Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

BETA PROJECTS

Dublin City Council BETA, BETA Project Report, **Driving Data Trial**

#DrivingDataBeta

Trial Description

Proposition:

In all fields of study, data management is important. Although all data can be useful, it is essential for an overall understanding of a system, that decisions are not governed only by that data which is most easily accessed. An over-reliance on a limited number of data sources leads to data blind-spots being created and opportunities missed. Traffic management is no different. In Dublin city, all traffic operations are underpinned by data received from various types of detection – electromagnetic loops, pedestrian push buttons, speed monitors, bicycle counters. However, there is very little data about how people drive and what factors influence behaviour behind the wheel. New data sources which may which can bridge this gap would be a welcome addition to the traffic management toolkit.

The aim of this project is to explore the potential of in-vehicle telematics devices (dongles) in supporting the policies of the Environment & Transportation Department of Dublin City Council. While devices of this kind have been employed successfully for many years as a tool to assist companies manage their fleet, their potential to support local authority policies is largely untested. While it is anticipated that data from vehicles could provide insights into the variation of driving styles on the road network, there is uncertainty around how these opportunities may be realised. In particular, the following questions are pertinent to this trial:

- Demand: will people be willing to participate in a trial of this type?
- Installation: can the dongles be fitted easily and securely in a variety of vehicles?
- Data: is the data reliable enough to be used and is it suitable for the proposed applications?
- Privacy: to what extent will data protection regulation restrict the collection and analysis of personal data?

The BETA trial was designed as a scaled demonstration to learn how dongles could be used to gather driving data; the processes and resources required for this small deployment help to provide answers to the questions above and offer a fuller understanding of the potential, challenges, and application areas of this technology.

The main proposition of this trial is that car owners, amenable to having a telematics device (dongle) installed in their vehicle, would be recruited for a number of months. During this period, the participants would drive normally and allow the data be shared with Dublin City Council; in addition, they would take part in surveys about their driving history and their mood.

The value of capturing these combined data-sets is that representative driver categories can be created based on the profiles and driving patterns of the participants. One of the principal motivations of this trial is to establish the level of variation in driving behaviour. Is there a significant difference in driving styles among the population? If so, can it be measured and is there a relationship between driving behaviour and the driver categories?

Although working from a very small sample size, it is hoped that the data obtained during this trial will allow the subsequent analysis (research on the data is due to be carried out after this trial) to ascertain whether or not there is a significant variation in driving behaviour on Dublin City Council roads and/or any correlation between particular driver behaviours and any of the selected driver categories. It is considered that an affirmative in either or both of these cases would lend support to the instigation of a larger and more comprehensive trial.

BETA Project Stage

This BETA project is at the **concept stage**.

BETA PROJECTS CONCEPT	BETA PROJECTS MODEL	BETA PROJECTS LOCAL
Concept Stage	**Scaling Model Stage**	**Local Implementation Stage**
Should Dublin?	How can/should Dublin?	Where in Dublin?
Does it cause any problems, is it beneficial for the city (or City Council), what sort of locations are suitable, etc?	Business model, funding, staffing, procurement, legals, maintenance, ownership of assets, insurance, planning, branding, etc.	Local feedback and input before permanent implementation of solutions in their area.
Projects at these stages 'default no' - ie they need to prove that they work as well as, or better than, what we currently do. Projects are REVIEWED and then fully REMOVED at the end of this stage.	Projects at these stages 'default no' - ie they need to prove that they work as well as, or better than, what we currently do. Projects are REVIEWED at the end of this stage.	Projects at these stages 'default yes' - ie the assumption is implemention if locals agree. Projects are permanently IMPLEMENTED at the end of this stage.

Figure 1: BETA project stages diagram

Trial Size/Extent: 14 volunteers.

Trial Period & Duration: July 2018 – Oct 2018, 4 months.

Cost: The total cost of the trial was €430 for the hire of the dongles.

Social media Discussion: Search #DrivingDataBeta

Location: Although the telematics devices will send data from anywhere in the Republic of Ireland, the focus of this trial was on attracting participants who reside in the Dublin City Council area.

Trial Description:

The Driving Data Beta trial was launched on social media in May with a call for volunteers. Anyone interested in taking part, which required that they have a telematics dongle installed in their vehicle, was asked to complete a short Mailchimp questionnaire (see appendix 3). Awareness of the trial was also raised by advertising in the Dublin City Council intranet. In addition to online advertising, a poster was created and placed around Dublin City Council offices, local libraries and community offices (see appendix 2).

By the end of May, requests to participate had been received from ten respondents. In order to ensure that participants selected for the trial were representative of the general driving population, a number of different cohorts were identified as per the following parameters:

- Age (younger driver/older driver)
- Journey (Commuter/Drive for Work/Leisure/School-Run)
- Gender (Male/Female)
- Time (Day driving/Night driving)
- Location (Residents of 30km/h zones)

A total of seven respondents were identified as good matches for the cohort categories above based on the information they had supplied via the original questionnaire and/or follow-up phone and email conversations. For instance, some of them drove for work, some lived in 30km/h zones, and some used their cars mainly for commuting. A gender balance was also sought throughout. The respondents were contacted and advised that, if they were agreeable, a dongle would be installed in their vehicle for the duration of the trial. At this point, consent was needed from the vehicle owner to the data being received by Dublin City Council and analysed for the purpose of gaining a better understanding of driver behaviour. All seven agreed with the above and each provided written confirmation of the following:

- Agreed to have a dongle installed in their vehicle
- Confirmed that they are the policy holder of the vehicle
- Advised that they (and any named drivers) consent to the terms of the trial
- Agreed that DCC may use the data obtained for the purposes outlined in the trial

As soon as this information had been received from each participant, the dongles were ordered and given to the participants. A number of different methods were used: some were posted out, accompanied by an information leaflet (see appendix 4) and a SAE for return at the end of the trial; for others who worked nearby, the dongles were hand-delivered. Of the seven participants, four of them installed the dongles themselves; the other three received assistance. As the year of manufacture, make and model of each vehicle was known, a customised instruction leaflet was provided for each participant, showing the location of the On-Board Diagnostic (OBD) port for their vehicle.

In all, the seven participants had their dongles successfully installed by the end of June. Once the dongles were fitted and the dongle provider had advised that the communication was up and running, an email confirmation was sent to each of the participants. At this stage, the dongle provider was instructed to create a user account for each participant so that the data being collected could be accessed and viewed via the visual display supplied by software developed by the dongle provider.

