab-
- lished principle of usability for the Net) 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.

- **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 incred-
- ibly impatient, there is nothing worse
- than not knowing what's going on... and
- I think possibly a large percentage of the
- mistakes are made where the user, out

of sheer impatience, hit the button another time and confused it.

Sometimes the phone is waiting for the user to input more information, but does not 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 are out of sight. They can only be found by scrolling further down the page – but there is not always any 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 that there was more text to be 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 to helping the users navigate successfully around such a small screen.

Cutting down on the opportunity for users to make mistakes is vital. One WAP site developer notes 'in mobile phone interface design,

Figure 1. *Genie's help function*

This is the help option on Genie's main menu. Located 'conveniently' at the end of a long four-page scroll

The first screen that comes up appears as below



Scrolling down a list of preset frequently asked questions presented the option highlighted below

This was the result!



every click loses half of your users' [7]. His solution is to provide selection lists as often as possible, this cuts down on the potential for error inherent in asking the users to type in too much information themselves.

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. However, this function is sometimes offered to the user on some networks but with less than reassuring consequences. See Figure 1.

Labelling

- Rarely will the users be willing to return to a site that disappoints – if they are lucky to find it in the first place.

Mary: I just wonder who invents the labelling 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.

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 instructions.

The message is that portals and WAP sites should adopt a straightforward approach to the way they construct their indexes and word their labels.

Going backwards

- The back button has become a fundamental part of the Internet. WAP users expect this facility too.

- All too frequently the WAP users were faced with dead ends or error messages that blocked their path. Instinctively most of the users 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 simply were not able to go back any further or were forced to go right back to the very beginning.

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 the 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 its 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.

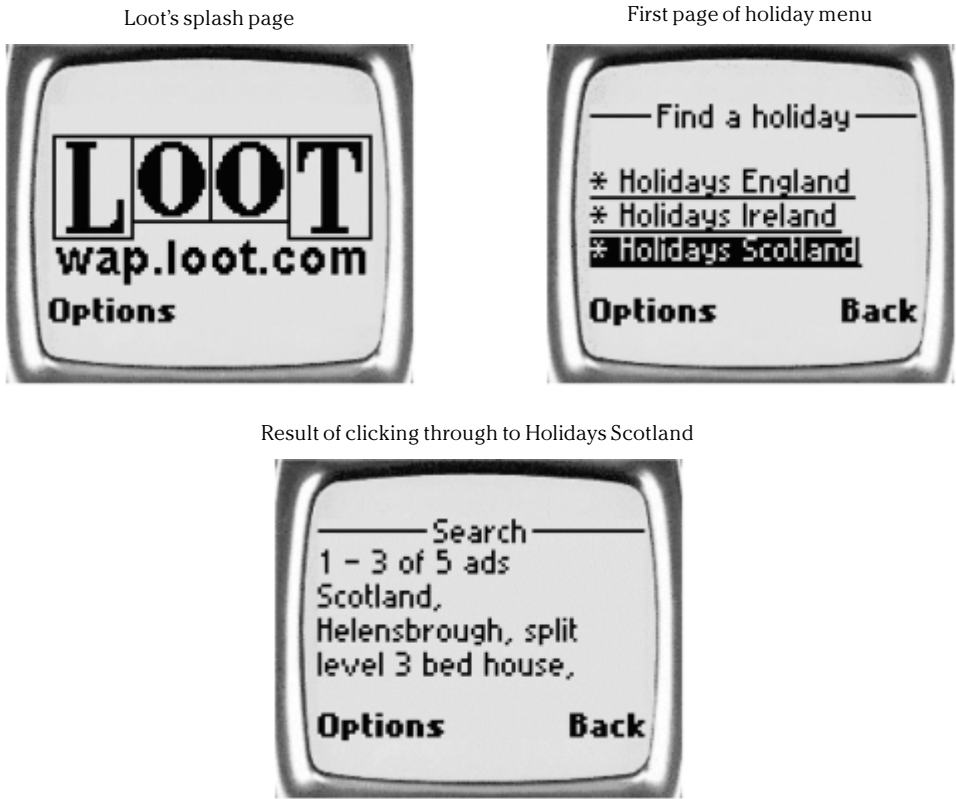
Bookmarks

- One in three bookmarks were sports sites.
- One in five bookmarks were entertainment sites.
- One in four bookmarks were news or weather sites.

The users were keen to bookmark sites they liked; indeed they generated over 90 bookmarks between them. And the sites stored were often ones that had a common principle – their design was kept simple. Here are the users' thoughts about two such sites. The comment below refers to the LOOT WAP site (a listings service) part of which is shown in Figure 2.

Anne: It just says find a car/find a home/meet somebody/find a holiday. Place a free ad. Terribly clear instructions... So press to find a holiday and again holidays

Figure 2. *LOOT WAP site*



England holiday Ireland holiday Scotland holidays...again terribly clear.

