

Intelligent Speed Adaption design

09028

December 2009



Confidentiality

Please note that the copyright in the attached report is owned by TfL and the provision of information under Freedom of Information Act does not give the recipient a right to re-use the information in a way that would infringe copyright (for example, by publishing and issuing copies to the public).

Brief extracts of the material may be reproduced under the fair dealing provisions of the Copyright, Designs and Patents Act 1988 for the purposes of research for non-commercial purposes, private study, criticism, review and news reporting.

Details of the arrangements for reusing the material owned by TfL for any other purpose can be obtained by contacting us at enquire@tfl.gov.uk.

Research conducted by 2CV

Contents

Executive Summary	3
- Conclusions and recommendations (in summary)	4
Introduction	6
Methodology	8
- Sample	8
- Stimulus	9
Results	10
Context affecting response to ISA	10
- Respondents have a significant relationship with driving	10
- Drivers as the new persecuted minority	10
- Attitudes to safety on the road	11
- Peculiarities of professional drivers	12
- Why our drivers speed (and why they don't)	12
- Types of speeding	14
- How the speed limit is perceived	16
- Attitudes to current speed management measures	17
Response to ISA as a concept	19
- Initial response	19
- The different modes of ISA: summary of barriers and benefits	21
- Voluntary ISA	22
- Voluntary ISA, cost a barrier	24
- Advisory ISA	24
- Advisory ISA as an app on currently owned technology	25
- Mandatory ISA	25
- Multilateral mandatory ISA	26
- Geographical scope of ISA	26
- The perfect ISA	27
- Broadening the proposition	27
- Response to ISA from professional drivers	28
- Impact of TfL provenance on perceptions of ISA	28
Marketing ISA	30
- Target audience	30
- Positioning ISA	30
- Marketing messages	31
- ISA - the name	31

Continues on next page

Responses to the design	33
- Considerations for the physical design	33
- The impact of physical design on usability	33
- User interface (UI)	34
- Responses to proposed user interfaces	37
• Alternative UI: Smiles	37
• Alternative UI: Dials	39
• Alternative UI: Signs	39
• Alternative UIs suggested by respondents	40
• Use of audio warnings	40
- The perfect UI	41
- Understanding the disparity between this and previous research	41
Conclusions and recommendations	43

Executive summary

This report outlines results from a project commissioned by TfL to further explore drivers' attitudes towards Intelligent Speed Adaption (ISA) and specially to understand drivers' response to the design of the user interface.

This research clearly demonstrates the difficult context into which ISA is being launched. Drivers have close psychological relationships with their cars and with driving. In addition, many feel currently that drivers are being discriminated against, particularly in terms of "anti driver" legislation passed by the government. TfL need to take this into account when thinking about the functionality and design of ISA.

Speed limits are currently seen as more to do with penalisation than with safety by most. The general consensus is that speed limits do not in the main lead to safer roads. Certainly most feel that they are something which should be obeyed in order to avoid penalisation, rather than an especially useful safety measure. Drivers have confidence in their own ability and don't feel they need to be told what speed to travel at.

As stimulus in this research users were presented with a video outlining use of ISA with two possible modes:

- **Advisory** in which the device tells the driver what the speed limit is and whether or not they are exceeding the limit
- **Voluntary** in which the device limits acceleration if the speed limit is exceeded (but can be overridden)

2CV were also briefed on a third mode which was not specifically introduced in the stimulus of this research, but which respondents talked about spontaneously:

- **Mandatory** in which the device limits acceleration if the speed limit is exceeded and which cannot be overridden

The ISA system is received quite negatively by drivers. Most do not see a need for it and immediately find fault. However, this negative response is primarily driven by a negative response to the Voluntary Mode of ISA (in which ISA limits acceleration but can be overridden if this is deemed necessary). When the ISA proposition is unpicked, it seems that there is a role for an Advisory only ISA system, where the device simply alerts the driver to the speed limit and whether they are exceeding the limit, to be offered at a reduced cost either as a stand alone device or piggy backing another device (i.e. included in Sat Nav or produced as a Smart Phone app). There is limited appeal for a Voluntary mode of ISA amongst a minority of respondents, especially when the likely price of the device is taken into account.

On launch, to maximise take up of ISA the system needs to be positioned as something which will help drivers, rather than another incursion into driving liberties. The name and interface should support this.

In terms of the design of ISA, the hardware needs to be as unobtrusive as possible. Of the three User Interfaces (UIs) explored in the research, Smiles is the most well

liked and is seen as clear and simple. However, Smiles could stand to be improved by including an indicator of current speed.

Conclusions and recommendations (in summary)

- Overall, ISA faces a number of significant barriers: drivers worry about its usefulness, its safety and what it represents emotionally
- An Advisory only system would appear to have the broadest appeal amongst London drivers
- Whilst a full ISA system including the Advisory and Voluntary modes is interesting to a minority, price is a major barrier, this would indicate that that perhaps piggy backing current technology might be a better option
- Of the UIs tested, Smiles works best

Introduction

ISA software development began in France in the 1980s and has been trialled and evaluated in a number of different markets since, proving effective at reducing driver speed and incidents on the road. In May 2009 TfL commenced a trial of one of the latest ISA systems in an attempt to reduce speed and road accidents in the capital. Prior to this trial TfL developed one of the most comprehensive digital speed maps of any city.

The three types of ISA modes currently available are *Advisory*, *Voluntary* and *Mandatory* ISA. The *Advisory* ISA displays the speed limit to the driver via a digital map and GPS system in the vehicle, and is currently an add-on unit, similar to a sat-nav device. *Voluntary* ISA goes a step further, linking the speed limit information with the vehicle engine management electronics, and can limit the vehicle's performance once the speed limit has been reached. Under the Voluntary system the equipment can be switched off if the driver wishes so that the device does not affect acceleration. The *Mandatory* ISA differs in that the equipment cannot be switched off (except in case of emergency). TfL is sponsoring a trial of *Advisory* and *Voluntary* ISA within London.

This project focuses specifically on Voluntary and Advisory Modes. Mandatory is not intentionally covered in this research, however drivers do talk about it spontaneously and it is therefore mentioned at several points in this report.

Previous research conducted on behalf of TfL^{*1} has already explored and uncovered a number of barriers including concerns over the value, design and safety of the device particularly. However, there is a need to explore the barriers to the system in order to confirm and develop these learnings for TfL and the manufacturers. This research therefore explores in detail the barriers and motivations to use of the different systems and particularly identify opportunities to provide resolution to any of these issues.

To date a year long project has already been undertaken by TfL to understand and explore the London drivers' attitudes, motivations and barriers to ISA. Amongst other barriers to use a key finding from the previous research is that the current design of the user interface (UI) is widely disliked by drivers who find the smiley face 'gimmicky' or 'childish'.

This research explores these issues further in order to help develop a more user friendly design for the interface which is both likeable and fit for purpose.

¹ *Attitudes to and Understanding of Speed and Speed Management in London, LRSU research project, 2009.*

The key objectives of the project are:

- To further explore and provide robust feedback on drivers' attitudes and barriers to the ISA system to inform future development of the system
- To explore response to the old interface design and gather detailed feedback on the elements that prompt rejection of the system
- To explore response to new design ideas and collaborate with London drivers in the development of a new UI:
 - Level of appeal / likeability
 - Ease of use / intuitiveness
 - Simplicity
 - Performance on key design parameters: visceral, behavioural and reflective
 - Call to action / impact on behaviour
 - Safety / appropriateness for task.

Methodology

This project uses a qualitative methodology incorporating a mix of focus groups, depth interviews and paired depth interviews. Fieldwork was conducted 15th- 27th July 2009.

Sample

In total, 6 focus groups of 2 hours duration were conducted. In addition, 2 paired depths, each of 1.5 hours duration were conducted.