For the purpose of transparency, it was important that each participant could see exactly what data was being recorded and how it could be displayed on a map. This was done by having seven user accounts created. The dongle provider sent out a hyperlink to each participant which, when clicked, brought them to a website where a temporary user account could be created with their own usernames and passwords. For the purpose of privacy, the unique

hyperlink for each participant was sent to a newly-created gmail address. As a data protection measure, seven gmail addresses were created and the username and password of each were issued to the email address originally supplied by each participant. These gmail addresses will be deleted at the end of the project, along with all data collected throughout the trial. A screen capture of how the journey data can be displayed visually is shown below (sample data is used):

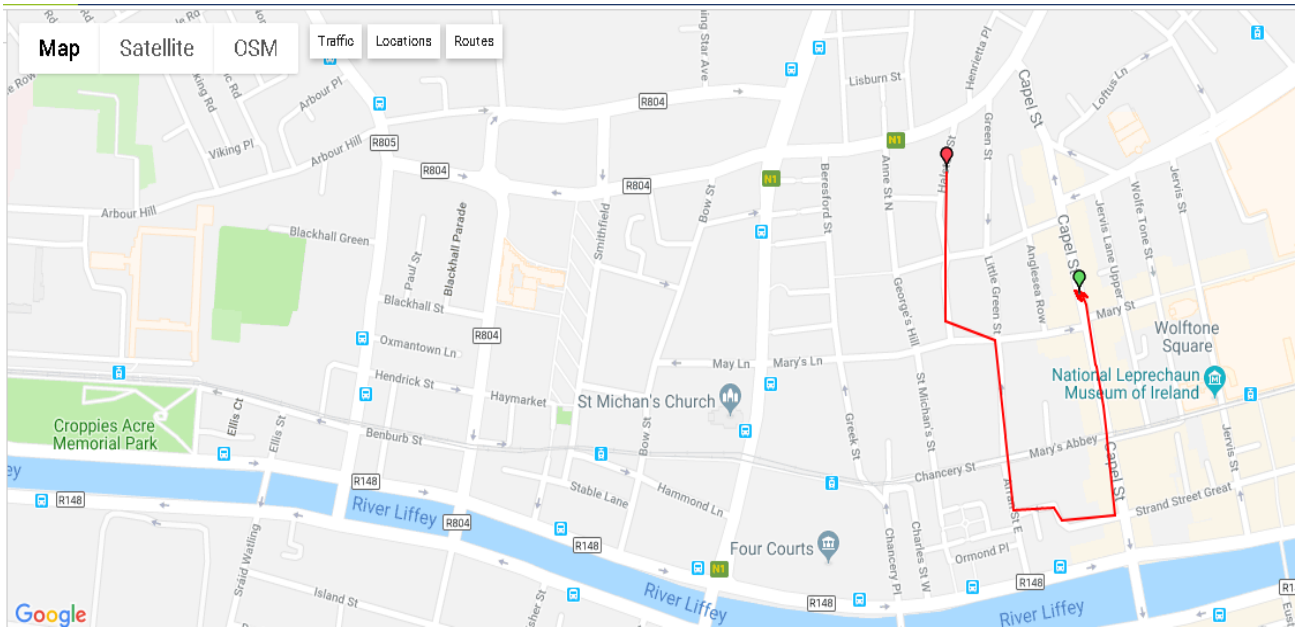


Figure 2: A screenshot of how drivers' journeys can be displayed on the map

Following the successful installations for the first group of participants, a second group of seven participants were selected working on exactly the same procedures as outlined earlier during the weeks that followed. A second batch of dongles were ordered and all were installed by the end of July. All of the dongles were hand-delivered this time. Of this group of seven participants, three installed the dongles themselves.

The trial was brought to a close at the end of September and a request for the dongles to be returned was issued. By this stage, the dongles had been in place in the first group of vehicles for three months and the second group for two months. It was considered that sufficient data had been collected. Of the fourteen participants, eleven managed to remove the dongles themselves without any assistance and return. The two participants who had been supplied with stamped and addressed envelopes posted the dongles back. One dongle was not returned.

As mentioned at the outset, additional information was requested from the participants over the course of the trial. A questionnaire, designed with Citizen Space (an established public consultation tool used by DCC), was used to gather information on the participants' driving style and history (see appendix 5). Out of the fourteen participants, ten replied; of those that replied, all answered the questionnaire in full.

In addition, a short survey looking to gauge driver mood was created using Google Forms (see appendix 6) and disseminated to each participant. It was intended that the form would be placed on the home page of each driver's smartphone so that they could easily complete the survey after each journey. Possibly due to the fact that this survey needed to be completed at a certain time and no reminders were in place, it was not well-used.

Data Protection:

A large part of this trial was concerned with ensuring the any data obtained would be processed, stored, and deleted in the correct manner and in accordance with the General Data Protection Regulations (GDPR). Working in collaboration with the DCC Data Protection Officer, a full Data Privacy Impact Assessment (DPIA) was carried out and the practices and proposed actions of the dongle provider and Dublin City Council were audited as part of this process. Data made available by the participants was done so on the basis of consent – the participants stated in writing that they were aware and happy with the data being captured. All participants were made aware of the manner in which the data would be stored and the duration. This includes all the data shared on the various forms and surveys using MailChimp, Citizen Space and Google Forms.

Data Analysis:

As previously outlined, the selection of the participants was done with a view to ensuring that the final selection was representative of the population. Familiar groupings on the basis of age, gender, occupation and journey type were used in order to inform the selection procedure. Although it is not possible to observe trends in behaviour with such a small sample size, it was thought that a greater degree of variation would be present in the data if an effort was made to maximise the differentiation.

In figure 3 below, a breakdown of the incidence of speeding detected over the course of the trial is displayed. In this context, speeding is defined as the percentage of events generated where a speed greater than the road speed limit was detected. The participants are rated and displayed in ascending order of speeding with user 10 coming first as the participant with the best record (least incidence of speeding). Other participants are ranked accordingly. In appendix 6, a full driving summary is included, listing the speeding percentage of each participant in order and their corresponding percentage score. The driving score is calculated by subtracting the speeding percentage from one hundred.

