segmented
marketing for
energy efficient
transport

INTELLIGENT
ENERGY
EUROPE
FOR A SUSTAINABLE FUTURE

Deliverable 7.8.4

Work Package 7
Golden Questions and Social Marketing Guidance Report

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GOLDEN QUESTIONS REPORT (WP6, Deliverable 3.6)

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1. INTRODUCTION

The SEGMENT methodology used a large number of survey variables to develop the final eight attitudinal segments it identified as being useful for the design of mobility management campaigns (See Deliverables 2.4, 3.2 and Annex 4 here). However, it is not feasible for Local Authorities or other bodies to conduct such large surveys on a regular basis. Therefore, the SEGMENT expert partner (Jillian Anable at Aberdeen University) conducted an additional piece of work to identify a smaller set of questions that can be used to find the segments in future surveys or to include on a website to allow people to be automatically allocated to a segment. These questions are called the 'Golden Questions'.

This note outlines these questions and the process that would need to be followed in order to replicate the segments in future surveys or to develop a web-based '*what segment am I in?*' tool. After presenting the Golden Questions themselves, 4 annexes are used to outline the necessary technical steps and other useful information to enable the Golden Questions to be used effectively. It also presents the background to the whole segmentation methodology for SEGMENT in Annex 5.

- Annex 1: Golden questions in Dutch, German, Polish, Bulgarian, Portugese and Greek
- Annex 2: Profiles of the segments
- Annex 3: Technical note on how to create a web-based tool
- Annex 4: Technical note on how to apply Golden Questions to a future questionnaire survey
- Annex 5: Technical note on method used to create the attitudinal segments in SEGMENT and the Golden Questions.

2. WHAT ARE 'GOLDEN QUESTIONS'?

Golden questions are the smallest number of survey questions that can be used to reproduce market segments previously created from longer lists of questions. They are derived statistically by examining the segments produced from the long list of questions and applying discriminant analysis to identify the most 'powerful' ones (i.e the ones that best discriminate between the segments).

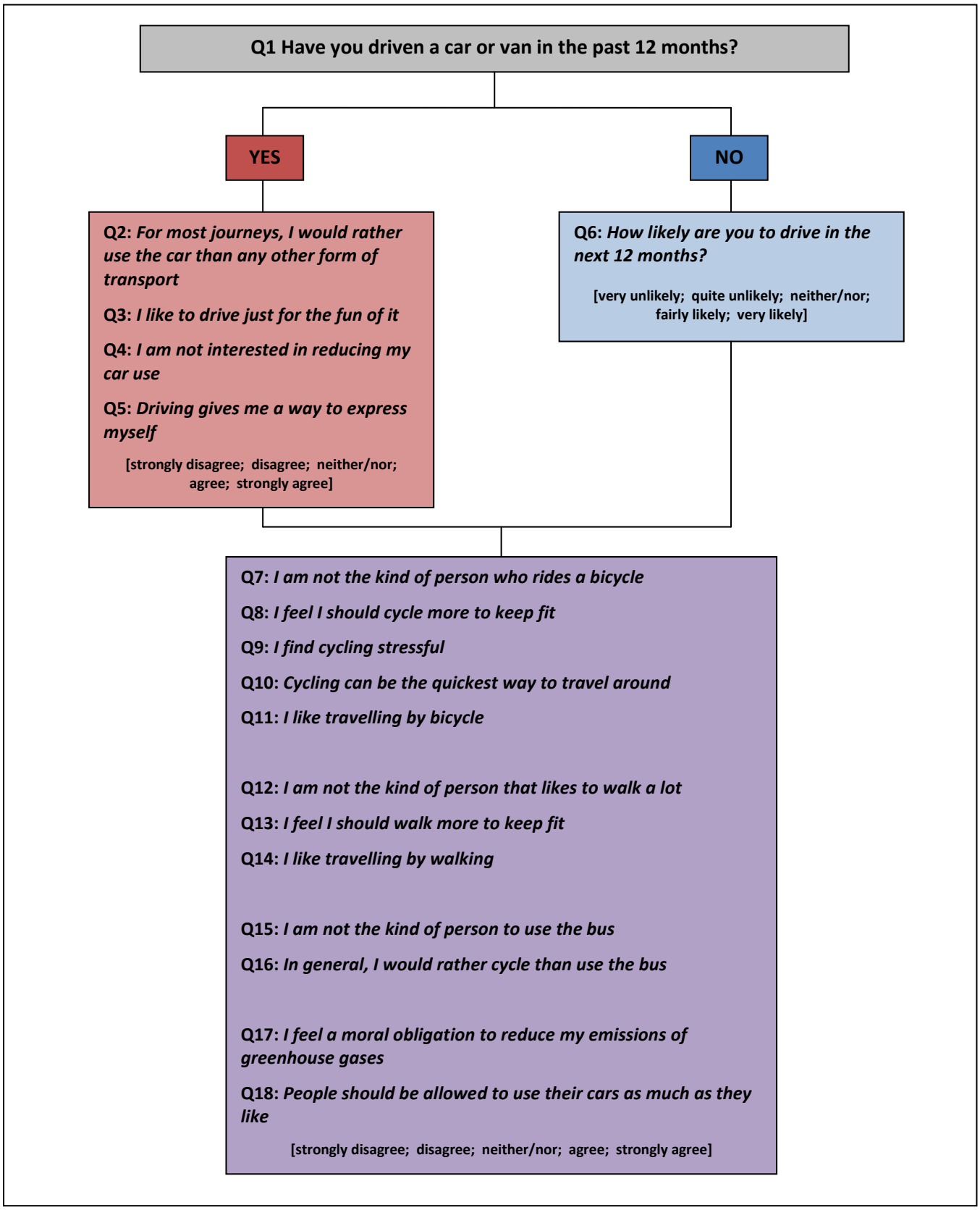
Golden questions allow the allocation of any 'customer' or contact to a segment, not just the ones who took part in a survey:

- They can be used on a website home page, to send people to the right content. E.g they could be used to send people to targeted pages of information about mobility and travel opportunities.
- They can be used in travel survey questionnaires for future research, and to track segments long-term in regular large travel surveys.

3. THE SEGMENT GOLDEN QUESTIONS

A different set of golden questions were identified for the car-driving and non-car driving respondents (17 for the car owning and 14 for the non car owning) – although 13 questions are common to both groups. In other words, if these questions are used on a questionnaire, **the total number of questions needed is 18 questions**. These questions are seen in Figure 1.

Figure 1: The SEGMENT Golden Questions



4. THE ALLOCATON ALGORITHM/ WEIGHTING COEFFICIENTS

The questions can be asked either on a stand alone website survey where people can find out what segment they are in straight away, or on future questionnaires where many people are allocated into segments at once. Either way, the responses that people indicate to each question need to be 'weighted' to determine which segments they are in.

Tables 1 and 2 provide these weighting coefficients. Membership of a segment is determined on a respondent by respondent basis in four steps:

Step 1: The respondent's answer to each of the Golden Questions is multiplied by the relevant weighting coefficient. This is done for each of the segments (columns) in the table.

Step 2: The products for each question are summed generating a single total score for each respondent for each column in the table.

Step 3: The relevant 'constant' is subtracted from each of the column totals.

Step 4: The respondent is allocated to the segment which they score highest once the constant has been subtracted.

Table 1: Weighting coefficients for car drivers

CAR DRIVERS	Devoted Drivers	Image Improvers	Malcontented Motorists	Active Aspirers	Practical Travellers
Q2: For most journeys, I would rather use the car than any other form of transport	2.925	2.730	1.900	1.406	1.995
Q3: I like to drive just for the fun of it	2.797	2.745	2.028	1.815	1.854
Q4: I am not interested in reducing my car use	3.336	2.799	2.454	1.990	2.578
Q5: Driving gives me a way to express myself	1.402	1.322	.933	.793	.533
Q7: I am not the kind of person who rides a bicycle	4.972	3.465	4.589	3.010	2.893
Q8: I feel I should cycle more to keep fit	1.438	2.141	1.987	2.181	1.103
Q9: I find cycling stressful	3.087	2.780	3.121	2.629	2.373
Q10: Cycling can be the quickest way to travel around	1.993	2.445	2.387	3.147	3.049
Q11: I like travelling by bicycle	3.065	4.292	3.600	4.549	4.252
Q12: I am not the kind of person that likes to walk a lot	4.101	3.555	3.389	3.174	3.458
Q13: I feel I should walk more to keep fit	2.625	2.969	2.774	3.074	1.841
Q14: I like travelling by walking	4.579	5.385	5.067	5.499	5.367
Q15: I am not the kind of person to use the bus	1.449	1.192	.858	.622	.846
Q16: In general, I would rather cycle than use the bus	2.761	3.772	2.621	4.045	4.151
Q17: I feel a moral obligation to reduce my emissions of greenhouse gases	4.598	4.868	4.676	5.479	4.806
Q18: People should be allowed to use their cars as much as they like	3.428	3.157	2.752	2.279	2.688
CONSTANT (subtracted from total)	**82.797**	**85.850**	**70.934**	**77.747**	**70.288**

Notes: Fisher's linear discriminant functions. All questions asked on a 5 point scale: strongly disagree; disagree; neither/nor; agree; strongly agree.

