Centre for Connected
& Autonomous Vehicles

UK testing ecosystem for connected and autonomous vehicles - response form

The call for evidence is available at:
www.gov.uk/government/consultations/driverless-vehicle-testing-facilities-call-for-evidence

The closing date for responses is **31 July 2016**.

Please return completed forms to:

Centre for Connected and Autonomous Vehicles
1 Victoria Street
4th Floor, Victoria 3
London
SW1H 0ET

Email: callforevidence@ccav.gov.uk

Information provided in response to this consultation, including personal information, may be subject to publication or release to other parties or to disclosure in accordance with the access to information regimes. Please see page 12 of the consultation for further information.

If you want information, including personal data, that you provide to be treated in confidence, please explain to us what information you would like to be treated as confidential and why you regard the information as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the department.

I want my response to be treated as confidential ☐

Comments: Click here to enter text.

BIS/16/274RF

Questions

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	Respondent type
☐	Business representative organisation/trade body
☐	Central government
☒	Charity or social enterprise
☐	Individual
☐	Large business (over 250 staff)
☐	Legal representative
☐	Local government
☐	Medium business (50 to 250 staff)
☐	Micro business (up to 9 staff)
☐	Small business (10 to 49 staff)
☐	Trade union or staff association
☐	Other (please describe)

Question 1

Are the proposed characteristics of an ambitious testing ecosystem correct? Where are the errors, gaps, and opportunities? (see section 4.2)

Comments: As the consultation notes, the UK is a world leader in developing autonomous vehicle technology and developing a test facility is an important opportunity to both maintain and enhance this competitive advantage. We therefore support the proposed testing facilities for driverless cars. The proposed characteristics cover many of the necessary features for an effective testing ecosystem, however we would also note the significance of:

1. Making use of real-world test facilities for assessing cyber security: Driverless vehicles rely on the processing and transmitting of data. In this connected environment, vehicles need robust security processes

to manage the risk of hacking. To create credible defences against cyber threats, researchers require access to data and test environments that mimic real-world threats and environments, before these defences are implemented in real world systems. The Royal Society's report on cyber security, published on 12 July 2016, recommended that the Government should promote the creation and uptake of real-world test facilities, including data sets that can be accessed and shared as a national resource to allow the robust evaluation of new cybersecurity research and products (recommendation 7).

2. Allowing space for research into adversarial environments: The environment within which driverless vehicles will operate will not always be benign. A testing facility should therefore allow space for research to test vehicles in an adversarial environment. For example, in the 'real world' there may be occasions when someone deliberately jumps in front of a driverless car, to test its reactions. Adversarial environment research could also allow for exploration of ethical questions around this technology.

3. Ensuring local support: In addition to political support, a project to test driverless vehicles should also take into account public views, aspirations for and concerns about the technology being used.

4. Quantifying the benefits of autonomous vehicle technology: Testing facilities should give space to quantify the benefits of autonomous vehicles, in addition to research into the risks associated with this technology. This evidence could then be used to inform a nuanced public dialogue about the benefits and risks associated with autonomous vehicles.

Questions 2

Do you support a flagship testing facility?

A ☒ Yes ☐ No ☐ Not sure

Comments: Click here to enter text.

Question 2a

If yes, what should it look like and what should it do?

Comments: Click here to enter text.

Question 2b

Where should it be?

Comments: Click here to enter text.

Question 2c(i)

How fast could this facility be delivered?

Comments: Click here to enter text.

Question 2c(ii)

How could it be delivered in stages to ensure impact in the short term?

Comments: Click here to enter text.

Question 2d

What would it cost (who should pay for it and how)?

Comments: Click here to enter text.

Question 2e

What additionality to the existing offer would it provide, and how would it fit into the existing CAV testing ecosystem?

Comments: Click here to enter text.

Question 2f

What role could central government play? (This call for evidence does not create an expectation of new funding)

Comments: Click here to enter text.

Question 2g

Do you wish to express an early interest in being a partner in its funding and delivery?

☐Yes ☐No

Comments: Click here to enter text.

Question 2h

If you are not in support of a flagship test facility please explain why you not support this concept?

Comments: Click here to enter text.

Question 2i

Do you have any alternative suggestions as to how to deliver the need that such a test bed might fulfil?

Comments: Click here to enter text.

Question 3

How have other countries responded to similar challenges and priorities? Are there any lessons to be learned and applied in the UK?

Comments: Driverless cars are being tested in countries across the world; including in the US, Germany and Sweden. For example:

In Sweden, Volvo plans to test vehicles on the roads next year.[1]

In Germany, the Government has recently announced it will allow testing of driverless cars on the roads.[2] There is also testing currently being carried out on the autobahn by Audi.[3]

In the US, Google Cars has been testing vehicles in California since 2009.[4]

In seeking to draw lessons from pilot initiatives in other countries, it is important to keep in mind that many questions about how driverless cars will work – from both researchers and the public – relate to how these vehicles will interact with their environment. Environmental conditions, social context and physical infrastructure, vary from country to country, and we cannot necessarily assume that results from California could be directly applied and integrated into technology in the UK.

