

# **The Challenges Facing Mobile Internet Partners in Providing Value Added Service**

Written by:

**Demster Marples**

[dm300@hotmail.com](mailto:dm300@hotmail.com)

Distributed by:

**Mobile IN**

[www.mobilein.com](http://www.mobilein.com)

### **About the author:**

Demster Marples has a Master of Science E-Commerce from Middlesex University, London, UK. Demster is available for questions/comments at [dm300@hotmail.com](mailto:dm300@hotmail.com).

### **About the publisher:**

Mobile IN ([www.mobilein.com](http://www.mobilein.com)) is dedicated to mobile communications, intelligent networks and applications.

<u>The Challenges Facing Mobile Internet Partners in Providing Value Added Service</u> .....	4
<u>1. SUMMARY</u> .....	4
<u>Access is joint monarch with content</u> .....	4
<u>Content must take advantage of the mobile context</u> .....	4
<u>Content must be produced specifically for the mobile context</u> .....	5
<u>Market Segmentation</u> .....	5
<u>2. Research Methodology</u> .....	5
<u>3. USER NEEDS</u> .....	8
<u>Who is the user?</u> .....	8
<u>Ease of use and HCI issues</u> .....	9
<u>Wireless Limitations</u> .....	10
<u>Continuous web access</u> .....	12
<u>Input issues</u> .....	14
<u>Menu Systems</u> .....	15
<u>Output</u> .....	19
<u>Cost issues</u> .....	20
<u>Reliability</u> .....	22
<u>Security</u> .....	22
<u>Current devices</u> .....	23
<u>4. WIRELESS SERVICES</u> .....	24
<u>Service success factors</u> .....	24
<u>Types of service</u> .....	25
<u>5. CONCLUSIONS</u> .....	26
<u>The user under pressure</u> .....	26
<u>An 'always on' service</u> .....	26
<u>Customisation</u> .....	27
<u>The critical user</u> .....	27
<u>Appendix 1</u> .....	28
<u>Appendix 2</u> .....	32

# **The Challenges Facing Mobile Internet Partners in Providing Value Added Service**

## **1. SUMMARY**

### **Access is joint monarch with content**

An understanding of HCI is important in addressing the difficulties of the mobile context. "Content is king" is only half the story. Content must be accessible. This is difficult to achieve given device limitations. Designers of wireless user systems must examine the interface and content of wireless services to ensure easy accessibility for the user.

In future the mobile device with continuous web access and data based charges must improve upon the need to dial-up at £6 per hour (UK prices). This will allow the consumer greater control over cost and encourage small digital transactions. Services should be available with a minimum of button pushes. User customised menus appropriate to the mobile context will assist the user to quickly achieve their goal. The user is under pressure as a result of the difficulty of accessing information and the fact that costs are time based.

### **Content must take advantage of the mobile context**

There are specific advantages to the fact that the user can take the mobile device anywhere. Services of limited use in the context of the fixed line Internet can attain great value as a result of:

- Location
- Timeliness
- 'Must have' importance to the mobile user
- Personalised information

## **Content must be produced specifically for the mobile context**

Content providers must produce sites specifically catering for the wireless Internet device due to the limitations of the medium. It is not acceptable to produce a single on-line service for the 'fixed-line' and wireless Internets. Providers must produce services that are increasingly device specific.

## **Market Segmentation**

Mobile device must reflect the need for easy interaction between user and service. In future, devices will reflect the diversity of the user. Simple services aimed at the non-technologically minded consumer may continue to be delivered to the mobile phone device. Complex services aimed at the serious user may require advanced technological solutions and will employ PDAs and Bluetooth technology. Two distinct market sectors exist. The critical user employs WAP services for both business and personal use and requires cutting edge technological solutions to assist interaction with WAP services. The private user will increasingly represent a separate sector, using services on an 'as needed' basis. Each sector has specific needs requiring specific solutions.

## **2. Research Methodology**

An on-line survey was employed to collect primary data in order to measure the experiences of WAP users. The aim of the survey was to collect quantitative data in order to measure user experience and feelings with regard to the issues of HCI and services, and identify any problems that may be associated with these. It is therefore possible to discover which areas are crucial for the development of the medium, and identify major weaknesses which need addressing.

The method of on-line survey was chosen in order to access the views of as many WAP users as possible. Respondents were made up of members of various on-line interest groups from the eGroups community. The survey consisted of 26 questions, and was split into two parts. Respondents who indicated that they were willing to take part in the survey were sent the first

part of the questionnaire, consisting of 16 questions (with a supplementary question requesting participation in second part).

An e-mail was sent-out to 1000 members of the eGroups community inviting users of WAP services to take part in the survey. Of the 1000 invitations to survey sent out, a total of 115 requests to take part were generated.

Of the 115 part one surveys sent out, a total of 85 were returned in time to be included in an analysis of the results. Of these 85 respondents, 65 indicated that they would be prepared to complete the second part of the questionnaire. Of the 65 part-two questionnaires sent out, 50 were returned in time for inclusion in the analysis of the results. This gave a total of 85 respondents for Questionnaire 1 and 50 for Questionnaire 2.

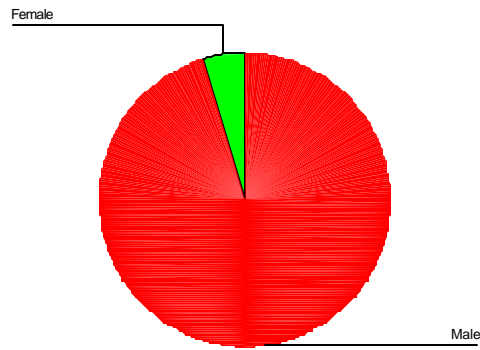
In order to obtain the opinions of mobile Internet users at this stage of market development it was inevitable that the survey would consist of early adopters of the technology and therefore may not represent the views of the typical user of the future. While the current user might be technologically aware, it is probable that the future user may be less aware of cutting edge technology as the mobile Internet becomes part of mainstream life. It is anticipated that many mobile Internet users will employ their mobile device as their sole or main access point to the Internet. They may not even have access to the fixed-line Internet at home. However the sample respondents comprise of existing Internet users.

At this present time, due to the fact that the services are still at the early adoption stage it is necessary to accept that the findings could be considered biased if taken to represent the future population of WAP users as a whole. This could manifest itself in several inaccuracies. For example the sample produced an overwhelmingly male response.

**Respondents' Gender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	81	95.3	95.3	95.3
	Female	4	4.7	4.7	100.0
	Total	85	100.0	100.0	
Total		85	100.0		

### 1. Respondent Gender



In the future, WAP users by gender may be more closely related to existing mobile phone usage. However, according to OpenMIND, after analysis of search engine terms used on-line, XXX material is high on the agenda of WAP users apparently confirming that uptake of WAP devices is currently largely composed of the younger male population.

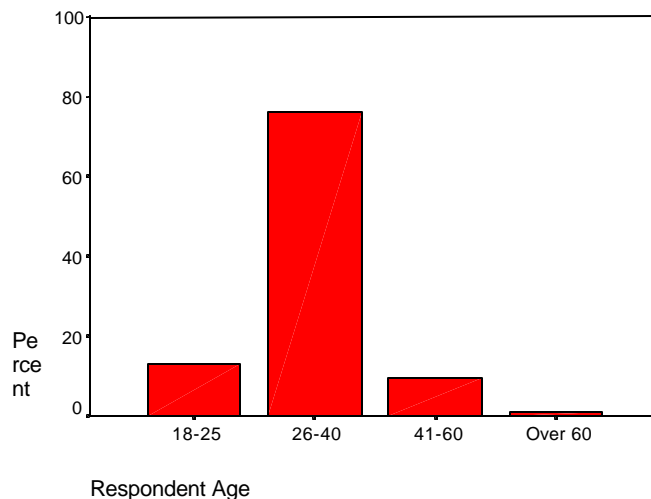
Respondents were strongly weighted towards the 26-40 age range. In future it might be expected to see more users from the youth and other sectors.