A new television series, *Big Brother*, gained cult status during the time of this usability study. Based on a Dutch series, *Big Brother* began to spill over into other media, including WAP.

Jess: 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, bio-

ographies were good and I was surprised 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 can look at the 'biographies' and you can 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.

Reading the data

This section examines the main points made by the users in the context of the actual site they were referring to. For ease of reference the comments have been put together on the basis that they refer to the same category of sites. However, to a very large extent the points made in one group can be applied to the others.

The test users were divided in terms of being at ease reading text from the small screens. Some took to it more quickly than others. A few never got to grips with it at all. The users also had somewhat mixed opinions in terms of the depth and structure of information they expected to find.

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.

The test users were divided in terms of how much detail they wanted on an individual basis. But taken together the message is clear:

- clear menus drilling through to the right category;
- short headlines;
- short summaries;
- longer text available with page length given.

The users who did succeed in getting the news had considerable differences in opinion in terms of how many lines of text they wanted given over to 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.

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 thirty 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 newspaper's identity being lost.

David: Went to *The Guardian* and the *FT* for the headlines for the news. I wrote down here 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, 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.

This is a problem for news providers. Branding is as important to them as it is to the users. However, this is difficult when the copy has to be short. The solution is perhaps to develop a more sophisticated style that is brief and to the point at the top of the hierarchy, but which allows clearer branding to emerge further down to be found by the user who wants more detail.

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 article and I did like that variety.

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

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; it's not a story just a little bit. And I think that was quite good, I would access it again.

Financial information

There is 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.

As with the news, users want quick access to basic headlines and the ability to go deeper if they want to.

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.

There is a clear need here but the data has to be up to date and be flexible in terms of the amount of detail on offer.

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 '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. But what is currently on offer is just too basic.

Sport

- Sport was the most popular category of bookmarked site.

Sports information is potentially a 'killer' application for WAP. There is considerable demand amongst users for up to the minute information on games in progress and for after the match details. 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 7pm and 9.50pm, looking at scores. Each time 'football365', each time live scores bit seeing what the scores were and turning off two minutes each burst. Exactly what I wanted. Quick, you knew how to use it, 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 up to date. And there never seems to be enough detail.

Richard: Gloucestershire were playing the semi final and so as I was moving around I managed to bookmark Sky cricket live... 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 in, 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.

Round ups of the scores were also wanted by the users but they were frequently disappointed. Again there are great opportunities here for content providers. Live reporting with statistical support would find a ready audience in the sports community.

Travel

- 65% of the test users were unable to find local travel information when asked to.

The users were asked to look for travel information for their train journey home 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 was a sense of confusion as to just what the category should contain. For the networks and content providers it turned out to be mostly about holidays.

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 it's 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 labelling.

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.

- One user found a site that was very up to date and which was able to list trains that ran between the user's entered destination and departure points. It seems like a ray of light in an otherwise dark tunnel.

Anna: I found this was the first useful thing – train service info – first excellent thing. It said service provided by Rail-track 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 being able to book online like you can on the Internet I think that would be very good.

- This 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 neither does it set out to be so. However, it can be personalised so that the system recognises the user. To do this the user registers with the site and the system then stores details of the user's route to work and automatically tells them whether their lines are clear or not. Figure 3 shows how the site can be used to find train connections. In this case Ely and (London) Paddington were entered.

- It was 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' etc. Some pages, as above, display the word 'Pick' to flag that a preset option needs to be selected. This is both simple and clear to the user. The approach should be standard practice in an

Figure 3. Train timetable site (Kizoom)

Having chosen the Train timetables option from the opening menu, the user is able to type in the places they wish to travel between.



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



Today was selected. A further screen (not shown) asked for times of intended departure.



The next screen appears as below. Further options (not shown) offer earlier and later trains.



environment where screen real estate is so limited and the potential for error so big.

In time, the site should be able to deal with the additional functionality of being able to issue tickets. That is in the future. But even as it is, this is a site that really knows what it is doing and from which many other sites could learn useful lessons [8, 9].

Travel, of course, covers much more than just the journey home and there are some travel agents who have a WAP presence. Taken together they are a mixed bag, but constrained by the fact that none of them are equipped to actually sell tickets on the phone – until they are it is unlikely that they will make much of

an impact. But, that said, there remain real opportunities for this kind of service.

Entertainment

- Entertainment sites were ranked third in terms of being bookmarked, behind news and weather.

Games and entertainment sites seem to be under-exploited by WAP. There are some games sites but they do not provide the content the users wanted – games that they could play.

Charlotte: The game play 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... I suppose that's misrepresentation of a site to me.

The potential range of entertainment sites is enormous. The following selections illustrate the range of sites that can currently be found on WAP. Predictably the users' experiences were varied.