Table 2: Weighting coefficients for non car drivers

NON CAR DRIVERS	Car Contemplators	PT Dependents	Car-free Choosers
Q6: How likely are you to drive in the next 12 months?	2.344	1.079	1.322
Q7: I am not the kind of person who rides a bicycle	3.830	4.977	3.223
Q8: I feel I should cycle more to keep fit	1.074	.727	1.187
Q9: I find cycling stressful	2.900	3.318	2.568
Q10: Cycling can be the quickest way to travel around	1.831	1.796	2.631
Q11: I like travelling by bicycle	4.113	2.940	4.437
Q12: I am not the kind of person that likes to walk a lot	3.141	2.707	2.787
Q13: I feel I should walk more to keep fit	1.995	2.603	2.424
Q14: I like travelling by walking	3.843	4.341	4.390
Q15: I am not the kind of person to use the bus	1.777	1.613	1.710
Q16: In general, I would rather cycle than use the bus	1.910	1.555	2.637
Q17: I feel a moral obligation to reduce the emission of greenhouse gases	4.450	4.637	4.834
Q18: People should be allowed to use their cars as much as they like	3.123	3.026	2.549
CONSTANT (subtracted from total)	**57.120**	**56.903**	**61.695**

Notes: Fisher's linear discriminant functions. Q7 - 18 asked on a 5 point scale: strongly disagree; disagree; neither/nor; agree; strongly agree. Q6 asked on a 5 point scale: very unlikely; quite unlikely; neither/nor; fairly likely; very likely

5. RELIABILITY OF THE ALLOCATON ALGORITHM

It is inevitable when using a reduced subset of the original survey questions (i.e. not using every single variable that was used in the original segmentation) that the accuracy of the allocation procedure will never be 100%.

Statistically, the minimum requirement is that the model accuracy performs 25% better than would happen by chance. For instance, if there were two equally sized segments there would be a 50/50 chance that someone would be accurately classified in the correct group anyway. For the car driving segments, the chance of accurately classifying someone in the correct group is 21% and adding on 25% to this leaves us with an 'acceptable' hit ratio of as little as 27%. However, it would not be a very good tool if only just over one in four people were allocated to a segment that is meaningful and accurate for them. Therefore, it is desirable to aim for an allocation efficiency of 80%.

Table 3 summarises the accuracy of the two algorithms (for car drivers and non-car drivers) both at the level of all respondents and for each of the eight segments. The percentages indicate the proportion of cases that were allocated to the correct segment when the algorithms were applied to the existing survey data using a 'cross validated' method which gives the most pessimistic hit ratio. Overall, the accuracy is very good – at the total level, the accuracy of both algorithms is over 81.5% and 85.9% respectively and the accuracy for any single segment is over 70% in all cases. Thus we would interpret our model as having accuracy above that expected by chance.

Table 3: Reliability of the allocation algorithms for each segment (% accuracy)

Segment	Predicted Accuracy (%)
Car drivers (16 variables)	**81.5%**
Devoted Drivers	82.6%
Image Improvers	89.8%
Malcontented Motorists	79.2%
Active Aspirers	78.8%
Practical Travellers	70.9%
Non car drivers (13 variables)	**85.9%**
Car Contemplators	82.6%
PT Dependents	90.4%
Car-free Choosers	85.9%

Although the algorithm predicted segmentation membership in over 80% of cases overall, this does vary from 39.7% to 97.4% between the segments in the different partner cities. Table 4 shows the different predicted accuracies. The greatest problem seems to be with the Practical Travellers segment. This is interesting because it is the segment with the most uneven representation across the partner cities and the small sample size in some locations is likely to contribute to its poor accuracy in these locations.

Table 4: Reliability of the allocation algorithms for each segment in each city (% accuracy)

	Predicted accuracy (%)							
	Full dataset	**Hounslow**	**Almada**	**Athens**	**Sofia**	**Utrecht**	**Gdynia**	**Munich**
Car drivers								
Devoted Drivers	**82.6**	69.1	83.4	89.8	91.0	73.5	77.4	69.5
Image Improvers	**89.8**	78.3	79.7	83.0	87.3	83.3	95.1	61.3
Malcontented Motorists	**79.2**	89.5	87.2	83.5	77.0	71.1	66.4	86.2
Active Aspirers	**78.8**	81.4	74.1	97.4	78.9	72.3	71.3	85.7
Practical Travellers	**70.9**	50.0	66.7		42.3	83.3	39.7	62.7
Overall	***81.5***	***81.0***	***81.5***	***86.1***	***84.0***	***79.6***	***83.5***	***78.3***
Non car drivers								
Car Contemplators	**82.6**	78.4	86.2	81.8	75.8	82.3	76.2	77.9
PT Dependents	**90.4**	85.3	89.6	92.6	88.2	75.0	86.3	92.4
Car-free Choosers	**85.9**	78.8	93.5	93.7	89.8	86.4	83.8	82.8
Overall	***85.9***	***80.9***	***88.9***	***88.0***	***86.6***	***84.8***	***80.6***	***82.8***

ANNEX 1: GOLDEN QUESTIONS IN DUTCH, GERMAN, POLISH, BULGARIAN, PORTUGESE AND GREEK

	Dutch	German	Polish	Bulgarian	Portugese	Greek
Q1 Have you driven a car or van in the past 12 months?	Heb je gereden een auto of bestelwagen in de afgelopen 12 maanden?	Haben Sie ein Auto oder Lieferwagen in den letzten 12 Monaten getrieben?	Czy prowadził/a Pan/ Pani samochód w ciągu ostatnich 12 miesięcy?	Карали ли сте кола или ван през последните 12 месеца?	Conduziu algum carro ou carrinha nos últimos 12 meses?	Έχετε οδηγήσει ένα αυτοκίνητο ή το φορτηγό τους τελευταίους 12 μήνες
Q2: For most journeys, I would rather use the car than any other form of transport	Voor de meeste reizen maak ik liever gebruik van de auto dan van andere vervoermiddelen	Für die meisten Wege nehme ich lieber das Auto als andere Verkehrsmittel.	Dla większości podróży, wolałbym/wolałabym korzystać z samochodu, niż z jakikolwiek innego rodzaju transportu	За повечето пътувания ще предпочета да използвам кола пред всеки друг вид транспорт	Para a maioria das viagens, prefiro usar o carro do que qualquer outro modo de transporte.	Για τα περισσότερα ταξίδια, εγώ θα προτιμούσα να χρησιμοποιώ το αυτοκίνητο από οποιοδήποτε άλλο μέσο μεταφοράς
Q3: I like to drive just for the fun of it	Ik rijd graag gewoon voor mijn plezier in de auto	Ich fahre gern nur zum Spaß mit dem Auto.	Lubię jeździć samochodem dla samej przyjemności	Харесва ми да карам просто за забавление	Eu gosto de conduzir apenas por diversão.	Μου αρέσει να οδηγώ μόνο για την διασκέδαση μου
Q4: I am not interested in reducing my car use	Ik ben niet geïnteresseerd in het beperken van mijn autogebruik	Ich will nicht weniger mit dem Auto fahren.	Nie interesuje mnie ograniczenie korzystania z samochodu mi średni pasuje	Не се интересувам от това да ограничa използването на колата си	Não estou interessado em reduzir o uso do carro.	Δεν με αφορά η μείωση της χρήσης του αυτοκινήτου μου
Q5: Driving gives me a way to express myself	Autorijden is voor mij een manier om mezelf te uiten	Autofahren ist eine Möglichkeit, meine Persönlichkeit zum	Prowadzenie samochodu daje mi możliwość wyrażenia	Шофирането ми дава възможност да изразя себе си	A condução é uma forma de me exprimir.	Η οδήγηση μου δίνει έναν τρόπο να εκφραστώ
Q6: How likely are you to drive in the next 12 months?	Hoe waarschijnlijk is het dat u de komende 12 maanden een auto gaat besturen?	Wie wahrscheinlich ist es, dass Sie in den nächsten 12 Monaten Auto fahren werden?	Jakie jest prawdopodobieństwo, że będzie Pan/Pani prowadzić samochód w	Колко вероятно е да шофирате през следващите 12 месеца?	Qual a probabilidade de vir a conduzir nos próximos 12 meses?	Πόσο πιθανό είναι να οδηγείσετε αυτοκίνητο μέσα στους επόμενους 12 μήνες
Q7: I am not the kind of person who rides a bicycle	Ik ben niet het type persoon dat fietst	Ich bin nicht der Typ Mensch, der Fahrrad fährt.	Nie jestem typem osoby, która jeździ na rowerze	Не съм от тези хора, които карат велосипед	Eu não sou o tipo de pessoa que anda de bicicleta.	Δεν είμαι από τα ατόμα που κάνουν ποδήλατο
Q8: I feel I should cycle more to keep fit	Ik denk dat ik meer zou moeten fietsen, om fit te blijven	Ich sollte mehr Fahrrad fahren, um fit zu bleiben	Czuję, że powinienem/ powinnam więcej jeździć na rowerze, żeby utrzymać formę	Чувствам, че трябва да карам велосипед повече, за да поддържам форма	Sinto que devia andar mais de bicicleta para me manter em forma.	Αισθάνομαι ότι πρέπει να κάνω περισσότερο ποδήλατο, έτσι ώστε να κρατιέμαι σε καλή φυσική