**Respondent Age**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	11	12.9	13.1	13.1
	26-40	64	75.3	76.2	89.3
	41-60	8	9.4	9.5	98.8
	Over 60	1	1.2	1.2	100.0
	Total	84	98.8	100.0	
Missing	.00	1	1.2		
	Total	1	1.2		
Total		85	100.0		

**Table 2 Respondent Age**

**Fig.2 Respondent Age**



### 3. USER NEEDS

The user needs:

- i. valuable content
- ii. easy access.

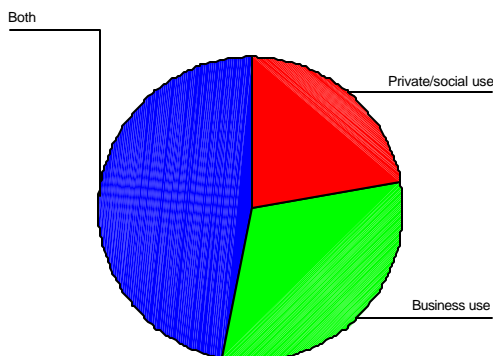
#### Who is the user?

The market can be clearly segmented between the corporate or business user and the individual user. The needs of the user vary according to the market segment to which the user belongs. For cost reasons corporate and business users in the past have been early adopters for mobile communications technology.

The results of the survey show that at the present time a relatively small proportion of users (22%) use the technology solely for private use. The big distinction between different classes of user lies in comparison between the group, which uses the WAP service for both business and private use and the rest of the population sample (whether they are solely business users or solely private uses). In general terms the proficient 'both purposes' user is more critical of service and device shortcomings than the other two groups. They are also prepared to read longer reports, despite the perceived shortcomings of WAP technology.

#### 3. Prominent Purpose of Use

		Prominent purpose			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private/social use	19	22.4	22.4	22.4
	Business use	26	30.6	30.6	52.9
	Both	40	47.1	47.1	100.0
	Total	85	100.0	100.0	
Total	85	100.0			



## Ease of use and HCI issues

While the mobile context brings opportunity for the delivery of value-added services the mobile device needs to overcome limitations which challenge the user and require new imaginative solutions.

HCI resides at the heart of design and development for mobile systems. The systems for accessing data must be closely meshed in with existing mobile practices. The HCI and type of information on offer must not be over-ambitious.

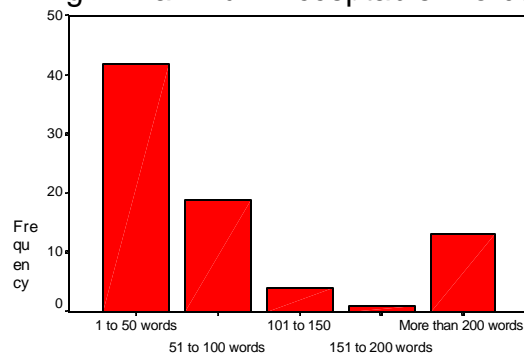
Maximum Acceptable Number of Words for a WAP Report

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 to 50 words	42	49.4	53.2	53.2
	51 to 100 words	19	22.4	24.1	77.2
	101 to 150	4	4.7	5.1	82.3
	151 to 200 words	1	1.2	1.3	83.5
	More than 200 words	13	15.3	16.5	100.0
	Total	79	92.9	100.0	
Missing	.00	6	7.1		
	Total	6	7.1		
Total		85	100.0		

Statistics

	N		Mean	Std. Deviation	Minimum	Maximum
	Valid	Missing				
Max no. of words	79	6	120.0886	186.9319	5.00	1000.00

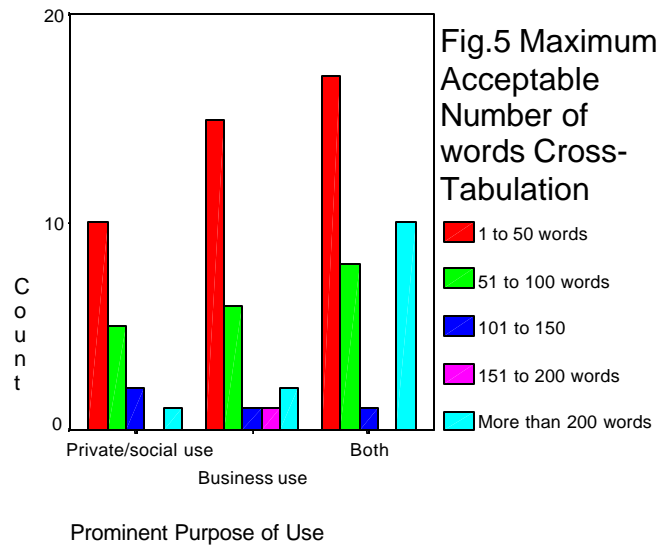
Fig. 4 Maximum Acceptable Words



Maximum Acceptable Number of Words for a WAP Report

The survey showed clearly that in general terms the fewer words to a report, the better. However a small proportion of 'hard-core' users expressed that they were prepared to view much longer reports. Most of these users were

both private and business users of WAP. As they use the device and service in both contexts it is possible that they are more comfortable with the medium and are prepared to invest more energy in accessing the deeper information that they require. This may be a pointer to future behaviour as general competence levels increase.

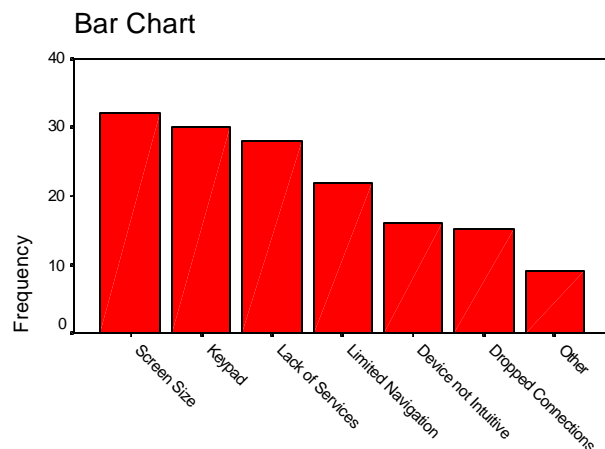


### Wireless Limitations

The application context of the mobile device must reflect the limitations in interaction possibility. To do this it is necessary for the applications developer to acquire a clear understanding of what people do in practice, with their device. The most successful developers of WAP services will be aware of, and work around the limitations of the medium.

Statistics

	N		Std. Deviation
	Valid	Missing	
Is Screen Size a Limitation?	50	35	.4785
Is the Keypad a Limitation?	50	35	.4949
Is Navigation a Limitation?	50	35	.5014
Are Dropped Connections a Limitation?	50	35	.4629
Is Device Intuitivity a Limitation?	50	35	.4712
Are Lack of Services a Limitation?	50	35	.5014
Are There Other Limitations?	50	35	.3881



Main Limitations of WAP Service

**Fig.6 Wireless Limitations**

The 'other' limitations mentioned by respondents include lack of personalisation, imprecise localisation, lack of intuition in services, lack of buffering, the fact that designers design sites as if they are for the wired-net, poor speed and responsiveness, limited graphical content, poor ergonomics in the service, and the lack of a colour display.

