

TRANSPORT FOR LONDON
EXECUTIVE COMMITTEE

Subject: **Automated Vehicles: Policy Choices**

Date: **19 May 2016**

Consulted: **Leon Daniels, Vernon Everitt, Gareth Powell**

1 Purpose

- 1.1 The attached paper presents our views on the policy, operational and technical issues created by the impending advent of commercially operated Connected and Autonomous Vehicles (CAVs)¹. This is one strand of a broader automotive innovation agenda, on which there is a programme of work underway across TfL.
- 1.2 The Executive Committee is asked to NOTE the contents of the paper; NOTE the work underway within TfL on automotive innovation in general, and Connected and Autonomous Vehicles (CAVs) in particular; and AGREE to further work to develop the priority issues set out in section five.

2 Background – An automotive revolution

- 2.1 A digital revolution is underway in the automotive sector. Every aspect of the sector is undergoing transformational change. These changes have significant implications for transport in London and for TfL itself, across the full range of its policy, regulatory, financial and operational responsibilities. The changes are varied, complex and interlinked and can be grouped into three main strands of automotive innovation:
- **Ultra Low Emission Vehicles (ULEVs)** – the development and take-up of low and no-emission vehicles (e.g. electric, hybrid, hydrogen) across the private, commercial and public transport fleets;

¹ CAVs do not necessarily mean driverless vehicles



■	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>
■	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>
■	<p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>

4 Current activity underway on Automotive Innovation

- 4.1 There is a significant programme of activity underway across TfL that is relevant to each of the three strands of the automotive innovation agenda. This activity includes;
- Establishment of the London Automotive Forum, bringing together the main car manufacturers, Society of Motor Manufacturers & Traders (SMMT), the British Vehicle Rental & Leasing Association (BVRLA), the RAC Foundation, DfT, GLA and the boroughs;
 - Extensive engagement with vehicle manufacturers and first tier suppliers to monitor the development of their shared mobility programmes and technical advances;
 - The Ultra Low Emission Vehicle (ULEV) Delivery Plan;
 - Deployment of new technologies in London's Bus fleet (e.g. Bus ISA trial, IBus, Countdown);
 - The Surface Transport Intelligent Transport Systems Programme (SITS) and development of the A2 "Connected Corridor" programme with Highways England, Kent County Council and the DfT;
 - Extensive engagement with DfT's three driverless trials in the UK, specifically with the GATEway project in Greenwich;
 - Consultation on the DfT's Code of Practice and Regulatory Framework for the testing of driverless vehicles;
 - Support for car clubs though the London Car Club Strategy;

- Extensive CAV engagement internationally via TfL’s work with the European Commission in areas of research, deployment and investment advice. Liaison with the US Department of Transportation, Singaporean Government and International research institutions directly involved in the development of autonomous systems, such as Michigan University;
- [REDACTED]
- The work on innovation being undertaken by the Technical Strategy, Systems Performance & Innovation team in London Underground.
- Early engagement with the Metropolitan Police Service on enforcement and policing implications for TfL and the police. While CAVs are expected to deliver road safety improvements there are still significant legal and resourcing considerations that need to be worked through, for example, impact on collision investigation.

4.2 We need to build on these existing efforts to make sure we are in a position to respond to further innovations, including, in particular, the potential commercial deployment of CAVs, in a way that supports TfL’s core purpose.

- [REDACTED]
- [REDACTED]
- [REDACTED]



- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]



6.1 [REDACTED]

6.2 [REDACTED]

6.3 [REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

6.4 [REDACTED]

6.5 The Executive Committee is asked to NOTE the contents of the paper; NOTE the work underway within TfL on automotive innovation in general and CAVs in particular; and AGREE to further work to develop the six policy issues discussed in the paper.

7 **Contact:** Ben Plowden
[REDACTED]
[REDACTED]

Shashi Verma
[REDACTED]
[REDACTED]



Annex I

7.1 SAE International, Five Level Automation Model

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)
Human driver monitors the driving environment						
0	No Automation	the full-time performance by the <i>human driver</i> of all aspects of the <i>dynamic driving task</i> , even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the <i>driving mode</i> -specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the <i>driving mode</i> -specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	System	Human driver	Human driver	Some driving modes
Automated driving system ("system") monitors the driving environment						
3	Conditional Automation	the <i>driving mode</i> -specific performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> with the expectation that the <i>human driver</i> will respond appropriately to a <i>request to intervene</i>	System	System	Human driver	Some driving modes
4	High Automation	the <i>driving mode</i> -specific performance by an automated driving system of all aspects of the <i>dynamic driving task</i> , even if a <i>human driver</i> does not respond appropriately to a <i>request to intervene</i>	System	System	System	Some driving modes
5	Full Automation	the full-time performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> under all roadway and environmental conditions that can be managed by a <i>human driver</i>	System	System	System	All driving modes

Copyright © 2014 SAE International. The summary table may be freely copied and distributed provided SAE International and J3016 are acknowledged as the source and must be reproduced AS-IS.

8 Annex 2

8.1 Automotive Innovation: Potential Impacts on TfL

	Highway authority	Traffic authority	Public transport provider/commissioner	Taxi Regulator	Bus/Coach Licensing authority	Fares setting authority	Ticketing/Payment platform provider
Private AVs	X	X					
Uber	X	X	X	X			
Uber Pool	X	X	X	X			
Car Clubs	X	X	X				
Bridj	X	X	X		X	X	X
Uber AVs	X	X	X	X		X	X
MaaS Apps			X			X	X
Connected logistics	X	X					