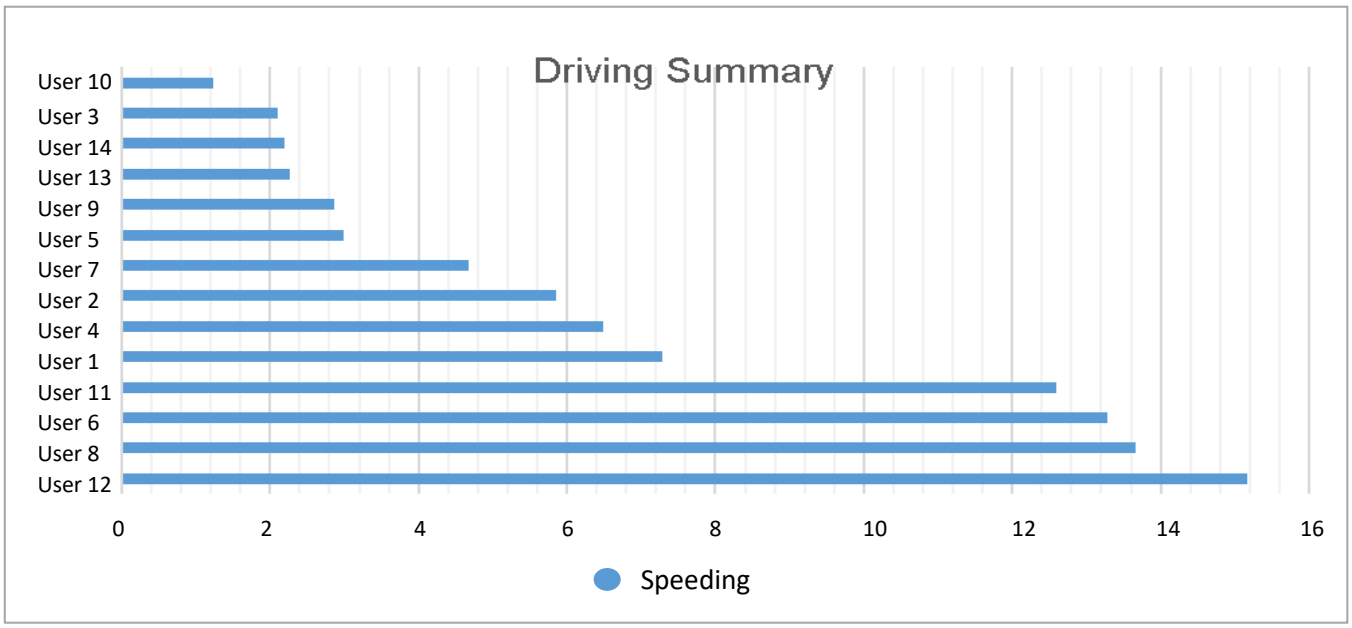


Figure 3: Driving Summary for Trial Participants

Most apparent from the diagram above is the degree of variation among the incidence of speeding recorded over the trial period. The participant at the top of the graph with the lowest incidence of speeding was recorded as speeding only 1.24% of the time; in contrast, the participant with the highest recorded incidence of speeding was found to be speeding over 15% of the time. This result reveals the extent to which driving behaviour can differ among even a small sample of people and would appear to support the proposition of targeted initiatives as a method of improving speed compliance.

However, as anticipated, no clear connection between the speeding observed and the participant groupings could be found. Even though, as stated earlier, an effort was made at selection stage to introduce diversity to the participants by identifying specific cohorts based on Age, Journey Type, Gender, Time of Driving and Residence, no discernible correlation could be established, possibly due to the small sample size.

However, a correlation was discovered when an analysis of the types of journey undertaken was carried out. Looking at the diagram in more detail, the results can be separated into three speeding zones: low, moderate, high.

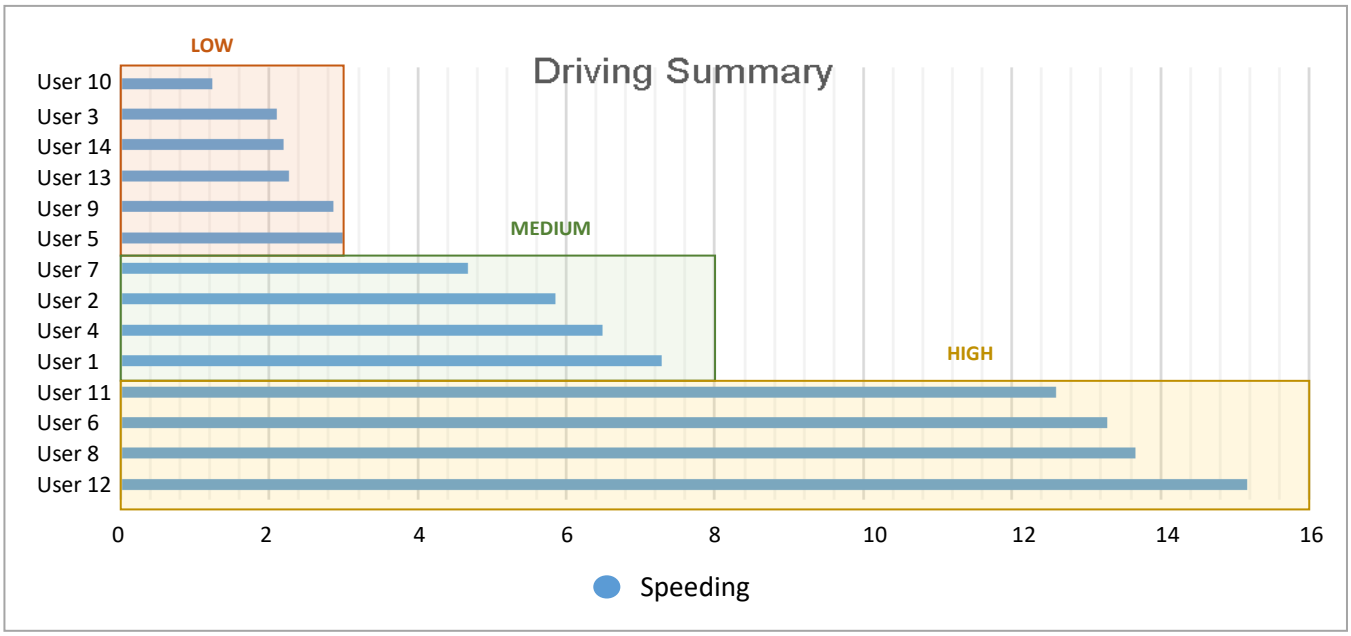


Figure 4: Driving Summary Speed Breakdown

Low corresponds to a speeding incidence of < 3%, Moderate is between 4% and 8% and High is over 12%. A focus on the participants in the High Speeding Zone when compared with the characteristics of their journeys found one thing in common: the average number of km that they drove per journey was higher than that of the other participants as shown below:

Rank	User Number	Average KM/Journey (km)
1	3	0.92
2	2	2.71
3	13	3.22
4	7	3.39
5	4	4.09
6	9	4.24
7	14	4.78
8	1	5.4
9	10	6.34
10	5	6.38
11	6	7.46
12	12	9.18
13	8	9.73
14	11	10.3

Table 1: Comparison of Average Distances covered per Journey by each Vehicle

As such, based on the results of this trial, it is recommended that consideration also be given to grouping drivers based on the characteristics of their journeys rather than on grouping them according to driver population profiles (eg “taxi drivers”, “younger people”, or such). When assessing how best to classify journeys, a number of metrics come to mind as follows:

- *Km/journey*
  As illustrated above, the average distance per journey can be a good predictor of speed limit compliance.
- *Time of day*
  Journeys could be filtered to group together those occurring at night or weekends.
- *Predominant Speed limit*
  With relevance to 30km/h zones, it is likely that speeding will be more prevalent on routes that pass through a lot of 30km/h speed limits. Journeys could be categorised on this basis.

In order to move forward with this approach, additional data processing and the development of new ways of displaying the data would be required. For example, at present, the software offered by the dongle provider compares all vehicles with each other, without any segregation, and there is no speed analysis conducted that takes into account the speed limit of the route of a journey. These features would need to be developed if this approach is to be feasible. However, notwithstanding these barriers, it is considered that, with cooperation from the dongle provider, a customised version of the existing software could be produced that would support a detailed analysis of journey data.

In addition to the approach recommended above which focuses on journeys, the use of applying weightings should be examined for any future trial. Drilling down further into the speeding figures, we can investigate the speeding profiles. In figure 4 below, the colour-coded speed summary reveals more about the type of speeding being committed i.e. by how much the speed limit was exceeded. User 11 comes out the worst in this particular assessment, with the largest red component which corresponds to speeds of at least 30% over the speed limit. At present, there is no facility offered by the dongle provider to weight the speeding result by proportion above the limit; this proposal should be explored as a safety-related driver behaviour parameter and should be included in the calculation of the driving score.

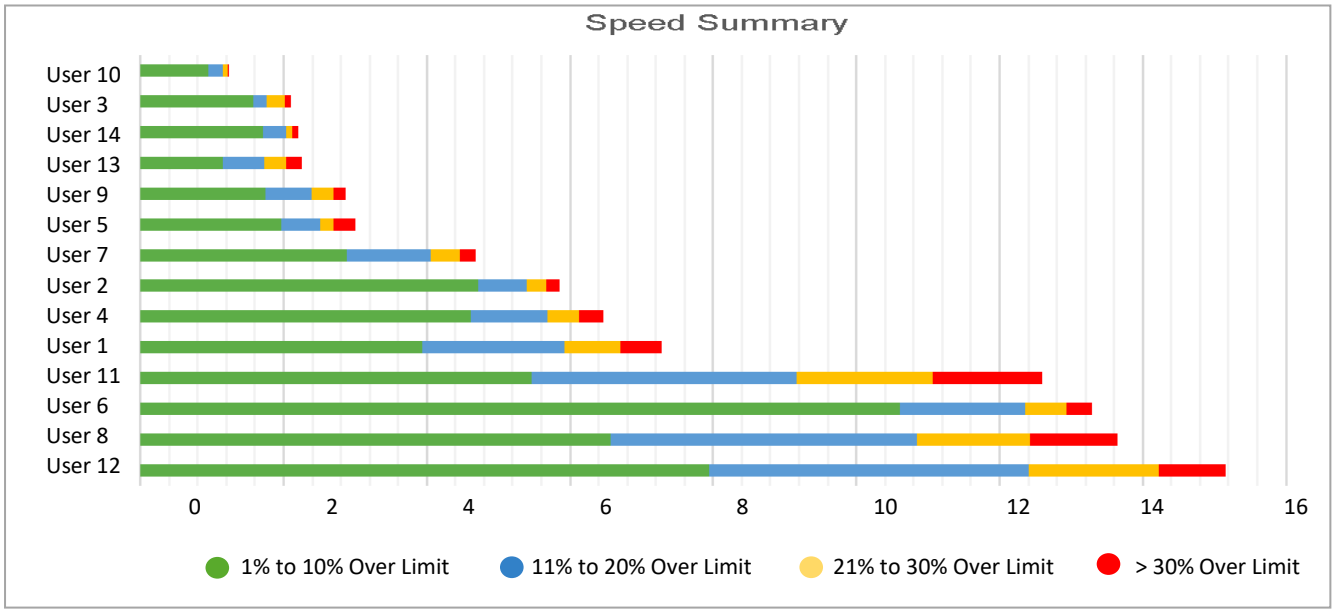


Figure 4: Colour-Coded Speed Summary for Trial Participants

As a corollary to the recommendation that the predominant speed limit should be factored into journey analyses, other features of the route should likewise be included. In particular, it should be possible to identify residential areas and also pinpoint the location of schools. This information could then be used as a weighting in the driving score calculation. It is recommended that the feasibility of this suggestion be determined for future trials.

As well as data on vehicle speeding, the dongles record data on other undesirable driving parameters. Harsh braking, rapid acceleration and harsh cornering can be included in the driver behaviour analysis. From the diagram 5 in figure 5 we can see how the ranking changes when these other parameters are included. User 10 still comes out best, indicating that the driving style of this particpant is smooth and deliberate across all measures.