Limitations such as bandwidth and the need to dial-up for access give pressure to the user who has to wait for information and pay by the second. About 60% of users reported feeling pressure to some degree. This pressure is derived primarily from time-based payment, but also due to the fact that the user is mobile and needs access to fast information.

**User Pressure to Limit Call Length**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very pressured	13	15.3	15.5	15.5
	Somewhat pressured	37	43.5	44.0	59.5
	Not very pressured	20	23.5	23.8	83.3
	Not at all pressured	14	16.5	16.7	100.0
	Total	84	98.8	100.0	
Missing	.00	1	1.2		
	Total	1	1.2		
<b>Total</b>		<b>85</b>	<b>100.0</b>		

User Pressure to Limit Call Length Pie Chart

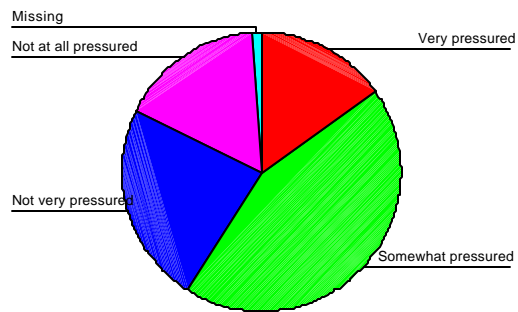
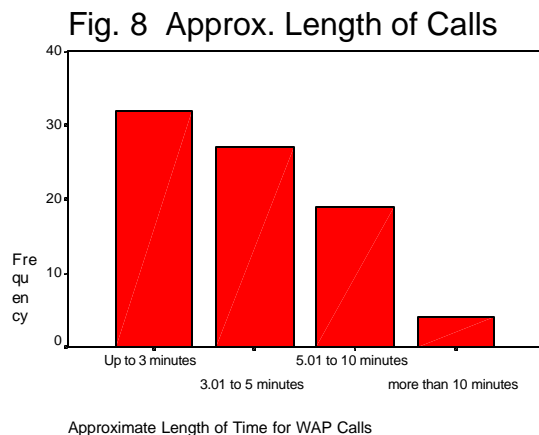


Fig. 7 User Pressure to Limit Call Length

These pressures are reflected in the small amount of time that people spend per call to WAP services.



**Length of calls**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	4	4.7	4.9
	2.00	9	10.6	15.9
	3.00	19	22.4	39.0
	3.50	1	1.2	40.2
	4.00	9	10.6	51.2
	5.00	18	21.2	73.2
	6.00	3	3.5	76.8
	7.00	1	1.2	78.0
	8.00	2	2.4	80.5
	10.00	12	14.1	95.1
	12.00	1	1.2	96.3
	15.00	3	3.5	100.0
	Total	82	96.5	100.0
	Missing	.00	3	3.5
Total		3	3.5	
<b>Total</b>	<b>85</b>	<b>100.0</b>		

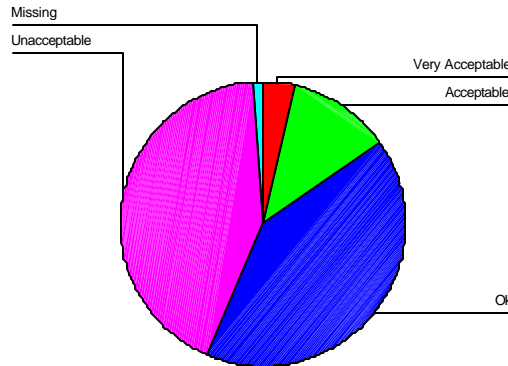
## Continuous web access

Continuous access is fundamental to enable the user to find information quickly. It has been one of the major selling points for iMode. With no need to dial-up, information is available within a couple of clicks. It is a psychological barrier to have to dial-in every time a piece of small information is required. A significant proportion of users (42%) indicated that the time taken to dial in was unacceptable.

Log-on time acceptability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Acceptable	3	3.5	3.6	3.6
	Acceptable	10	11.8	11.9	15.5
	Ok	35	41.2	41.7	57.1
	Unacceptable	36	42.4	42.9	100.0
	Total	84	98.8	100.0	
Missing	.00	1	1.2		
	Total	1	1.2		
Total		85	100.0		

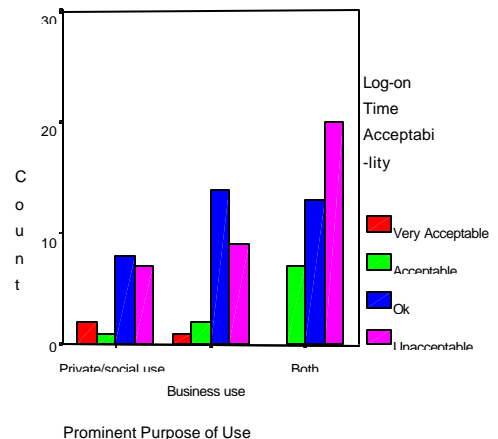
Fig. 9 Log-on Time Acceptability



The most dissatisfied group was the respondents who were both business

Prominent Purpose of Use \* Log-on Time Acceptability Crosstabulation

Count		Log-on Time Acceptability				Total
		Very Acceptable	Acceptable	Ok	Unacceptable	
Prominent Purpose of Use	Private/social use	2	1	8	7	18
	Business use	1	2	14	9	26
	Both	7	13	20	40	40
Total		3	10	35	36	84



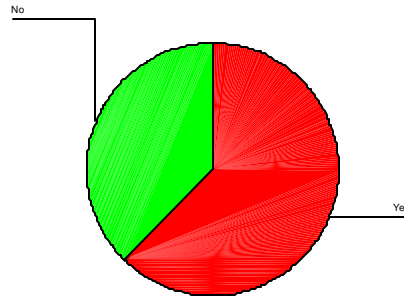
and private users- 20 out of 40 respondents (50%). These more experienced users appear to be more demanding with regard to levels of service, and point the way to rising expectations.

Significantly users are sometimes discouraged from accessing services by the need to dial up. All classifications of user are similarly discouraged.

**Log-On Discouragement**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	53	62.4	62.4	62.4
	No	32	37.6	37.6	100.0
	Total	85	100.0	100.0	
Total		85	100.0		

Fig. 11 Log-On Discouragement

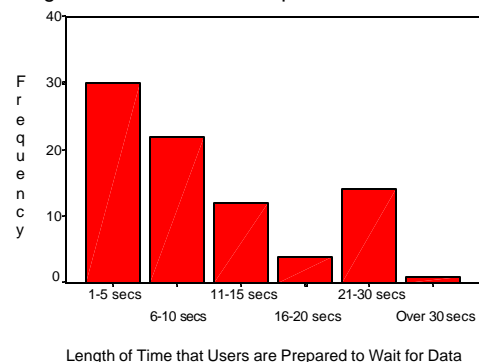


Continuous access is also the most direct way of saving time. Clever menu systems that take the user quickly to relevant information are fine, but a time consuming dial-up process stands between these systems and the WAP user. It will also enable usage patterns for wireless data access to retain similarity in feel to other aspects of the handset operation.

