



This item was submitted to Loughborough's Institutional Repository by the author and is made available under the following Creative Commons Licence conditions.



CC creative commons
COMMONS DEED

Attribution-NonCommercial-NoDerivs 2.5

You are free:

- to copy, distribute, display, and perform the work

Under the following conditions:

BY: **Attribution.** You must attribute the work in the manner specified by the author or licensor.

Noncommercial. You may not use this work for commercial purposes.

No Derivative Works. You may not alter, transform, or build upon this work.

- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

Your fair use and other rights are in no way affected by the above.

This is a human-readable summary of the [Legal Code \(the full license\)](#).

[Disclaimer](#) 

For the full text of this licence, please go to:
<http://creativecommons.org/licenses/by-nc-nd/2.5/>

A survey of 'young social' and 'professional' users of location-based services in the UK

| | |
|------------------|--|
| Journal: | <i>Journal of Location Based Services</i> |
| Manuscript ID: | draft |
| Manuscript Type: | Research Paper |
| Keywords: | survey, mobile location services, attitudes, awareness |
| | |



Review Only

A survey of 'young social' and 'professional' users of location-based services in the UK

Abstract

The objective of this study was to assess the response to location-based services (LBS) by three key demographic groups within the United Kingdom (UK). This study took the form of a survey of relevant demographics, attitudes and consumer behaviour undertaken via a web-based survey. Results are based on over 1200 respondents, filtered and segmented into three demographic groups who are typically early adopters of new technology. There were positive attitudes towards a range of location-based services, with the major exception being location-based advertising. There were mixed views towards location-based gaming and safety camera information. There were low levels of awareness of many services. The levels of use were typically under 20% for all types of LBS.

Keywords: location-based services, mobile location services, survey, attitudes, awareness, value

1 Introduction

1.1 Background

Location-based services – also termed mobile location services (MLS), or location-aware services were launched with much hope, with Mountain and Raper (2001) describing how they were initially portrayed as offering great potential. However, it is widely accepted that they have failed to live up to their initial hype (Schiller 2004). With the exception of navigation applications, MLS have failed to become mass market products, despite attempts by the mobile phone network operators to market them in order to increase the revenues derived from non-voice services.

Despite the early failure of MLS, it is now being suggested that MLS are making a comeback (Schiller 2004), with several important drivers including: the appearance of new mobile phones with high-resolution colour screens and increased processing power; faster data connections; implementation of high performance positioning technologies; and greater emphasis by the telecoms operators on data services to compensate for the levelling off of revenues from voice and text messaging.

Fagerberg (2005) also suggests that MLS are set for a comeback, highlighting that although revenues from location-based services in the European market were only 108 million in 2004, this figure is expected to grow to 2,183 million over the ensuing five years, and will account for 4.5 percent of total non-voice revenues. In a recent United Kingdom (UK) fact-finding visit to Japan (DTI 2005), it was made clear ‘that the [Japanese] operators and content providers see ‘location’ as one of the cornerstones of future services’.

Despite the mixed views on the take up of MLS, there is a general lack of published data on the levels of awareness and use of different services. There is a need for more *evidence* regarding consumer awareness and use of MLS. In addition to this direct usage data, the literature on technology adoption, eg Rogers (2003), describes the need to understand the characteristics and behaviour of groups who are early adopters in order to provide an indication of the rate of uptake of innovations, including new technology such as MLS.

1.2 *Aims and objectives*

The study reported in this article is a survey, the wider aims of which were to identify a range of demographic, usage and attitudinal data relating to mobile information and communication technology (ICT). The specific aims of this article are to report those results relevant to MLS, and in particular: (1) the extent to which early adopters were actually using, or were aware of a range of MLS, and (2) their general attitudes to these services. The results can be interpreted in terms of the success of current MLS offerings, and the future market for services.

2 **Method**

2.1 *Overview*

This study comprised a web-based questionnaire that was targeted and analysed according to three key demographic groups that are typically early adopters of mobile technology (Lindgren et al. 2002): a 'young social' and an 'older professional' group, the latter being split according to whether they had children. Data were analysed to give a snapshot of the typical demographics of these groups, their travelling behaviour, their use of static and mobile ICT, and their awareness of, and attitudes to a range of MLS that can be delivered over a mobile phone.

2.2 *Target respondents*

Telecom network operators segment customers in order to understand, target, develop and market services for relatively homogeneous user groups. A typical categorisation is as follows (note this is based in part on information supplied by a personal contact working in the telecoms industry who asked that this was not attributed to either him or his company). In addition, there are not necessarily clear distinctions between groups, as apparent from table 1.

[insert table 1 about here]

This study targeted three consumer groups as described by Lindgren et al. (2002): 'MOKLOFs' (mobile kids with lots of friends) are defined (p 247) as:

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

‘teenagers and young people up to the age of 30, constantly on the move and with extensive networks. They want to use their mobiles to keep in touch with friends, arrange meetings, chat, play games, listen to music, use picture telephony, send images, and so on’.

A ‘YUPPLOT’ (young urban professional parent with lack of time) is defined (p248) as:

‘a professional, urban, well-educated parent of good income aged between 30 and 50. A typical YUPPLOT is a highly mobile individual, with his or her own laptop, mobile phone and possibly also [personal digital assistant] PDA. His or her primary goal in life is to gain time, increase personal productivity, keep up-to-date and use time effectively.’

It is important to note that these groups are sub-groups of the age-defined population segments. ‘MOKLOFs’ and ‘YUPPLOTS’ respectively make up about 60% of the 16-30, and 40% of the 30 – 50 demographic group in Sweden. Although one key characteristic of a ‘YUPPLOT’ is that they have children (since this defines some of the competing lifestyle goals, and hence time pressures), this distinction excludes all older well educated professionals who do not have children but are still potentially motivated by the desire to use time effectively and increase personal productivity. Therefore a third sample group was incorporated into the study to represent the well-educated professional *without* children.

2.3 Sampling strategy

A mixed *convenience* (Robson 2002) and *quota* (Alreck and Settle 1995) sample approach was used, targeting the above three groups via a range of electronic noticeboards, email distribution lists and contacts working at large commercial organisations. The total set of responses received was differentiated and filtered according to the three demographic groups of interest; responses falling outside of these groups were not analysed. An attempt was also made to target respondents from a range of geographical locations, to reduce the bias arising from a predominance of local respondents. In order to encourage participation, all completed responses were entered into a periodic prize draw for £100.

2.4 Design of the questionnaire

The questionnaire was initially piloted as a paper-based survey and then developed and piloted in Dreamweaver™ as a web-based questionnaire. The questionnaire comprised a range of categorical responses based on radio buttons (where only one from a number of different items could be selected), check boxes (where more than one response to a question could be selected), and free text entry via text fields where alphanumerics could be entered. Field checking was not incorporated because it would: increase the non-completion rate; promote random answers to enable submission; and restrict flexibility of response (eg disallowing text responses in numerical fields in order to giving a frequency range or state a more appropriate response time frame).

The questionnaire comprised the following sections:

1. Participant demographics – gender, date of birth, qualifications held, whether in employment or studying, occupational (if in employment), hours worked.
2. Details of mobile phone make(s), model(s) network(s) and contracts.
3. Accommodation – living arrangements, location, length of residence.
4. Travel behaviour for work and leisure purposes.
5. Use of technology – mobile phone ownership, use of other new technology.
6. Frequency of use of static and mobile ICT, for week days and the weekend.
7. Awareness and use of different mobile location services – summarised in table 2 below, but described in more detail to respondents.
8. Preferences for local Points of Interest in an unfamiliar area.
9. Attitudes - towards technology in general, and specific mobile services.
10. Willingness to take part in follow-up research.

This article focuses on whether respondents held positive or negative overall attitudes to a range of mobile location services, and the levels of awareness and actual of these services (i.e. 7 and 9 above). The reader is welcome to contact the authors for other results they may be interested in. Questionnaire responses were returned as text files via email, and imported into Excel™ and then SPSS™ for data cleaning and analysis. A range of measures were used to discourage and identify multiple entries.