Q9: I find cycling stressful	Ik vind fietsen stressvolle	Es ist stressig, mit Fahrrad zu fahren.	Uważam, że jazda na rowerze jest stresująca	Намирам колоезденето за стресиращо	Acho que andar de bicicleta é stressante.	Θεωρώ την ποδηλασία στρεσσογόνα
Q10: Cycling can be the quickest way to travel around	Fietsen kan de snelste manier zijn om te reizen	Das Fahrrad kann die schnellste Art der Fortbewegung sein.	Jazda na rowerze może być najszybszym sposobem podróżowania	Колоезденето може да бъде най-бързият начин да пътувам наоколо	Andar de bicicleta pode ser a maneira mais rápida de viajar.	Το ποδήλατο μπορεί να είναι ο πιο γρήγορος τρόπος για να μετακινηθεί κανείς
Q11: I like travelling by bicycle	Ik vind het leuk om te reizen per fiets	Ich fahre gern dem Fahrrad	Lubię podróżować rowerem	Харесва ми пътуването чрез велосипед	Eu gosto de viajar de bicicleta.	Μου αρέσουν τα ταξίδια με το ποδήλατο
Q12: I am not the kind of person that likes to walk a lot	Ik ben niet het type persoon dat het leuk vindt om veel te lopen	Ich bin nicht der Typ Mensch, der gerne viel zu Fuß geht.	Nie jestem typem osoby, która lubi dużo chodzić pieszo	Не съм от тези хора, които обичат да ходят пеша много	Eu não sou o tipo de pessoa que gosta de caminhar muito.	Δεν είμαι ατόμο που θέλει να περπατάει πολύ
Q13: I feel I should walk more to keep fit	Ik denk dat ik meer zou moeten lopen, om fit te blijven	Ich sollte mehr zu Fuß gehen, um fit zu bleiben	Czuję, że powinienem więcej chodzić pieszo, żeby utrzymać formę	Чувствам, че трябва да ходя повече пеша, за да поддържам форма	Eu sinto que devia caminhar mais para manter a forma.	Αισθάνομαι ότι πρέπει να περπατάω περισσότερο για να κρατιέμαι σε καλή φυσική κατάσταση
Q14: I like travelling by walking	Ik vind het leuk om te reizen per lopend	Ich fahre gern zu fuß	Lubię podróżować pieszo	Обичам да пътувам, ходейки пеша	Gosto de viajar a pé.	Μου αρέσει να περπατάω
Q15: I am not the kind of person to use the bus	Ik ben niet het type persoon dat de bus neemt	Ich bin nicht der Typ Mensch, der öffentliche Verkehrsmittel benutzt.	Nie jestem typem osoby, która jeździ autobusem	Не съм от хората, които използват автобус	Eu não sou o tipo de pessoa que usa o autocarro.	Δεν είμαι ατόμο που χρησιμοποιεί λεωφορείο
Q16: In general, I would rather cycle than use the bus	Over het algemeen fiets ik liever dan dat ik de bus neem	Im Allgemeinen würde ich eher Fahhrad als mit öffentlichen Verkehrsmitteln.	Ogólnie, wolałbym/wolałabym jeździć rowerem niż autobusem	Като цяло, предпочитам да карам велосипед от колкото да използвам автобуса	Em geral, prefiro andar de bicicleta do que andar de autocarro.	Σε γενικές γραμμές, θα προτιμούσα το ποδήλατο από το λεωφορείο
Q17: I feel a moral obligation to reduce my emissions of greenhouse gases	Ik voel een morele verplichting om de uitstoot van broeikasgassen te beperken	Es ist mir wichtig, die Treibhausgasemissionen zu reduzieren.	Czuję moralny obowiązek, by włożyć swój wkład w zmniejszenie emisji gazów cieplarnianych	Чувствам се морално задължен да намаля своите емисии на парникови газове	Sinto a obrigação moral de reduzir as minhas emissões de gases com efeito de estufa.	Νιώθω ηθική υποχρέωση να μειώσω τις εκπομπές των αερίων του θερμοκηπίου από τις μετακινήσεις μου
Q18: People should be allowed to use their cars as much as they like	Mensen zouden hun auto zo vaak moeten kunnen gebruiken als ze willen	Die Menschen sollten ihre Autos so oft benutzen dürfen, wie sie wollen.	Ludzie powinni mieć możliwość korzystania z samochodów tak często jak im się podoba	На хората трябва да им бъде разрешено да използват колите си колкото искат	As pessoas deviam poder andar de carro tanto quanto quisessem.	Οι άνθρωποι θα πρέπει να μπορούν να χρησιμοποιούν τα αυτοκίνητά τους όσο θέλουν

ANNEX 2: PROFILES OF THE SEGMENTS

These profiles are suggested wording to add to the web-based 'Golden Questions tool' (see Annex 3). The profiles are based on the extensive statistical analysis undertaken in the baseline and follow-surveys in SEGMENT and paint a picture of the attitudes and motivations of each group with respect to their dominant mode choices. Note that socio demographic characteristics are not differentiated across every segment, as they are not necessarily predictors of environmental behaviours and attitudes, but key points are included where they are relevant to a segment profile.

Devoted Drivers

You prefer to use a car than any other mode of transport and you are not interested in reducing your car use. You do not believe there are realistic alternatives to most of the journeys you make and you do not see yourself as a bus user or a cyclist anyway. Other modes are too slow and often stressful with few, if any, advantages over the car. It has probably been a while since you have been on a bus or a bike and you use a car most days. You tend to think successful people use cars and driving is a way to express yourself. You are not particularly motivated by using your travel time to get fit by using the bike or walking, and you are also not particularly motivated by reducing your emissions of greenhouse gases. You believe that people should be able to use their cars as much as they like with little restriction on this and you would like to see more roads built to reduce congestion.

Image Improvers

You like to drive and consequently you do not want your ability to drive to be restricted, but you also recognize that it would be good for the planet if we all reduced our car use a little. The main reason you do not want to reduce your car use is largely practical but you also feel that car driving is part of who you are and your identity. You do not relate to bus users but you are likely to see cycling as a form of self-expression and have been interested and committed to keeping slim and fit. You are also likely to think you should walk more and leave the car at home but everything takes so much longer when you walk. You are not entirely convinced about the scientific evidence on global warming and your motivation to act is not high, but at the same time you want to do the right thing.

Malcontented Motorists

You drive a lot but find it increasingly stressful. You want to cut down your car use but find that there are a lot of practical problems and issues with using alternative modes. For instance, you are likely to feel that bus provision in your area is inadequate or would take too long to do all you need to do. Although you can see that it might be beneficial to your health, cycling is not something you feel comfortable doing. You walk sometimes, but only when it is more convenient than driving and for practical rather than fitness reasons. You might make more effort to walk more in the future though. Environmental issues are something you are aware of and know a little bit about, but you do not feel it is practical to make decisions about your travel based on these issues.

Active Aspirers

You feel that you drive more than you should and you would like to cut down. You feel particularly guilty when you use your car on short journeys. But you do not see the bus as a solution – even though it can sometimes be quicker – because it is not always practical for carrying things or travelling with children. Your most preferred alternatives are walking and cycling. You walk a lot already because it is healthy and you enjoy it and are likely to try and fit it into your daily routine as much as possible. Cycling is also something you already do or consider to offer freedom, speed and fitness. You are likely to be motivated by environmental issues and this gives you some extra impetus to leave the car at home when you can.

Practical Travellers

You regard the car merely as a practical means of getting from A-B and largely use it only when necessary. But you also see other modes as equally or more practical in certain circumstances. You walk and/or cycle a lot as you believe these modes can often be superior to the car in terms of speed, cost and general convenience. The bus, however, is something you feel is often inferior because of the time penalty it involves. You do not tend to walk or cycle specifically because it helps you to be fitter, but fitness is important to you and you are likely to be fit already. You would not change much about how you currently travel as you feel you are already making optimum choices given your commitments and what you have available to you.

