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DELIVERABLE 2-3

Survey Methodology

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1.0 Introduction

A main objective of SEGMENT is the development of a replicable and transferable market segmentation model and associated methodology, data collection and analysis procedures. This deliverable outlines the stages undertaken to develop a robust but efficient methodology, including sample design and survey instruments.

The following steps were undertaken in order to achieve this objective:

1. Sampling strategy
2. Conceptual model development
3. Questionnaire design
4. Pilot
5. Workshop (WP2.5)
6. Design of 21 questionnaires to be translated into each partner city's language (WP2.4)

2.0 Sampling strategy

In order to design the sampling strategy, decisions must be made about the use of control groups, the sample size and the timing of the surveys. These will be discussed in turn as follows.

2.1 Control groups or comparison groups

SEGMENT aims to understand whether targeted mobility management campaigns have an impact on travel behaviour and attitudes. This involves establishing an evaluation methodology that will detect behaviour or attitudinal

change in small populations between two different points in time before and after a campaign.

The most reliable way to measure impact and establish cause and effect is through the use of some kind of control or comparison groups. The purpose is to compare the behaviour of the group that was exposed to the campaign and the group that was not before and after the intervention. If the travel behaviour of the 'treated' group changes more than the behaviour of the non treated (control) group, we can have more confidence that the extra behaviour change happened as a result of the campaign. For example, if 15% of the treated group and 10% of the control group are new users of the bus in the 'after' survey, we can have some confidence that the awareness campaign resulted in a 5% increase in bus use¹.

There are a variety of ways in which untreated groups could be identified:

- Identify a similar target sample elsewhere in the city (but ideally with similar levels of transport provision) which will not be subjected to the campaign and also conduct a before/ after survey on this sample (a 'control' or 'comparison' group)
- Compare the behaviour of the target sample with the average trends across the city as a whole
- Compare the behaviour of the target sample with the trends in a similar target group in a similar city elsewhere
- Use historic data on travel patterns for the target sample and see whether the campaign leads to new behaviour from the historical trend

By far the most robust method is to carry out before and after studies on a similar target group elsewhere in the city. This group needs to have two important characteristics:

- It is the same as the treated group in as many ways as possible: demographics, location, lifestage (e.g. new employee, new resident)
- It will not be exposed to the campaign. Whether it is possible to identify such groups depends on how the campaign is being run.

Neither of these conditions are easy to achieve in an evaluation process. The ideal design would start with a 'before' survey and then randomly assign the SAME participants into those receiving the campaign material and those who are not. And then measure the 'after' behaviour of each of these 'control' groups. However, this design is complex as (i) we cannot always target the campaign at the same people that we use for the 'before' survey (e.g. if we

¹ See Max Sumo for a good explanation of this: http://www.epomm.eu/docs/MaxSumo_.pdf

survey parents of first year pupils in year x, they will not be the recipients of any campaign aimed at 1st years students in year x+1 as they would have graduated to the second year of school), and (ii) it means that the campaigns have to be very targeted to specific individuals and no leakage can occur (i.e. to other 1st year school pupils or other schools in the neighbourhood etc).

It is more common in the evaluation of travel behaviour change initiatives to undertake a 'comparison group design'. This means that we will compare the treated groups with a 'similar' group who are not exposed to the campaign. This still means we have to take care to identify comparison groups with characteristics which are as similar as possible and which will not be subjected (directly or indirectly) to the campaign.

A summary of these principles can be seen in Figure 1.