Group	Speed Attitude	Gender	Lifestage / Age	Location
1	Averse	Female	Pre-family	Outer London
2	Tolerant	Male	Younger Families	Inner London
3	Averse	Male	Older / post Families (including kids aged 17-21)	Outer London
4	Tolerant	Female	Older / post Families (including kids aged 17-21)	Inner London
5	Averse	Female	Younger Families	Inner London
6	Tolerant	Male	Pre family	Outer London
7*	Tolerant	Male	17-21 years old	Outer London
8*	Averse	Female	17-21 years old	Inner London

* Paired depths

In addition, the project includes 6 1 hr. depth interviews with business drivers:

- 2 x black cab/mini-cab drivers
- 2 x Light Goods Vehicle (LGV) Drivers
- 2 x fleet managers (who have ultimate responsibility for making decisions on purchases related to the fleet)

Stimulus

A common set of stimulus was used for all groups/ interviews:

- A short film (5 mins 13 secs). This video was specifically produced for this piece of research. It explains the purpose of ISA and shows the device in use (including the UI shown and disliked in previous research)
- An actual ISA screen
- 3 alternative UIs specifically designed for London ISA system (shown on laptop/ Plasma screen / projected).

Results

Context affecting response to ISA

Before looking at responses to ISA itself, it is important to discuss the context in which ISA would operate, specifically current attitudes to driving in general and specifically attitudes and behaviours around speeding.

Respondents have a significant relationship with driving

This and previous research with drivers conducted by 2CV shows how psychologically significant driving is for the majority of London drivers. Certainly, the attitudes to driving encountered in this research mirror what we have seen in the past.

People tend to have close relationships with their cars and with driving. Learning to drive has historically acted as a significant rite of passage for the average UK adult. It marks entrance into the adult world and with it brings both literal and metaphorical freedom: metaphorical in that it is symbolically empowering, literal in that it allows drivers to travel by themselves and on their own terms, to go where they want to go when they want. For all it continues to play this role:

"I don't know what I'd do without my car" – Female Speed Averse, 18-21

"I like getting into my car, having my music and driving." – Female Speed Averse, 18-21

Getting behind the truth of people's driving habits can be quite difficult. Only a tiny minority describe themselves as anything other than great drivers and most feel that they are brilliant drivers and can respond defensively when their driving is called into question.

Drivers as the new persecuted minority



Persecution is a common discourse underlying conversations with drivers. This is something that has been observed by 2CV both in primary research and in analysis of current media.

This discourse is frequently alluded to by drivers in this project: speed cameras, the congestion charge, congestion itself, traffic light phasing, road tax, the price of petrol, proposed measures such as toll systems and media attention to environmental issues are all frequently cited as examples of an unnamed "them" (probably the government) persecuting drivers. This sits alongside a similar discourse (which again frequently arises in this research, especially amongst drivers aged 35+ years) that the fun has been taken out of driving. There is the sense of yearning for the good old days of driving, when it is believed it was easier to speed,

when there was less congestion, before climate change existed and when there was more freedom for drivers.

We also observe a certain resignation on the part of drivers as they imagine an almost teleological progression as the freedom and fun of driving is chiselled away to the point of non existence.

“It’s only a matter of time until we don’t even control our cars any more” – Male, Speed Averse, older/post family

“What’s the point in even driving any more?” – Female, Speed Averse, older/post family

This sense of being persecuted affects responses to ISA as a concept and we predict would affect response to most speed management measures or legislation.

This would seem to have an impact on how ISA should be ‘marketed’ to drivers. In order to ensure that ISA isn’t seen as just another anti-car, anti-driver initiative, ISA will need to be positioned as something which is there to help drivers: it must challenge the opinion of drivers that it is intended to further spoil the experience of driving.

Attitudes to safety on the road

Drivers tend to spontaneously describe their driving as generally safe and only occasionally will describe what they do in negative terms. This is true across the board, from respondents with clean licences (who seem comparatively safe) to those who eventually admit to having had serious slips in judgement, lapses in concentration or even moments of aggression. As conversation with any driver progresses the reality of their driving behaviour comes out in stark contrast to their definitions of themselves as above average/ safe/ sensible drivers:

“Usually I’m very calm, but I can easily get into a mood. If something irritates me at home I can get stroppy, and then get into my car and just zip it down.” – Male, Speed Tolerant, 17-21

“I drive on the pavement if I need to get round a traffic jam” – Male, Speed Averse, post family

Interestingly, it seems to only be the almost wilfully dangerous drivers (especially young men and the truly speed tolerant amongst the sample) who immediately admit to dangerous, reckless, aggressive or “stupid” driving, even though their reported behaviour does not appear to be hugely different to the norm (or different in degree rather than in quality). Ironically then, it is these most dangerous of drivers who potentially are most self aware when it comes to their own dangerous driving behaviour.

“When you have an argument and you’re [annoyed] about something you do drive more dangerously.” – Male, Speed Tolerant, 17-21

Prior to the project we hypothesised that there may be significant differences between men and women in how they talk about driving. Within the sample, we found that attitudes and opinions tended to be in accordance with the amount they drive, the amount of experience they’ve had of driving and by age rather than by gender. Older drivers tend to report to having slowed down and moderated their behaviour over the years, while younger drivers are more likely to speed to great excess or just for fun. More experienced drivers, those who have (or claimed to have) driven a lot tend to feel more confident in making decisions around driving and while they will happily admit to dangerous behaviour are more likely to report that this is a conscious decision they have made based on their experience of driving.

Peculiarities of professional drivers

Professional drivers stand out as different to the rest of the sample for a number of reasons. Many have more of a vested interest in driving, if they drive recklessly they potentially put clients off (in the case of taxi drivers), or risk losing their licences and their livelihoods. They are also likely to spend far more time on the road than private drivers. This experience and familiarity can be seen to make them slightly complacent, but also makes them the most practised drivers within our sample. When these professional drivers decide to break the law in any way, they certainly feel that they are making informed decisions. In the way that they report their illegal behaviour, it seems that much of these decisions are genuinely informed, they seem more knowledgeable and more rational than non professional drivers. It is interesting that most will only speed in very specific (and limited) circumstances: in isolated locations, on roads which they know well, when they know there are no cameras and when driving “off peak” when roads are empty. Also, reported speeding (while obviously dangerous) tends to be quite minor: travelling at 5 mph above the limit rather than 10 mph above the limit.

Why our drivers speed (and why they don’t)

Without exception, all of our drivers eventually admit to speeding at one time or another. Speeding to varying degrees is accepted as a necessary part of driving universally amongst the drivers canvassed in this research. Admissions to speeding vary in degree of the severity of the offense alluded to, or at least to the perceived or claimed severity. Less severe instances of speeding include drivers pushing 1-5 mph over the speed limit just to stay at the same speed as others, or misinterpreting speed limits on the motorway.

“Sometimes it’s influence from other people. If you’re not going as fast as what they want, they get impatient and start beeping you. Most people are impatient drivers.” – Male Speed Tolerant, 17-21

More severe are instances of wilful and dangerous driving for the pleasure derived from speeding.

While all will admit there is some safety risk around speeding, the danger is seen by all as being very unlikely. Everyone understands that bad driving has far graver consequences in terms of safety than in terms of legality, but these former consequences are deemed far less likely to actually occur than the latter: one is more likely to get a speeding ticket than for example to kill a child.

The primary concerns around speeding are not therefore around collisions, but rather around getting caught and punished for illegal behaviour. This mentality is driven by two related issues, partly drivers' self-assuredness in driving and partly drivers' experience and how this experience constitutes empirical evidence as to which outcome is most likely.

In the case of self assuredness: if you feel that you are a great driver, you need not worry about having accidents. Many feel that they are making calculated decisions around what speed they travel at, irrespective of whether they are under or over the speed limit: most genuinely believe that they are driving safely even if they are regularly breaking the speed limit. As they believe they are driving safely, they also believe they are far more likely to get a speeding ticket than they are to cause an accident.

This feeling of self-assuredness is exacerbated by drivers' experience around the negative effects of driving. Every driver has some experience of the penalties associated with speeding, either direct (receiving points themselves), indirect (friends receiving points/ losing their licence). The presence of cameras makes people think more about the legality of speeding than about the literal physical danger speeding creates.

"I worry a lot about speeding. My friend didn't realise that you lost your licence after 6 points when you'd just passed. He lost his job without his car. It didn't ruin his life but it was a big setback" - Fleet Manager

A tiny minority do mention the fuel economy benefits of driving under the speed limit. However, when mentioned this is usually in the context of motorway/ dual carriageway driving where it is possible to travel at over c.60mph.