**Length of Time User is Prepared to Wait for Data in Seconds**

		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	1.00	1	1.2	1.2	1.2	
	2.00	5	5.9	6.0	7.2	
	3.00	5	5.9	6.0	13.3	
	5.00	19	22.4	22.9	36.1	
	6.00	1	1.2	1.2	37.3	
	7.00	3	3.5	3.6	41.0	
	8.00	2	2.4	2.4	43.4	
	10.00	16	18.8	19.3	62.7	
	12.00	2	2.4	2.4	65.1	
	15.00	10	11.8	12.0	77.1	
	20.00	4	4.7	4.8	81.9	
	25.00	1	1.2	1.2	83.1	
	30.00	13	15.3	15.7	98.8	
	60.00	1	1.2	1.2	100.0	
	Total		83	97.6	100.0	
	Missing	.00	2	2.4		
Total		2	2.4			
Total		85	100.0			

Fig. 12 Time Users are Prepared to Wait for Data



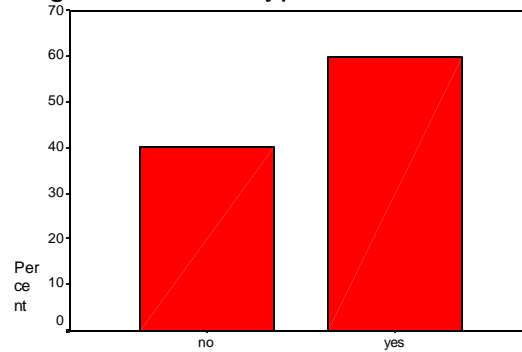
## Input issues

Keying procedures must be kept to a minimum for the mobile phone device. The devices are used in the field and must be capable of delivering information quickly to the user. The numeric pad of most mobile phones is an

**Is the Keypad a Limitation?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	20	23.5	40.0	40.0
	yes	30	35.3	60.0	100.0
	Total	50	58.8	100.0	
Missing	.00	35	41.2		
	Total	35	41.2		
Total		85	100.0		

Fig. 13 Is the Keypad a Limitation?



Is the Keypad a Limitation?

extremely poor method of input. The more experienced business/private users perceive the keyboard to be a particular limitation. However it has not prevented SMS text messaging from becoming extremely popular among the young, who have the time to use it. It is a fun and cheap alternative to the voice call. People in busy situations such as the business user do not have the time required to input messages letter by letter, but SMS has the potential to complement WAP services.

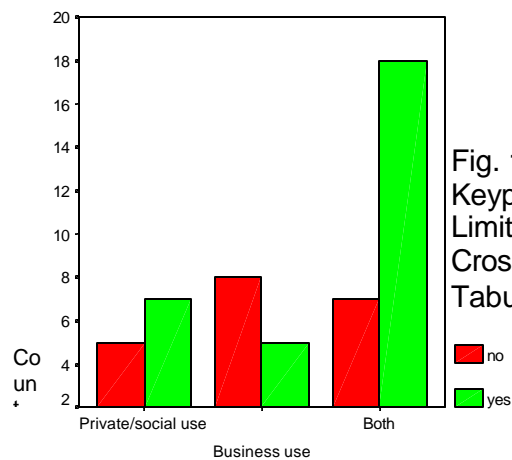


Fig. 14 Is the Keypad a Limitation?  
Cross-Tabulation

Prominent Purpose of Use

**Prominent Purpose of Use \* Is the Keypad a Limitation?  
Crosstabulation**

Count

		Is the Keypad a Limitation?		Total
		no	yes	
Prominent Purpose of Use	Private/social use	5	7	12
	Business use	8	5	13
	Both	7	18	25
Total		20	30	50

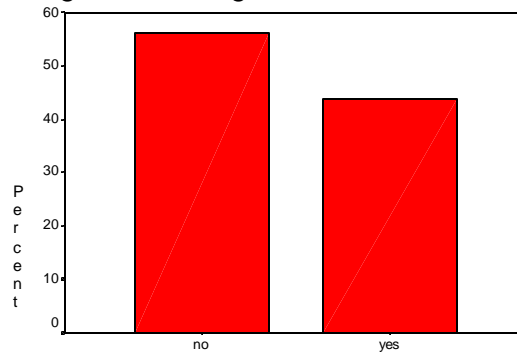
The mobile Internet has potential to target the busy user on the move. It is therefore vital that the keying for the WAP device be kept to a minimum. The designer must carefully plan paths for the mobile user, which allow single button push access to simplify access to desired information.

### Menu Systems

Menu systems employed for mobile phone devices are unable to take

Fig. 15 Is Navigation a Limitation?

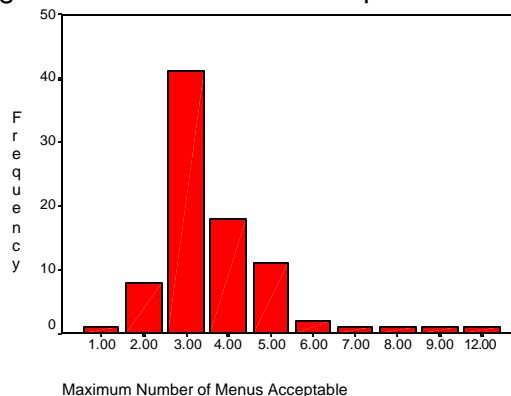
Is Navigation a Limitation?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	28	32.9	56.0	56.0
	yes	22	25.9	44.0	100.0
	Total	50	58.8	100.0	
Missing	.00	35	41.2		
	Total	35	41.2		
Total		85	100.0		



Is Navigation a Limitation?

advantage of the graphical and textural benefits of the Windows type operating system. This is due to screen size and present limitations of device processing power. As a result, a fresh look at navigation techniques is

Fig. 16 Max. Number of Acceptable Menus



maximum number of menus Acceptable

		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	1.00	1	1.2	1.2	1.2	
	2.00	8	9.4	9.4	10.6	
	3.00	41	48.2	48.2	58.8	
	4.00	18	21.2	21.2	80.0	
	5.00	11	12.9	12.9	92.9	
	6.00	2	2.4	2.4	95.3	
	7.00	1	1.2	1.2	96.5	
	8.00	1	1.2	1.2	97.6	
	9.00	1	1.2	1.2	98.8	
	12.00	1	1.2	1.2	100.0	
	Total		85	100.0	100.0	
	Total		85	100.0		

required to make the system user-friendly. 44% of respondents indicated that in their experience navigation was a limitation. The user would prefer to access information within three button presses while on the move.

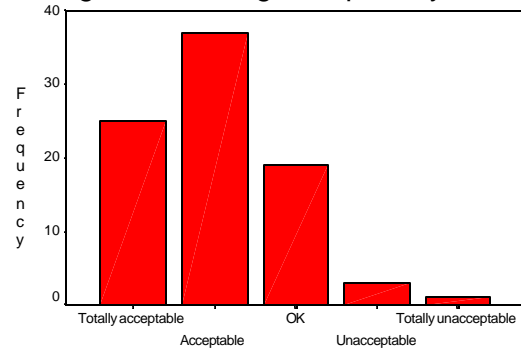
Menu systems must meet the challenge of providing sufficient breadth of options for the user. Information must not be hidden away too deeply beneath many layers. Menu structure must adapt to the structure of the task and to allow the most efficient sequence of steps to help the user accomplish their goals. However, the breadth of the device menu will not be wide due to screen size.