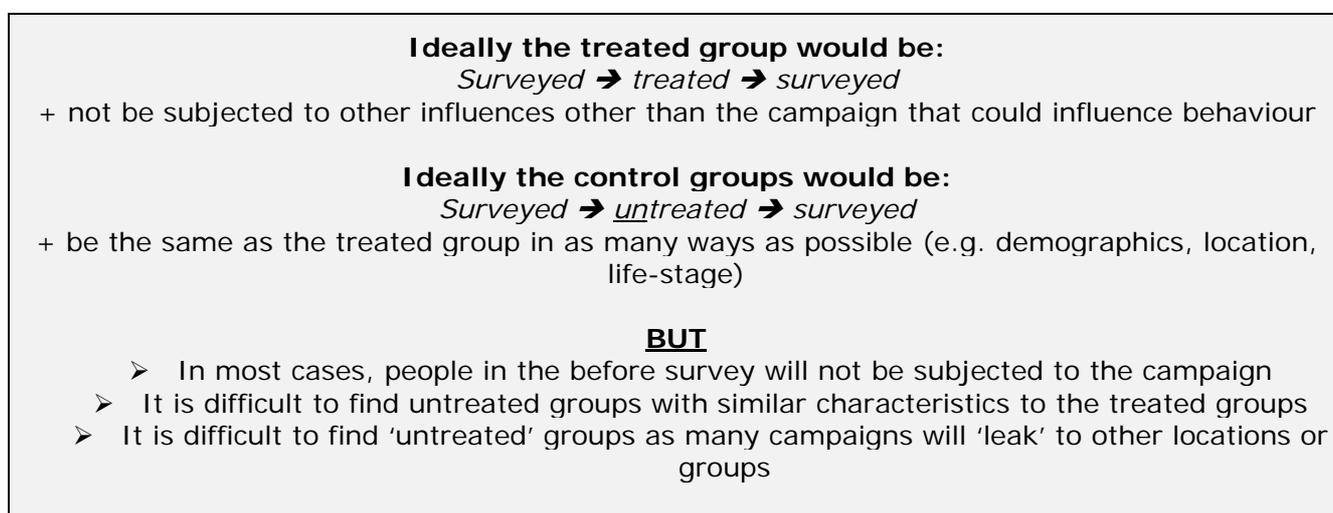


Figure 1 The difference between treated and untreated groups in evaluation design

2.2 Sample size

A main premise of SEGMENT is to understand the motivations, attitudes and behaviours of sub-samples in any given target population. This presents some challenges with respect to initial exploratory analysis and evaluation as the sample has to be big enough in each eventual sub-segment in order for statistical tests to be carried out.

The sample size needs to be large enough to allow for the fact that we will be doing statistical analysis with sub-groups (segments) in the data.

There are four reasons to aim for a sample size:

- i. To identify meaningful sub-groups (clusters) within each target group
- ii. To detect behavioural change
- iii. To allow for control or comparison group samples

iv. To allow for 'attrition' of control group samples

i. Segmentation

The clearer the true factor structure, the smaller the sample size needed to discover it. But it would be very difficult to discover even a very clear and simple factor structure with fewer than about 50 cases, and ideally there would be at least 10 times as many observations (people) as there are attitude questions used to do the clustering. As we are aiming to use around 25 attitude statements (meaning there will be a lot of possible answer patterns) and we will perform the cluster analysis separately on each target group in each city, this means a minimum of 250 respondents per target group per city.

ii. Detecting behaviour change

SEGMENT will involve comparing travel behaviour of the different target groups between two different samples (in the 'before' and 'after' surveys). However, the differences in behaviour are likely to be very small (<10%). The larger the sample size, the easier it will be to accept that any difference is not due to sample variation, but due to 'real' change.

iii. To allow for control / comparison groups

Not only are we going to try and detect any behaviour changes between different time periods (before and after), but we are also going to compare between the treated and untreated control or comparison groups. This means that we need a bigger sample size to further be able to split the sample into these two main groups and compare them. Ideally we would need 2 lots of 250 people (=500) in total.

iv. Attrition

One way of getting around the need for a control or comparison group would be to contact the same people in the before and after surveys. If we use the sample set of people in the 'before' survey and re-contact them in the after survey, we can expect some of them to have moved away, and a proportion to not want to answer the second survey. This means we have to over-sample in the 'before' survey.