Car contemplators

You do not have a car at the moment but would like one at some point in the not so distant future. You are likely to not be able to afford a car at the moment or acknowledge that it would be a hassle or an unnecessary drain on your resources in your current circumstances. However, you aspire to own a car as you believe it is a sign of being successful and will provide much desired independence and freedom. Cycling is not something you want to do more of and you believe it is a rather impractical and stressful mode. You see walking as practical sometimes, good for fitness and something you intend to do more of, but generally limited as a mode of transport. You see even more problems with using the bus and whilst you might use it a lot at the moment, you would like to use the car more.

Public Transport Dependents

Although you are not against cars in any way and think people should be allowed to use them freely, you don't like driving very much. You are frustrated, though, that you do not get to travel by car a bit more often as you are fed up with the bus being slow so much of time, particularly when it gets caught up in congestion. You do not see yourself as a cyclist, but you don't mind walking and would like to do more of it, particularly for fitness. You have very little interest in environmental issues and do not think they concern you very much, although local pollution and congestion is a concern.

Car-free Choosers

You are not keen on driving and believe that cars and their impacts are something that need to be urgently addressed. You are committed to using other more healthy modes of transport instead. You can see benefits of travelling by walking, cycling and using the bus. If you take the bus you find it enjoyable and relaxing. If you walk you see it as healthy and would like do more of it. If you cycle, you like the sense of freedom it gives you and feel it says something about who you are and how you feel about protecting the environment.

ANNEX 3: TECHNICAL NOTE ON HOW TO CREATE A WEB-BASED SEGMENTATION TOOL

This technical note describes how the SEGMENT Golden Questions can be used to develop an on-line tool to sort people into each segment once they fill in the small number of questions on a website.

Use of the Tool

The on-line tool is hosted on the SEGMENT project website - the on-line tool homepage is: (http://www.segmentproject.eu/segmentationquiz).

The tool presents the user with a short quiz consisting of the 18 Golden Questions.

Following an initial question on whether respondents are car drivers (offering a "YES" or "NO" response) the tool then automatically filters the users to the remaining questions accordingly.

- Figure 1 illustrates the structure and possible responses offered for each question.
- Figure 2 shows a screen shot from the on-line tool for Golden Questions 2 to 5 relating to car drivers.
- After all 18 Golden Questions are answered, users are prompted to enter their first name or an alias they will recognise and then they click a button to "submit" their responses (Fig 3).
- An acknowledgement that their responses have been recorded is presented (Fig 4).

Below the acknowledgement box is a clickable link to view the results of the segmentation analysis performed on their responses. This identifies which one of the 8 segments they belong to and gives a description of the general characteristics of persons in that segment. The results are tagged with the respondents name or alias and time stamped to give the user confidence the results relate to them (Fig 5).

From their individual results users can return to the on-line tool home page and can then click a second link to view a summary pie chart of the results from segmentation analysis of all the inputs submitted through the on-line tool (Fig 6).