Scrolling gives opportunity for the display of a wider set of options. Scrolling is

**Scrolling Acceptability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally acceptable	25	29.4	29.4	29.4
	Acceptable	37	43.5	43.5	72.9
	OK	19	22.4	22.4	95.3
	Unacceptable	3	3.5	3.5	98.8
	Totally unacceptable	1	1.2	1.2	100.0
	Total		85	100.0	100.0
Total		85	100.0		

Fig. 17 Scrolling Acceptability

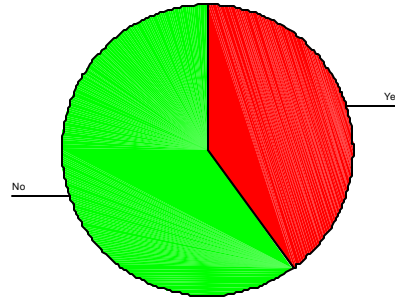


Scrolling Acceptability

accepted by users as a necessary evil for the small screen of the mobile device and to enhance the size of the virtual display. However it should be restricted to the minimum necessary to use the system easily. This will be achieved through intelligent ordering of on-screen options with most frequently chosen options available without the need to scroll. The most proficient users (who employ their devices for both private and business use) were the most tolerant group with regard to the need to scroll for information. However they were also the least likely group to scroll to view all the options on a menu.

Fig. 18 Do Users Always Scroll?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	40.0	40.0	40.0
	No	51	60.0	60.0	100.0
	Total	85	100.0	100.0	
Total		85	100.0		



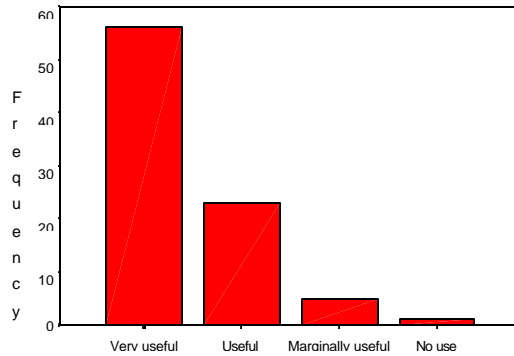
Clear sequencing (the order in which screen options are laid out) has the potential to guide the user logically, rhythmically, and efficiently. Meaningful ordering is key to a manageable user interface.

When asked how useful it would be to define the top menu option, respondents overwhelmingly agreed that it would be 'useful' or 'very useful'. The first menu choice is highlighted by default and therefore it takes only one

Option to User DefineTop Menu Option

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very useful	56	65.9	65.9	65.9
	Useful	23	27.1	27.1	92.9
	Marginally useful	5	5.9	5.9	98.8
	No use	1	1.2	1.2	100.0
Total		85	100.0	100.0	
Total		85	100.0		

Fig. 19 Option to User Define Top Menu Option



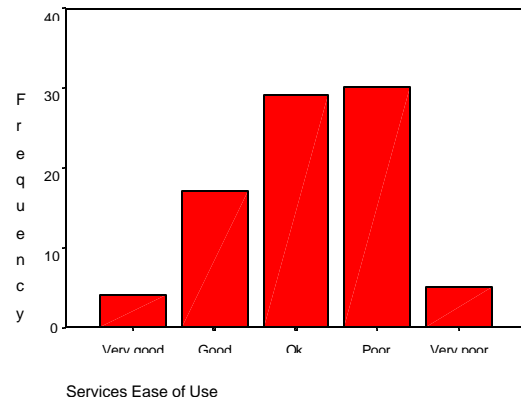
Option to User DefineTop Menu Option

button press to select. In the future, developers should allow the site visitor to customise options so that their preferences could be recognised on subsequent site visits. This could be implemented through the use of cookies. Previously preferred options could be prioritised to reduce the need for scrolling. Research should also be undertaken by content providers to reveal the most chosen option for their applications, which can be selected by default so that the user can access it using a single button push.

Services Ease of Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very good	4	4.7	4.7	4.7
	Good	17	20.0	20.0	24.7
	Ok	29	34.1	34.1	58.8
	Poor	30	35.3	35.3	94.1
	Very poor	5	5.9	5.9	100.0
	Total	85	100.0	100.0	
Total		85	100.0		

Fig. 20 Services Ease of Use



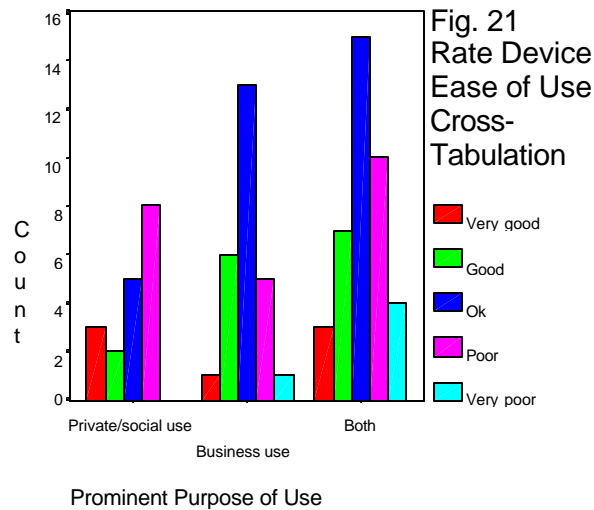
41% of people in the survey believe that services were poor or very poor with respect to ease of use. All categories of user shared this view (although purely business users were more inclined to rate service ease of use as ‘very poor’).

Designers can reduce search times through the clear use of signals to the user. Navigation can be assisted through the use of these signals so that the user does not need to read the screen every time he makes input. Use of bold or italicised options could assist the user in progressing down the most commonly chosen paths.

In general terms most people were satisfied with the performance of their device. However one third of respondents believed that there was progress to be made in this area. The most critical sectors appeared to be the private sector and the user for both private and business purposes.

Prominent Purpose of Use \* Rate Device Ease of Use Crosstabulation

Count		Rate Device Ease of Use					Total
		Very good	Good	Ok	Poor	Very poor	
Prominent Purpose of Use	Private/social use	3	2	5	8		18
	Business use	1	6	13	5	1	26
	Both	3	7	15	10	4	39
Total		7	15	33	23	5	83



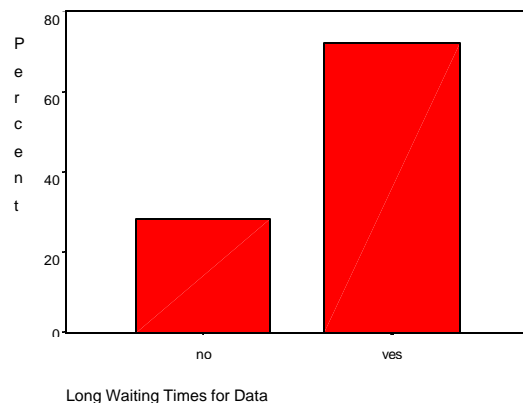
## Output

The screen design requires consideration of how people see, think and understand. The way in which information is visually presented to the user must consider the hardware, the software and the interface. The variety of devices, and their output limitations mean that the user interface becomes a more sensitive issue than for wired-Internet computers.

