



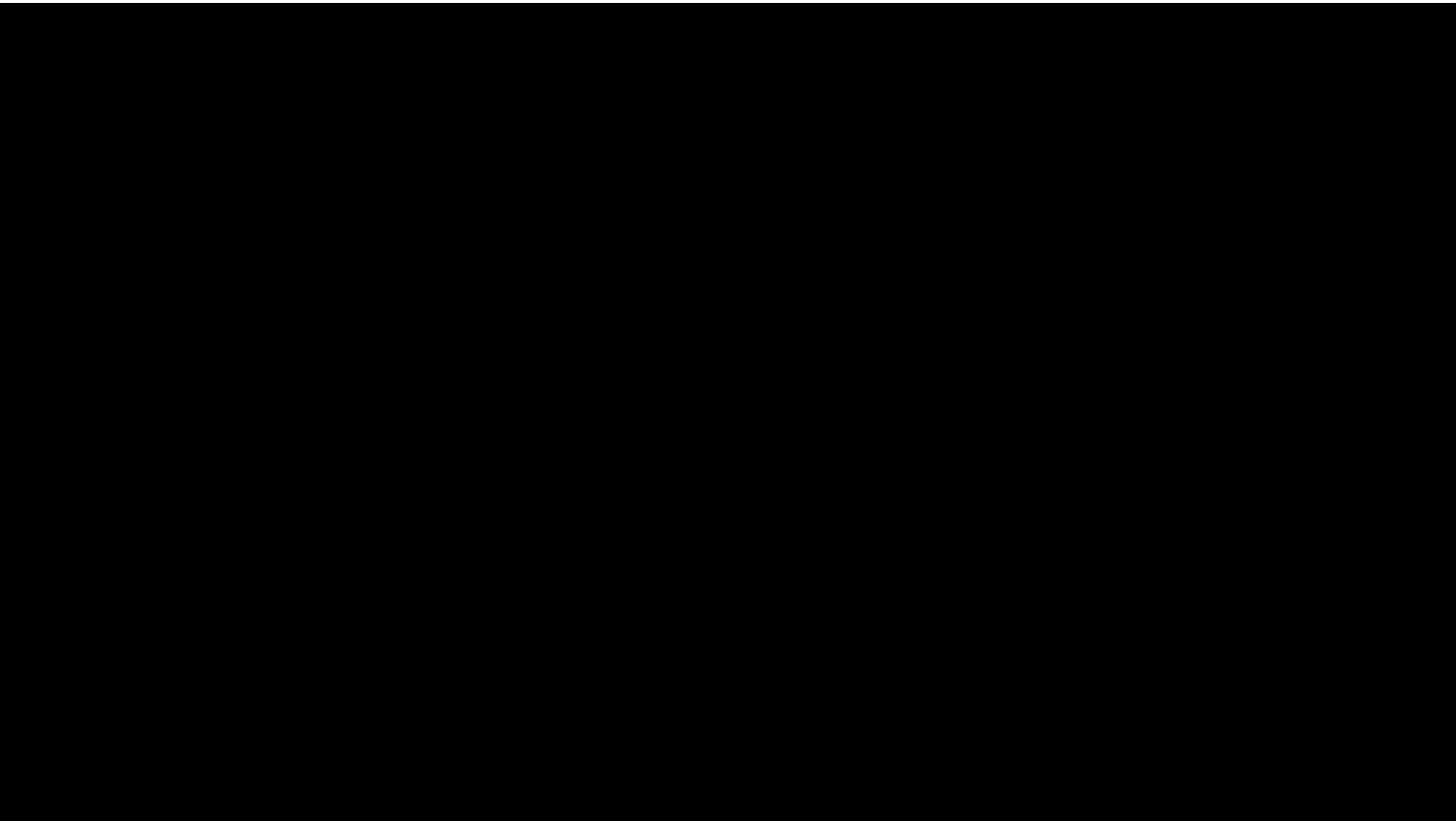
Centre for Connected
& Autonomous Vehicles

The UK's Pathway to Connected and Autonomous Vehicles (CAVs)

Michael Talbot



May 17



TECHNOLOGY IS **GREAT**

BRITAIN & NORTHERN IRELAND



No driver required; the Pathfinder Pod is pioneering the development and testing of personal transit systems. For cutting edge research and innovation choose the UK.