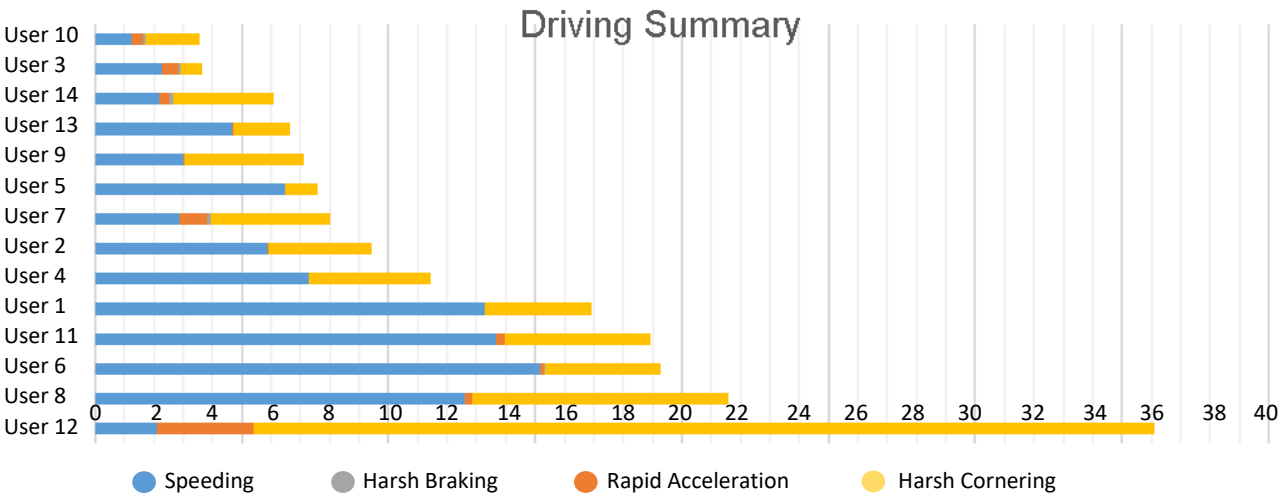


Figure 5: Driving Summary with Additional Parameters for Trial Participants

However, other participants have been shuffled about as a result of this broader view of sriving style. For example, user 3, ranked second in the speeding only analysis, now has the dubious honour of occupying the bottom position. This result is due to the comparatively high incidence of harsh braking and harsh cornering recorded by this participant; one explanation for this might be that the participant may often drive a route that includes a lot of turns such as a commute that involves passing through residential estates.

Next Steps:

The analysis presented above gives an initial overview of how data of this kind could be used to evaluate driving behaviour. The results are promising: the dongles were relatively easy to install, communicated well enough to allow variation between the driving styles of small group of participants to be observed, and a subsequent data analysis concluded that there may be a way to progress this concept with cooperation from the dongle provider.

The next phase of this project is to have further data analysis carried out by statistical consultants. In addition to the trial participants' data, vehicle data from the Dublin City Council fleet (over 700 vehicles) will be made available to the research team for the purpose of their analysis. It is expected that the fleet data will be used to establish a comparative baseline from which to evaluate the driving behaviour of the participants.

Upon completion, the results of this research will be reviewed to see what benefits an approach such as the one demonstrated in this trial could confer on Dublin City Council. It is expected that if a suitable application can be found, a larger, more comprehensive trial will be commenced at a future date.

Trial Description

This project tested the following assumptions:

Key Assumption	Outcome
1. DCC time & resources	Although the installation and administration of the dongles required a considerable amount of time and resources, it is expected that it would be substantially reduced with the knowledge gained from this trial.
a. That the dongles could be installed easily by participants without any DCC staff being present.	• This assumption was partially correct. The half of the participants that felt confident with the idea of installing it themselves had no problems, and it took less than a minute in all cases. However, the other half were not confident with the idea of carrying out this task themselves.
b. That the dongles would be returned	• This assumption was generally correct. One dongle was lost.
c. That the administration would be minimal	• This assumption was incorrect. A lot of staff time was needed to recruit volunteers, have the dongles installed and manage the trial in general.
d. That the project would not take much time from start-to-finish.	• This assumption was incorrect. The trial has taken much longer than expected, principally due to the need to carry out a Data Privacy Impact Assessment (DPIA).
2. Data Collection	It was found that many people were willing to participate in a trial that could lead to improvements for the city. There were no issues with the dongles in terms of operation or communication.
a. That sufficient people would be interested in taking part to give us good differentiation amongst the trial group, and to enable a couple of clear cohorts.	• This assumption was correct.
b. That the data could be collected.	• This assumption was correct.
3. Data Protection	The recent introduction of the General Data Protection Regulations (GDPR) legislation required that a Data Privacy Impact Assessment (DPIA) be carried out.
a. That the data could be processed	• This assumption was correct. The data was received in compliance with GDPR.
4. Actionable Data	It was unclear whether we would be able to see clear behaviours associated with driver cohorts – ie observe potential actions on the results of the data received.
a. That we would see clear distinctions in the data of the various cohorts.	• We were able to see a clear distinction in one of the cohorts, however the sample size was tiny.
b. That the processed data would be useful in informing us about driving behaviours.	• This assumption has not yet been conclusively shown. The research team will assess the possible use and application of this data.

Recommendations

The main reason for delivering this trial as a BETA project was so that lessons could be learned from the process. Owing to its small scale, promotion and administration overheads were kept to a minimum and costs associated with the dongles were contained. This lean and low-cost trial has managed to generate a lot of data and prompted a determination on how to improve and scale the concept being explored.

Promotion:

Advertising and promotion would need to be expanded for a larger trial. It appears that many of the participants became aware of the trial through seeing the poster in Dublin City Council. Thus, the recruitment process was limited to one locality and one form of advertising. In order to reach a wider audience, increase the number of respondents, and ensure that the selection of participants is diverse enough to be representative of the driving population, a much more ambitious advertising and promotion campaign would be necessary. As online advertising can reach many more people with less resources than other methods, the focus should be on developing a strategic, online marketing campaign that can promote the initiative quickly and effectively, supported by the use of print media and perhaps radio advertisements. It is expected that greater awareness will lead to more respondents which would facilitate a selection process that is statistically robust.

Data Privacy

Establishing that personal data is obtained in the correct manner, stored securely and used in compliance with the General Data Protection Regulations (GDPR) formed a substantial part of this trial. The extent to which this component of the trial would absorb time and resources was not anticipated. It is recommended that for any future initiatives, sufficient time and resources are put in place in advance to make sure that data management is prioritised. It is also recommended that the dongle provider should have a greater role in managing the process of disseminating the dongles and the logistics of their installation. This could potentially reduce the workload for Dublin City Council and also the amount of personal data that they would need to receive. Also, with this in mind, it is advised that an extensive data management plan be specified as part of the contract between Dublin City Council and the dongle provider at the outset and that an external data protection consultancy be engaged to assist with the compilation of this contract and to carry out a Data Privacy Impact Assessment (DPIA).

Notwithstanding the recommendations suggested above, there are some lessons from this trial that Dublin City Council could learn from in relation to the methods used to recruit and communicate with respondents and participants. For example, rather than using a service like MailChimp to create an initial online form, Citizen Space may be a better choice as it is an established tool used regularly by Dublin City Council and the data can be easily managed, stored and deleted. In addition, it would be optimal if respondents could be contacted without having to use their personal email addresses. Upon selection, participants could be assigned a generic email address for correspondence. Procedures such as these could cut down on the personal data ending up in the possession of Dublin City Council; this approach is advocated as it aligns with a guiding principle of the GDPR which states that if personal data is not necessary for a process, it should not be procured.