Types of speeding

The different types of speeding reported by drivers can be considered as falling into four broad categories:

- Conscious, wilful speeding
 - o Calculated risk
 - o Speeding for safety
- Unconscious, non deliberate speeding
 - o Careless creep (when a driver continues accelerating without concentrating on the speedometer and inadvertently, unconsciously exceeds the limit)
 - o Ignorance of limit

Calculated risk is the most commonly mentioned of these categories. This is where drivers decide that they know best and that they can or should break the limit. As discussed, drivers tend to feel confident in making decisions around safety in their driving. Thus, they sometimes choose to break the speed limit if they feel it is safe to do so and if they perceive that they are unlikely to get caught or if there is an especially pressing reason for them to take a risk. This type of speeding is more common on familiar journeys where drivers know the road, and therefore feel confident they know the risks they are likely to encounter. Many will also admit to speeding when there are few other vehicles or pedestrians on the streets either in the early hours of the morning or on quiet country streets.

“If I know the area well and I know there’s not a bend then I would speed. Sometimes you know you can get away with it.” – Male Speed Tolerant, 17-21

“If it was an emergency I’d like to think that I might (speed), but I also consider myself a good driver and I don’t consider that I’d put anyone at risk.” – Female, speed averse, younger family

There are various practical and emotional reasons why drivers might take risks by speeding. Practically, people speed because they believe that by doing so they will get to their destination more quickly. For some this can be a daily event, and even one which is seen as a natural, normal part of behaviour for someone with a busy life:

“If I’ve got loads to do or perhaps I’m running late then of course I’ll go a little bit over the speed limit.” – Male, Speed Tolerant, 17-21

“The times that we live in, everything is much faster, we want everything on demand. Everybody is rushing more, there are more things to do.” – LGV Driver

The more emotional reasons for taking calculated risk in choosing to speed can be more complex. The perceived fun of speeding is something that respondents talk about repeatedly, especially the younger, more genuinely Speed Tolerant male drivers. This is a much reported phenomenon and could play a role in many instances of speeding, even if a driver gives a practical explanation when quizzed

about their speeding behaviour. That is to say, while drivers may report that they were speeding because they thought it was safe to do so, the real reason may have been that they enjoyed the “buzz”.

In this research, several respondents happily vocalised a love of speeding to varying degrees:

“I love driving at 2 in the morning. There’s no one on the road, you can go as fast as you want.” – Male, Speed Tolerant, pre-family

Many respondents reference a *careless creep* in speed that they experience when driving (note, “careless creep” is our terminology and does not come from drivers). Drivers refer to instances when they are driving along at the speed limit without really concentrating, think to look down at the speedometer and realise they are exceeding the speed limit. In these instances, they tend to report that once they realise they are speeding they will reduce their speed. This can happen either on an empty road, (for example inadvertently driving faster when a high energy track comes on the radio) or when taking cues from the traffic around them: travelling at the same speed as other vehicles rather than following the speed limit or deciding the appropriate speed for themselves.

“I’ll be cruising along on the motorway, in my own little world, and I’ll look down and see I’m going at 85, and it scares me because it really doesn’t feel like it.”
– Female Speed Averse, 17-21

In some instances, respondents claim *ignorance of the limit* has caused them to speed: they have either not known the speed limit or they’ve got it wrong. Drivers feel they know the speed limit, but sometimes obscured signposts, road works, or not being sure whether a specific street counts as a built up area leads to confusion. Frequently in these instances drivers only realise they have been speeding at all when they are caught or when they see a sign.

Some report feeling duped by the government: that local authorities or the DfT deliberately make speed limits confusing as a way of generating revenue from fines.

The final type of speeding, *speeding for safety* (again, this is our terminology, not drivers) is normally only mentioned when respondents start to discuss the use of ISA in Voluntary Mode. People commonly talk about times in which it is necessary to speed in order to avoid accidents. The instance where this seems to be most common (although not necessarily the most commonly cited) is speeding in order to keep up with other traffic, for example travelling at 40 mph in a 30 mph zone because everybody else is travelling at c. 40 mph and feeling that it would be dangerous to travel substantially slower than the rest of the traffic. More commonly reported are instances where it is deemed essential to speed in order to accelerate out of danger. When pushed, drivers can come up with example occasions when this might be the case, however these sometimes feel quite contrived, almost as though they have been generated as rational objections to ISA itself, used to rationalise and make sense of what is really an emotional objection.

“If you’re coming over a cross roads and someone jumps the red you need to be able to accelerate away” - Male Speed Tolerant, younger family

While all claim to have had experiences in which they have needed to speed for safety, very few can cite real examples where this has happened. Irrespective of the truth of the objection, it is firmly held by almost all respondents. The idea of speeding as a measure to increase safety is also reflected in some of the language used in the homework exercise: “nippy” is a word frequently used to favourably describe fast driving.

How the speed limit is perceived

Our drivers do not seem to see the speed limit as an absolute limit which should be adhered to in all instances. Most feel that they can make an informed decision about what speed they should be travelling at. It is their perception that their judgement on speed is likely to result in driving which is either safer or as safe as if they had adhered to the legal speed limit. Furthermore, it is generally felt that the speed limit has little to do with safety, that speed limits are arbitrary and unessential and that the consequences of exceeding the speed limit are more likely to be penalisation (speed fines, penalty points) rather than collisions resulting in death or injury of themselves or others.

“I don’t believe that all collisions are because people are driving too fast.” – Male, speed averse, older/post family

Rather than as the limit above which you shouldn’t drive, the speed limit on any given road is generally seen as being indicative of the speed at which you *should* be driving. That is to say, in a 30 mph speed zone, drivers feel they should be driving at roughly 30 mph, rather seeing 30 mph as being the upper limit of a suggested range of speeds of, say, 20-30 mph (and that therefore perhaps 25 mph, not 30 mph is the optimum speed).

This isn’t something explicitly stated by respondents, but it is a quite clear subtext to conversations about speed and speeding. It has implications for ISA as even in Advisory Mode, when ISA tells you that you are at the speed limit, it is effectively validating a (mistaken) belief that drivers are expected to drive *at* and not *under* the speed limit.

Attitudes to current speed management measures



Drivers spontaneously talk about speed management measures as a danger and an irritation when driving. They commonly talk about speed management measures which have a physical agency on the car, particularly traffic humps, and measures which directly lead to penalties (i.e. speed cameras and police speed traps). Less commonly mentioned are the less tangible speed management measures (narrowed sections of road, speed limits, traffic light

phasing etc.).

Speed management measures bare the brunt of lots of frustration from drivers. Speed cameras are almost universally seen as a way of exploiting drivers; that they are used to extort fines rather than to make the roads safer. While drivers concede that cameras do make them slow down, which is on some level a good thing, they are still frequently seen as unnecessary and just an irritation. Some also report that speed cameras have a negative effect on their driving, particularly those who talk about driving above the limit and then decelerating dangerously quickly at a known speed camera. This seems to be a deferral of responsibility for their own driving behaviour: blaming the cameras instead of taking the blame themselves.

Speed humps come in for criticism as well: again, they are similarly seen to encourage dangerous driving. This can be either in terms of rapid acceleration and deceleration, or cars being driven into the centre of the road to avoid bumps:

"I just go as fast as I can between them, then I slow down for the bump. It's a waste of time it makes it more dangerous" – Female, older/post family, Speed Tolerant

Speed bumps are also disliked for being bad for your car, insofar as they are seen to damage suspension (strangely though, the drivers who make this objection seem unaware that if they simply drove more slowly over speed humps this would not be a problem). There are a few limited mentions of their being indiscriminate. Speed humps are physically indiscriminate in that they slow down emergency vehicles as well as private traffic, and temporally indiscriminate in that they have as much of an effect when the roads are quiet (when speeding is perceived to be safe) and when roads are busy (when there is more of an obvious risk).

Speed signs are also occasionally cited as inadequate. Some, especially less experienced drivers, claim it is frequently difficult to know the speed limit. This can be a problem with signage (signs are obscured, infrequent or confusing) or a problem with judgement (perhaps the driver will know they shouldn't drive faster than 30 mph in a built up area but is unsure as to what constitutes a built up area). The most experience drivers, especially those who drive professionally, claim to know exactly the speed limit in the vast majority of instances.



