



Centre for Connected
& Autonomous Vehicles

Safe Deployment of Connected and Autonomous Vehicles in the UK

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The UK has a unique combination of advantages

Which make us a go-to destination for research, development, demonstration and deployment of CAV technologies

A world class research base and innovation infrastructure

International leadership in vehicle regulations, chairing critical working groups in the UNECE

A global centre for financial, legal and insurance sectors

The Automotive Council – exemplar of government/industry co-ordination

Diverse testing conditions, including Europe's only mega city

R&D facilities, such as HORIBA MIRA and Millbrook

Most competitive corporate tax regime in the G7

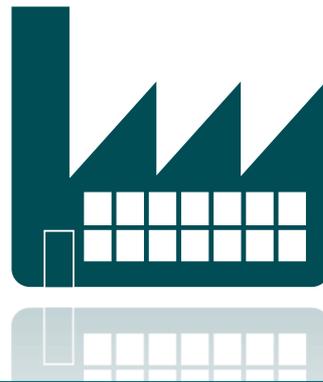
Government committed to increasing productivity through support to emerging industries

Welcoming regulatory environment





Why this matters to government





Central point of contact in Government

CCAV will coordinate government policy and act to proactively secure UK leadership by:





Developing a comprehensive R&D programme

- ▶ Keen for the UK to be at the forefront of CAV R&D
- ▶ Significant investment to support development of new technologies
- ▶ £100m worth of Government investment (match funded by Industry) to create the right environment for innovation
- ▶ Series of calls/competitions to help stimulate more collaborative research and development





8 CAV1 collaborative R&D projects and 14 feasibility studies

- ▶ **UK Connected Intelligent Transport Environment (UKCITE):** will create an environment for testing CAVs by equipping over 40 miles of urban roads, dual-carriageways and motorways with technologies and establish how this can improve journeys; reduce congestion; and provide entertainment and safety services through better connectivity.
- ▶ **Insight:** will develop driverless shuttles with advanced sensors and control systems and trial them in city pedestrian areas, with a particular focus on improving urban accessibility for disabled and visually-impaired people.
- ▶ **Tools for autonomous logistics operations and management:** will bring together transport modellers and computer games industry to develop new modelling and help significantly improve the return on investment into CAV fleets.
- ▶ **FLOURISH:** will help develop innovative new tools to improve the understanding of user needs and expectations of CAVs.
- ▶ **MOVE-UK:** will focus on accelerating development, market readiness and deployment of automated driving systems.
- ▶ **Innovative Testing of Autonomous Control Techniques (INTACT):** will reduce the cost of testing and evaluating autonomous control systems in a safe, repeatable, controlled and scientifically rigorous environment.
- ▶ **Pathway to Autonomous Commercial Vehicles:** will develop a solution to monitor key information from the vehicle and predict safety risks based on analytics. It will build on a prototype which monitors tyre pressures and temperatures in commercial vehicles.
- ▶ **i-MOTORS - Intelligent Mobility for Future Cities Transport Systems:** will deliver a connected V2X system via a mobile platform as a proof of concept. Will also develop hardware which will receive and analyse sensory data in real-time from multiple locations

CAV1 competition - Key themes





Government is keen for the UK to be at forefront of development and deployment of connected and autonomous vehicles (CAVs).

Truck Platooning

- ▶ Following from the 2014 feasibility study, explore trials to investigate operational impacts and benefits.



- ▶ What are the benefits to fleet operators?
- ▶ How do platoons respond to UK network designs?

Four cities driverless car trials

- ▶ Government is investing, with industry match funding, in 3 major real-world trials of autonomous vehicles around the country.



GATEway – Three types of CAVs in Greenwich including passenger shuttles, and valet parking.



Venturer – CAV equipped BAE Wildcats and lightweight self driving pods in Bristol.



UK Autodrive – A fleet of 40 autonomous pods, along with road cars, will be trialled in Milton Keynes and Coventry.





Government actions to secure UK CAV leadership

Four-cities driverless car trials

The Driverless Cars Trials - three projects worth £33m in Bristol, Greenwich and Milton Keynes/Coventry
→ **unlocking innovation through collaboration**

The Regulatory Review

Detailed review of existing regulations
→ **Real world testing possible now without need for a special permit**

The Code of Practice

World-leading light touch approach to uphold road safety without stifling innovation
→ **Recommendations not requirements**

Highways England Innovation Fund

£150m to 2019/20 set out in the 2014 Roads Investment Strategy
→ **Up to £40m for infrastructure investment around new vehicle technologies**

Centre for Connected & Autonomous Vehicles

New Policy Unit to provide a single point of contact for industry and co-ordinate govt activity
→ **Lead CAV programme and policy delivery across government**