Figure 2 Screen shot from the on-line tool for Golden Questions 2 to 5

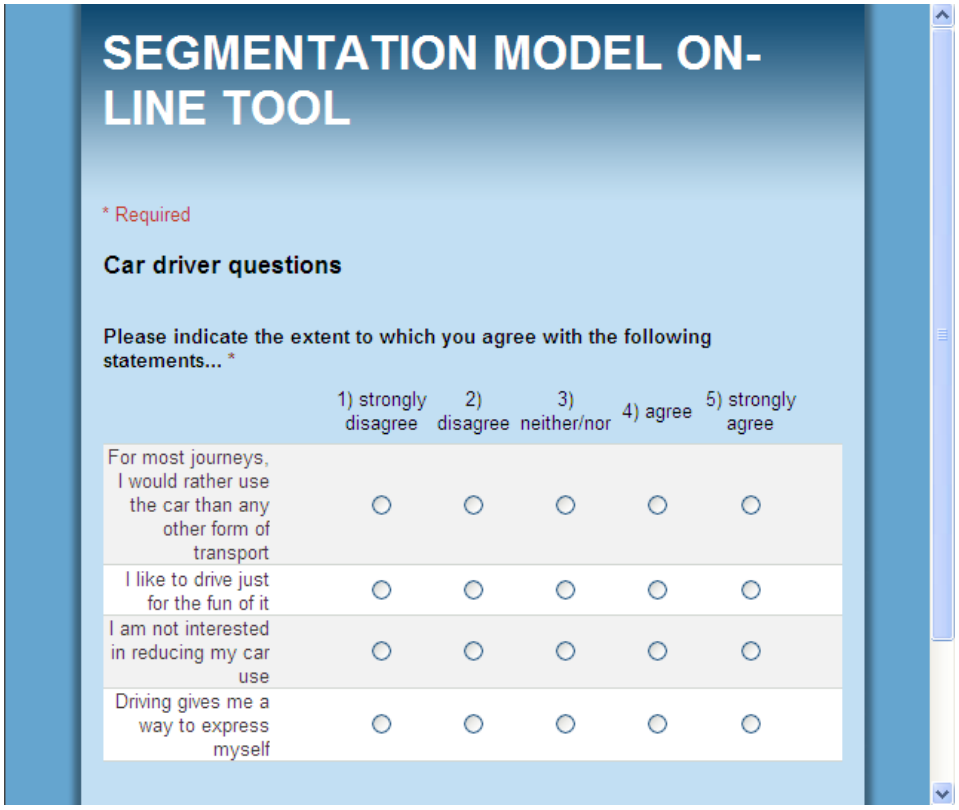


Figure 3 Screen shot from the on-line tool for identification and submission

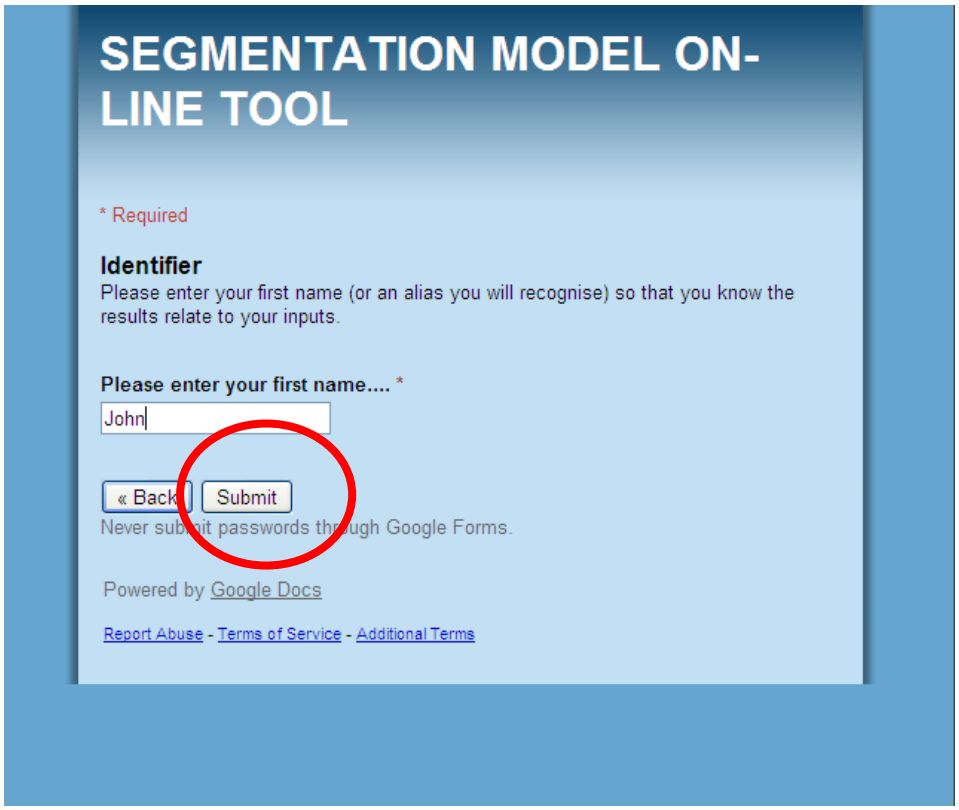


Figure 4 Acknowledgement that user responses have been recorded

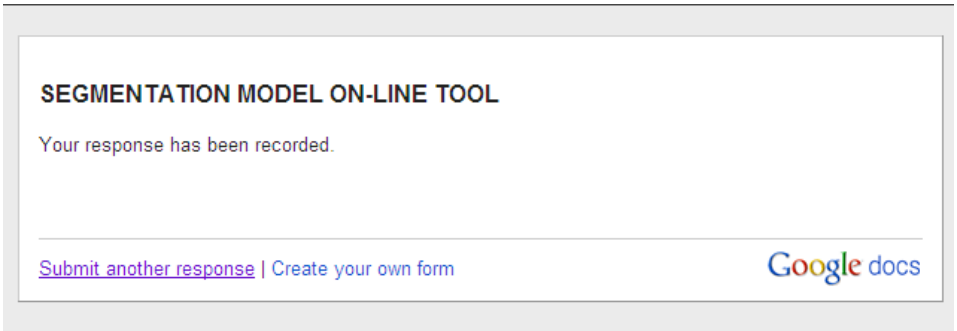


Figure 5 Segmentation results -tagged with the respondents name and time stamped

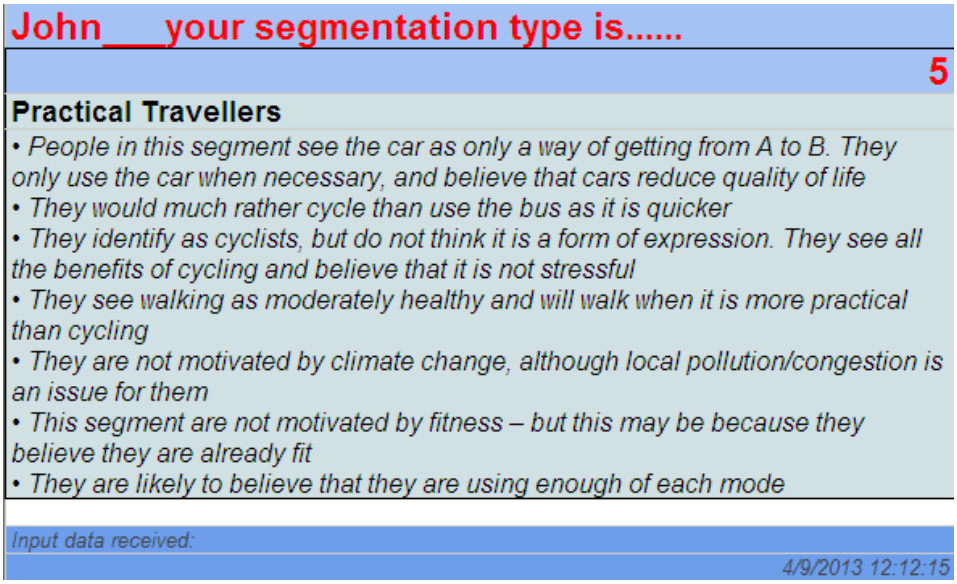
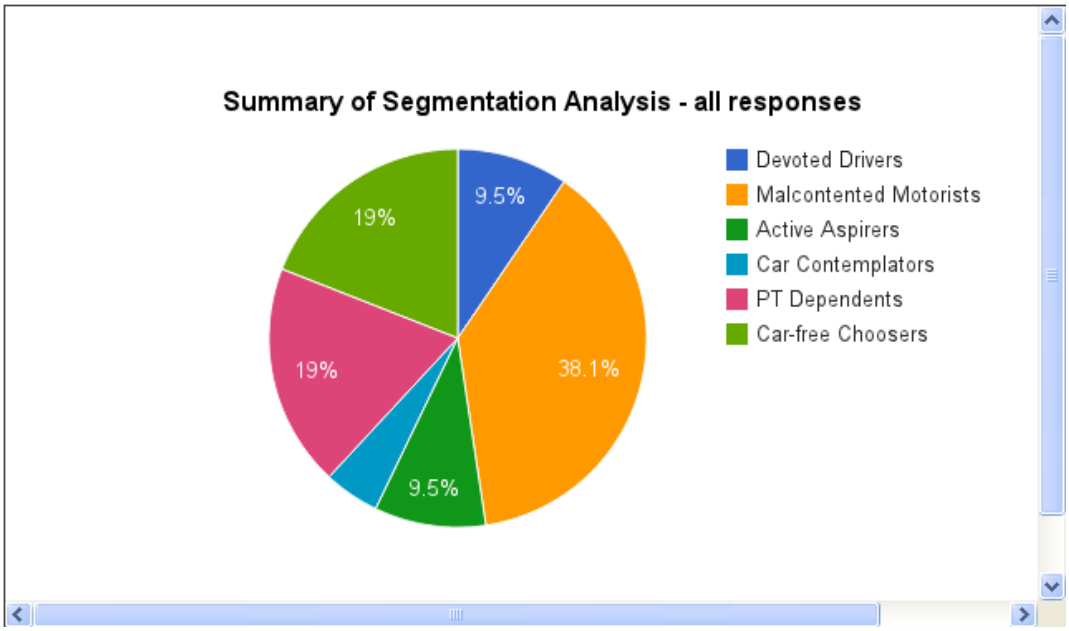


Figure 6 Summary pie chart of the results from segmentation analysis of all responses



Development of the Tool

The on-line tool was developed using Google Spreadsheets and Google Forms.

Google Forms provide a simple to use template for clear generation of the Golden Questions which can be published on the web and embedded within existing web-pages.

Data entered from Google forms has been linked directly to a Google Spreadsheet (Called 'Segmentation On-line Tool') where responses are stored in an 'input data' worksheet. The most recent entry is read from the input data sheet and is manipulated in an 'analysis' worksheet allowing the steps of the allocation algorithm and coefficient weightings to be applied (as described in Section 4).

A third 'segment profile' worksheet contains a description associated with each of the 8 segments. The descriptions provided for each Segment can be easily modified and web-link to site specific information relevant to particular Segment types can be included.

The 'results' worksheet links the segment to which the respondent is allocated in the 'analysis' worksheet to the segment description in the 'segment profile' worksheet.

Finally a separate spreadsheet which provides analysis of all the responses (rather than just the most recent) is also available.

Transferability and personalisation of the tool

As mentioned above, the on-line tool is hosted on the SEGMENT project website. For the tool to be useful to local authorities or other organisations (hosting users) they will want to be able to host the tool on their own sites and provide information to end users which is pertinent to the location and environment in which they live.

It is possible to easily share access to a copy of the 'Segmentation On-line Tool' Spreadsheet with an approved hosting user. The only requirement is that other hosting users have a Google Drive account (open to anyone, anywhere and free - go to www.drive.google.com to sign up or log-in).

From this the hosting user can save their own version of the tool in their own Google account and then modify and tailor the segment profile information. This allows the hosting user to provide information to the end user which is more directly relevant and useful to them in their particular environment.

To request shared access through Google Drive to a copy of the 'Segmentation On-line Tool' Spreadsheet e-mail Jillian Anable from Aberdeen University (j.anable@abdn.ac.uk).

To publish the modified version of the tool on a different web-site (e.g. a Local Authority web-site) the hosting user must simply follow the instructions below:

1. Open your modified copy of the 'Segmentation On-line Tool' Spreadsheet and go to the 'input data' worksheet (Fig .7)
2. From the menu at the top select 'Form' and then select 'Embed form in a webpage…' (Fig. 8)

3. You will be presented with a line of html code to copy and paste into your own website at the appropriate place (Fig. 9)
4. Now go to the 'results' worksheet and from the top menu select 'File' and then select 'Publish to the web...' (Fig. 10)
5. In the box that appears (Fig. 11) ensure the 'Automatically republish when changes are made' option is ticked. Enter which cells you want to publish (e.g. A1:A7) and then copy and paste the link provided into your on-line tool homepage at the point where you ask the user to "Click here for your SEGMENTATION MODEL RESULT".