1
2
3
4 [insert table 2 about here]
5
6
7

8 9 **3 Analysis and results**

10 11 **3.1 Summary of the differentiated sample**

12 The variables used to differentiate between the three sample groups are shown in table
13
14
15
16 3.

17
18
19
20 [insert table 3 about here]
21
22

23
24 The groups are mutually exclusive, approximating the distinctions made by Lindgren
25 et al. (2002) It can also be seen that the sample was dominated by respondents falling
26 into the 'young social' category, a limitation discussed in section 4.
27
28
29

30 31 **3.2 Travel: the daily 'commute' to work or study**

32 As an example of key differences between the three groups, the main modes of
33 transport used for regular travel to work or study are shown in figure 1.
34
35
36
37

38
39 [insert figure 1 about here]
40
41

42
43 Note: respondents could indicate they use more than one mode of transport for their
44 regular 'commute'. Figure 1 plots usage of transport modes, irrespective of whether
45 they were single journeys or elements within multimodal journeys.
46
47

48 This figure shows clear differences in the modes of transport used for the regular
49 journey to work or study. The older professional groups made much greater use of the
50 car, this particularly being the case for those older professionals with children.
51
52
53
54
55
56
57
58
59
60

3.3 Overall attitudes to new technology

Figure 2 shows respondents' overall attitudes towards new technology. Table 4 shows the long descriptions given in the questionnaire.

[insert table 4 here]

[insert figure 2 about here, directly below table 4]

This shows that all three demographic groups held attitudes showing a clear skewing towards early adopter categories. For all groups, over 50% fell into categories 1 and 2 (roughly equivalent to the *innovators* and *early adopters* described by Rogers (2003)).

3.4 *Attitudes to and awareness of different mobile location services*

Table 5 shows the levels of awareness/use, and overall attitudes towards 15 different mobile location services, split by demographic group. The chi-square statistics for each graph show whether there were significant variations in response, according to differentiation by these demographic groups.

[insert table 5 about here]

This shows a low degree of usage of all services, but positive attitudes to most MLS. This is discussed in section 4.

3.5 *Attitudes based on awareness / usage*

A cross-tabulations analysis was undertaken to determine whether attitudes varied according to whether respondents were either aware of the service, or had actually used it. This excludes all respondents who stated they had never heard of a particular service, and no differentiation is made between sample groups. The chi-square statistics for each service in table 6 show whether there were variations in proportions of positive versus negative attitudes according to whether participants were merely aware of, or had actually used a service.

[insert table 6 about here]

This shows, for most services, significant relationships between (1) the levels of awareness/use of services, and (2) the attitudes that respondents hold towards those services. These results are discussed below.

3.6 *Impact of self-reported adopter category*

An additional analysis was undertaken to investigate the impact of self-reported adoption category (i.e. the categories shown in Table 4) on the levels of awareness towards different types of MLS, and their overall attitudes towards specific services.

1
2
3 This analysis was done on the entire sample (n = 1265), without any segmentation
4 according to demographic data. This is shown in table 7 below.
5
6
7
8

9 **[insert table 7 about here]**
10
11
12

13
14 The overall levels of awareness/use, and the overall proportions of positive or
15 negative attitudes are similar to those arising from a segmentation according to a
16 demographic sub-groups, as might be expected. However the data in table 7 shows
17 how the variation in response according to adopter category differs according to MLS.
18 This is discussed in section 4 below.
19
20
21
22
23
24
25

26 **4 Discussion**

27
28

29 Figure 1 is included as an illustration of the behavioural differences between the
30 different demographic groups. Many of the young social group were students, who
31 made their regular daily journey on foot due to the short distances involved. In
32 contrast, the older professional groups were likely to be more affluent, and hence
33 more likely to be private car owners or use a vehicle in connection with work. In
34 addition, the ownership of a car and/or use of that car for the regular commute was
35 more likely for respondents with children, presumably due to cost and convenience
36 reasons.
37
38
39
40
41
42

43 Figure 2 is included to validate the filtering of data, and differentiation between
44 different user groups. As shown in figure 2, the majority response from all three
45 groups was that they liked to try out new technology and were motivated by the
46 opportunity to improve their lifestyle. This supports the suggestion by Lindgren et al.
47 (2002) that these demographic groups (as differentiated within this sample) tend to be
48 early adopters. However, it also shows that these groups cannot be *defined as* early
49 adopters, as there is a sizeable proportion (between 30-40%) of all groups who adopt
50 a 'wait and see' attitude. Interestingly, although the 'young social' group had the
51 highest proportion who 'liked to be the first' with new technology, they also had the
52 highest proportion who fell into the 'wait and see category'; this indicates a more
53 heterogeneous sample than for either of the two 'older professional' groups.
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Table 5 shows the level of awareness or usage for each of 15 different mobile location services plus the overall attitudes of respondents towards that service. There was a low degree of usage of all of these services. Respondents were generally aware of being able to access local weather information via a mobile phone, but had not actually tried this. Respondents tended to be unaware of the existence of services such as ‘friend finder’, location-based games, access to safety/security information via a mobile, and location-based advertising. For all other services respondents were fairly evenly split between having never heard of them, or being aware of them without having actually used them. These findings mirror the lack of interest in active information search found by Andersson and Heinonen (2002) in the Swedish market and the general lack of use of advanced capabilities on phones (Kaasinen 2005).

There were few differences between the three demographic groups. A greater proportion of the ‘young social’ group had accessed information on local phone numbers via their mobile. This information was consistent with the social nature of their lifestyle (ie a *need*), and the lack of availability of this information via traditional non-mobile means such as the telephone directory and fixed web access (ie *constraints* imposed by the mobile context).

The older professional group with children tended to make less use of walking directions, and greater use of roadside assistance via mobile, presumably due their greater use of cars for commuting, work and non-work related journeys.

Correspondingly, the ‘young social’ group tended to make greater use of public transport information.

The clearest findings from Table 5 were that the incidence of *use* of mobile location services was low, and in most cases was less than a third of the *level of awareness* of a service. In addition, differences in the level of awareness or usage were much more dependent on the particular service in question, than the demographic group.

Table 5 also shows whether respondents held either negative or positive attitudes to each of the 15 services. This is a very basic analysis, since within the questionnaire, respondents were only asked to indicate their level of awareness regarding each service (‘never heard of it’, ‘aware of it’, or ‘have used it’) and then whether they were ‘mostly positive’ or ‘mostly negative’ towards that particular service. The table clearly shows that for most services, the majority response (by a factor of over 4:1) was that respondents were generally positive towards that service. A binomial test

1
2
3 was carried out for each group to test for significant consensus of response, based on
4 comparison with an expected random 50:50 distribution. With the major exception of
5 location-based advertising, this confirmed the highly significant proportion of positive
6 attitudes towards all services, by all three demographic groups.
7
8
9

10
11 There were overtly negative opinions towards location-based advertising from all
12 groups. This is probably due to concerns about the potential intrusiveness of these
13 services, together with issues to do with privacy (Myles et al. 2003), although firm
14 conclusions cannot be reached based on the data from this survey.
15
16
17

18
19 Both older groups held mixed overall attitudes to services providing information on
20 safety (speed) cameras. It is likely that attitudes were influenced by the usefulness of
21 knowing where these cameras were, coupled with a desire to see them catch motorists
22 who are speeding (ie a conflict between personal and societal good).
23
24
25

26
27 The older professional group without children were negative towards location-based
28 games. This may be due to a lack of awareness of these services – a general problem
29 noted by Andersson and Heinonen (2002). In contrast, the older professional group
30 with children were more ambivalent towards location-based games, presumably due a
31 greater exposure to mobile gaming from their children.
32
33
34

35
36 A cross tabulation analysis was undertaken on the data shown in table 5, i.e. the level
37 of awareness data ('never heard of it', 'aware of it' or 'have used it') versus the
38 overall attitude towards the service ('mostly positive' or 'mostly negative'). This can
39 show whether positive or negative attitudes are associated with either awareness of a
40 service, or usage of a service. It is not possible to state a simple causal relationship
41 between these two variables, since the level of usage of a service will be influenced
42 by the attitudes an individual hold towards it (Ajzen and Fishbein 1980; Davis et al.
43 1989), but attitudes will also *arise from* a level of awareness or experiences through
44 usage. The results of this (shown in table 6) suggests that if individuals actually use
45 services, they tend to be positive towards them. Despite the failings identified by
46 Schiller (2004) and others, and the low levels of usage of mobile location services
47 identified within this study, there are some satisfied users of MLS. However a
48 limitation of the analysis shown in table 6 is that it is not possible to distinguish
49 between the factors that may predispose an individual to use a service (ie the
50 characteristics that differentiated the 'aware of it' sample from the 'have used it'
51
52
53
54
55
56
57
58
59
60