While graphics have revolutionised the design of the user interface for desktop or notebook computers, the mobile device in Europe at present, due to bandwidth reasons and limitations of screen size presents a fresh challenge to the interface designer. 72% of survey respondents experienced the problem of what they considered to be long waiting times for data on a regular basis.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	14	16.5	28.0	28.0
	yes	36	42.4	72.0	100.0
	Total	50	58.8	100.0	
Missing	.00	35	41.2		
	Total	35	41.2		
Total		85	100.0		

Fig. 22 Have You Experienced Long Wait Times

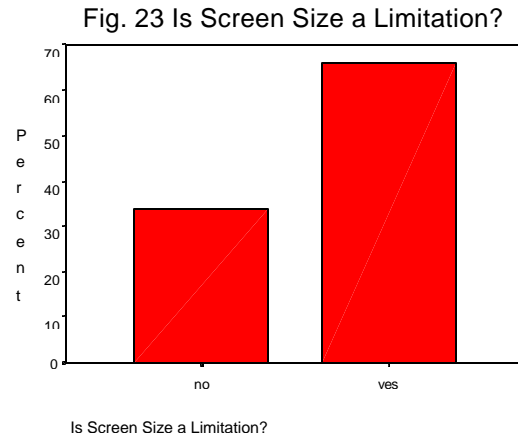


The small screen is a window through which critical tasks are performed. Poor design promotes user error, especially when the user is in the field and

wishes to keep transactions through the device as a short as possible. This is particularly true with GSM technology, where payment is made by the second and not by the byte. In the survey screen size was considered to be the greatest limitation acting upon WAP service, with 66% of respondents acknowledging its limitation.

**Is Screen Size a Limitation?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	17	20.0	34.0	34.0
	yes	33	38.8	66.0	100.0
	Total	50	58.8	100.0	
Missing	.00	35	41.2		
	Total	35	41.2		
Total		85	100.0		



Around one-third of survey respondents rated their device to be poor or very poor. The most critical groups were those who use their mobile devices for personal or both personal and business reasons (especially private users, 44% of whom rated their device as poor with regard to ease of use).

Around one-third of survey respondents rated their device to be poor or very poor. The most critical groups were those who use their mobile devices for personal or both personal and business reasons (especially private users, 44% of whom rated their device as poor with regard to ease of use).

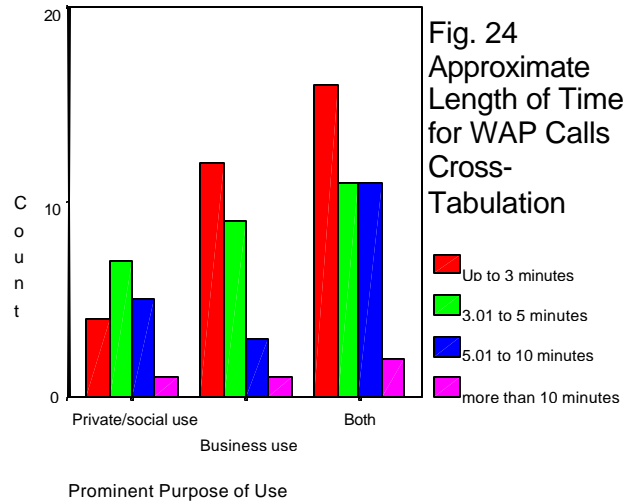
## Cost issues

WAP is expensive and visually uninteresting and expensive with comparison to the dynamic services available on the fixed-line net. The implications are that the user feels pressured to minimise time spent dialled-in to services.

**Prominent Purpose of Use \* Approximate Length of Time for WAP Calls Crosstabulation**

Count

		Approximate Length of Time for WAP Calls				Total
		Up to 3 minutes	3.01 to 5 minutes	5.01 to 10 minutes	more than 10 minutes	
Prominent Purpose of Use	Private/social use	4	7	5	1	17
	Business use	12	9	3	1	25
	Both	16	11	11	2	40
Total		32	27	19	4	82

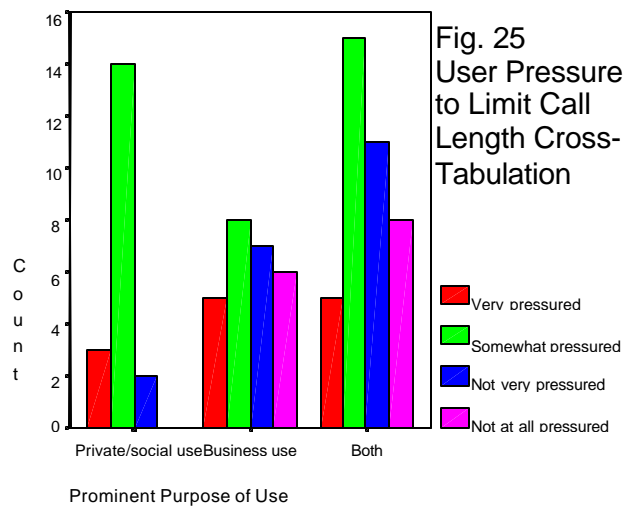


The users most likely to spend more than five minutes dialled-in to services are those who are both business and private users.

Not surprisingly the private user felt the most pressure to limit time spent dialled-in. This would seem to imply that the pressures perceived by the user are primarily related to cost.

**Prominent Purpose of Use \* User Pressure to Limit Call Length Crosstabulation**

Count		User Pressure to Limit Call Length				Total
		Very pressured	Somewhat pressured	Not very pressured	Not at all pressured	
Prominent Purpose of Use	Private/social use	3	14	2		19
	Business use	5	8	7	6	26
	Both	5	15	11	8	39
Total		13	37	20	14	84



The mobile telecommunications industry is very competitive, with the consumer highly sensitive to pricing issues. WAP services must establish

themselves by offering truly value-added services. It is important for reasons of cost that these services are easily accessible and the amount of time that the user spends on-line is minimised. This situation will persist as long as payment is time-based. For iMode small transactions are relatively cheap. The user is not pressured into dialling-in, grabbing a transaction and then logging-off again as quickly as possible.

## Reliability

Many of the major service related problems experienced by respondents included issues of reliability.

	Statistics		Mean	Std. Deviation
	Valid	Missing		
Problems Accessing Services	50	35	1.5400	.5035
Problems Logging-on to Service	50	35	1.4800	.5047
Non Availability of Services Experienced	50	35	1.4800	.5047
Dropped Calls	50	35	1.3800	.4903
Long Waiting Times for Data	50	35	1.7200	.4536
Broken Links	50	35	1.3600	.4849
Slow Downloads	50	35	1.4600	.5035

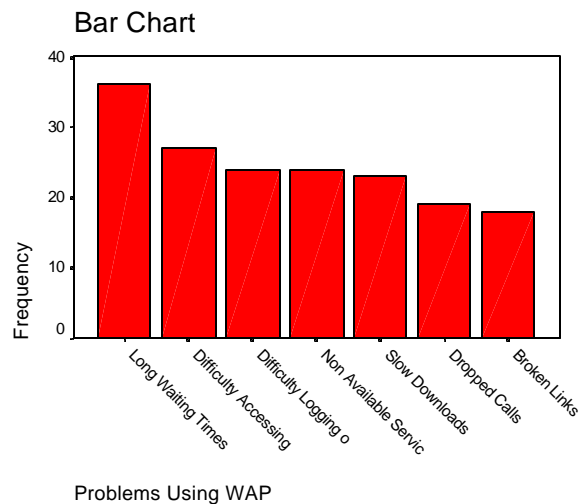


Fig. 26 Problems Using WAP

These difficulties are perceived by a very high proportion of users and must be addressed in future by network operators. Given the expressed concern with high cost of service and pressure to limit call length, these reliability issues will act to discourage use and adoption of WAP services.