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 tantalises 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 dialled 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.

Most portals offer TV listings but they all seem to do the same thing – list the programmes channel by channel. This meant looking up every channel one by one and page by page a truly tortuous process.

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

- Entertainment sites could prove very popular
- but, as these comments indicate, the users
- expect a high degree of added value.

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 –
- but the users expect it now.

Anna: I looked at 'Freestore shopping'. Tried to buy a book. Their book choice was lousy under 'featured titles'. Looked at the top ten books list instead. We got the four Richard 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.

Lifestyle

- Lifestyle is a category that seems to sweep up
- anything that does not easily fit into entertain-
- ment or anywhere else. Users found sites that
- demonstrated lifesaving techniques being
- listed next to ones that offered you the chance
- 'to meet a friend'. The one exception that the
- users found was food, which seemed to bridge
- both categories. WAP does not seem to know
- whether to file eating out as entertainment or
- as 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 find. None of them worked. What's amazing if you actually go through Genie and look through the menus the list of foods is mind-boggling. It's got Botswanan food – east Botswanan food. It's got a lot of 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 bavarois 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 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 the simple display problems such as different layouts or total failures that result in an error message. The users, of course, do not care and nor should they. WAP sites should work properly or be removed from the scene until such time as they do function.

The users' verdict – overall usability

- 70% of users said that they would not have a WAP phone within one year.

- 20% said they would not have a WAP phone within three years.

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.

Users praised many aspects of WAP but overall the negative undermined the positive. This is clear even when the users are trying to be upbeat about the service. They also have ideas about what needs to be added.

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.

That is providing they could get past how it actually is at the moment.

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 10 pence a minute. So hang on, five minutes, it cost me 50 pence to get the TV listings. Most of those things I did I would say seven out of ten took me five minutes definitely, so that's 50 pence and a newspaper costs what, 35 pence?

Lionel: It seems an incomplete service. It's like being on holiday in a half-built resort. The signs to the beach and other major tourist attractions are OK, 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.

Conclusions

The comments found in the section above, amount to something of a conclusion in themselves. The users' frustrations are clearly 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 usability [10] (learnability, efficiency, memorability, errors and satisfaction) WAP did not perform too well. WAP enabled phones are not that difficult to learn to use and, to a relatively large extent, once learnt the key functions were not easily forgotten. 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 get 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, user satisfaction was generally very poor.

There is a strong feeling that the users were never able 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 also, at the same time, a clear demand from users for a portable version of at least some of the Internet. So what does that mean for WAP?

Some of the answers to squaring the current vicious circle that is WAP and creating something rather more virtuous can be found in this report. The users spelt out basic requirements loud and clear. Give me what I want and what I did not know I want, now! What they got from WAP was less clear.

The phones themselves are not as big a problem as one might have imagined. The users accepted the screen's limitations and realised there has to be a trade off between portability and ease of use.

Poor connectivity is the Achilles heel 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 simply is not yet available or temporarily out of order. It may be that an error default page, as found on the Internet, is needed. This could at least minimise the amount of time, and money, the user wastes.

eNavigation and labelling 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 the users this was a recipe for disaster. The long menus required thumb-numbing scrolls. Categories in themselves were a good start. But once the user clicked through, the guiding role of the screen was often abandoned. This left the user 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 material that is so difficult to read into sound. This is, after all, the natural medium to receive information on a mobile phone.

However, there are clear pointers as to how better to offer data for users to read. Offer the users clickable options that go deeper into the area the user wants 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. The users do not thank you for wasting either. A site that is easy to mine and which presents its information clearly is one that the users will return to again and again. Sadly, such sites are rarely to be seen.

Displaying data on a small screen is never going to be easy. But the users make the basic principles clear. Short openings that sum up everything that lies beyond. For news that means clear one or two line headlines. The source and date of posting should also be provided. 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 to (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. With this in mind the data has to be easy to scan at a cursory level or quick to drill through. Certainly both facilities must be offered. Lastly, the information offered for whatever reason cannot be simply lifted from a different media. Print or Internet copy does not transfer well to WAP. The small screen makes scrolling or scanning all but impossible for the user to do with any sense of 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. Gossip about Madonna, or sites tracking Big Brother, were all seen as delights in an otherwise disappointing service. This suggests that far more attention should be paid to providing sites that can be explored in a handful of minutes whilst the user has a spare moment. 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. These are the lack of provision of personal or localised services. WAP should be able to do more than entertain someone for simply a few minutes. 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 localised information could be a possibility even now. But there is little sign of it. Providing the 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 provide personal and locally relevant information, quickly, to a user on the move, but it is simply not up to this. There is a real sense that 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 lie 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. The new operating system GPRS (when it arrives) will solve many of the underlying problems. But until the issues, identified above, 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 is just a question of when and whether it will be WAP that enables it.

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