1
2
3 sample), and the service or contextual factors that may lead to positive or negative
4 attitudes.
5
6

7
8 The questionnaire was targeted, and data analysed, according to three key
9 demographic groups that are described as typically being early adopters of mobile
10 technology (Lindgren et al. 2002). This assertion is borne out by the skewed nature of
11 the data shown in figure 2 – the groups used as the unit of analysis within this study
12 are *typically*, but not *exclusively*, early adopters. The analysis in table 7 shows the
13 impact of self-reported adoption category only (i.e. without segmentation according to
14 demographic data) on the levels of awareness towards different types of MLS, and
15 their overall attitudes towards specific services. As might be expected, those who
16 wanted to ‘be the first’ with new technology tended to have used services slightly
17 more, and were slightly more positive towards services (and the opposite for those
18 respondents who stated that they ‘don’t like new technology’). However, there is
19 clearly a differential response across adopter category, according to the individual
20 MLS – for some MLS such as Nearest Services, and Local Phone Numbers,
21 respondents who were potentially resistant to new technology were much less aware
22 of these services, and/or much more negative towards them. For other services such as
23 Roadside Assistance, Safety Camera Information, and Friend Finder, the variation in
24 response across adopter categories was much less. This interaction effect can be
25 explained by the extent to which services are seen as adding value – i.e. being ‘better
26 than the alternatives out there’ (Lindgren et al. 2002). Where there is a viable, non
27 technology mediated service (such as a local telephone directory), those characterised
28 as late adopters appear to be particularly unreceptive to MLS concepts, and negative
29 towards them.
30
31

32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 **4.1 Limitations of the study**

49 The aims of the study were to understand current consumer behaviour and attitudes in
50 relation to existing and emerging services that can be delivered over a mobile phone.
51 The study was successful in attracting a substantial number of respondents (1276 of
52 which 365 were discarded as not falling into the demographic groups of interest).
53 However the differentiated sample was dominated by the ‘young social’ group (81%),
54 with only 11% and 8% falling into the professional groups without and with children
55 respectively. Despite this imbalance, the minimum recommended expected cell sizes
56 for basic cross-tab analyses were met in the majority of cases, since the numbers
57
58
59
60

1
2
3 falling into these categories were still relatively large at $N = 102$ and $N = 72$
4
5 respectively. Where minimal expected cell size requirements were violated, the chi-
6
7 square statistic was not calculated.

8
9 There were less than 1% very incomplete responses (defined as being less than nine
10 questions answered) which were discarded from analysis, and only 1% duplicate
11 returns which were also discarded. These were identified based on duplicate data,
12 names and/or email addresses (which were the last data to be supplied by
13 respondents). From analysis of the time of submission, it was clear that most
14 duplicates were the result of simply pressing the 'submit' button twice, whether this
15 was intentional or not. This should have returned the respondent to a home page, and
16 it was unclear why on occasions this did not occur. It has to be accepted that despite
17 measures to discourage and detect multiple entries under different names (eg the
18 requirement for photo ID if claiming the prize draw) there may have been some
19 duplicate responses in different names which were impossible to detect.

20
21 The main limitation of this survey was the non-random nature of the sampling used,
22 since a combination of a 'convenience' and 'quota' sampling approach was used.
23 Respondents were segmented according to established demographic criteria (Lindgren
24 et al. 2002), with other respondents not analysed; this increases the potential
25 generalisability of the results. The sample was self-selecting due to the means of
26 recruiting respondents (via email or web) and the way in which the questionnaire was
27 completed (web-based completion). However, subsequent filtering and segmentation
28 of respondents was based in part on those same criteria influencing self selection.
29 Therefore the recruitment and response mechanisms resulted in self-selection bias
30 when compared to the wider population, but were consistent with the characteristics
31 expected of the groups differentiated in the sample.

32
33 A further limitation (and that common to many survey approaches to data collection)
34 is that of the reliability of the data obtained, and particularly errors to do with
35 estimations of frequencies. As discussed by Conrad et al. (1998), respondents may use
36 a variety of strategies for making frequency estimations in surveys, with errors
37 particularly likely when general impressions of frequencies are converted to numbers.

38
39 There was a high willingness to take part in follow up research as the majority of
40 Group 1 (76%), Group 2 (67%) and Group 3 (71%) stated a willingness to take part in
41 follow up research (a specific question in the questionnaire). This can be interpreted

1
2
3 as potential buy-in to this research from respondents; it therefore increases the level of
4 confidence in the answers obtained from this survey. In addition, a free text field was
5 incorporated for general comments, and there were relatively few adverse comments
6 regarding the design or content of the questionnaire.
7
8
9

10 11 **5 Summary and conclusions**

12
13
14 This study comprised a web-based questionnaire, analysis of which was based on the
15 identification of two key customer groups who are typically early adopters of mobile
16 technology: (1) the mobile youth, aged 18 - 29 who is highly mobile and social; (2)
17 the professional, aged between 30 and 50, who is motivated to use time effectively
18 and be more productive. This professional group was further subdivided into those
19 with, and without children.
20
21
22
23
24

25
26 There was a low degree of usage, and also a general lack of awareness, of mobile
27 location services. There was little difference between the groups in this respect, with
28 approximately 20% being the highest rate of *usage* for any one service, even where
29 the majority of respondents were *aware* of them.
30
31
32

33
34 Despite the lack of awareness/usage of services, respondents were, at an overall level
35 positive towards the services proposed to them. For many services, there was a
36 majority response of over 80% who were positive rather than negative towards
37 services. The only exceptions were location-based gaming where there were roughly
38 equal positive and negative attitudes, and location-based advertising, where
39 respondents were negative towards the concept. Again, there were few differences
40 between the two samples, although as might be expected, the younger group held
41 more positive attitudes to location-based gaming. Mobile advertising is currently
42 perceived very negatively and this highlights there being a number of issues such as
43 privacy and trust which are of concern to users. These have been discussed by various
44 authors (Kaasinen 2003; Myles et al. 2003; Ng-Kruelle et al. 2002) and are the
45 specific focus of current research into MLS (CityWare 2006).
46
47
48
49
50
51
52
53

54
55 Despite the low levels of use of mobile location services, there may be *potential* for
56 developing mobile location services that are adopted by the groups differentiated
57 within this survey:
58
59
60

1. They are early adopters who are willing to try new technology.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

2. They hold generally positive attitudes to a range of different MLS.

In addition (and based on wider data from this survey), these groups make extensive use of static and mobile ICT (eg heavy daily use of email, internet, instant messaging and/or text messaging). They also have highly mobile lifestyles (within a social or work context), and hence opportunity for services to capitalise on mobile and location-relevant delivery.

However, mobile location services are clearly not currently mainstream applications in the UK, since they are not even being used by those demographic groups who are typically 'early adopters'. Based on ongoing research, there are several possible reasons for this:

- The existence of services as disparate, discrete applications provided by third party developers, with a lack of integration within handsets or network services.
- A lack of awareness of services. In general (and with the exception of navigation applications), these services are little advertised, and if provided on a phone tend to be relatively 'buried' within a menu structure. As an example, even when set up as a personalised link on an operators' mobile web home page, it took one of the authors nine clicks to access a simple navigation application.
- A lack of *perceived usefulness* or added value of services, potentially indicated by respondents being aware of services without having used them. (Although of course a range of other factors can also lead to a non-use, including cost and availability on individuals' particular phones.)
- Poor user experiences due to a range of factors, including poorly specified functionality for target markets, lack of usability or perceived benefit, technical limitations such as inadequate positioning capability, cost of use, and negative perceptions regarding issues such as privacy and trust.