Interestingly, one of the more popular and frequently referenced speed management measures/ devices is the in-car speed camera detector, “Speed Angel”. Many drivers use this technology, either in the form of a stand alone device or as an overlay/ mode on their GPS. In the case of these devices, speeding prevention is much more about avoiding penalties than about safety. Drivers claim that the only impact on their driving from these is that they slow down for speed cameras, rather than drive more slowly in general.

Response to ISA as a concept

In this section the reaction to ISA at a conceptual level is explored: how people respond to it as an idea. The report then goes on to look at design and marketing separately.

Initial response

In the stimulus video ISA is presented as one device with two modes. This is significant as initial responses to ISA are based on the net of the whole system: Advisory, Voluntary and (an imagined, possible) Mandatory system. It is only once we tease out the difference between different modes, different prices and different ways of positioning the ISA system that we start to understand the peak points of appeal and dislike and how ISA could be used by drivers.

On first watch of the video, we observe tutting, sucking of teeth, giggles and raised eyebrows. It has a powerful visceral non verbal response. To an extent it is possible to gauge response just by looking at how people behave and listening to their mutterings and comments: a resigned and amused antipathy.

While comprehension is good, initial response tends to be focussed on the Voluntary Mode of ISA. The response to Voluntary Mode is negative, on both an emotional and practical level, and as such leads to a very negative initial response to ISA overall, even though further exploration allows respondents to find some good in the concept.

It is apparent that the different modes seem to represent different propositions to respondents. When examined, ISA and its different modes seem to divide into separate ideas. Once price has been discussed, and the idea of running an ISA type system on an existing piece of technology has been raised (either by the researcher or respondents) ISA can be thought of as falling into four quite distinct propositions.

- **Voluntary ISA:** as described in the stimulus video; talks to your engine management system and automatically stops the vehicle from accelerating if breaking the speed limit, but which can be overridden (this could be switched to an Advisory Mode)
- **Advisory ISA:** a system based on a stand alone device (similar to a GPS) which does not communicate with the engine, and simply advises the driver as to the speed limit in any area and possibly the speed they are travelling at
- **Advisory ISA (on existing technology):** an app (an application, “widget” or downloadable program) designed to run on a device already owned by the user (using a smart phone or sat nav device). The device would not communicate with the engine, but would simply advise the driver as to the speed limit in any area and possibly the speed they are travelling at.
- **Mandatory ISA:** talks to your engine management system and automatically stops the driver from accelerating if breaking the speed limit and which couldn't be overridden (NB: this wasn't something the research specifically introduced respondents to or something we probed, but an idea which came up spontaneously in a number of groups).

- **Multilateral Mandatory ISA:** as with “Mandatory ISA” above, but supported by legislation which makes it compulsory for every car to use.

The different modes of ISA: summary of barriers and benefits

Before looking at each aspect of ISA in detail, in summary the perceived benefits and barriers to each mode/ system are:

		Voluntary ISA	Advisory ISA	Advisory ISA (on existing technology)	Mandatory ISA
BENEFITS	Reduces the likelihood of getting a speeding ticket	✓	✓	✓	✓
	Makes it much less likely that the driver will get a speeding ticket	✓			✓
	Helps the driver to stay informed	✓	✓	✓	✓
	Makes driving safer by alerting the driver to dangerous behaviour	✓	✓	✓	✓
	Makes driving safer by preventing speeding	✓			✓
	Uses equipment I already have			✓	
	Isn't too expensive		✓	✓	
BARRIERS	Might make driving erratic/ unpredictable	✓			✓
	Means that drivers cannot accelerate out of dangerous situations	✓			✓
	Seems to be telling the driver what to do	✓			✓
	Too expensive	✓			✓
	Another gadget in the car	✓	✓		✓
	Will increase journey times	✓			✓
	Will make driving less fun	✓			✓

Voluntary ISA

As discussed, it is the idea of Voluntary ISA which generates most conversation and is the focus of initial response. The vast majority of respondents react negatively to Voluntary ISA on both an emotional and rational basis. It is seen as a further infringement of the rights of drivers (and their right to break the law!), an instance of “nanny state” and an unwelcome incursion into their physical and emotional space.

“I don’t think I like to be told how to drive. When you take your test, you are adult enough to drive. It’s all a bit nanny-state.” – Female, speed averse, younger family

Voluntary ISA directly challenges people’s self perception as good drivers: the existence of the system and the suggestion that it should be installed in their cars makes drivers feel they are being got at, that their driving is being criticised, that they are being patronised and told what to do. Driving can be a significant part of personal identity so the implicit criticism of drivers’ driving inherent in ISA can feel like a personal confrontation and slur.

“This is the Big Brother of motoring.” – Male Speed Averse, older/post family

More specifically there are concerns that Voluntary ISA will (most obviously) just slow you down, spoiling driving and making journey times longer.

Drivers believe that by being forced to drive more slowly, you will become an irritation to other drivers and thereby become a potential victim of road rage, that is to say they will be at the receiving end of aggressive behaviour, either in terms of driving (being cut up, dangerously overtaken), non physically abused (unnecessary use of horn, gesticulation, shouting etc.) or even physically abused.

Furthermore, Voluntary ISA is seen as potentially dangerous. Drivers have concerns that it will make their own driving erratic. While the stimulus used in the groups stresses the smoothness of driving with ISA, this is still a concern and forms a key barrier to ISA: by making your car accelerate and decelerate unpredictably so that other drivers cannot predict your behaviour, ISA will make your driving *more* not less dangerous.



Interestingly, those with experience of cruise control, or the new programmable speed limiters (currently available on Mercedes and Jeep cars) are far less concerned about this aspect of ISA. In fact, they frequently contradict drivers who claim ISA will be dangerous for this reason, almost trying to convince them that it will not be a problem in reality.

Perhaps more seriously at least in the minds of drivers are the alleged instances of “speeding for safety”. Drivers repeatedly claim that ISA will limit their speed in a potentially dangerous way: that if required they will not be able to accelerate to escape a dangerous situation.

“That’s just dangerous.” - Common

“I don’t like the idea of it interfering with my driving. I can’t accelerate out of a situation.” – Female, speed averse, younger family

While an override function potentially mitigates this, almost all drivers have concerns that it would not be sufficiently instinctive/ easy to use as to be useful in an accident. Drivers talk about their driving in such situations as being something instinctive, almost as though the decision to speed for safety was like a reflex arc.

In the face of these perceived barriers/ problems, drivers do understand that the system could be permanently overridden by changing mode. When they think about how they would use ISA in reality, most imagine that that they would always tend to drive in Advisory Mode not Voluntary Mode. This makes them further question the usefulness of ISA:

“I’d need to be able to turn it off so I wouldn’t get into difficult situations, but then what’s the point in having it when I would just turn it off?” – Male, speed averse, older/post family

In addition to finding specific drawbacks to the idea of Voluntary ISA, the majority fail to see a benefit for themselves: dismissing the idea that ISA would positively impact on their driving. As discussed, most feel that they are driving safely already, that they’re not speeding dangerously, and that if they know how to avoid speed cameras, there is no reason why they would need a Voluntary ISA system.

That said, whilst many do not see a great need for ISA for themselves, they can imagine it would be good if other road users had it installed. It is felt by many (especially those with children of or approaching driving age) that Voluntary ISA will help young drivers to avoid making mistakes while they are still inexperienced, help them recognise when their driving might be reckless and help them learn to drive better.

“I’m getting this for my daughter just for my peace of mind.” - Black cab driver

A slightly cynical note creeps in when many also point out that it’s bad drivers who would most benefit from ISA, particularly young and reckless drivers, and it’s these same drivers who are most likely to override the system and just turn it to Advisory Mode. This gives rise to the suggestion that perhaps ISA could be introduced as a mandatory measure to punish and rehabilitate repeat driving offenders: ISA which cannot be overridden (this is discussed later on).

It is only a minority of drivers who see a benefit specifically in relation to their own driving and could imagine using it regularly and usefully. Particularly they see a benefit in that they understand that Voluntary ISA will help completely cut out instances of careless creep speeding (where a driver gradually accelerate above the speed limit without really realising) and of speeding caused by not knowing the

speed limit. This is seen primarily as helping them avoid speeding fines, but is also seen as having a marginal benefit in improving safety.