It should be borne in mind that it is only pertinent data that should be collected; a practical guiding principle in this regard is that every effort should be made to remove extraneous data at the source. Such a policy would ensure that personal data kept to a minimum and could also serve to assure people that may feel uneasy about sharing their driving data. As one participant noted:

> *"I was happy to take part in the trial but I was also glad to hand the dongle back."*

As such, it is recommended that every action should be taken to work with the dongle provider to investigate ways to reduce the data collected to that which is absolutely necessary for the trial, and/or to provide better reassurances to participants in relation to what the data will (and definitely won't) be used for, and in relation to anonymising the data as much as possible.

Potential Future Trials - Behaviour Change

It is considered that one possible application of this technology is as a means of appraising the outcomes of behaviour change initiatives relating to speed limit compliance. In particular, this technology may provide a way to measure compliance with the new 30km/h speed limit (this was one of the original motivations for setting up the trial). Dongles could be installed in the vehicles of participants for a certain period prior to a targeted incentive being applied in order to build up a substantive baseline; left for the same period afterwards, the comparison would indicate if a change in driving behaviour has been achieved. While it is generally accepted that incentives are required to bring about a behaviour change, it should be noted that one volunteer of this trial reported that their behaviour was altered simply by having a dongle installed in the vehicle.

> *"I was conscious of the device and more aware of looking at speed limits on roads, even on roads I have travelled on for years."*

In addition, the data collected through the mood survey also seems to have made people think about their driving style. As one participant noted:

> *"I think when the survey piece came that did influence me a bit - particularly because it made me think about whether I was tired or distracted and to be a bit more conscious about my driving in those circumstances"*

However, although this method seems to be effective at inducing drivers to contemplate their actions, it requires volunteers to have a smartphone and to remember to do it after each journey. This is quite an onerous task and the general consensus from the trial was that it was not a realistic proposition. If the mood surveys are to be included in any future trials, it is recommended that drivers are prompted to give the feedback after/before a journey (by text or email for example) rather than leaving it to the drivers themselves to remember.

To advance the prospect of using this technology as a tool to improve compliance rates of the new 30km/h speed limit, a follow-up trial is being considered. Lessons learned from this initial trial will be adopted when considering the structure, scope and objectives of a new trial. A request has already been made of the dongle provider to submit an outline of how such an incentivised scheme could work; not only would driving data need to be collected but a methodology to evaluate the performance of drivers with regard to the speed limit of each location would have to be established. An exercise such as this represents a significant step up from the generic data processing capability offered by the dongle providers and a departure from their usual role as a software supplier for fleet managers. However, with the knowledge gained form this trial, it is hoped that a new application for this technology can be developed and that speed management via telematics dongles will become a viable proposition for Dublin City Council.

Report by: Barry McCann, Engineer,
Policy, Strategy and Innovation section, Transportation.

Shane Waring, Coordinator,
Dublin City Council BETA, Transformation Unit.

Appendix 1 – Metrics

	**Dublin City Council costs** This trial cost €430 – consisting of the cost of hiring the dongles for the duration of the trial.
	**Installing & Returning** Of the 7 (out of 14) participants that were allowed to install the dongles themselves without any DCC staff presence, all noted that it took under 1 minute to do so. 2 participants mentioned that the instruction leaflet was not helpful. 1 participant reported that the dongle had been knocked out of the port during their trial period – but that it was easily refitted. 13 of the 14 dongles were returned. 1 dongle was lost. 3 participants were supplied with self-addressed envelopes to help us to explore whether that method might work. All 3 returned the dongles by post using the envelope.
	**Driving** The 14 participants took a total of 9,456 trips, covering a distance of 57,000km over 1,840 hours of driving.
	**Participant Perception** 6 of the 14 participants clicked on the hyperlink to set up an account for access to their driving data. 1 of the 6 participants reported difficulty in setting up the account, and so were unable to view their data.
	**Participant Participation** At the end of the trial, an email was sent to each of the 14 participants with a list of questions about their experience and 6 responded. 3 of the 6 respondents noted that they considered themselves to be more compliant drivers by the end of the trial. 1 volunteered the information that he would like to take part again. The Citizen Space online questionnaire was answered by 10 out of the 14 participants.
	**Scalability** 23 people expressed an interest in taking part. It's impossible to exactly gauge public demand at the moment for various reasons, including not knowing how many people heard of the project in the first instance, how many saw the posters and what impact the design of the poster had on their interest, and so on. We do, however, have some numbers from social media. We, know that 6,355 people saw posts about the project and that 194 of them (3%) interacted with the post (such as opening or clicking on a link) and that 7 of them ultimately signed up. That could suggest an interaction rate of 3% and a final signup rate of 0.1%.

Appendix 2 – Volunteer Recruitment Poster

DUBLIN CITY COUNCIL DRIVING DATA TRIAL

DRIVERS WANTED!

Dublin City Council will shortly commence a trial project with the aim of gathering driving data of people who use a car in and around the city. The data will be gathered via wireless dongles – small devices similar in size to a USB key. The dongles can be easily fitted to the vehicle's On-Board Diagnostic (OBD) port, usually located under the dashboard on the driver's side. We expect that this data will be useful as a means of establishing baseline driving behaviour and will enable us to learn more about driving in the city.

A number of volunteers are being sought for this trial. We will be looking for a mix of jobs and lifestyles (eg commuting, driving for a living, school runs, older drivers etc). We'll also be seeking diversity in gender, age, profession, lifestyle, distance to city and so forth. You will need to agree to have a dongle installed in your vehicle for the duration of the trial and to allow us access to the data. Analysis of the data will facilitate the development of a methodology for rating driver behaviour.

If you are selected to take part in this project, the data captured by the dongle will be anonymised before it is passed to a project research team in the University of Limerick. We'll also fully involve you in the study, so that you can see what we've been able to learn!

Our first priority is to learn about the installation phase. The dongles can be fitted by the participant if they are confident to undertake this task or by a member of our project team. In that case, the vehicle will need to be brought to Civic Offices, Wood Quay, Dublin 8 for installation.

Our second priority will be to explore the usefulness of the data that we receive and to establish what needs to be tweaked and how the process can be improved.

The trial should last no longer than two months. At the end of the trial, we'll arrange for the removal of all dongles from vehicles.

If you are interested in taking part in this trial, please visit the DCC Beta Projects website at www.dccbeta.ie *before 11th June 2018* for more information and to register your interest.