The most successful location-based services are likely to be those that offer 'new freedoms' (Keen and Mackintosh 2001). However, location can also be used to increase the relevance or ease of use of a range of services (not just those immediately identifiable as 'location-based') by tailoring the 'world' that a mobile user interacts with. This is consistent with the notion of 'situated action' (Dourish 2001), where all

1
2
3 human action is to some extent influenced by the setting in which it occurs. Finally,
4 (and to re-iterate a view emerging within the field), it is likely that users are not
5 actually that interested in location. Rather than services being marketed as 'location-
6 based' (i.e. highlighting the positioning capability), location should be incorporated in
7 a transparent manner as an enabler within more integrated mobile services.
8
9
10
11
12

13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

- Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Alreck, P. L., & Settle, R. B. (1995). *The survey research handbook* (2nd ed.): Irwin.
- Andersson, P., & Heinonen, K. (2002). *Acceptance of mobile services: Insights from the Swedish market for mobile telephony* (No. SSE/EFI Working Paper Series in Business Administration No 2002:16).
- CityWare. (2006). <http://www.cityware.org.uk/> (Vol. 2006).
- Conrad, F. G., Brown, N. R., & Cashman, E. R. (1998). Strategies for Estimating Behavioural Frequency in Survey Interviews. *Memory*, 6(4), 339-366.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). Users acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- Dourish, P. (2001). *Where the Action Is: The Foundations of Embodied Interaction*. Cambridge, Massachusetts: MIT Press.
- DTI. (2005). *Location-based services: understanding the Japanese experience*. www.globalwatchonline.com.
- Fagerberg, J. (2005). *Berg Insight: The Structure of the European LBS Market 2005*.
- Kaasinen, E. (2003). User Needs for Location-Aware Mobile Services. *Personal and Ubiquitous Computing*, 7(1), 70-79.
- Kaasinen, E. (2005). *User acceptance of mobile services - value, ease of use, trust and ease of adoption*. Tampere University of Technology, Tampere.
- Keen, P., & Mackintosh, R. (2001). *The Freedom Economy: Gaining the M-commerce Edge in the Era of the Wireless Internet*. California: Osborne/McGraw-Hill.
- Lindgren, M., Jedbratt, J., & Svensson, E. (2002). *Beyond Mobile: People, Communications and Marketing in a Mobilized World*. New York: Palgrave.
- Mountain, D., & Raper, J. (2001). Positioning techniques for location-based services (LBS): characteristics and limitations of proposed solutions. *ASLIB Proceedings*, 53(10), 404-412.
- Myles, G., Friday, A., & Davies, N. (2003). Preserving privacy in environments with location based applications. *IEEE Pervasive Computing*, 2(1), 56-64.

1
2
3 Ng-Kruelle, G., Swatman, P. A., Rebne, D. S., & Hampe, F. (2002, Jan 16-18 2002).
4 *The Price of Convenience: Privacy and Mobile Commerce*. Paper presented at
5 the 3rd World Congress on the Management of E-Commerce, Hamilton,
6 Canada.
7

8 Robson, C. (2002). *Real World Research* (2nd ed.): Blackwell Publishing.
9

10 Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
11

12 Schiller, J. (2004). *Location-Based Services*: Morgan Kaufmann.
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review Only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Tables

| Group | Typical characteristics |
|----------------------|--|
| Teenagers | Up to 18 years old, still at school, highly social, budget constrained, want fun, entertaining products, low ARPU value |
| Young social | Aged 18 – 30, students or young professionals, similar to above, but less budget-constrained |
| Older professionals | Employed, motivated to use time effectively and be productive, impacted by presence of dependent children |
| Company phone users | People given a company phone, need to be contactable, typically middle manager type, embrace new technology |
| Self employed | Self-employed business users - pay their own bill, need it for work, keep phone on all the time, use functional products, not interested in new technology per se. |
| Heavy business users | Travel extensively including abroad, keep phone on / in contact all the time, extremely high ARPU value |
| Older users | Typically aged 50+, want to be contactable, occasional use, low ARPU |

Table 1 Typical customer segmentation

| | |
|-----------------------|--------------------------------|
| 'Nearest Services' | 'Safety Camera Information' |
| 'Local Weather' | 'Public Transport Information' |
| 'City Guides' | 'Friend Finder' |
| 'Local Phone Numbers' | 'Location-based Games' |
| 'Walking Directions' | 'Mobile Booking/paying' |
| 'Driving Directions' | 'Location-based Advertising' |
| 'Traffic Information' | 'Safety/Security Information' |
| 'Roadside Assistance' | |

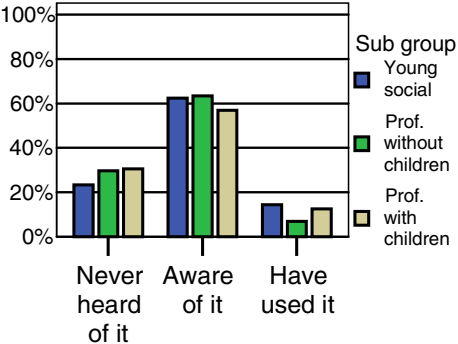
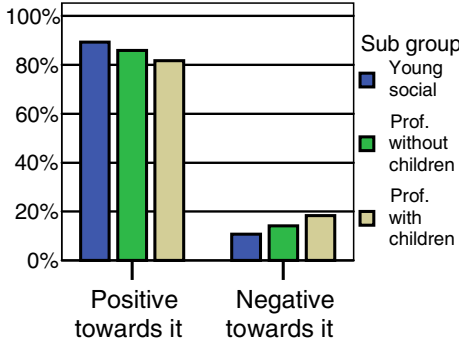
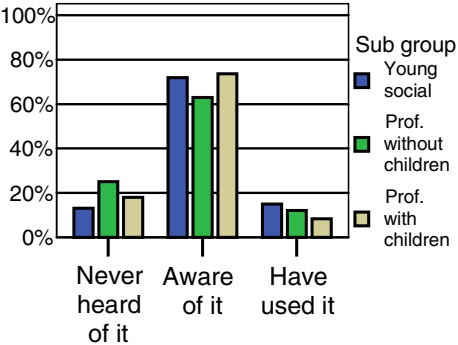
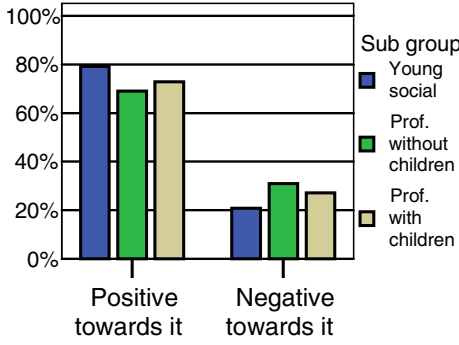
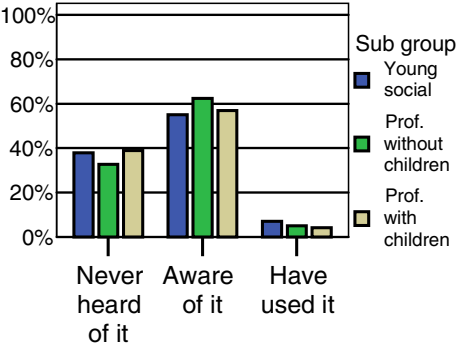
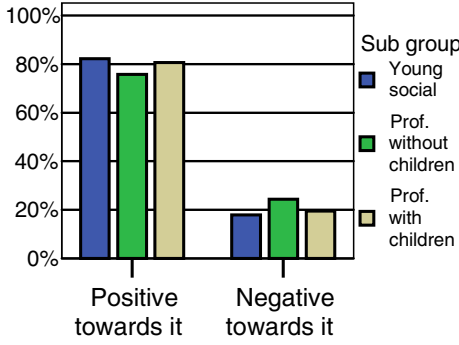
Table 2 The mobile location services described in the questionnaire