## Security

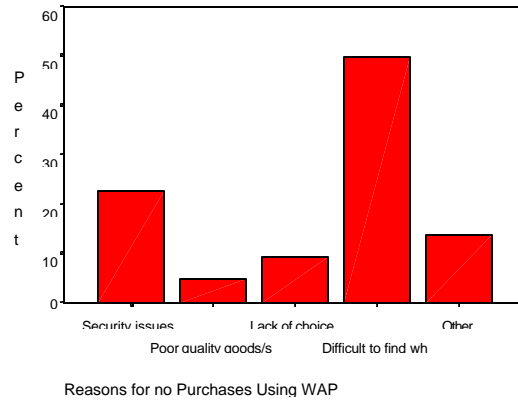
Security for the wireless Internet is a problem, which is not yet adequately addressed.

Altogether 23% of respondents in the survey expressed that the reason that they had not made purchases using WAP services in the past were security concerns.

**Reasons for no Purchases Using WAP**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Security issues	5	5.9	22.7	22.7
	Poor quality goods/services	1	1.2	4.5	27.3
	Lack of choice	2	2.4	9.1	36.4
	Difficult to find what you want	11	12.9	50.0	86.4
	Other	3	3.5	13.6	100.0
	Total	22	25.9	100.0	
Missing	.00	63	74.1		
	Total	63	74.1		
Total		85	100.0		

Fig.27 Reasons For No Purchases Using WAP



None of the private/social users in the survey had made purchases using the mobile Internet, and that group displayed less willingness to make purchases.

### Current devices

According to the survey, the Nokia7110 is by far the most popular device on the market. The rewards for innovation and appealing design are market leadership.

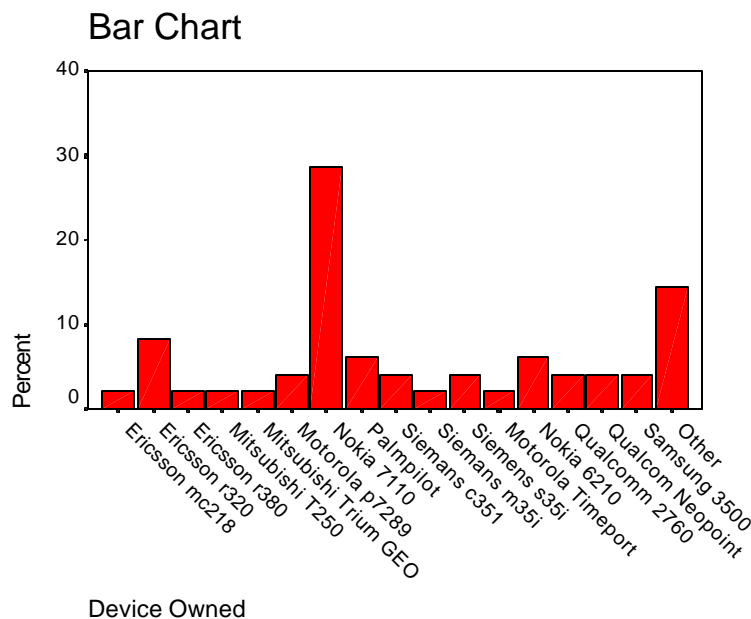


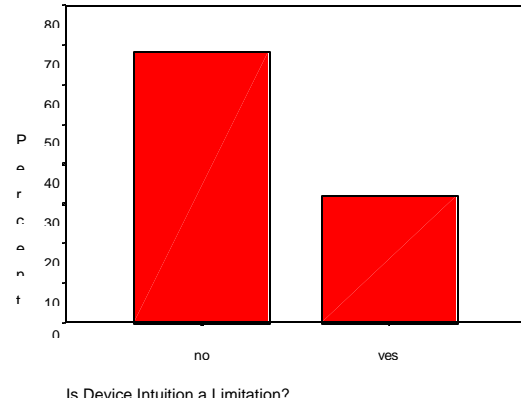
Fig. 28 Device Owned

The phone format is not the ideal for WAP use due to limitations in screen size and data input.

Approximately one third (32%) of the respondents in the survey stated that device intuition was a limitation for WAP service.

Is Device Intuitivity a Limitation?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	34	40.0	68.0	68.0
	yes	16	18.8	32.0	100.0
	Total	50	58.8	100.0	
Missing	.00	35	41.2		
	Total	35	41.2		
Total		85	100.0		

Fig. 29 Is Device Intuition a



## 4. WIRELESS SERVICES

### Service success factors

Service developers must use the context of the machines if the medium is to overcome its inherent limitations. This encourages the tailoring of standard applications for mobile devices (such as spreadsheets, containing recent customer ordering patterns for the travelling salesman) and the development of new applications based on the mobile context. Simply extending Internet services, without thought for the special restraints and capabilities of the mobile Internet will miss the opportunity to provide new types of information and to tailor it to the device and user.

A significant portion of users (41%) considers their services to be poor or very poor with regard to ease of use. The major reason for not making purchases using WAP was the difficulty of actually finding what you want. (Fig. 31)

## Types of service

The survey found that the services used by the 85 respondents were as follows. The most used services were News/Entertainment services and E-mail.

**Services Used**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid News/Entertainment	71	18.9	18.9	18.9
E-mail	56	14.9	14.9	33.9
General Browsing	38	10.1	10.1	44.0
Trading Stocks & Shares	33	8.8	8.8	52.8
Travel Ticketing & Information	29	7.7	7.7	60.5
Mapping	27	7.2	7.2	67.7
Leisure & Games	25	6.7	6.7	74.4
Corporate Uses	22	5.9	5.9	80.3
High Street Financial Services	14	3.7	3.7	84.0
Tourist Guides	14	3.7	3.7	87.7
On-line Diary Services	14	3.7	3.7	91.5
Shopping	10	2.7	2.7	94.1
Advertising	6	1.6	1.6	95.7
Data Tracking	6	1.6	1.6	97.3
Other	10	2.7	2.7	100.0
Total	375	100.0	100.0	
Total	375	100.0		

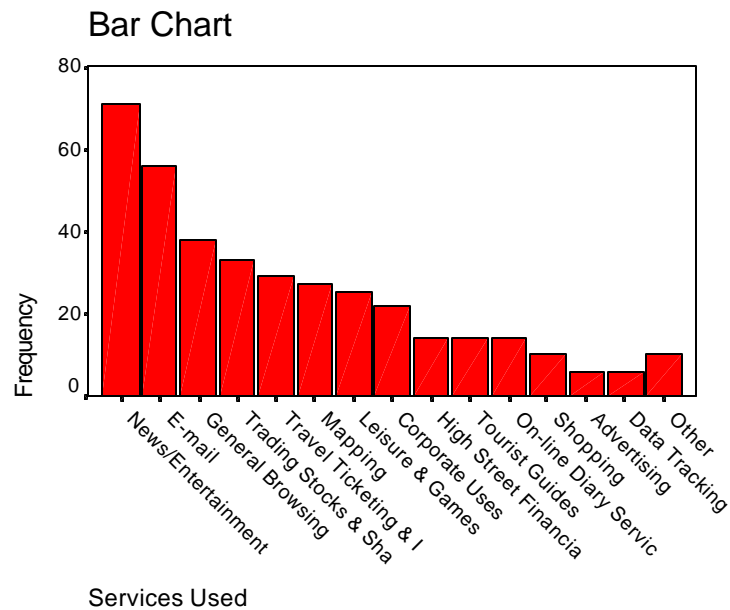


Fig. 30 Services Used

## **5. CONCLUSIONS**

### **The user under pressure**

The WAP user is operating under pressure. This pressure is based upon cost and because the user is on the move and needs fast information. The issue of cost is of primary importance and the developer needs to employ every option to ensure that time dialled-in to services is minimised. Access is joint monarch with content, especially in the mobile context. Information must be easy to locate. Information must be simplified to give the user the essence of what they require. Menu structures must be simplified to assist the pressured user. A balance must be struck between providing a narrower breadth of menu options compatible with the mobile context, and supplying the user with the depth of information required.