Figure 7 Segmentation On-line Tool 'input data' worksheet

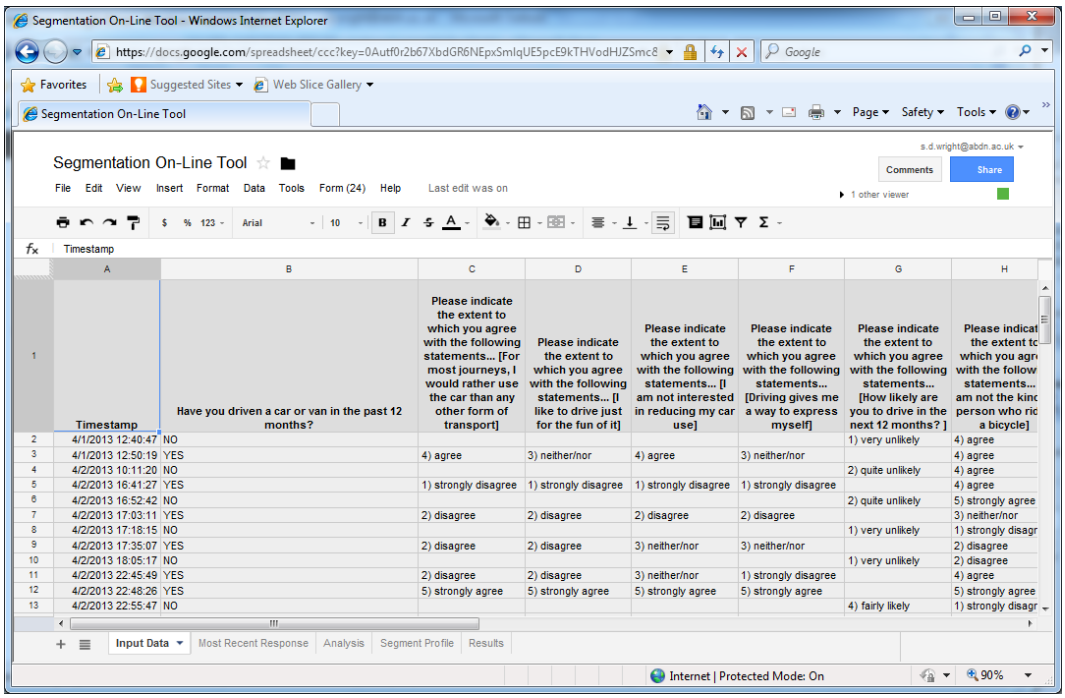


Figure 8 Selecting Forms - 'Embed from a web page option'