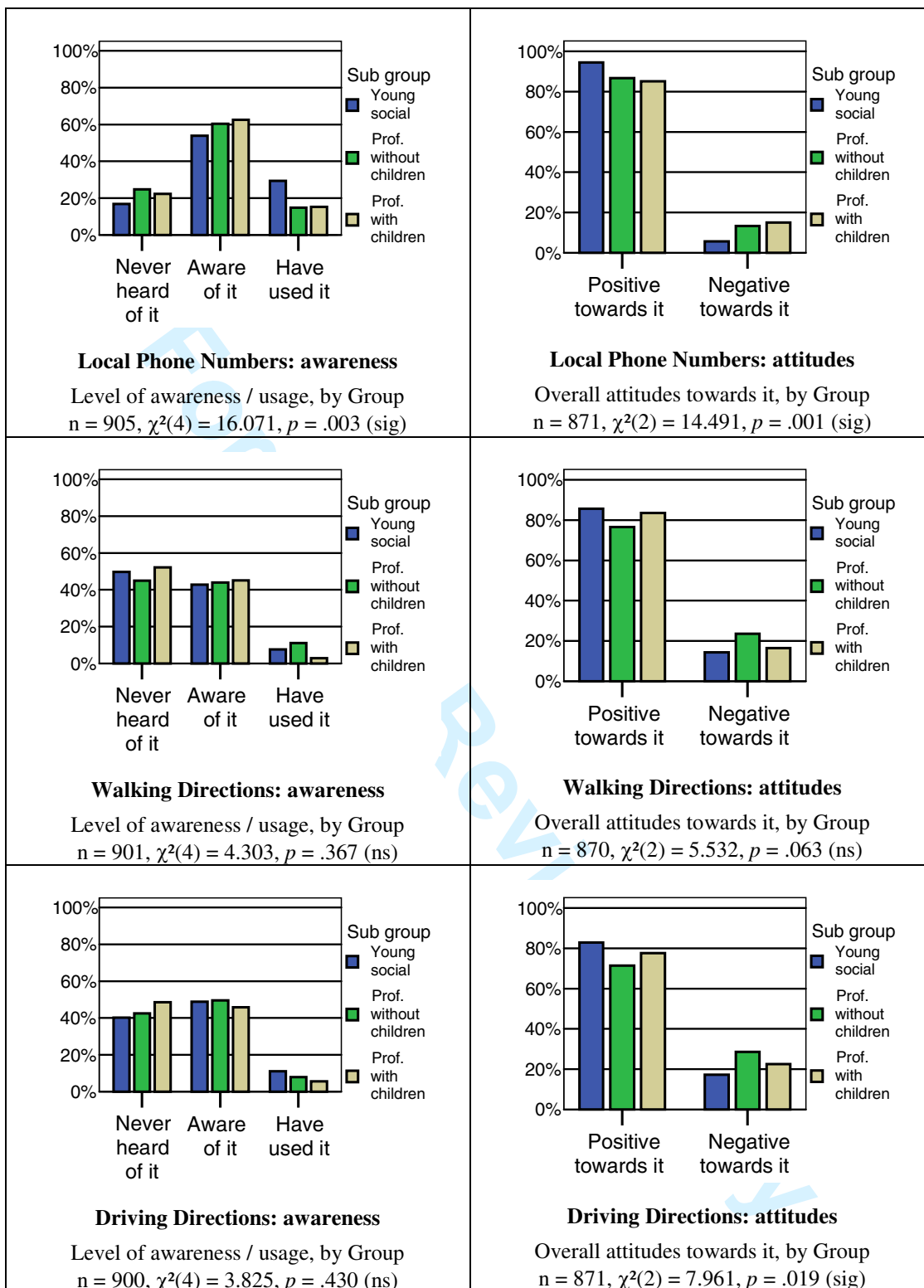
| | Group 1: 'Young social' | Group 2 'Professional without children' | Group 3 Professional with children' |
|--------------------------|---|---|---|
| Age | 19 - 29 | 30 - 50 | 30 - 50 |
| Children under 18 | None | None | At least one |
| Education | At least 5 'O' levels or equivalent | At least two 'A' levels or equivalent | At least two 'A' levels or equivalent |
| Work / Study | No distinction | In full time professional, technical or managerial employment | In full time professional, technical or managerial employment |
| Use of mobile ICT | Uses at least one mobile phone | | |
| Use of static ICT | Uses a PC and the Internet at home or work or study | | |
| Number in sample | N = 737 | N = 102 | N = 72 |

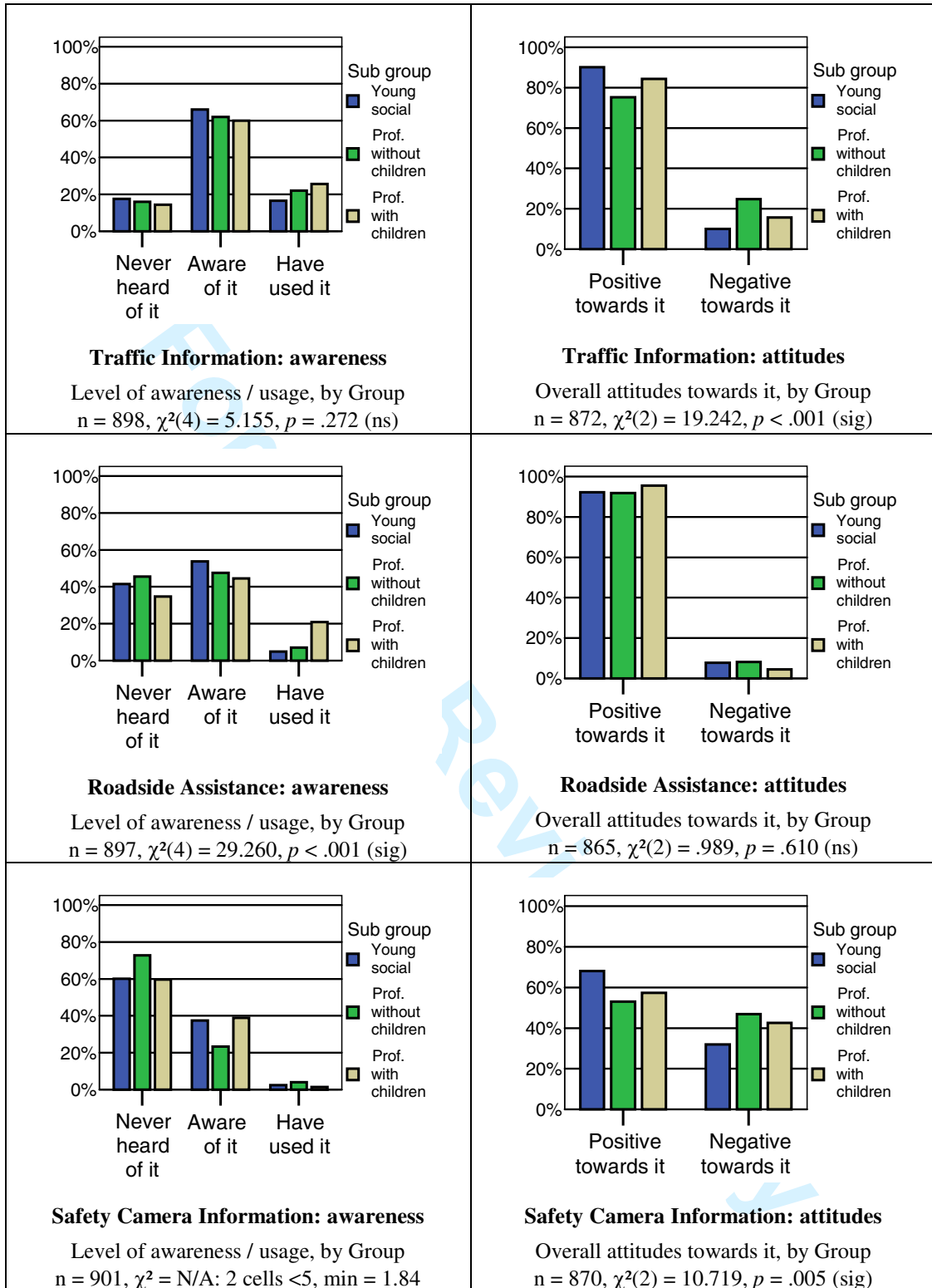
Table 3 Characteristics used to differentiate between the sample groups