In conclusion, these considerations mean that for each life-change target group (school pupils, employees etc), we ideally need to achieve at least 500 completed surveys in both the before and after survey. Response rates can be quite low (often around 20% only) for these types of surveys so it is quite challenging. The response rate will depend on the resources available to undertake face-to-face surveys and send out reminder letters. We have been optimistic here and assumed a 40% response rate. Without healthy sample sizes, it may be necessary to amalgamate the samples from each of the cities and perform the cluster analysis on the larger samples. However, this will dilute

the identification of target groups which are specific to each life-change segment in each target group and will not allow the same degree of targeting of messages to be designed in to the campaigns.

2.3 Timing

In SEGMENT, in addition to identifying the 'target' and 'comparison' samples, it has also been necessary to carefully work out the dates and sample populations of the 'before' and 'after' samples. Because it is important that the 'after' survey is carried out on people who have definitely been exposed to the campaign, it is very important to pay attention to the dates of the before and after surveys and the timing of the campaign. Also, there are only a few limited cases when it will be possible to use a panel design. For example, if we survey parents of 1st year school pupils *this year*, they will not be subjected to the campaign *next year* and so we cannot re-contact them and measure behaviour change. Also, we cannot use them as a *control* as they will have got older and may change behaviour *anyway*.

Table 1 was used to 'map' the possible composition, timing and sample sizes for each of the life-change target groups in SEGMENT.

Table 1 Composition, size and timing of survey samples for each life-change segment

Before/ Baseline (achieved sample)	CAMPAIGN	After survey (achieved sample)	
Baseline		Treated group	Control
NEW PRIMARY SCHOOL PUPILS			
<u>October 2010</u> Parents of 500 1st year primary school pupils (arrived at the school in September 2010)	<u>Spring/Summer 2012</u> Parents of children at nursery schools which 'feed' into the surveyed 'treated' primary schools	<u>October 2012</u> Parents of 300 1st year primary school pupils (arrived at the school in September 2012)	<u>October 2012</u> Parents of 200 1st year primary school pupils (arrived at the school in September 2012) of schools which will not have their feeder nursery schools treated to the campaign.
NEW EMPLOYEES			
<u>October 2010</u> 500 new employees (=employees that arrived in the companies less than 6 months ago)	<u>Spring/Summer 2012</u> Employees that arrive during Spring/Summer 2012	<u>October 2012</u> 300 new employees who arrived since early 2012 and were subjected to the campaign.	<u>October 2012</u> 200 of those who answered in October 2010 (now having worked there 2 years but had not been subject to the campaign).
NEW RESIDENTS			
<u>October 2010</u> 500 new residents	<u>Spring/Summer 2012</u> Residents that arrive during Spring/Summer 2012	<u>October 2012</u> 300 new residents who arrived since early 2012 and were subjected to the campaign.	<u>October 2012</u> 200 of those who answered in October 2010 (now having lived there 2 years but were not subject to the campaign).
HEALTH CENTRE VISITORS			
<u>October 2010</u> 500 health centre visitors (in centres to be subject to the campaign)	<u>Spring/Summer 2012</u> Health centre visitors during late 2011/ early 2012	<u>October 2012</u> 300 of those surveyed in the 'before' survey (and were subjected to the campaign).	<u>October 2012</u> 200 of those surveyed in the 'before survey' (and were not subjected to the campaign).
NEW PARENTS			
<u>October 2010</u> 500 parents (visiting health care centres to be subject to the campaign)	<u>Spring/Summer 2012</u> Parents visiting health care centres during late 2011/ early 2012	<u>October 2012</u> 300 of those surveyed in the 'before' survey (and were subjected to the campaign).	<u>October 2012</u> 200 of those surveyed in the 'before survey' (and were not subjected to the campaign).
NEW UNIVERSITY STUDENTS			
<u>March 2011</u> 500 1st year students (October 2010 arrivals)	<u>October 2011</u> 1st year students (October 2011 arrivals)	<u>March 2012</u> 300 1st year students (October 2011 arrivals)	<u>March 2012</u> 200 of those who answered in March 2011 (now in their 2nd year).