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

BETA PROJECTS

University of Limerick

Transpoco

Appendix 3 – Original Recruitment Form

Driving Data - Beta Project

The below information is required to help us pick a spread of different types of people to take part in the trial. Your data will be kept safe, and will not be used for any other purposes without your prior consent.

First Name

Email Address

What type of vehicle do you drive?

Where do you live?

Why are you interested in this Beta Project?

Briefly describe your weekly driving routine.

Do you drive regularly into/through Dublin City?

- ○ Yes
- ○ No

Untitled

Which of the following do you do most weeks?

- ☐ I commute by driving. (I take roughly the same journey every day.)

Untitled

Which of the following do you do most weeks?

- ☐ I commute by driving. (I take roughly the same journey every day.)
- ☐ I often complete a school run by car.
- ☐ I drive during my work-day. (Eg you might drive to meetings.)
- ☐ I drive for a living. (eg taxi, deliveries, etc)
- ☐ I drive at weekends for leisure reasons.
- ☐ I drive regularly, but don't do any of the above.

Subscribe to list

Appendix 4 – Dongle Installation Information

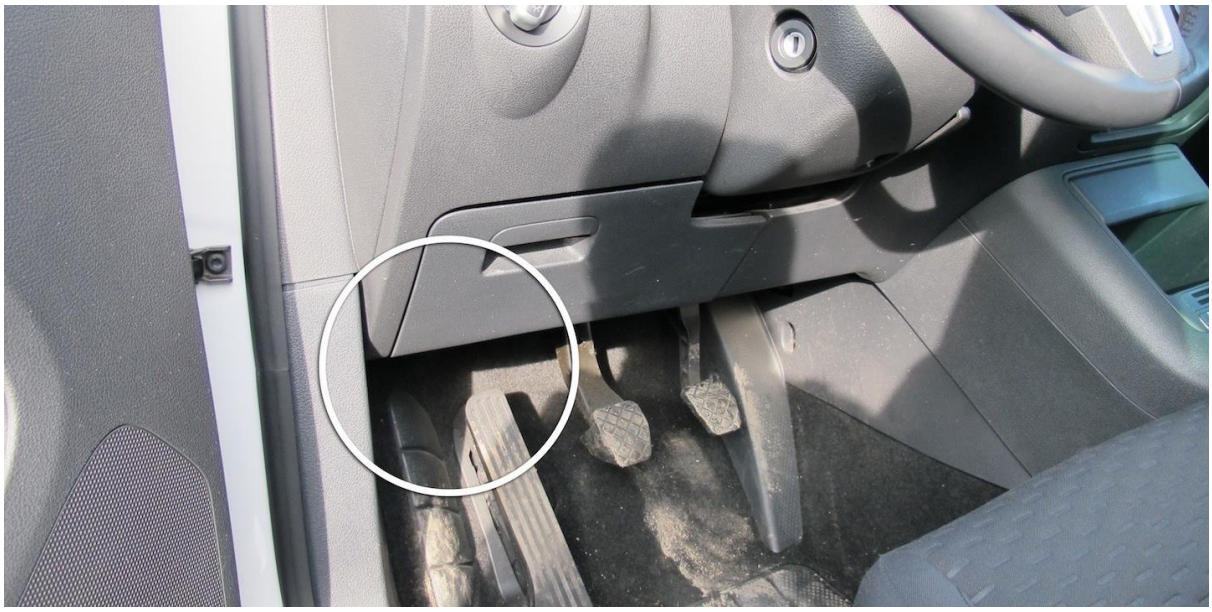
Telematics Driving Data Trial

Dear Participant,

Thank you for taking part in this Driving Data project, being run as a Dublin City Council BETA trial.

The telematics unit included with this information leaflet is a small electronic device which is used to record and monitor driver behaviour. It fits discreetly into the car. The device measures and passes on details of how the car is driven. Data measured includes time, data, location coordinates, braking frequency and force, cornering and acceleration. This data is used to determine your driving behaviour and calculate a driver score.

The IMEI code for this device is **864547034925391**. In most cases, the device will simply connect to the car's OBD-II port or On-Board Diagnostics port. Once the device has been installed we will send you a confirmation text and e-mail confirming the device has been properly installed. In a VW TIGUAN, the OBD port is located just above the accelerator pad. An image showing the location of the port is provided below.



The data collected by the device will also be used to test the logistics involved in the installation and/or removal of the devices and testing the accuracy of the detection. All data transmitted to and from the device is secure.

During the trial, we may send you short questionnaires in order to assess your mood while driving. The purpose of this exercise is so that a measure of how mood affects your driving can be captured.

The device is the property of DCC and is for use by you for a period of up to two months to monitor your driving behaviour. Please install the device in your car within 3 days of receiving it and ensure it remains installed for the duration of the trial. Please return the device when the trial is completed or when requested.

The device should be returned in the envelope provided to *Barry McCann, Dublin City Council, Block 2 Floor 7, Civic Offices, Wood Quay, Dublin 8.*

Appendix 5 – Citizen Space Questionnaire

1. Email address?

If you enter your email address then you will automatically receive an acknowledgement email when you submit your response.

Email

2. Gender?

- ○ Male
- ○ Female

3. Age Bracket?

- ○ 17-24
- ○ 25-34
- ○ 35-44
- ○ 45-54
- ○ 55-64
- ○ 65-74
- ○ 75+

4. Employment Type?

- ○ Office-Based
- ○ Drive for a living
- ○ Working from Home/At Home
- ○ Full-Time Student
- ○ Retired

Other (Specify)

5. Are you the main driver of the vehicle?

- ○ Yes
- ○ No

6. How many other drivers use this vehicle?

- ○ One
- ○ Two
- ○ None

7. What type of Driving Licence do you hold?

- ○ Full Irish
- ○ Provisional Irish
- ○ Full EU
- ○ Full UK
- ○ Other

8. For how many years have you held a Driving Licence?

- ○ 0-2
- ○ 2-4
- ○ 4-6
- ○ 6-8
- ○ 8-10
- ○ 10+

9. What is the make of your vehicle (e.g. Audi)?

10. What is the model of your vehicle (e.g. A4)?

11. What is the year of manufacture of your vehicle (e.g. 2008)?

12. What is the engine size of your vehicle (e.g. 2.0 L)?

13. What is the fuel type of your vehicle?

- ○ Petrol
- ○ Diesel
- ○ Electric
- ○ Hybrid

14. Approximately how many kilometres do you travel each year?

- ○ Less than 5,000km
- ○ Between 5,000km and 10,000km
- ○ Between 10,000km and 15,000km
- ○ Between 15,000km and 20,000km
- ○ More than 20,000km