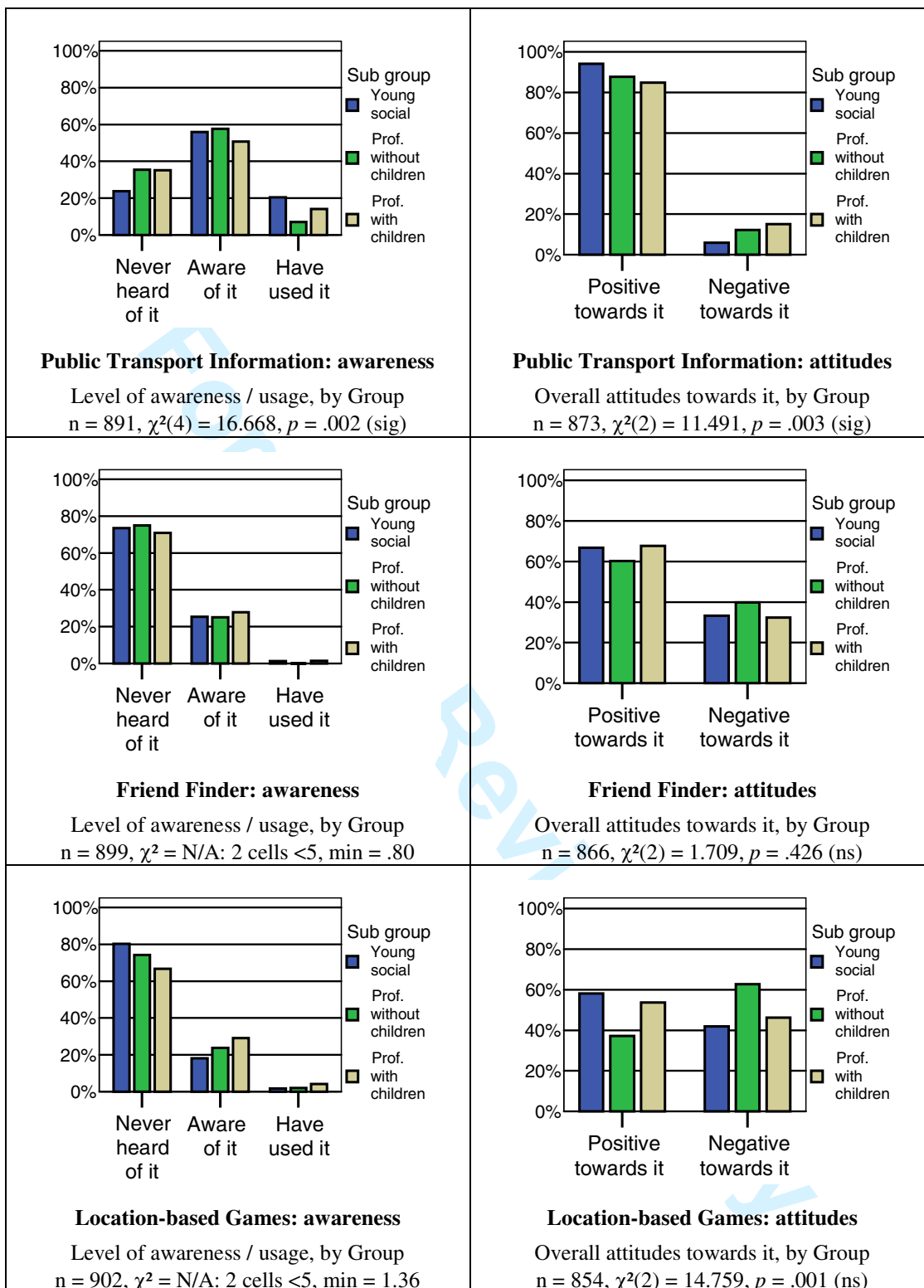
| Questionnaire Label | Long description given in questionnaire |
|---------------------|---|
| 1 'Be the first' | 'I like to be the first to try out new technology when it comes out. I am motivated by an interest in the technology for its own sake.' |
| 2 'Try it out' | 'I like to try out new technology. I am motivated by the opportunity to improve my lifestyle.' |
| 3 'Wait and see' | 'I like to wait and see with new technology. I am motivated by it being functional and easy to use.' |
| 4 'Sceptical' | 'I am sceptical about new technology. I am only motivated to use it when told to do so by others.' |
| 5 'Don't like it' | 'I don't like new technology. I am very resistant to using it.' |

Table 4 Descriptions provided for technology adoption categories

| Levels of awareness/use | Overall attitudes |
|---|--|
|  <p>Nearest Services: awareness Level of awareness / usage, by Group n = 906, $\chi^2(4) = 6.605, p = .158$ (ns)</p> |  <p>Nearest Services: attitudes Overall attitudes towards it, by Group n = 885, $\chi^2(2) = 4.155, p = .125$ (ns)</p> |
|  <p>Local Weather: awareness Level of awareness / usage, by Group n = 904, $\chi^2(4) = 12.427, p = .014$ (sig)</p> |  <p>Local Weather: attitudes Overall attitudes towards it, by Group n = 891, $\chi^2(2) = 6.206, p = .045$ (sig)</p> |
|  <p>City Guides: awareness Level of awareness / usage, by Group n = 906, $\chi^2(4) = 2.910, p = .573$ (ns)</p> |  <p>City Guides: attitudes Overall attitudes towards it, by Group n = 875, $\chi^2(2) = 2.428, p = .297$ (ns)</p> |