3.0 Conceptual model development

In order to promote the use of alternatives to the car using targeted marketing campaigns, the responses obtained in surveys of travel behaviour and attitudes on which to base the segmentation analysis need to be placed in a framework, preferably justified by and underpinned by theory of travel behaviour change. This framework is required in order to capture the underlying processes necessary for travel behaviour change to occur upon which the questionnaire survey will be designed. As a result, a major task of D2.3 was to develop a conceptual model of mode choice intention based on prior work in this area and which could be used as a standard framework for each of the target life-change segment questionnaires.

The following framework was developed by drawing upon prior work in this area by the Aberdeen Partner (e.g. Anable 2005) and other authors (see references in Table 2). By reviewing this work, the following principles were adopted:

- The conceptual model represents the integration of a range of subjective and objective constructs identified as being potential predictors of mode choice. These have been identified from the socio-psychological attitude literature, published research investigating pro-environmental behaviour, and specific studies of travel mode choice.
- The model acknowledges that demographic and socio-economic factors influence these attitudes but recognises that personal characteristics are simply one component of overall attitude.
- The model uses the Theory of Planned Behaviour as its starting point (Ajzen 1991). This is based on three primary determinants (i) beliefs about consequences and their positive or negative evaluation (attitudes) (ii) perceptions influenced by others (social norms) and what is believed to be approved by 'significant others' (subjective norms) (iii) perceived ease or difficulty (control beliefs) and conviction that one can successfully execute the behaviour (perceived behavioural control). These primary determinants feed into the formation of intentions to act which informs actual behaviour.
- Additional predictors have been added where these have been identified in the literature as relevant to an investigation of mode choice. This includes notions of moral norm, awareness of consequences, ascription of responsibility, environmental worldview and habit.
- In recognition of the fact that travel behaviour change will not necessarily occur as a one-step process, the questionnaire will measure each person's

position on the ‘stage of change’ form pre-contemplation through contemplation to action. This will allow us to understand the state of readiness to change of each target segment, but it will also be used to evaluate the impact of the campaigns. There is a large body of literature on such transitions (Prochaska and Di Clemente 1992) and this has been encapsulated in the Max Sem model and described as follows:

“It is increasingly acknowledged that in many instances behavioural change does not occur as a one-step process and can instead be viewed as a series of transitional stages (or steps) which individuals progress through in order to reach the final stage of behavioural change (i.e. non-car use). Accordingly, some [mobility management] measures, may not result in overt behavioural change per se (or for not all people), but may have an impact on peoples’ attitudes and perceptions towards alternative travel modes, i.e. has moved them towards a higher stage of readiness to change. In order to obtain a ‘fuller picture’ of what the MM intervention has achieved it is thus important to measure these more subtle changes in attitudes and perceptions as well as overt behavioural change. (ENU 2006)

Figure 2 outlines this conceptual framework and Table 2 takes each construct in turn, provides a description and justification for inclusion and an example question included on the questionnaires.