Question 4

We are currently exploring options for communications activities to increase awareness and understanding of the benefits of Connected and Autonomous Vehicle technologies. What support do you think government should offer in helping to raise awareness and communicate the benefits of these technologies?

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[1] http://www.bbc.co.uk/news/technology-36149043; https://www.theguardian.com/technology/2016/apr/27/volvo-test-self-driving-cars-london-2017

[2] http://www.reuters.com/article/us-germany-autos-merkel-idUSKCN0X915A
[3] https://www.theguardian.com/technology/2016/jun/25/look-no-hands-on-the-autobahn-in-audis-driverless-car
[4] http://www.google.com/selfdrivingcar/where/

Comments: The Royal Society's machine learning project has been working with Ipsos MORI to investigate public views on, and attitudes towards, machine learning. As part of this work, public dialogues were carried out earlier this year about machine learning technology, which involved discussions about autonomous vehicles. The project also has an online community of 240 members (as of 24th June) as a test environment for project outputs, as well as a valuable way of collecting public opinion.
A quantitative survey of the public this year found that, although only 9% of people know the term 'machine learning', familiarity with machine learning applications is much higher. Driverless vehicles were one of the technologies considered as part of this research. Driverless cars were one of the applications with which people were most familiar – with 75% of people having heard of them. In a risk versus social value exercise, driverless cars were seen as the application which had the greatest potential social risk, but they also scored highly on social value.

The UK's experience with other emerging technologies is that arrangements that enable a robust public consensus and dialogue on the safe and valuable use of even the most potentially contentious technologies are possible. In the face of low levels of awareness of machine learning in the abstract, but considerable familiarity with potential applications such as driverless cars, participants in the project's machine learning dialogues have taken a broadly pragmatic approach. Unsurprisingly, the Society's public attitudes research found that people seek assurance that the applications of machine learning can be shown to work effectively, and are based on good data. Individuals' views on the risks and benefits of any specific new application are likely to be informed by what is known about its intended purpose, the motivations of those promoting the new application, and the anticipated consequences that it may have for individuals and society more broadly.

Communications activities should seek to create a dialogue about the benefits and risks associated with driverless cars, providing space to discuss concerns and develop regulatory approaches that everyone can have confidence in. Such a forum will be increasingly important as public awareness about this technology increases, likely to be fueled by reports of both successful applications and risks. For example the first known fatality in a car on autopilot was reported on 1 July and gained significant media attention.[5]

In the Society's dialogue sessions with the public about driverless vehicles, the following key messages came through:

1. Technologically engaged participants could see benefits from increased efficiency on the roads, as a result of driverless cars being programmed in a similar way.
2. Participants who enjoyed driving were usually concerned that introducing driverless vehicles would reduce their freedom to carry out an activity they took pleasure in.
3. Conversely, if participants were unable to drive, they said that access to a self-driving car could be liberating.

Risk was also at the forefront of many participants' minds; they were easily able to imagine the impact of inaccuracies in the algorithms used in self-driving cars. Participants therefore wanted assurances on:

- standards and safety;
- successful integration of technology onto existing roads; and
- realisation of the benefits for all of society.

Of these, safety was the main concern; participants needed clear evidence that driverless cars could be as safe as humans. Most supported the idea of driverless vehicles, if they could be shown to be safer than human drivers. Participants wanted driverless cars to be tested under a range of conditions (such as icy roads, heavy rain, and sudden objects appearing in their path) and to pass them all before they would want to see them integrated onto the road. An effective testing ecosystem could help address some of these concerns.

During the course of our public attitudes research, the Society's machine learning project has been collecting questions from the public about machine learning technologies. These questions may be useful when considering communications materials about driverless cars. They have included:

- "How will a self-driving car handle icy or snowy conditions?"

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[5] https://www.theguardian.com/technology/2016/jul/01/tesla-driver-killed-autopilot-self-driving-car-harry-potter

- “How will a driverless car handle thick fog?”
- “Could a driverless car really have the ability to react like a human....I can quite picture maybe fewer collisions between cars but how do you teach a computer to react for an emergency stop, for example a dog or child running into the road which is a situation that cannot be predicted at any time?”

The Society also ran a public engagement event on 9 July entitled ‘Driverless cars – ask the experts’ which over 100 people attended. The machine learning working group would be happy to share further insights from its public engagement work and wider project, to assist with this consultation.

Thank you for taking the time to let us have your views. We do not intend to acknowledge receipt of individual responses unless you tick the box below.

Please acknowledge this reply ☒