£200m R&D programme

£20m competition for collaborative R&D on connectivity, autonomy and customer interaction
→ **22 Projects funded from 1st tranche (£20m) announced Feb 2016.**





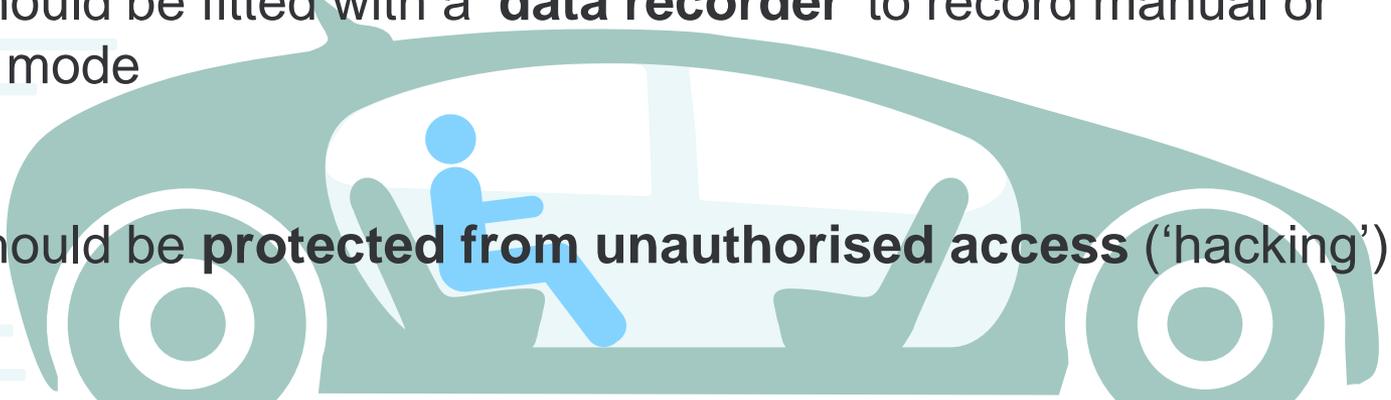
What this means for drivers

- ▶ There should be a responsible qualified driver (or operator) present
- ▶ The driver should be:
 - ▶ hold an appropriate licence for the vehicle category
 - ▶ and be alert and able to take control if needed
- ▶ The driver or operator should receive appropriate training on the vehicle, systems and functionality





What this means for vehicles

- ▶ The test vehicle should be **roadworthy**
 - ▶ Vehicles should be fitted with a '**data recorder**' to record manual or automated mode
 - ▶ Vehicles should be **protected from unauthorised access** ('hacking')
 - ▶ The specific vehicle **technology should have been proven preferably on closed roads or test tracks** before any on-road testing commences
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- A stylized illustration of a car in profile, facing right. The car is light green with white wheels. Inside the car, a blue silhouette of a person is sitting in the driver's seat. The car is positioned behind a series of horizontal light blue lines that suggest motion or speed.





We need a proportionate Regulatory Programme

- ▶ We want the UK to be [one of] the first – and best – places for deployment of CAVs
- ▶ Regulation needs to be on a proportionate and pragmatic basis
- ▶ There likely to be a transition from a normal car to a fully autonomous one which could involve co-existence
- ▶ Regulation needs to adapt on the short, medium and long term basis





Important Questions

Regulation and Legislation

- ▶ What regulatory changes do we need to facilitate the adoption of CAV technologies?
- ▶ How do we best regulate to support rollout without compromising safety?
- ▶ How do we take the public along on our programme to drive CAV development and deployment?
- ▶ What changes need to be made to our road infrastructure to prepare for introduction of these technologies?

Safety and Security

- ▶ What type of evidence do we need to develop long term policy around the impacts of CAV technologies?
- ▶ CAVs will generate lots of data. How do we best ensure the security of this data?
- ▶ How do we ensure optimal benefits from the data produced by CAVs while addressing public perception including that of privacy?
- ▶ What is government's role in ensuring CAV technologies are safe, secure and handle data appropriately?





Important Questions

Standards

- ▶ What does the CAV standards landscape look like and which key standards do we need in future
- ▶ What standards should the UK be actively seeking to develop and influence in future
- ▶ How does the UK work with international counterparts to develop the right standards without stifling innovation and new opportunities
- ▶ How do we accelerate innovation and development of new technologies and capabilities through focus on the right standards/

Technology

- ▶ **Validation:** How do we ensure that there are sufficient testing and validation facilities to support CAV technology development?
- ▶ **Mapping:** Is the UK's current mapping capability sufficient for CAVs and if not how do we support next generation, high precision dynamic mapping?
- ▶ **Connectivity:** How do we better understand CAV connectivity requirements. What are the right levels of connectivity across the full range of functions?
- ▶ How can we reduce the development cost for new CAV technologies i.e. sensors?





Thank You

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