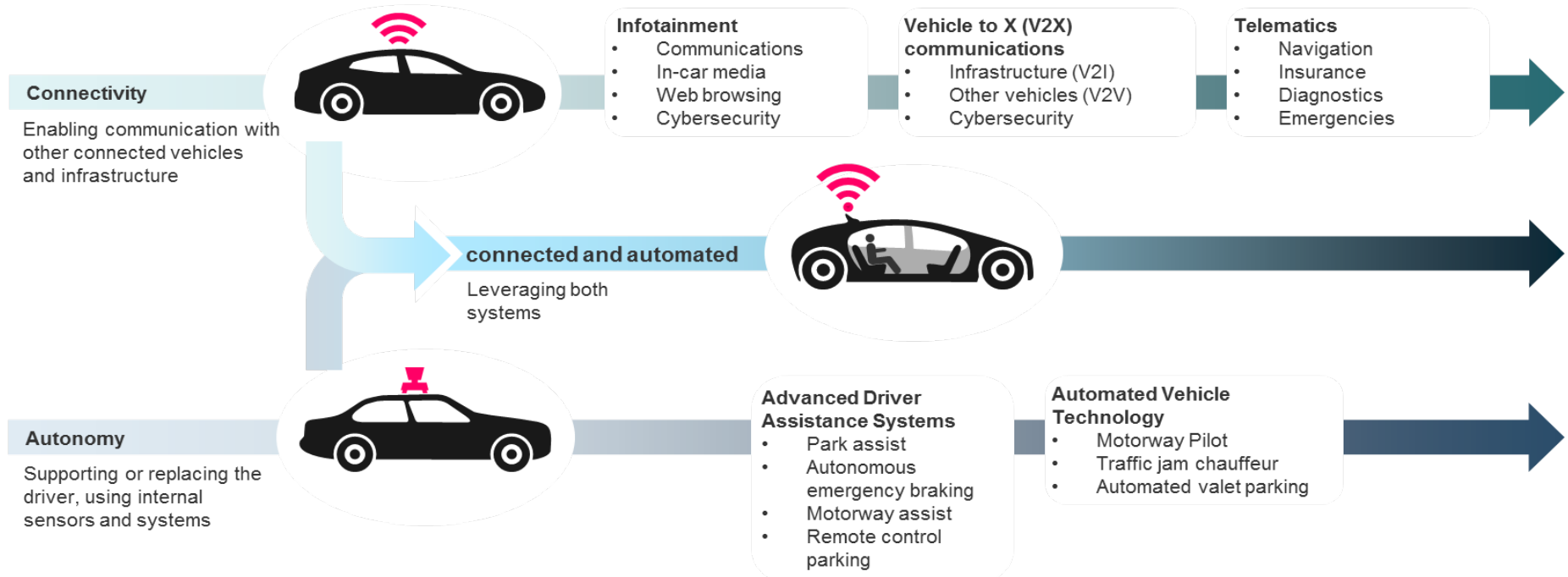
CATAPULT
Transport Systems





A mobility revolution

“The convergence of advances in **computing power**, **sensing technology**, and **data analytics** will enable vehicles to communicate with each other or infrastructure, and drive themselves for some, or all, of the journey without human input.”





Government recognises the potential



safety



mobility



efficiency



productivity





Rising to the challenge

- ▶ In 2015, the UK Government created the Centre for Connected and Autonomous Vehicles (CCAV)



CCAV has four strategic objectives to ensure that:

1. The UK has a vibrant, world-leading connected and autonomous vehicle industry,
2. The UK remains one of the best places in the world to develop and deploy connected and autonomous vehicles,
3. UK research on connected and autonomous vehicles is effective, targeted, and coordinated,
4. Connected and autonomous vehicles in the UK are safe and secure by design and handle data appropriately.





Google Car (2010)



TRL



Photo: J. G. Thompson, Department of the Royal Household, London, 1954



Bringing world class research to market

Four Cities driverless car trials (2014-18)

Three “driverless car” trials in Greenwich, Bristol, Coventry and Milton Keynes worth a total of £32 million (including £19m Government funding). The projects commence on-the-road demonstrations from 2016.



GATEway Pod, Greenwich



Pathfinder Pod, Milton
Keynes



BAE Wildcat vehicle, Bristol

UK AUTODRIVE

ARUP CATAPULT
Transport Systems



OXBOTICA
robotics & autonomous systems



VENTURER



brl
Bristol Robotics Laboratory

COMPASS 4D



GATEWAY







Centre for Connected
& Autonomous Vehicles

Bringing world class research to market

Four Cities driverless car trials (2014-18)

Three “driverless car” trials in Greenwich, Bristol, Coventry and Milton Keynes worth a total of £32 million (including £19m Government funding). The projects commence on-the-road demonstrations from 2016.

£100 million Intelligent Mobility Fund (2015-20)

Match-funded by Industry to up to £200 million to support collaborative R&D competitions.

The first, £20 million round (CAV1) launched in February 2016 and includes eight CR&D projects and 13 feasibility studies.



MOVE_UK



INSIGHT



INSIGHT

Heathrow
Making every journey better



A2-M2 CONNECTED CORRIDOR



COMPASS 4D



UK AUTODRIVE

ARUP **CATAPULT**
Transport Systems



VENTURER



FLOURISH

ATKINS **ageUK**



PATHWAY TO AUTONOMOUS COMMERCIAL VEHICLES



INTACT



i-MOTORS



GATEWAY



TOOLS FOR AUTONOMOUS LOGISTICS OPERATIONS



UK CITE



MOVE_UK



JAGUAR LAND ROVER



DRIVE ME



NISSAN





Bringing world class research to market

Four Cities driverless car trials (2014-18)

Three “driverless car” trials in Greenwich, Bristol, Coventry and Milton Keynes worth a total of £32 million (including £19m Government funding). The projects all commence on-the-road demonstrations this year.