“Well, unless they’re [taking liberties] we normally pay our drivers’ fines, so this could pay for itself in a year.” Fleet manager

Voluntary ISA- cost a barrier

Furthermore, a major problem with Voluntary ISA is the cost. While 2CV were advised prior to the research that the costs of Voluntary ISA would be dependent on actual uptake, and could cost as much as £1,000 in this research we explored an indicative cost of £500. Only one respondent (a black cab driver) in this research would imagine paying in excess of £500. A handful become more enthusiastic at about £200 (including a fleet manager and some of the older private drivers), but most of those who like Voluntary ISA (and that is a minority within the sample) would only be willing to spend around £50-£100 on the system.

Certainly, even those who are most enthusiastic about Voluntary ISA feel that a purely Advisory system, which told you the exact speed limit, your current speed and whether you were going too fast but which was substantially cheaper (c. £50) would be better value for money and probably a better option.

Advisory ISA

The ISA Advisory Mode is far more positively received by most. The majority quite like the idea of a purely Advisory ISA system (i.e. with no Voluntary Mode). Most of the drivers in this research imagine that they would not use Voluntary Mode anyway, so wouldn’t want it included in the system and especially not if they had to pay for it. Even for those who actively like the Voluntary Mode of ISA, providing an Advisory only ISA at a greatly reduced cost is more appealing than a fully functioning ISA which includes Voluntary Mode.

Assuming an approximate price of £500-£1,000 for ISA with Voluntary and Advisory Modes compared to a price of £50-100 for a version of ISA which only has Advisory Mode, the overwhelming majority prefer the Advisory only version of the device.

Advisory ISA is felt to provide the same potential benefits as Voluntary, albeit without the certainty (i.e. you are far less likely to go over the speed limit, but it cannot *infallibly* ensure that you don’t go over the speed limit to the extent that Voluntary can). It will help you avoid speeding through careless creep and not knowing the speed limit by alerting you when you start to speed. It also acts almost as just another gauge/ navigational aid: telling you what the speed limit is, and whether you are over or under.

“I’d probably have it in advisory mode, but I’d be perfectly happy for it to beep if I went 10% above the speed limit.” – Male, speed averse, older/post family

Advisory ISA is almost universally preferred over Voluntary ISA. The benefits of a standalone system over a system which “talks” to the engine are clear. Emotionally it feels like the system is less telling you what to do, less bossing you, and more about helping out. Practically, the imagined problems around Voluntary ISA stopping you from speeding for safety to escape dangerous situations or making you drive in an erratic way disappear.

It seems that this version of ISA is preferred by the majority: an Advisory only system with no Voluntary Mode.

Advisory ISA as an app on currently owned technology

This is an idea which was informally introduced in some of the later groups and that arose spontaneously in others. Essentially, rather than buy a dedicated piece of ISA machinery, a similar system is run on a device which they already own. The most commonly mentioned is running ISA on Sat Nav, but there are very limited mentions of using Smart Phones (esp. iPhone).

Delivering ISA in this way potentially eliminates the barrier of cost, it also limits the amount of clutter drivers have in their cars. Some Sat Nav users feel they already have this insofar as their Sat Nav is programmed to tell them the locations of speed cameras and thereby avoid speed fines.

While the impaired accuracy of such a solution is discussed with drivers, most feel happy to make a compromise: slightly impaired accuracy but at a far lower cost.

On the basis of this research, it certainly seems worth further exploring the idea of a TfL iPhone app or overlay to Sat Nav maps. The dramatic reduction in “cost to entry” for the technology swings the cost/ benefit equation firmly to the side of ISA.

Mandatory ISA

Prior to the research it was agreed that the Mandatory mode of ISA would not be discussed (specifically because TfL are not trialling this in London). However, it is something which respondents come up with themselves and thus is discussed here. In discussions around Voluntary ISA, a “slippery slope” argument emerges. The sense of persecution drivers have leads many to see Voluntary ISA as the thin end of the wedge, and to imagine that a mandatory system will be soon be imposed on all drivers.

“Soon enough cars will just be driving themselves.” - Common

Most can see a specific role for other drivers: repeat speeders, young drivers and commercial drivers particularly.

“The wrong people will have it. It should be mandatory for new people coming into the country or young drivers, those who’ve just passed their test.” – Female, speed averse, younger family

Multilateral mandatory ISA

In several instances in the research respondents talk about the idea of a multilateral and mandatory ISA, that is to say legislation which makes mandatory ISA compulsory in every vehicle in the UK.

Based on the response to Voluntary ISA, it would be fair to assume that such an idea would get a very negative reception. In fact, it is met with more of a sense of resignation and mild frustration than with vitriol. The fact is that most can see that such a system would improve safety on the road, despite its drawbacks.

“The more I talk about it, the more I feel I need it.” – Female, speed averse, younger family

It seems here that one of the specific problems imagined with mandatory ISA is that it would be applied unilaterally: if you are the only driver with ISA installed it puts you in a dangerous or comparatively impaired position, whereas if everyone is in the same boat, it simply makes the roads safer.

Testing the reception to legislation enforcing the use of mandatory ISA for all drivers is outside of the remit of this research. Still, exploration of the idea does suggest two things: first that the reception to such legislation might not be as negative as one would expect and second (possibly more significantly) that the more people who have ISA installed, the safer and more accepted it will become.

Geographical scope of ISA

That ISA only works in London is a limitation to the system. ISA makes less sense if it does not work nationally, unless TfL's ISA is seen as a pilot or a first step towards national ISA.

This problem seems to arise for two reasons. First, while the drivers spoken to in this research make most of their car journeys within London it is when they are on unfamiliar roads outside of London that they feel that ISA would be most helpful. Second is perceived value for money: if the device only works in London, it represents poorer value for money than if the device works throughout the UK.

It is also worth noting that the sample in this research are not necessarily typical in the types of journey they make, insofar as they are making a significant number of journeys in London. Anecdotally in other research we have seen that a large number of London drivers, especially those in outer London make many more trips outside of the area of TfL's responsibility than they do in London itself, making a London only ISA potentially less appealing.

Suggesting that the TfL development of ISA is running alongside development by DfT can ameliorate these concerns: positioning TfL ISA as the first stage of national ISA coverage makes it feel far less limited to drivers. It is therefore important that

any system developed by TfL is subsequently compatible with any national speed limit maps published by DfT.

The perfect ISA

In order to optimise ISA, TfL should think about the cost/ benefit equation for the device: exactly what it does what the benefits and drawbacks of this are and how much it costs.

On the basis of this research, while it seems as though there is a role for a Voluntary ISA system which knows the speed and limits the engine accordingly, it would be too expensive for most drivers. It is only a very limited number of respondents who could imagine spending more than £200 on an ISA system.

This research suggests there is a much greater role for an Advisory only ISA at a dramatically reduced price with reduced functionality (i.e. not linked to engine management). This could work either as a stand alone device or built into an existing device (ie. Sat Nav or iPhone).

In addition, the perfect ISA will either work nationally (and not just in London) or be configured so as to be compatible with national systems as and when they are introduced by DfT.

Broadening the proposition

Again, thinking about the cost/ benefit equation for the device, appeal of ISA can be increased by loading more benefits into the proposition. This can be done literally by packing more functionality into the hardware itself, for example including a general navigational GPS, hotspot warning system (e.g. a system that tells the driver when they are approaching a school or a high collision area), speed camera warning system or traffic information ticker. Alternatively, it is suggested that ISA should entitle users to deals like reduced road tax, reduced car insurance or congestion charge exemption. Certainly “sweetening the pill” could encourage take up, although we understand that this may prove difficult in reality.

Response to ISA from professional drivers

As we have already touched upon, professional drivers tend to think of themselves as far more practiced and experienced than other drivers in the sample. Hence, it should come as no surprise that they are far less likely to feel the need for ISA themselves: they feel that they always know the speed limit and are unlikely to break it in what they consider to be a dangerous manner, or a manner which is likely to result in penalisation. The exception to this is one of the fleet managers we spoke to who feels that while she is perfectly able to gauge the speed limit herself, has some concerns about the drivers in her employ. She can see that ISA potentially has the effect of reducing her company’s outlay on speeding fines.