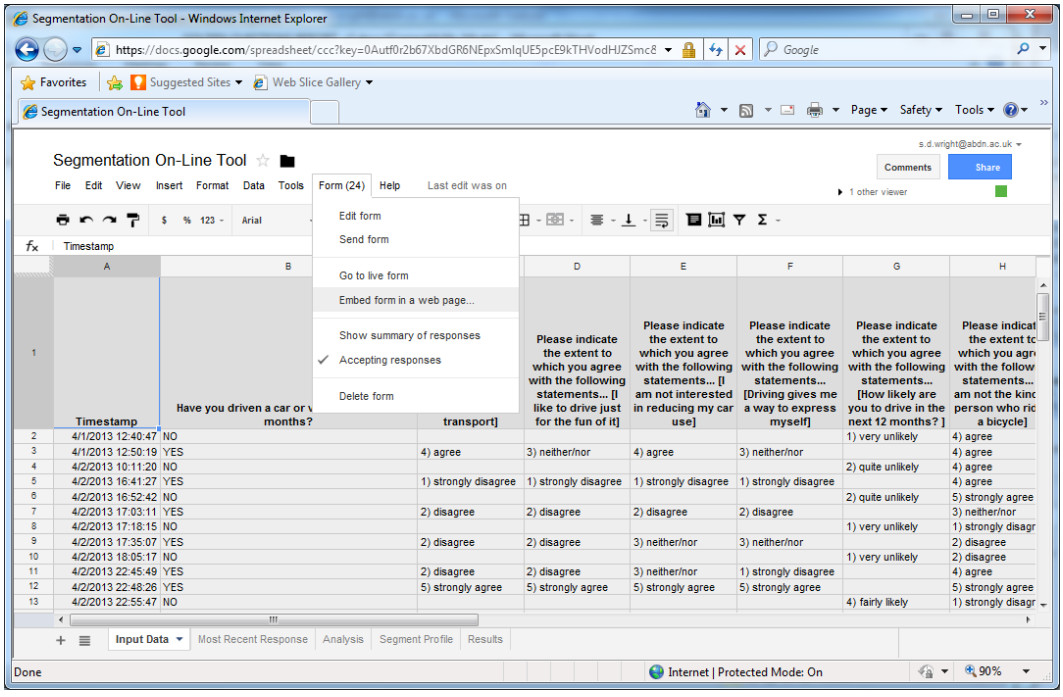


Figure 9 Html code to allow embedding forms in your web-site

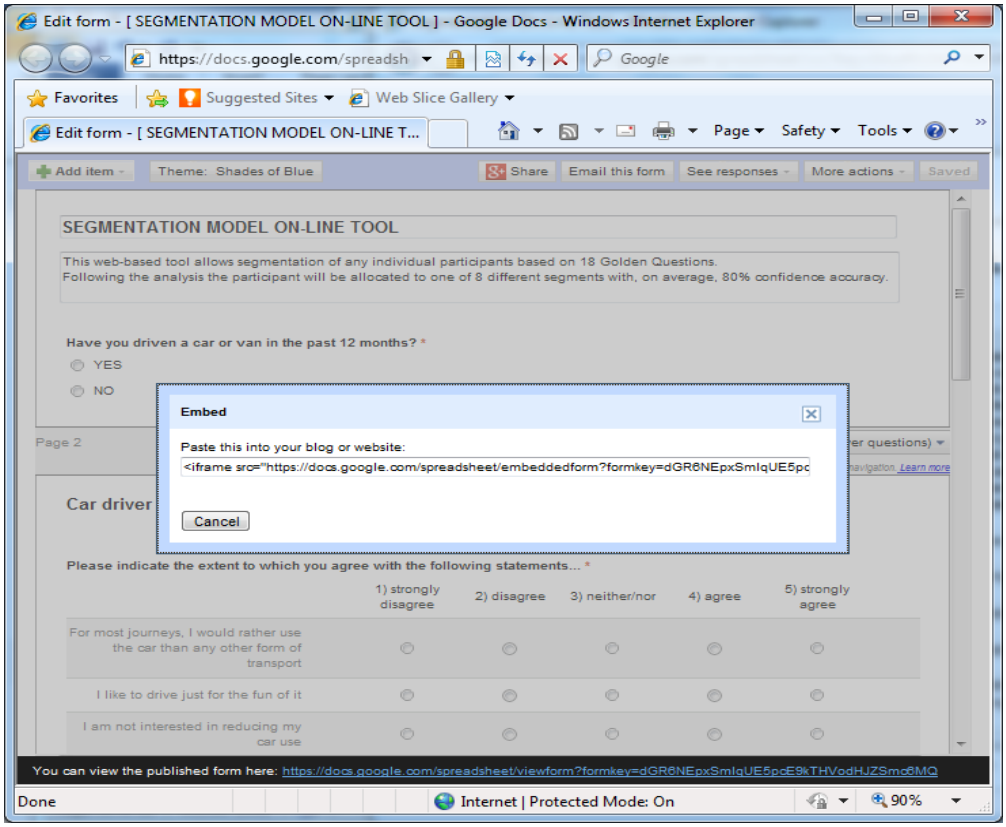


Figure 10 Selecting 'Publish to the web' for results

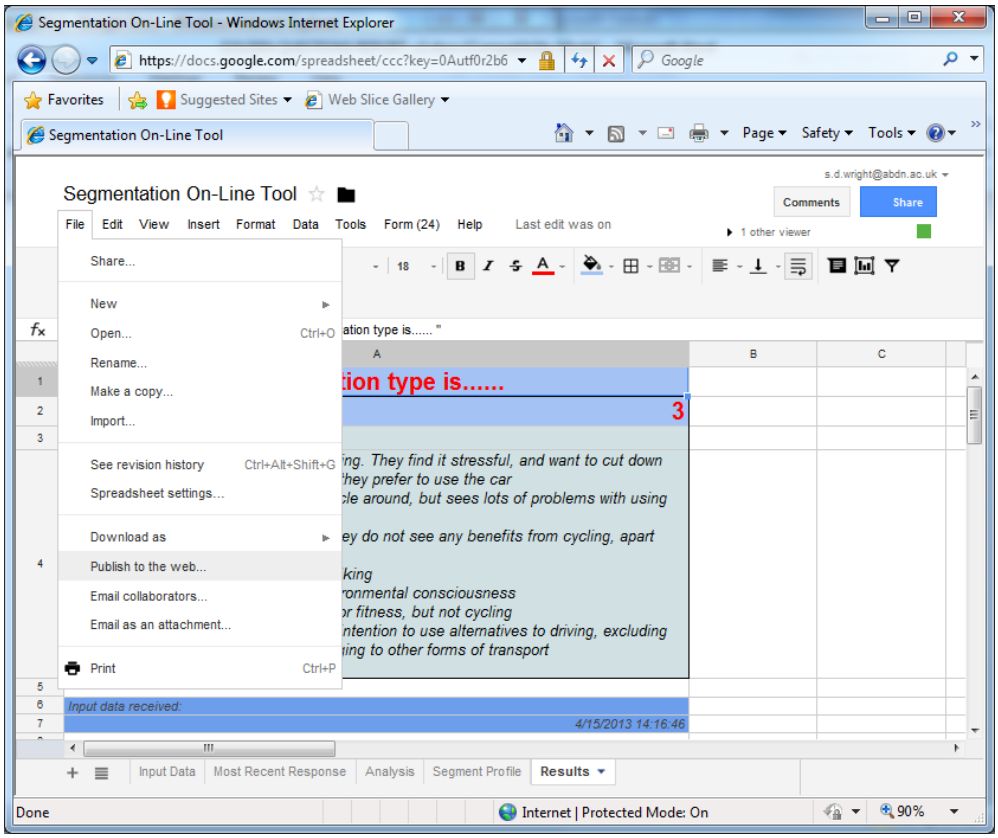
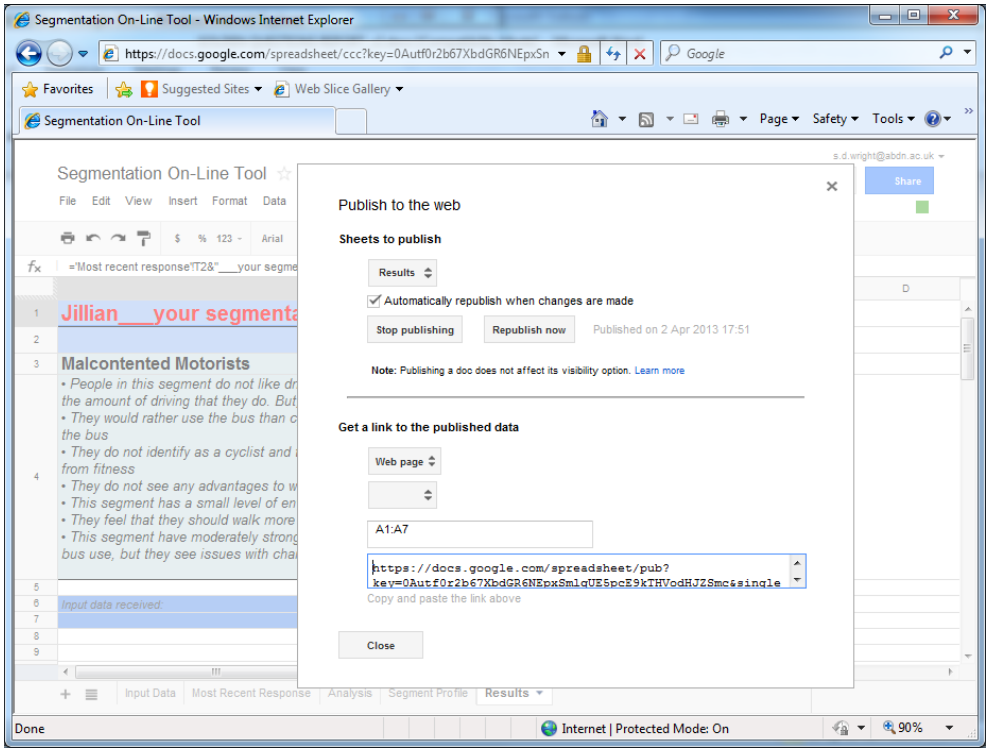


Figure 11 'Publish to the web' options for results



In order to publish a summary pie chart of all your respondent's results requires the following steps:

1. Access the copy of the 'Summary Results' spreadsheet from the shared documents repository in Google Drive
2. Save your own version of this in your Google account.
3. You must now link this to the 'input data' worksheet in your version of the 'Segmentation On-line Tool' Spreadsheet. To do this open your version of 'Segmentation On-line Tool' Spreadsheet and copy the spreadsheet key (which is the long string in the URL for the spreadsheet that matches to the key= parameter). Then go to your version of Summary Results spreadsheet and in Cell A1 of 'Respondent data' worksheet replace the spreadsheet key in the import range function (the first parameter inside the quotations) with the key for your version of the 'Segmentation On-line Tool' Spreadsheet. Below is an example of the import range function with the spreadsheet key string highlighted in bold.

   =importrange("**0Autf0r2b67XbdGR6NEpxSmlqUE5pcE9kTHVodHJZSmc**", "Input Data!a1:s")

   Following this, your respondent's inputs are now linked to your summary results spreadsheet.

4. In the Summary Results spreadsheet go to the 'Segmentation Results' worksheet and click on the top right corner of the pie chart for a drop down list to appear (Fig. 12). Select "publish chart"
5. In the publish chart window that appears, select 'image' in the publish chart format box and then copy and paste the HTML code into the on-line tool homepage of your website.

Figure 12 Selecting 'publish chart' from the Segmentation Results worksheet

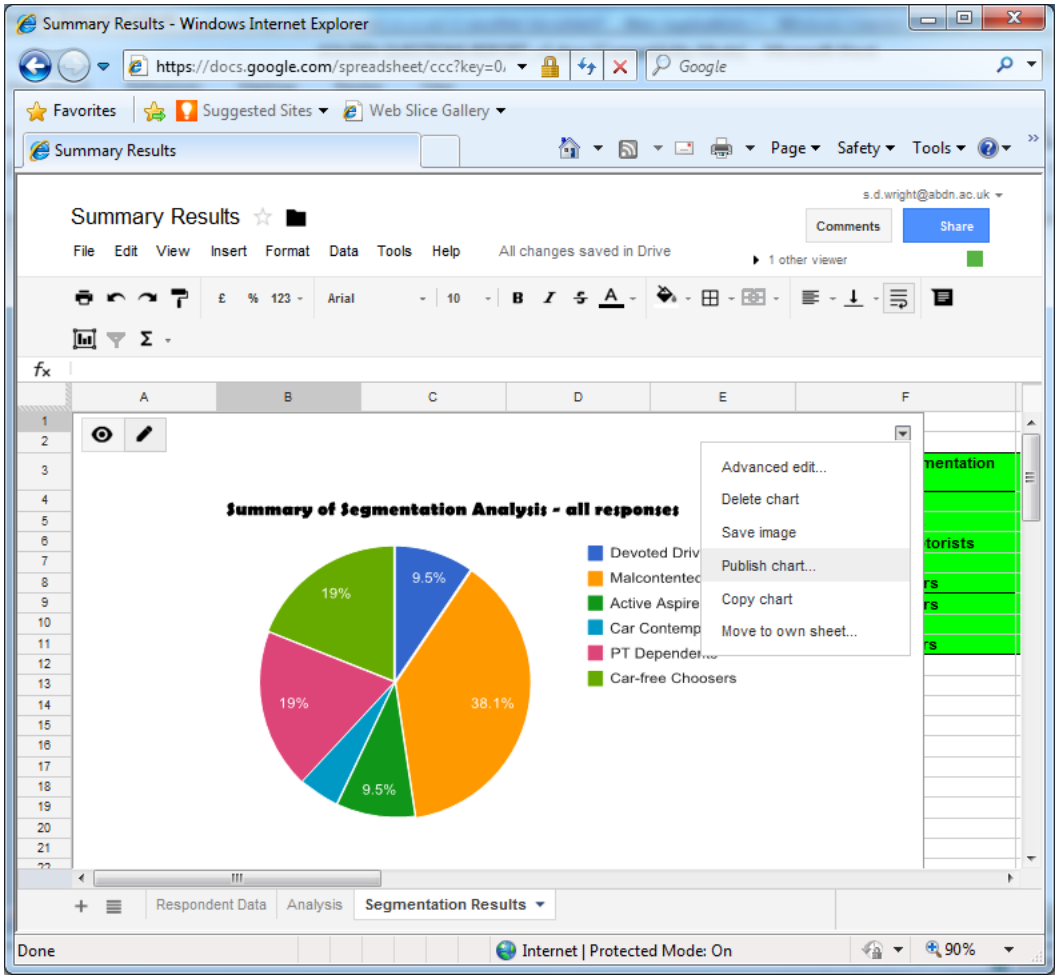
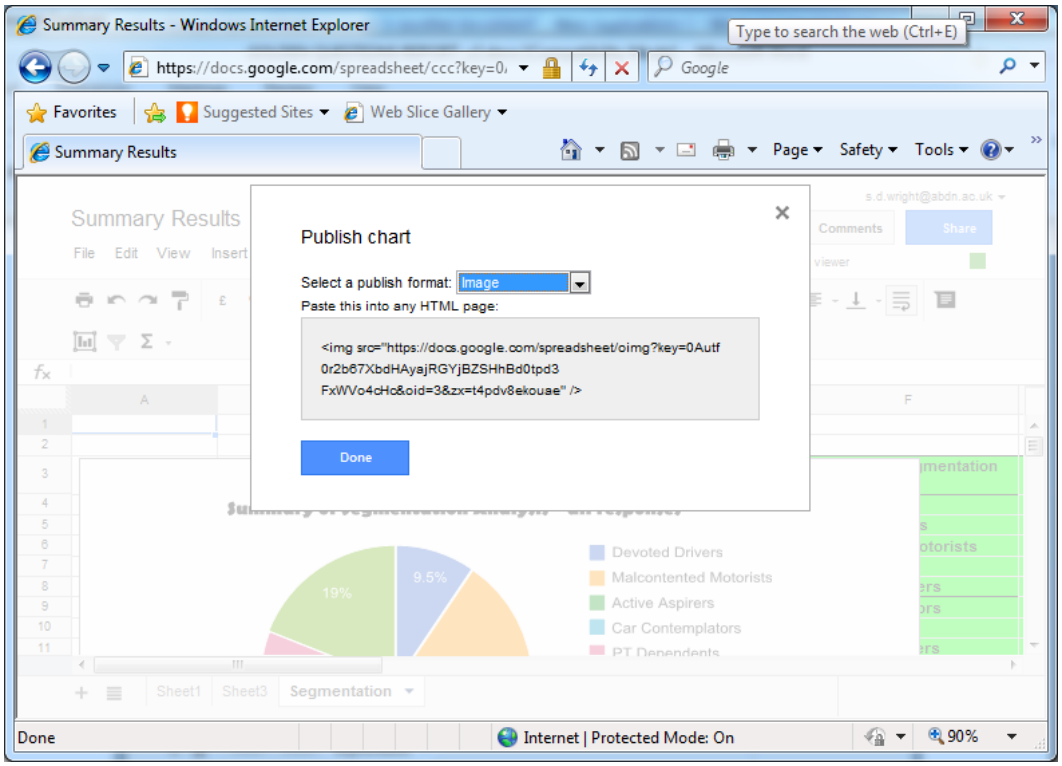