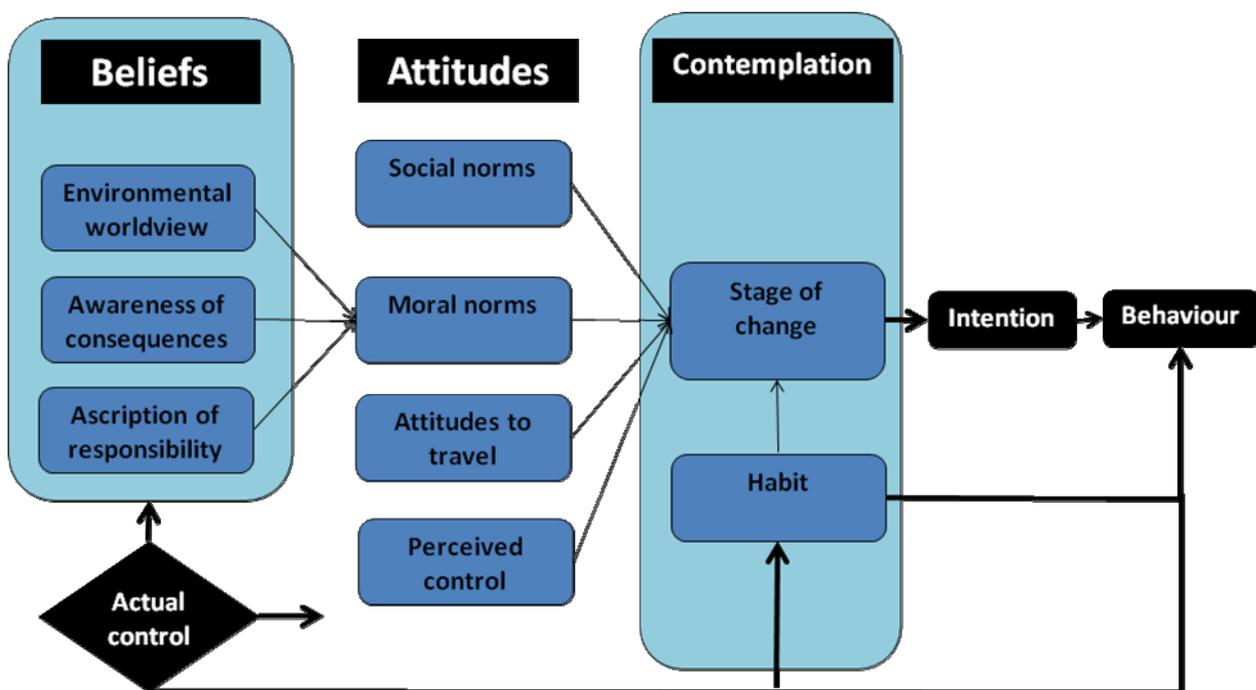


Figure 2 The SEGMENT conceptual framework

Table 2 Conceptual model components

Construct	Description	Example question
Beliefs		
Environmental worldview	Given that the background for research in mode choice is the problems caused by transport, it is natural to include some measure of environmental 'concern' and awareness of the environmental consequences of travel behaviour. Kaiser <i>et al's</i> (1999) review of the literature concludes that the relationship between environmental concern and behaviour is usually found to be weak if attitude is assessed by a single measure. Consequently, a number of aspects of environment attitude were measured in this study in order to facilitate an assessment of the extent to which environmental considerations enter mode choice decision-making.	<i>Environmental threats such as global warming have been over exaggerated</i>
Awareness of consequences	According to Schwartz's norm activation theory (Schwartz 1977) an important antecedent to pro-environmental behaviour should be awareness of environmental problems and the perceived possibility to reduce these problems. This problem awareness should activate a personal norm or a perceived moral obligation to act in order to protect the environment.	<i>Car use reduces the quality of life in cities due to traffic noise and odour nuisance</i>
Ascription of responsibility	According to the norm-activation theory, the second condition required for an individual to act upon a norm is personal responsibility for the issue at hand (Schwartz 1977).	<i>What I do personally can make a difference to climate change</i>
Attitudes and Norms		
Attitudes to travel	These refer to the degree to which a person has a favourable or unfavourable evaluation of the use of different modes in general or for the journey purpose in question. A number of different journey attributes are measured. Both affective (emotional e.g. fun) and instrumental (functional e.g. cost/ time)	<i>Walking is a very healthy way to travel around</i> <i>Buses can be the quickest way to get around</i> <i>I find travelling by bus stressful</i>
Social norms	Normative beliefs relate to social influence. Injunctive norms are beliefs about 'significant others' expectations and whether they approve or disapprove of a particular action. Descriptive norms are perceptions of whether 'significant others' themselves actually perform the behaviour. Here we measure 'identity' to capture the theory that individuals continuously engage	<i>A car provides status and prestige to its owner</i>