Interestingly, there is a sense that while professional drivers need the help of ISA less than private drivers, the stakes are higher for them. Points on the licence or a driving ban are a major inconvenience for private drivers, but can be potentially ruinous for professional drivers as this group are likely to need a (clean) licence in order to continue to make a living. This means that they are more amenable to anything which can help them to avoid penalisation, even if it would not necessarily have as much of an impact on their driving behaviour as it might on the driving behaviour of private drivers.

As with private drivers, however, cost of ISA would be a major barrier. As our professional drivers had not received tickets/ fines themselves for speeding they find it hard to imagine making a significant outlay on ISA: based on their personal experience it is unlikely that ISA justify a £200+ price. A cheaper advisory only ISA, or an ISA that runs on currently owned technology is more likely to appeal to this group.

Again, the exception to this is the fleet manager. Fleet managers can have more of a “bird’s eye view” of the situation and can see how much their company spends on staff retention, insurance, cars and speeding penalties. This means that the calculation of ISA’s worth becomes much more of a profit/loss analysis. Fleet managers must be convinced that ISA would save them money and not cost a huge amount.

Impact of TfL provenance on perceptions of ISA

The provenance of ISA has implications for how it will be received by drivers. As seen in other research, there is a degree of antipathy to TfL amongst drivers (although it is worth noting that we saw *less* antipathy to TfL amongst drivers than we would normally expect in such a project). Overt TfL branding may hinder attempts to market ISA as the Driver’s Friend, with the result that any other communications would have to work harder.

That ISA has been developed by TfL specifically also leaves the system looking quite limited: necessarily if the system has been developed by TfL it will only work in London. Drivers would prefer to see the system being developed by DfT, car manufacturers or motoring bodies (e.g. RAC) as such provenance immediately implies national compatibility/ coverage.

Marketing ISA

This research gives a clear steer on how best to position and market ISA. The way that respondents immediately respond negatively to ISA and warm to it when details are unpicked demonstrates how important it is that ISA is communicated in the most positive light possible.

Target audience

Based on this research it would appear that the target audience for ISA is likely to be defined more by attitudes to speeding and safety on the roads rather than specifically by demographics. It is those who are more reflective and less defensive about their driving who seem more willing to accept the help ISA could offer them. ISA is effectively a tool intended to bring about behaviour change so unsurprisingly it will hold most appeal for those who see that they have some reason to alter their current behaviour.

We saw these types of drivers across the different sub groups we spoke to:

- Anyone who has received penalty points for speeding and has realised that if their driving does not improve they are likely to lose their license. This typology is especially prevalent amongst younger male drivers.
- Anyone who has scared himself or herself by speeding when not really concentrating. We see drivers like this across the sample, but particularly respondents with families and those who have just learned to drive
- Professional drivers who feel their driving is generally exemplary but are honest enough to admit that they are not perfect

In targeting ISA we would recommend talking to all London drivers, but accepting that it will only appeal to those with certain attitudes to their driving.

In addition to those buying ISA for themselves, there is a secondary audience of people buying ISA for others: either businesses buying ISA on behalf of drivers in their employ, or concerned parents buying ISA on behalf of loved ones. Positioning ISA as a device which you could give to others to keep them out of trouble could be a compelling route in marketing.

Positioning ISA

Most of the objections to ISA seem to stem from an emotional attachment to the car and a feeling that Voluntary ISA is going to spoil their driving experience. When respondents discuss ISA, they tend to default to talking as though ISA is the boss of them, playing the role of a policeman in your car.

"It's bad enough being monitored by cameras and policemen [sic] and that. I don't want like a security guy in my car" - Male Speed Tolerant, 17-21

We would recommend that TfL position ISA more as the driver's friend, as something there to help you by sharing information, which recognises that you are a great driver already but can help you become even better. This would help avoid drivers reaching the conclusion that ISA is something which controls your car and that forces you to drive in a certain way. This in turn will help alleviate some of the concerns that drivers have.

Marketing messages

Key messages should be around avoiding speeding fines and penalties. As we have seen, while increased safety is perceived as a benefit, it is limited as few have experienced accidents first hand. Messages around speeding fines are far more relatable for drivers.

Messages around the environment (that ISA reduces carbon emissions) are dismissed as irrelevant and possibly untrue. Certainly, few link sticking to the speed limit with environmental behaviour, and even they doubt that ISA would make that much difference.

Messages around traffic flow are similarly dismissed when explored. Most feel that ISA will slow traffic down rather than help improve traffic flow.

ISA - the name



While ISA works as a descriptive, functional name it is felt by most that using the same acronym as a well known financial product is just peculiar. This does not constitute a gross negative: most understand the rationale for the name even if it is an odd choice. Still, there is a general sense that a name for ISA could work harder, supporting the positioning and communicating a more emotional message.

Speed Watch and Speed Advisor seem to work better than ISA. Both seem a little dry, but work to an extent. Speed Advisor is preferred by most: it is descriptive, suggests a purely Advisory role and does not imply that ISA will have a massive negative impact on driving behaviour. However it is seen as quite bland and is possibly the best of a bad bunch. Speed watch has specific negatives: as well as sounding rather like Bill Oddie's Spring Watch (very limited mentions by respondents) it can conjure up visions of a spy in your car, reinforcing fears that ISA feels too Orwellian.

The word "Speed" can bring with it negative connotations. Younger respondents read allusions to underground drug culture here, especially when the word is partnered with nouns like "buddy" or "angel". "Goodspeed", specifically explored in some of the groups suffers from this problem as well, and also can be seen as somehow encouraging speeding.

Overall the name should be friendly, should suggest helping (not imposing or telling) and should perhaps avoid specific mentions of speed.

Responses to the design

Responses to the design, physical and UI, are on the whole favourable. There are no sufficient objections from the majority of drivers. Similarly, there are no specific differences between different groups within the sample: for example the response of professional drivers tends to be in line with the response from other sub groups.

Considerations for the physical design



The car plays a significant role in drivers' lives. Drivers can spend a huge amount of time behind the wheel and as such the car has a tendency to become almost an extension of the home. For many there is a sense of being "house proud" when it comes to the interiors of their cars and therefore not wanting anything to encroach on their territory. It seems there are an aesthetic aspect and an emotional aspect to this.

In terms of aesthetic, someone has designed the interior to be a certain way, and so to change any element of the interior would be to make it less beautiful. In terms of emotional impact, if ISA is too obvious it feels even more like it has been imposed on the driver.

ISA needs to be designed in such a way that it limits the psychological and aesthetic intrusion into the car. In order to do this it should be as discreet and integrated as possible. Ideally, most would want ISA to be integrated at purchase, designed into the car rather than retrofitted (installed after the vehicle is purchased). Otherwise, it should follow current car interior design conventions that is to say it should pick up cues from other in-car technology (sat nav etc.), it should be as small as practically possible and should wherever possible not interfere with the way that the car looks.

While the physical design of the ISA unit is not the key priority for any of the drivers we spoke to: it is not the criteria by which ISA will succeed or fail. That said, it seems important that drivers are not given another reason to dismiss ISA: there are already lots of barriers to ISA and physical design could constitute another.

The impact of physical design upon usability

Evidently, the physical design of ISA also impacts the usability and the interface of the unit. For example, much of the legibility of ISA will come down to the screen size and position of the unit in relation to other meters/ dials. Similarly, assuming uptake of the Voluntary version of the unit, the mechanics and positioning of the override switch have an impact on perceived usability.

The override switch demonstrated in the video introduction to ISA is broadly disliked on aesthetic and practical grounds. While it is made clear that the switch in question is part of a prototype and shouldn't be taken as final, it still generates interesting feedback which has implications for the design of ISA. On an aesthetic level the switch shown is the very opposite of good design and integration. On a practical level, drivers have real concerns that the switch will be too difficult to use in a "speeding for safety" situation. As discussed, people feel that decisions taken in

these situations are almost instinctive and the button simply adds a level of complexity which would render the device unsafe. Other options discussed were the idea of a button on the steering wheel or an override fitted to the pedal. While both are seen as improvements on the switch on the dash board, both being more discrete and more direct, neither is without problem. The button is still felt to not be sufficiently immediate - the respondents still feel it would take too long to press it at the crucial moment. Also, there are concerns that installing a button may make the technology even more expensive. The pedal has the advantage of being completely integrated and unobtrusive, and would require less thought/ time in the heat of the moment. That said, it seems to make ISA pointless: if all one needs to do to override is put one's foot down, drivers feel they would just always override ISA, meaning it would seldom have any real impact on their driving.