Cost of use is very important, especially for the private user who pays the bills. For this reason it is possible that 3G technology may experience resistance from the private user if priced too high. As the network operators recoup huge sunk costs in 3G networks in the initial five years, GPRS services could find success with the cost conscious private user.

### **An 'always on' service**

The need to dial in to achieve services is a big barrier. Time based payment causes pressure especially with high waiting times for data. The message for the service developer is to provide simplified and relevant services. With the advent of 'always on' services offered through GPRS (2.5G) and UMTS (3G) the potential for large data downloads (e.g. video services) together with small data transactions will allow the developer more scope for expression and a deeper mine of information for the user to access. This will help to alleviate cost based pressure and encourage the micro-transactions enjoyed by Japanese iMode users. Once data is downloaded the user will be at liberty to enjoy information at their leisure.

## **Customisation**

Users welcome the opportunity to customise visited services. Cookies can be employed to remember whether a particular user has visited a site in the past. The options that are chosen by the user could be recorded to appear at the top of the menu options list on subsequent visits. This will bypass the need to scroll and in many cases allow fast 'one-click' navigation through to often requested information (e.g. access to a particular portfolio of shares). This represents a powerful weapon to counter current 2G device and system limitations. It also represents a useful added value for the user on the move.

## **The critical user**

The user is highly critical towards the limitations of the mobile Internet. The more experienced user- as represented in this survey by the user for both private and business purposes- is the most critical user. Screen size, keypad, lack of services together with impatience over the amount of time it takes to download information are current major weaknesses for the mobile Internet. In future, bandwidth limitations will be addressed through GPRS and 3G solutions. Bluetooth solutions will free the mobile communications device from some limitations associated with the mobile phone. The device has the potential to become a PDA, with a larger screen and greater possibility for keypad, screen and voice recognition solutions. Currently these issues are acting to hold back the early development of WAP services.

Presently, the most critical user category is the sector which is most prepared to read 200+ word reports. These users are the most proficient, and point the way for the future as competence grows in the general user. Two distinct markets could emerge in the future. These are the 'serious' user and the 'casual' user. As more mobiles become WAP enabled the majority of users may be casual, occasional users employing their device primarily for voice calls and SMS messaging. The serious user may require a mobile device that is capable of voice communication but is heavily geared to the mobile Internet. Their device will resemble the PDA, employ Bluetooth, voice recognition or touch sensitive screen technology and be more expensive, while bringing benefits in HCI and service possibility. Both sectors require

individual attention from service developers to reflect different needs and levels of competence.

## **Appendix 1**

### **Wireless Application Protocol (WAP) User Questionnaire.**

Please indicate your choice by inserting a cross between the brackets.

**Q1. What is the prominent purpose for your WAP device?**

Private/social use ( )

Business use ( )

Both ( )

**Q2. How long in seconds do you find that you are prepared to wait for data?**

(please input a number)

\_\_\_\_\_ seconds.

**Q3. What is the maximum length of report (number of words) that you regard to be acceptable for your WAP device?**

(please input a number)

\_\_\_\_\_ words

**Q4. How many menus is it acceptable to be presented with before you access desired information?**

(please input a number)

\_\_\_\_\_ menus

**Q5. How acceptable is scrolling to access menu options on screen?**

Totally acceptable ( )

Acceptable ( )

OK ( )

Unacceptable ( )

Totally unacceptable ( )

**Q6. Do you always scroll to view the full list of menu options on-screen?**

Yes ( )

No ( )

**Q7. How useful would it be to ensure that options, which you use most frequently, appear at the top of each menu?**

Very Useful ( )

Useful ( )

Marginally useful ( )

No use ( )

**Q8. What is the (approximate) average length of time for your WAP calls?**

\_\_\_\_\_ minutes

**Q9. How pressured do you feel to minimise the length of your WAP calls?**

Very pressured ( )

Somewhat pressured ( )

Not very pressured ( )

Not at all pressured ( )

**Q10. How acceptable is the amount of time that it takes to log-on to WAP services?**

Very Acceptable ( )

Acceptable ( )

Ok ( )

Unacceptable ( )

**Q11. Has the need to log-on ever discouraged you from accessing WAP services?**

Yes ( )

No ( )

**Q12. How would you rate your WAP device for general ease of use?**

Very good ( )

Good ( )

Ok ( )

Poor ( )

Very poor ( )

**Q13. How would you rate your WAP services for general ease of use?**

Very good ( )

Good ( )

Ok ( )

Poor ( )

Very poor ( )

**Q14. Which WAP services have you used in the past?**

E-mail ( )

News/Entertainment ( )

Shopping ( )

High Street Financial services ( )

Tracking Stocks and Shares ( )

Travel ticketing and Information ( )

Tourist Guides ( )

Mapping ( )

Advertising ( )

Data tracking ( )

On-line Diary Services ( )

General Browsing ( )

Corporate uses

Leisure and games

Other  Please state \_\_\_\_\_

**Q15. What is your age?**

Under 18

18-25

26-40

41-60

Over 60

**Q16. What is your gender?**

Male

Female

**Q17. Thank you very much for your participation. I also have a supplementary 9-question questionnaire, which focuses on WAP services would you like me to e-mail it to you?**

Yes

No

## Appendix 2

### WAP Questionnaire Two

**Q1. Is the WAP service generally reliable?**

Yes ( )

No ( )

No opinion ( )

**Q2. Have you experienced any of the following problems on a regular basis?**

Difficulty in accessing the service that you require ( )

Difficulty in logging on ( )

Non availability of services ( )

Dropped calls ( )

Long waiting times ( )

Broken links ( )

Slow downloads ( )

**Q3. Have you purchased any product or service using the WAP device?**

Yes ( )

No ( )

**Q4. Are you likely to purchase goods/services through WAP in the foreseeable future?**

Yes ( )

No ( )

Not sure ( )

**Q5. If no why not?**

Security issues ( )

Too expensive ( )

Poor quality products/services ( )

- Lack of choice ( )  
Difficult to find what you want ( )  
Other ( ) ( please state)
- 

**Q6. Each time you use WAP services, how many tasks do you usually perform?**

- One ( )  
Two or three ( )  
More than 3 ( )  
It varies ( )  
Other ( )\_\_\_\_\_

**Q7. How often on average do you access WAP services?**

- Several times per day ( )  
Once per day ( )  
Less than once per day ( )

**Q8. What are the main limitations of the WAP service?**

(Check as many as you like)

- Screen size ( )  
Keypad ( )  
Limited navigation ( )  
Dropped connections ( )  
Device is not intuitive enough ( )  
Lack of services ( )  
Other ( )\_\_\_\_\_

**Q9. Which device do you own?**

Ericsson mc218 ( )

Ericsson r320 ( )

Ericsson r380 ( )

Mitsubishi T250 ( )

Mitsubishi Trium GEO-@ ( )

Motorola p7289 ( )

Motorola p 7289 ( )

Nokia 7110 ( )

Palmpilot ( ) Siemans c35l ( )

Siemens m35i ( )

Siemens s25 ( )

Siemens s35i ( )

Alcatel One Touch ( )

Other ( ) Please state\_\_\_\_\_