	in an attempt to influence how others perceive their character traits, physical characteristics, intentions, attitudes and values (Armitage et al. 1999).	
Moral norms	Choice of transport mode in particular can be viewed as a social dilemma – that is a conflict between self interest and what is good for society at large. Moral norms are self-expectations that are based on internalised values that manifest themselves in feelings of obligation to engage in behaviour (Schwartz 1977).	<i>Being environmentally responsible is important to me as a person</i> <i>Reducing my car use would make me feel good</i>
Perceived control	This refers to a person's perception about his or her own capability to perform an act. Although taken to be a proxy for actual control, an individual's beliefs in what they can do are seen as important determinants of what they will do.	<i>There are no realistic alternatives for most of the car journeys I make</i>
Contemplation		
Habit	It is essential to understand the degree to which behaviour is habitual in order to assess the extent to which behavioural choice is preceded by deliberate decisions and the formation of attitudes and intentions.	<i>If I have to go somewhere, I tend to automatically go by car</i>
Stages of change	Statements can be included on the questionnaire to measure the 'stage of change' of each respondent with respect to a readiness to reduce car use.	<i>I have already cut down my car use as much as I can</i>
Intention	Intention is pivotal to the Theory of Planned Behaviour. According to the theory, intention can be predicted from attitudes, subjective norms and perceived behavioural control. Subject to a number of intervening factors (perceived control, actual control, habit) an individual is assumed to aspire to translate his or her intention into action.	<i>Over the next 6 months I intend to use public transport more than I do now to get to work</i>
Behaviour	Respondents are asked to provide 'revealed' behaviour data in the form of mode choice to the target destination (school, work) on a 'typical' day.	<i>For all of your journeys combined, in the past 12 months, how frequently have you used each type of transport? (car as a driver, bus, bicycle etc)</i>
Actual control	For some people, their choice of modes of transport to use will be constrained by circumstances beyond their control such as the access to different modes, disability or its affordability.	<i>Income, car ownership, access to a car to drive, distance from the nearest public transport stop</i>

4.0 Questionnaire design

A separate questionnaire was designed for each of the target groups outlined in D2.1. However, each was designed with a set of attitudinal questions common to each ('Core questions') together with those which needed to be asked specifically to each target group (e.g. when an employee started work; when a new resident moved in to the new home and where they moved from etc). Figure 3 outlines the basic questionnaire structure.