Another problem noted is the size of the on-board computer. While the video reassures respondents that it would be stowable under the passenger seat, most still think of it as unnecessarily big and again as an unwelcome incursion into their car. Again, the size of the on-board computer is not the final factor which will determine the success or otherwise of ISA, but presents one more barrier which will sway drivers against the concept.

User Interface (UI)

As Voluntary mode is largely dismissed, when feeding back on interface designs drivers tend to imagine using the device primarily as an Advisory only system and this has specific implications for the UI.

A minority of drivers, generally those who are least enthusiastic about ISA and who are most precious about the appearance of their cars suggest that all Advisory ISA needs to do is display the speed limit in the given location, effectively acting as portable speed sign in the vehicle. This is the most empowering version of ISA, it symbolically leaves all the judgements and decisions to the driver, just giving them the bare facts rather than bossing them or nannying them. However, we feel that this request for "minimal ISA" is more symptomatic of a negative response to ISA at a conceptual level rather than a serious request.

The majority want an Advisory version of ISA which can:

- advise of the actual speed limit in any given location.
- advise as to whether the car is on, above or below the limit.

In addition, many respondents feel that there is a third, crucial piece of information which needs to be communicated: the current speed of the car. This is important: drivers want to know how much they are exceeding the speed limit or how much faster they can go and feel that having to compare two separate dials in two separate places could be an unwelcome distraction. This is especially true of some of the older and more myopic drivers in this research.

This is problematic: a large proportion of drivers request that the ISA shows how fast they are travelling, but we understand that this contravenes guidance on design of in car systems. However, based on feedback from this research, including a

speedometer within the ISA HMI which measures speed in addition to the built in speedometer in the car would be marginally better than not including one.

Functionally, these elements need to be brought to the fore and made most prominent, so that the driver can quickly gauge:

- 1) current speed limit
- 2) whether they are exceeding the current speed limit
- 3) the speed at which they are travelling

However, it will not detract hugely from the device if the 3rd cannot be seen.

These elements (if included) should be given a prominence on the device. Other elements such as whether the device is communicating with the satellite, what mode the device is in and whether the device is limiting acceleration can form a much smaller part of the display. In fact, the majority of respondents find these less immediately important elements a distraction and ask that they are removed entirely.

While the communication of the speed limit and actual speed of the vehicle will always require a degree of interpretation (that is to say, the driver will have to “read” the dial or written numeric display), it is commonly felt that the part of the display which indicates whether the car is driving too fast or “too slow” should be readable immediately and without interpretation:

“You need to be able to tell at a glance whether you’re going to fast or not” - Common

This immediate legibility could be achieved either by using very simple visual symbols or even sound. This is reflected in the response to the stimulus: Smiles is loved for its clear “at a glance” communication, while Signs and Dials are less liked simply because they are felt to require a little more interpretation.

In conclusion then, the elements of the user interface can be divided and prioritised as follows:

Element	Priority	Considerations
Too fast/ too slow indicator	Most important	Needs to communicate at a glance without any interpretation
Speed limit in present location	Second most important	Must be simple to read
Current speed	Third most important	Must be simple to read. NB: while this is requested by respondents, if legally it would not prove possible its absence would not hugely detract from ISA
Indication that device is talking to satellites	Limited/ occasional importance	Can be a very small part of display
Indication that device is affecting engine	Limited/ occasional importance	Only relevant for minority who imagine using Voluntary ISA

This chart translates to a brief for designers: it outlines what ISA needs to show and the relative space which each element should take up.

Responses to proposed user interfaces

As mentioned earlier in the document, previous research indicated potential problems with the interface used for ISA. In this project we look at three separate alternative UIs, Smiles, Dials and Signs.

- **Smiles** shows the speed limit in the current location and has a smiley face to indicate that the driver is under the speed limit. The smiley face becomes indifferent when the vehicle reaches the speed limit and then becomes unhappy when the speed limit is exceeded
- **Dials** again shows the speed limit in the current location and has a dial with an arrow pointing to a green arc to indicate that the driver is under the speed limit. The arrow turns clockwise to an amber arc to indicate the vehicle has reached the speed limit and turns further to point to a red arc to indicate the vehicle has exceeded the speed limit
- **Signs** shows the speed limit in the current location on a sign positioned above a depiction of a road diminishing as it approaches a horizon. When the vehicle is under the speed limit, the field behind the sign is entirely green. When the vehicle approaches the speed limit, an amber field (diminishing towards the horizon) is superimposed upon the green field. In turn, when the speed limit is exceeded a red field (again diminishing towards the horizon) is superimposed upon the amber field

Alternative UI: Smiles

On balance Smiles is the preferred of the routes, at least stylistically. Certainly when shown, it gets some laughs and some curious responses

"That takes me back to my rave days" - female, Speed Averse, pre family

"Old school!" - male, Speed Tolerant, 17-21

Despite criticisms however it is generally the best liked for its clarity, familiarity and simplicity.

The smiley face dynamic is well recognised and immediately understood: everybody interprets its meaning without any need to decode. It is a familiar way of suggesting approval or disapproval (or indifference) which most have been accustomed to since primary school. It's this familiarity which potentially makes it seem slightly childish, acting as a double edge sword: on the one hand Smiles are friendly on the familiar, but it is this which makes them feel patronising too.

More positively, the smiley face interface is something which some drivers are familiar with from other signage, particularly the Speed Indicator Devices which are becoming more common on Britain's roads.

This communication of speed (whether the car is above/on/below the limit) is felt to be really unproblematic and simple. All respondents immediately correctly interpret

what each of the screens means (i.e. that unhappy is too fast, happy under the limit). This clarity of communication is felt to be simple, but more importantly to be safe: the driver does not need to work to interpret the interface.

That the graphic is underscored using traffic light colours adds to this clarity. Many feel that just seeing a smudge of red would be enough to alert them that they were driving over the speed limit.

As well as clarity, Smiley faces can give an emotional benefit too. While some see them as childish or patronising, this view tends to be limited to those who dismiss ISA anyway. For the majority they are positively received by some as being cute and fun. This in turn can make ISA feel more driver friendly and more like something which is there to help. In this way the UI actually supports a compelling positioning for the device itself. On this basis Smiles significantly outperforms the other options.

The sign post element on the left of the screen is also incredibly clear and well received. This element is common across the three routes: each uses the familiar sign post dynamic to indicate the speed limit in current location. Again, this is universally seen as simple, familiar and easy to interpret. By using a common dynamic which is already a familiar part of the vernacular of road/ safety signage, you reduce the 'learning curve' associated with any new UI: talking to drivers in a language they understand rather than forcing them to learn a new one.

While emotionally "Smiles" works well, functionally it could stand to be improved



- Equal weight is given to the smiley face and to the current speed limit, the smiley face could be larger (meaning a driver would be more likely to see it out of the corner of their eye)
- As it stands (without indication of current speed) it tells you if you are going too fast, but not by how much.

A minority suggest a further level beyond the red angry face: would it be possible to have another level in which the face flashes or becomes very unhappy?

Of the routes explored, we would recommend that you go forward with Smiles over Dials and Signs. While Smiles is not without problems, the research shows that these objections cited by respondents specifically to the use of smiley faces are likely to be overstated because of unhappiness with the concept overall rather than any real objections to smiley faces.

Alternative UI: Dials

While Dials is understandably perceived as less childish and “cheesy” than Smiles it can be seen to be overcomplicated and more difficult to read. The dial is undoubtedly seen to be more professional and adult looking, has the advantage of feeling more related to motoring and to an extent overcomes the problem seen in



Smiles where the device does not tell you by how much you are over the speed limit.



Problematically, Dials is felt to need more interpretation than in Smiles: many are concerned that the UI is too difficult to read quickly and that the most important piece of information (that you are driving too quickly) risks being lost. While in the case of Smiles the interface is really easy to read and does not require interpretation, drivers feel that with Dials there is some working out to do. This is partially overcome by the large red segment which appears when the speed limit is exceeded, but not in as clear a way as with Smiles.