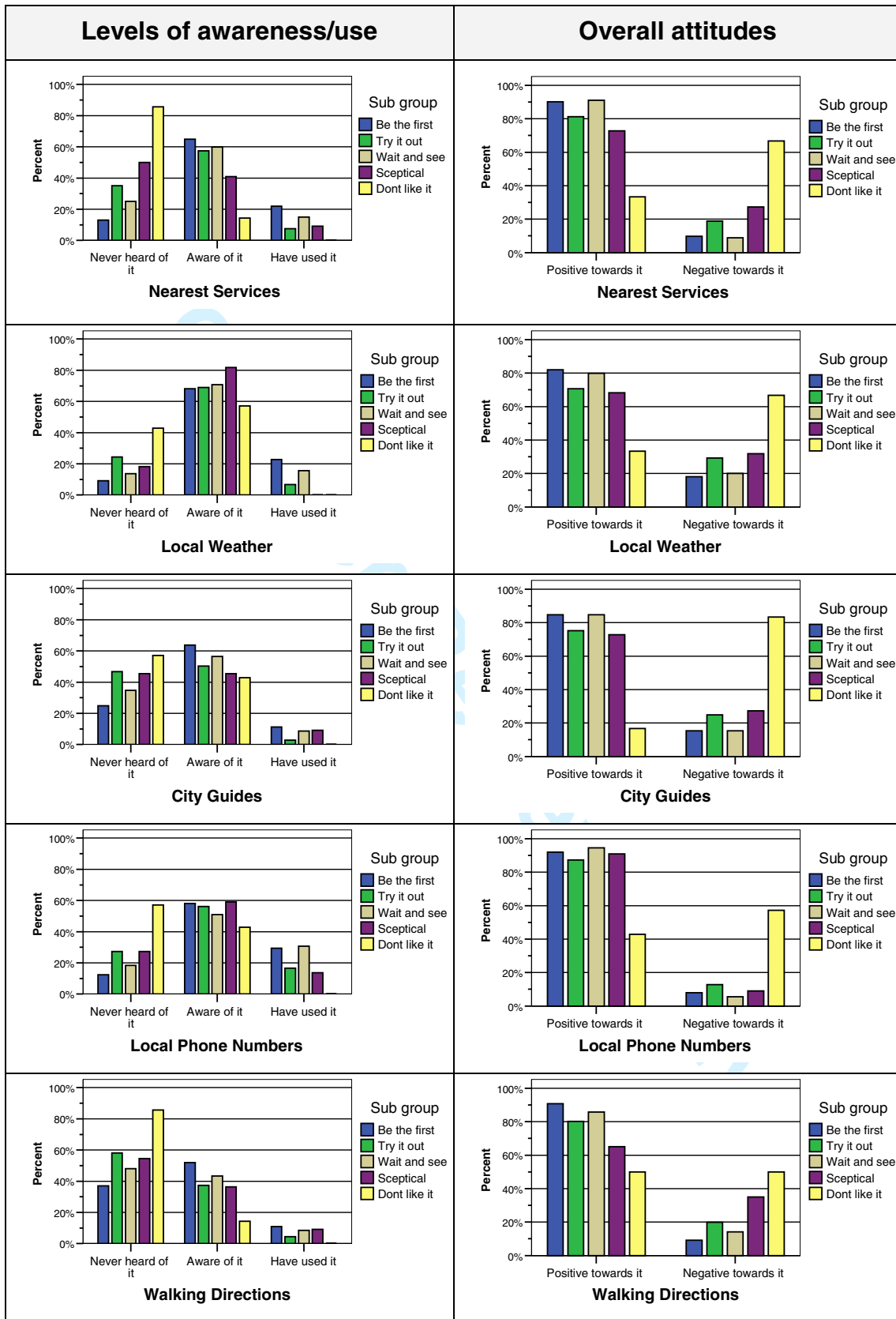


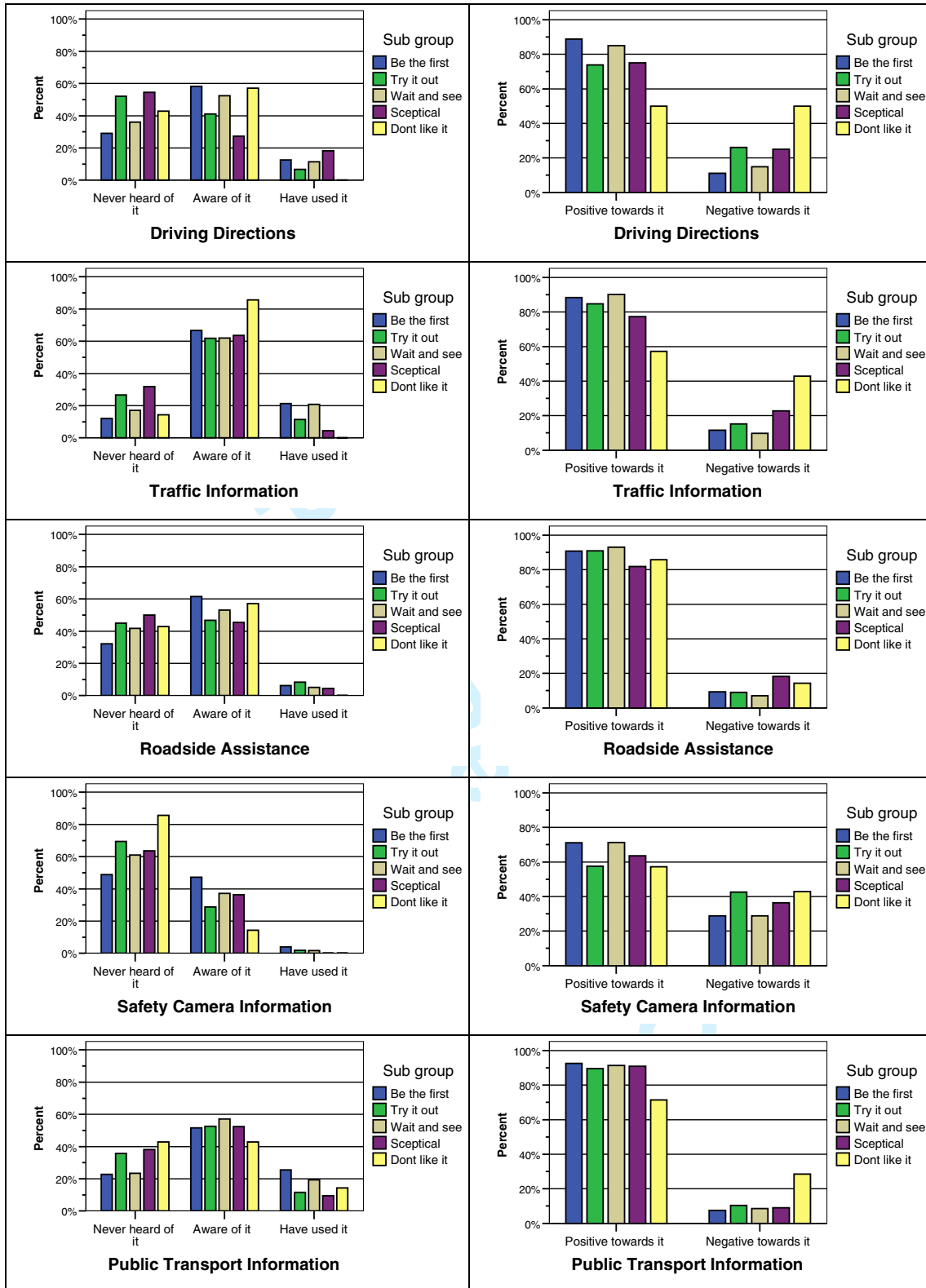
| | |
|--|--|
| <p>Mobile Booking / Paying: awareness Level of awareness / usage, by Group n = 897, $\chi^2(4) = 3.162, p = .531$ (ns)</p> | <p>Mobile Booking / Paying: attitudes Overall attitudes towards it, by Group n = 867, $\chi^2(2) = 5.317, p = .070$ (ns)</p> |
| <p>Location-based Advertising: awareness Level of awareness / usage, by Group n = 895, $\chi^2 = N/A$: 2 cells <5, min = 3.17</p> | <p>Location-based Advertising: attitudes Overall attitudes towards it, by Group n = 876, $\chi^2(2) = 4.285, p = .117$ (ns)</p> |
| <p>Safety / Security Information: awareness Level of awareness / usage, by Group n = 901, $\chi^2 = N/A$: 2 cells <5, min = .72</p> | <p>Safety / Security Information: attitudes Overall attitudes towards it, by Group n = 863, $\chi^2(2) = 13.170, p = .001$ (sig)</p> |

Table 5 Levels of awareness and/or use, and overall attitudes towards different mobile location services, split by demographic group

| Mobile location service | Cross tabs (attitudes vs use) |
|--------------------------------|---|
| 'Nearest Services' | n = 671, $\chi^2(1) = 4.615$, $p = .032$ (sig) |
| 'Local Weather' | n = 756, $\chi^2(1) = 22.161$, $p < .001$ (sig) |
| 'City Guides' | n = 553, $\chi^2(1) = 11.499$, $p = .001$ (sig) |
| 'Local Phone 'Numbers'' | n = 716, $\chi^2(1) = 9.907$, $p = .002$ (sig) |
| 'Walking Directions' | n = 442, $\chi^2(1) = 2.082$, $p = .149$ (ns) |
| 'Driving Directions' | n = 510, $\chi^2(1) = 5.211$, $p = .022$ (sig) |
| 'Traffic Information' | n = 723, $\chi^2(1) = 2.810$, $p = .094$ (ns) |
| 'Roadside Assistance' | n = 506, $\chi^2 = \text{N/A}$: 1 cell < 5, min = 1.85 |
| 'Safety Camera Information' | n = 338, $\chi^2(1) = 8.687$, $p = .003$ (sig) |
| 'Public Transport Information' | n = 642, $\chi^2(1) = 2.306$, $p = .129$ (ns) |
| 'Friend Finder' | n = 232, $\chi^2 = \text{N/A}$: 1 cell < 5, min = 3.36 |
| 'Location-based Games' | n = 185, $\chi^2(1) = 7.241$, $p = .007$ (sig) |
| 'Mobile Booking/paying' | n = 466, $\chi^2(1) = 4.509$, $p = .034$ (sig) |
| 'Location-based Advertising' | n = 390, $\chi^2(1) = 1.790$, $p = .181$ (ns) |
| 'Safety/Security Information' | n = 268, $\chi^2 = \text{N/A}$: 1 cell < 5, min = 1.24 |

Table 6 Cross-tabs of attitudes to different mobile services according to degree of use.