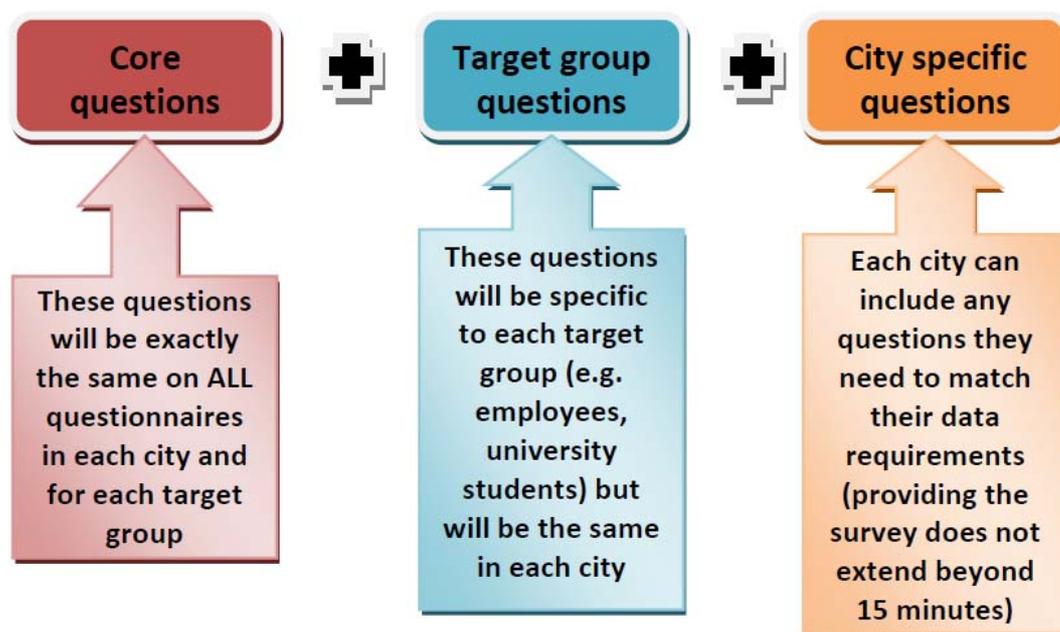


Figure 3 The SEGMENT questionnaire structure

The questionnaire was designed to be able to be filled out either on paper or on-line and to last between 10 and 15 minutes to complete. Most of the responses provided options to choose rather than being open ended. For example, responses to the attitudinal questions were measured using 5-point Likert scales². The respondents were given a statement and asked to indicate their level of agreement or say how often they performed an action. Some statements were reverse-worded to break up any patterned responses and encourage introspection. In order to test the questions, the structure and the length, a pilot survey was carried out (see Section 5.0).

Table 3 details the sections included on each of the final target group questionnaires. A copy of the questionnaires in each language is produced as D2.4.

² There are no *a-priori* criteria to decide how the scales used in the questionnaire are best scored. Advice in the literature has been followed as appropriate, see Eagly and Chaiken (1993) and Oppenheim (1992) for a discussion of scaling options. Ajzen (1991) and (2001b) discusses these issues with specific reference to the measurement of the TPB constructs.

Table 3 Sections included on each of the target group questionnaires

Target Group	Sections on the questionnaire
School pupils	A Your child's journey to school B About YOUR travel patterns C Car driving (for car drivers only) D Car driving (for non drivers only) E Attitudes to different modes of transport F Improving the journey to school G About you and your household
New Employees	A Travel patterns B Car driving (for car drivers only) C Car driving (for non drivers only) D Attitudes to different modes of transport E Attitudes to your journey to work F Improving your journey to work G About you and your household
New Residents	A Travel patterns B Car driving (for car drivers only) C Car driving (for non drivers only) D Attitudes to different modes of transport E Attitudes to transport provision in your local neighbourhood F About you and your household
New Parents	A Your journey to the health care centre B About YOUR travel patterns C Car driving (for car drivers only) D Car driving (for non drivers only) E Attitudes to different modes of transport F Improving the journey to the health care centre G About you and your household
Health Centre	A Travel Patterns B Your visits to health centres C Car driving (for car drivers only) D Car driving (for non drivers only) E Attitudes to different modes of transport F Your journey to YOUR health centre G About you and your household
University Students	A Travel patterns B Car driving (for car drivers only) C Car driving (for non drivers only) D Attitudes to different modes of transport E Attitudes to your journey to University F Improving the journey to university G About you and your household

A coding frame for each questionnaire (i.e. the number/ code to be entered for each response on the questionnaire) was provided to each partner alongside a template excel spreadsheet for the data.

5.0 Pilot Survey

In August 2010, a pilot of the new employees survey was distributed to ~2000 employees at LB Hounslow. It was distributed through the employee intranet, with an incentive for completion of a £100 voucher to a local department store. 397 responses were received, of which 270 were usable. The questionnaire took between 10 and 40 minutes to complete (15 minutes on average). Comments were received about how to improve the questionnaire. These, combined with preliminary analysis of the results and a consultation with all partners at PMG2 in Munich, enabled some refinements to be made to the final surveys used in the baseline. The results from this survey will be reported in D3.1.

6.0 Workshop (PMG2)

At PMG2 in Munich in October, all partners were consulted about the content and structure of the questionnaire in light of the results from the pilot outlined in Section 5.0. Concerns about length led to a slight shortening, and attempts were made to include common categories for transport modes and demographic characteristics.

7.0 Translation of Questionnaires

A copy of the questionnaires in each language is produced as D2.4.

8.0 References

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