As with Smiles, the use of the road sign to indicate the speed limit in current location is well received as clear, familiar and very easy to interpret.

This is the second most preferred of the three routes explored, however it lacks any of the emotional positives of Smiles and is potentially more confusing.

Alternative UI: Signs



Signs is the least well liked of the three UI routes shown. It is felt to be confusing and to require too great an effort in terms of interpretation. Respondents don't “get it” at a glimpse and take this as an indication that it will be hard to use in practice. While Dials and Smiles both use simple and familiar mechanisms to indicate whether the driver is travelling too fast, Signs expects the user to learn a new mechanism. While in practice we imagine that drivers would quickly get used to the mechanism, the UI is immediately off putting for most. This is partly a limitation of the research: in real life drivers will have the opportunity to get used to the interface so that perhaps it becomes easier to use, but in the context of a focus group/ in depth interview, they do not have the chance to go through the learning curve and therefore judge the UI on the basis of first impressions, rather than in the way they might judge it after prolonged period of use in the real world.

The very clear use of colour stands out for some as a positive. As with Smiles, the use of traffic light colours to indicate below/on/above the speed limit is considered to be straightforward, and potentially legible “out of the corner of your eye”. Still, the fields of colour do not immediately make sense, leading to rejection of the interface.

Alternative UIs suggested by respondents

In addition to the routes tested, respondents came up with some ideas of their own. These ideas would require further development to be implemented. Without further exploration, none works as well as Smiles, however they do indicate potential directions and give some idea of what drivers are looking for from the UI.

- Colour alone to indicate over/on/above the speed limit
 - This option would work by using traffic light colours alone. This is a well liked route, but drivers understand that it would potentially be problematic for the colour blind
 - This idea again shows that respondents are looking for simplicity above anything else in the design
- Familiar road signs to indicate over/on/above the speed limit
 - This option would use familiar signs to indicate over/on/ above the speed limit. For example the exclamation mark sign could be used to indicate that the driver is travelling over the speed limit
 - As with smiles it uses a very familiar language and is easily interpreted by drivers.
- Familiar symbols to indicate over/ on/ above the speed limit
 - Another suggestion from drivers is to use commonly known symbols to indicate over/on/ above the limit. Specifically respondents suggest a tick, a dash and a cross. Potentially this would be as obvious and readable as smiley faces, but overcomes any problems with being seen as patronising and cheesy.



As none of these ideas were included in the stimulus, it is hard to recommend any as an approach, however each seem worthy of further exploration.

Use of audio warnings

When the idea of using warning sounds is explored, drivers are split primarily according to gender. It would seem that men really like the idea of an audio warning (a bleep when the car goes over the speed limit), and feel it would be a really intuitive and clear addition to the UI, particularly in that it would allow them to focus on driving rather than being distracted by having to look at the screen whilst driving. Women on the other hand tend to feel the audio warnings would be yet another distraction on top of many they already face. This could partly be explained by the differences in the types of journeys the women in this sample regularly make in cars: within the context of this project women are more likely to travel with other family members, ferrying kids to and from school, taking them with them as they run errands etc.. We hypothesise that this makes the in-car environment far noisier and more stressful for women than it is for men and that an audio warning would contribute to this.

“When you have kids, they’ve always got things that make bleep noises. We’ve switched our ears off to beeps.” – Female, Speed Averse, 17-21

We would recommend that audio warnings are included, but as an option: as something which can be turned on or off as the user desires.

The perfect UI

Of the three UIs tested, we would recommend going forward with the Smiley Faces route but with a couple of changes:

- The smiley face itself could be more prominent so that it can be seen from the corner of the eye (however use of colour may obviate the need for this)
- The current speed is not shown, this would be a welcomed addition (however if not possible due to DfT guidelines on in car UIs, not showing a speedometer would be an option).

Some respondents also suggest a fourth face could be employed: in extreme cases of speeding perhaps the face could turn into a scared face or skull. 2CV take this recommendation with a pinch of salt as in practice such a development may trivialise ISA.

Understanding the disparity between this and previous research

As indicated in the introduction to this document, previous research indicates that a similar UI, based on the smiley/ unsmiley face is roundly rejected by drivers. The verbalised reason for rejection echoes the negative response seen in the previous research: that the smiley faces were too childish and too patronising. While objections to a smiley are of the same kind in both pieces of research, they are very different in terms of degree. In the last piece of research, the UI was rejected, in this piece of research it is accepted and even liked despite seeming slightly “cheesy” and potentially patronising.

While it is hard to compare the response from these two different pieces of research, certainly there are a number of factors which could be driving this difference in response/ interpretation:

- Different stimulus was used in each piece of research. In this project we looked at a more finished version of the UI which potentially made the Smiles UI look more professional, and thereby more acceptable to respondents
- The last piece of research saw a very negative response to ISA as a concept. We feel that perhaps this led to a “baby with the bathwater” effect: respondents verbally objected to the Smiles UI, but this was perhaps another way of articulating their anger and frustration at the overall concept of ISA. In this project, we let respondents reconceptualise ISA, that is to say we allowed them to imagine it formulated in a way that it would be useful (and non threatening) to them. In this way, when it came to looking at UIs, they imagined a piece of equipment they actually wanted or at least could imagine owning, rather than something they disliked. This perhaps allowed them to assess UIs from a more positive stand point, rather than simply as another aspect of a system they resented.

- In the last piece of research, respondents were only shown one possible UI, whereas in this project they were shown three. Here respondents were given more of a chance to ponder the pros and cons for each UI. While the same negatives arise as did in previous research, in this project respondents could better reflect on the pros and cons of each approach and could therefore understand the positives of the Smiles UI as well as the negatives.

We would therefore recommend that out of the UIs shown you go ahead with Smiles, despite findings from previous research. As a disclaimer, it is important here to note that:

- Had we shown another UI which had the clarity and simplicity of Smiles, but without the negative “childish” and “patronising” associations it could have outperformed Smiles. We recommend Smiles as the best UI shown, and as “doing the job” rather than as the best *possible* UI for ISA
- Those who really object to ISA will still object to the Smiles UI (but would probably object to any UI)

Conclusions and recommendations

Overall, ISA presents a number of significant barriers: drivers worry about its usefulness, its safety and what it represents emotionally. It is seen in some quarters as an attack on drivers. It is important that how it works, what it looks like and how it is launched are carefully considered by TfL.

While this research explores a “full ISA” system in which drivers can choose between different modes (Advisory and Voluntary) on the basis of this research we would recommend an Advisory only system. This will have the broadest appeal amongst London drivers as it is seen more as a helpful tool for drivers rather than as another encroachment into the liberty of drivers. In addition, an Advisory only system is felt potentially cheaper than a “full ISA” which helps reduce the barriers to the technology. To help further reduce cost of the device, this research shows that it is worth exploring a version of ISA which simply piggy backs current technology (for example, an iPhone app, or ISA included in a SatNav system.).

This research touches on response to a multilateral mandatory ISA, that is to say a mandatory ISA which all UK drivers are obliged to use by law. This is surprisingly well received: there is a sense that if everybody had ISA it is more palatable. This project did not fully explore the idea of legislation around ISA but suggests that it is something which may be worth developing in the future.

Cars are significant possessions for drivers: they often exhibit a great sense of pride in their cars. Physically, the ISA should be aesthetically in tune with the interior of a car. It should either be well designed in itself to fit with modern car interiors or unobtrusive so it is hardly noticed.

In terms of marketing ISA it will be important to ensure that the device is positioned as being the driver’s friend: helping the driver to drive more safely and more proficiently rather than bullying them into a certain type of behaviour. This can be reflected in the way it is launched, its name and the way it is designed.

Above all else, the UI needs to be clear and legible. Hence, of the UIs tested, Smiles seems to work best, although there is room for improvement here. Smiles is seen as friendly, clear, familiar and easy to use. While some suggest it is patronising and “cheesy”, these comments seem to stem more from an objection to the overall concept of ISA rather than a serious consideration in assessing the different UIs.

While many suggest that for ease of use the device should include a speedometer (telling the driver their current speed), we understand that this may not be possible. Certainly it would not be essential for the overall success of ISA.