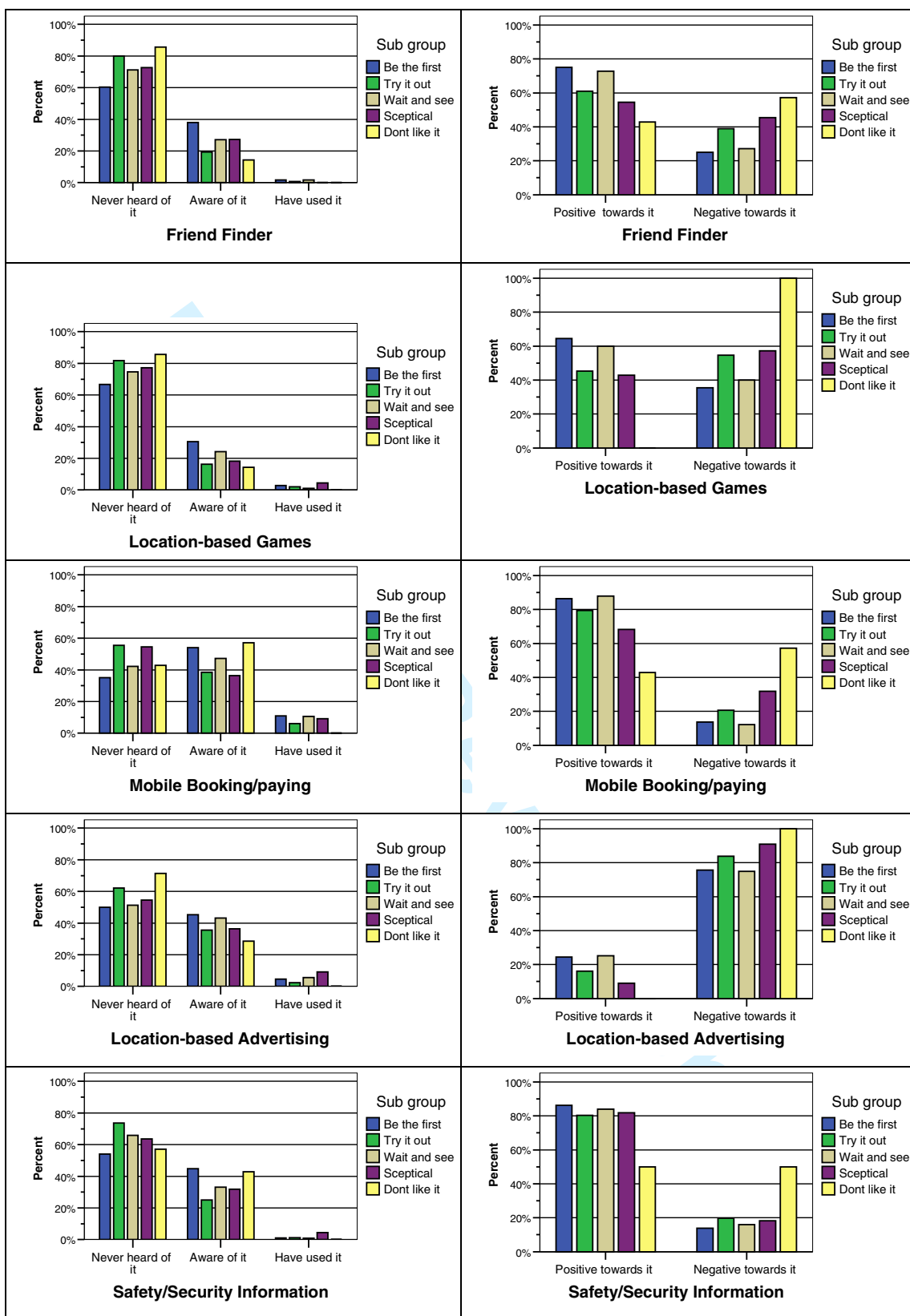


Table 7 Levels of awareness and/or use, and overall attitudes towards different mobile location services, split by self-stated adopter category

List of captions for figures (included as separate files)

**Figure 1 Mode(s) of transport used for the regular (ie at least once a week) journey
to work or study, by Group**

Figure 2 General reaction to new technology and motivation to use it

For Peer Review Only

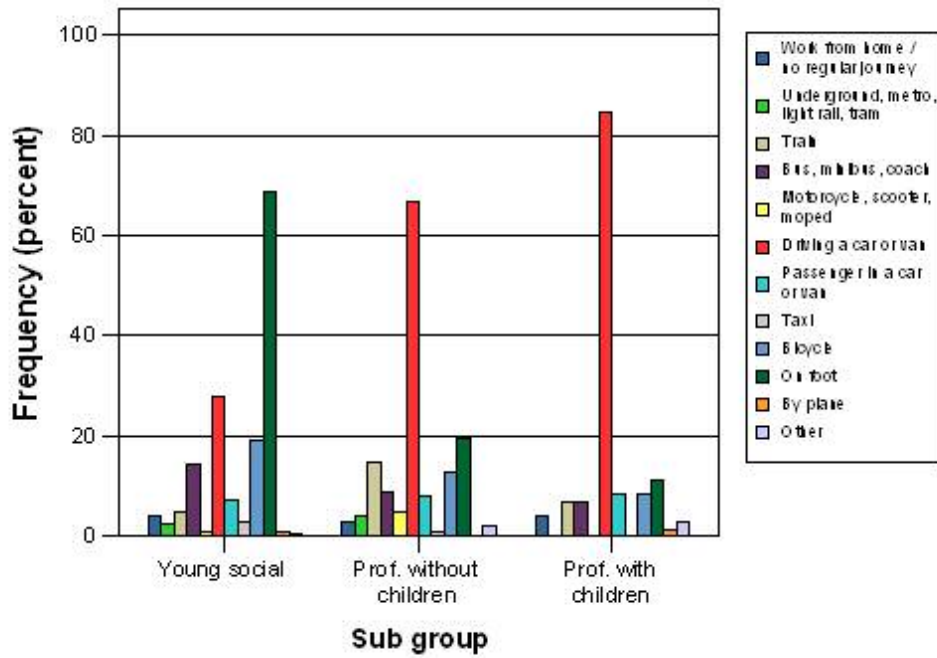


Figure 1 Mode(s) of transport used for the regular (ie at least once a week) journey to work or study, by Group
 177x125mm (72 x 72 DPI)

View Only

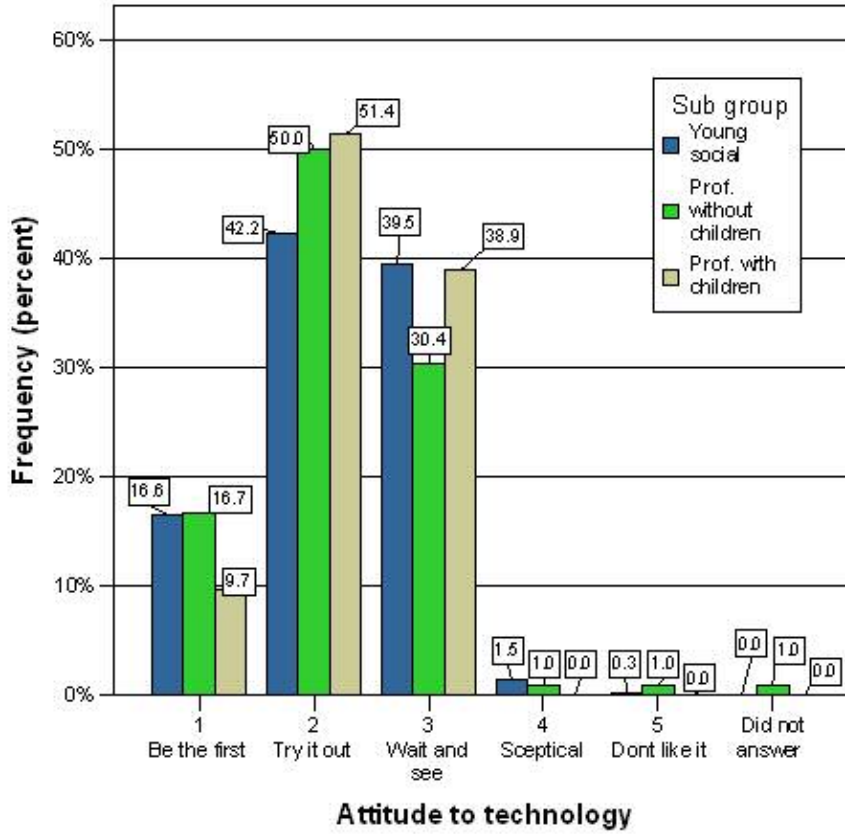


Figure 2 General reaction to new technology and motivation to use it
184x182mm (72 x 72 DPI)

AMV