Figure 13 Illustration of 'Publish chart' window



ANNEX 4: TECHNICAL NOTE ON HOW TO APPLY GOLDEN QUESTIONS TO A FUTURE QUESTIONNAIRE SURVEY

This technical note describes how the SEGMENT Golden Questions can be used to apply the weighted coefficients to a set of data collected through a questionnaire.

In addition to the on-line Segmentation tool, a survey analysis tool has also been developed. This takes the form of an Excel Workbook and calculates the distribution of different Segment types from within a group of survey respondents. Up to 5000 survey responses can be analysed at once.

The Excel Workbook contains 4 separate worksheets:

- Survey Inputs
- Coefficients
- Segmentation Analysis
- Summary Pie Chart

Users can only enter data to the first of these worksheets. The remaining three are protected and provide the analysis and results without user intervention.

The 'Survey Inputs' worksheet contains a column for each golden question; each row is for entry of responses from separate individuals.

Users simply enter the survey responses to each of the golden questions to the shaded section in the Survey Inputs worksheet. That is, YES or NO for column B and a number between 1 and 5 for columns C to S.

Up to 5000 survey responses can be analysed.

The Survey Analysis Tool is available to download from the SEGMENT project web-site.

ANNEX 5: TECHNICAL NOTE ON METHOD USED TO CREATE THE ORIGINAL SEGMENTS AND THE GOLDEN QUESTIONS

Finding the original segments

Cluster analysis was used to identify the segments in SEGMENT. Cluster analysis is a multivariate statistical technique to identify homogenous groups of respondents according to their similarity on any number of combinations of variables. It does this by maximising the distance between groups whilst simultaneously minimising the distance within a group.

Variables are chosen which are known to be the strongest explanators of a dependent variable (i.e. the intention to reduce car use) or to distinguish well between respondents in the sample. Groups of variables identified from the factor analysis capturing certain attitudinal constructs (such as attachment to the car, cycling, environmental values, awareness of the impacts of car use; importance attached to status) were used in addition to variables on the questionnaire which specifically measured people's attitudes towards different transport modes.

The scores for each of these were subject to the following procedure:

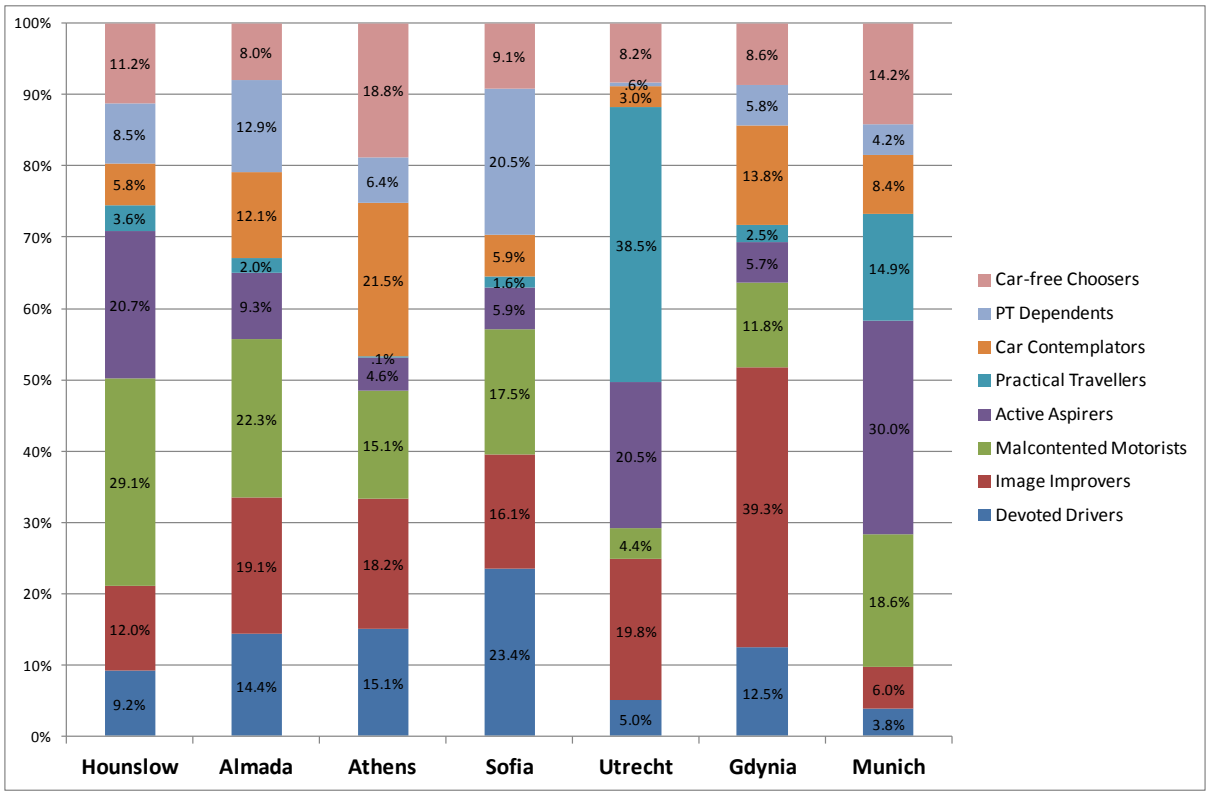
1. The sample was split into those with access to a car and those without and the following procedures carried out separately for each (as the measured attitudes were different for each group)
2. Hierarchical cluster procedure (Wards Method, Squared Euclidean distance)
3. Using the mean values for each variable for each of the 5 + 3 clusters from the previous step to start the K-means procedure (No-update method) to identify the final cluster solution.
- After examination of the dendogram and other procedures (mainly basic initial profiling to find the solution that makes the most conceptual), settle on a 5 + 3 cluster solution

The above stages still need some more or less subjective decisions to be made to determine how many segments there are in the data. The most important indicator of the correct number of segments and the consequent quality of a segmentation is how well the resulting segments answer the key research questions. It is always important to construct segments which:

- Are recognisable
- Are easy to interpret and communicate to others
- And can be used for future marketing

In addition, a number of other (statistical) outputs and diagnostics were checked to ensure the statistical robustness, reliability and replicability of the segmentation solution. These included inspection of the dendogram, sum of F-statistic/ Variance Ratio Criterion and segment size. If very large segments are discovered, this could indicate that the segmentation has not been effective as there is a large group of respondents for whom no differentiation was detected. Likewise, if very small segments are detected, the sample size becomes too small to say anything meaningful about them or to be able to profile them reliably. In this case, there was a reasonable distribution of sizes among the segments. Where a segment represented less than 5% of a partner city's respondents, this segment was deemed too small to realistically exist in that city (eg Practical travellers in Hounslow, Athens, Almada and Gdynia).

Figure 1: Final distribution of segments in each SEGMENT partner city



Finding the Golden Questions

Discriminant analysis builds a predictive model for group membership

In the original segmentation, there were 37 input variables used in the cluster analysis to define the 8 segments. This was not surprising given the breadth and complexity of the subject area and the range of attitudes, motivations and barriers included in the analysis. But it is nevertheless evident that a set of less than 20 variables is needed for the segmentation model to be used in future.

Purpose of Discriminant analysis:

- to maximally separate the groups.
- to determine the most parsimonious way to separate groups
- to discard variables which are little related to group distinctions

Discriminant analysis was therefore used to find the minimum number of survey questions needed – i.e. the Golden Questions documented in this report.