15. For which type of journey is the vehicle most often used?

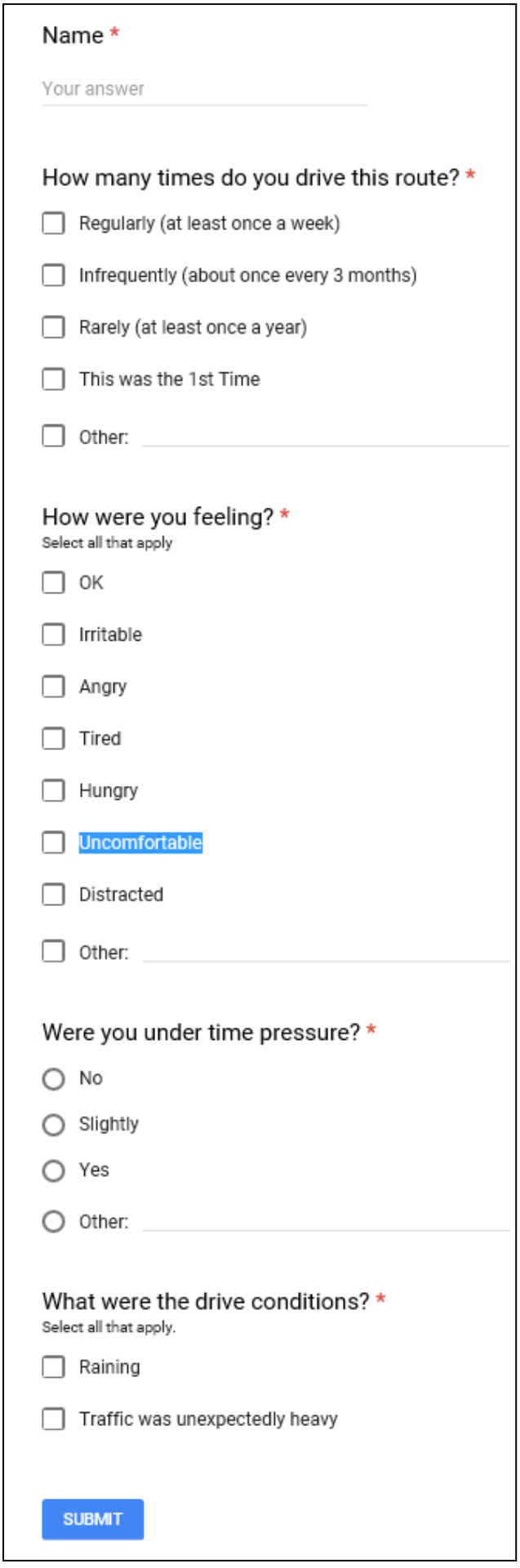
- ○ Commute
- ○ School Drop-Off
- ○ Leisure
- ○ Use vehicle for work

Other (specify)

16. How would you rate your current driving safety level?

- ○ Excellent
- ○ Good
- ○ Average
- ○ Poor
- ○ terrible

Appendix 6 – Google Form Mood Survey



Name *

Your answer

How many times do you drive this route? *

- [ ] Regularly (at least once a week)
- [ ] Infrequently (about once every 3 months)
- [ ] Rarely (at least once a year)
- [ ] This was the 1st Time
- [ ] Other:

How were you feeling? *

Select all that apply

- [ ] OK
- [ ] Irritable
- [ ] Angry
- [ ] Tired
- [ ] Hungry
- [ ] Uncomfortable
- [ ] Distracted
- [ ] Other:

Were you under time pressure? *

- ( ) No
- ( ) Slightly
- ( ) Yes
- ( ) Other:

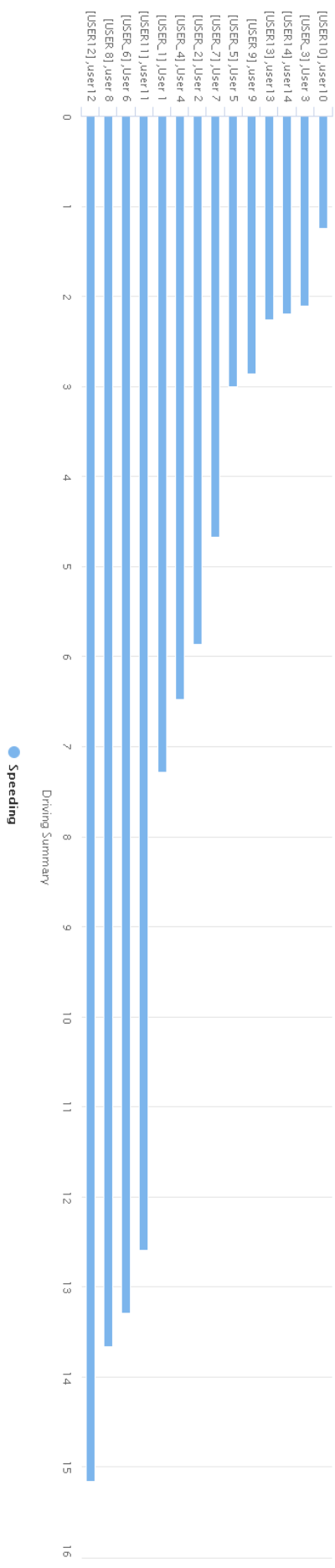
What were the drive conditions? *

Select all that apply.

- [ ] Raining
- [ ] Traffic was unexpectedly heavy

SUBMIT

Appendix 7 – Driving Speed Summary



Click on numbers bellow to check detailed info

Rank	Vehicle	Speeding%	Score%
1	[USER10] user10	1.24 %	98.76%
2	[USER_3] User 3	2.11 %	97.89%
3	[USER14] user14	2.2 %	97.80%
4	[USER13] user13	2.26 %	97.74%
5	[USER 9] user 9	2.86 %	97.14%
6	[USER_5] User 5	3 %	97.00%
7	[USER_7] User 7	4.67 %	95.33%
8	[USER_2] User 2	5.86 %	94.14%
9	[USER_4] User 4	6.48 %	93.52%
10	[USER_1] User 1	7.28 %	92.72%
11	[USER11] user11	12.59 %	87.41%
12	[USER_6] User 6	13.29 %	86.71%
13	[USER 8] user 8	13.66 %	86.34%
14	[USER12] user12	15.16 %	84.84%