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The first, £20 million round (CAV1) launched in February 2016 and includes eight CR&D projects and 13 feasibility studies.

The second round (CAV2) is for up to £35 million in four streams to provide real-world user and commercial benefits.



Launched in April 2017

£69 million
27 projects
+ industry match





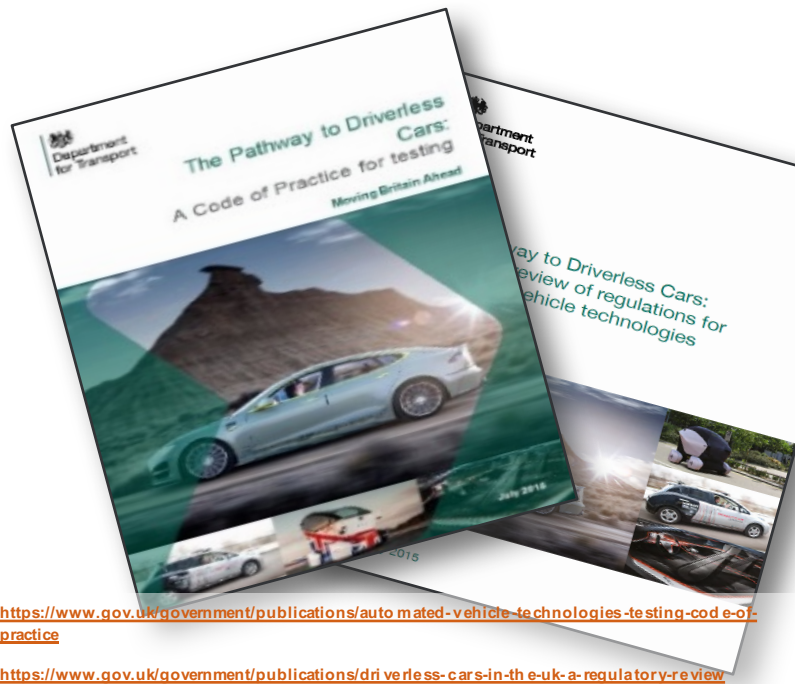
A welcoming regulatory environment

The Code of Practice for testing anywhere in the UK now

Internationally praised, our regulatory framework makes it easy to **test in the real world without special permits or surety bonds**. Our Code of Practice, set out in 2015, clearly and simply sets out that testers must obey all relevant road traffic laws and that:

- Test vehicles must be roadworthy;
- A suitably trained driver or operator (not necessarily in the vehicle) must be ready, able, and willing to take control; and
- Appropriate insurance must be in place.

(Although permission from the road owner/ operator is *not* required, testers should discuss plans with them and use a data recorder.)



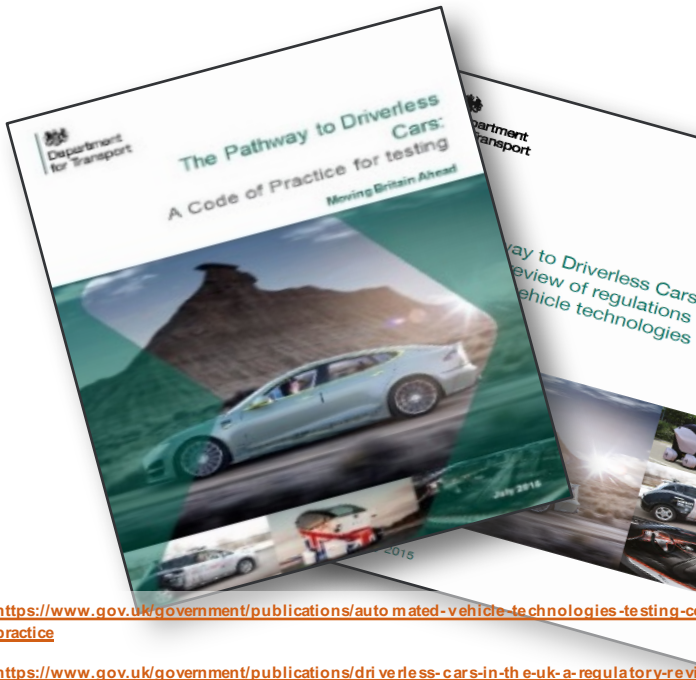
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Pathway to Driverless Cars:
Proposals to support advanced driver assistance systems and automated vehicle technologies



July 2016

Testing anywhere in the UK now

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...operator (not necessarily in the vehicle, and willing to take control; and a data recorder must be in place.

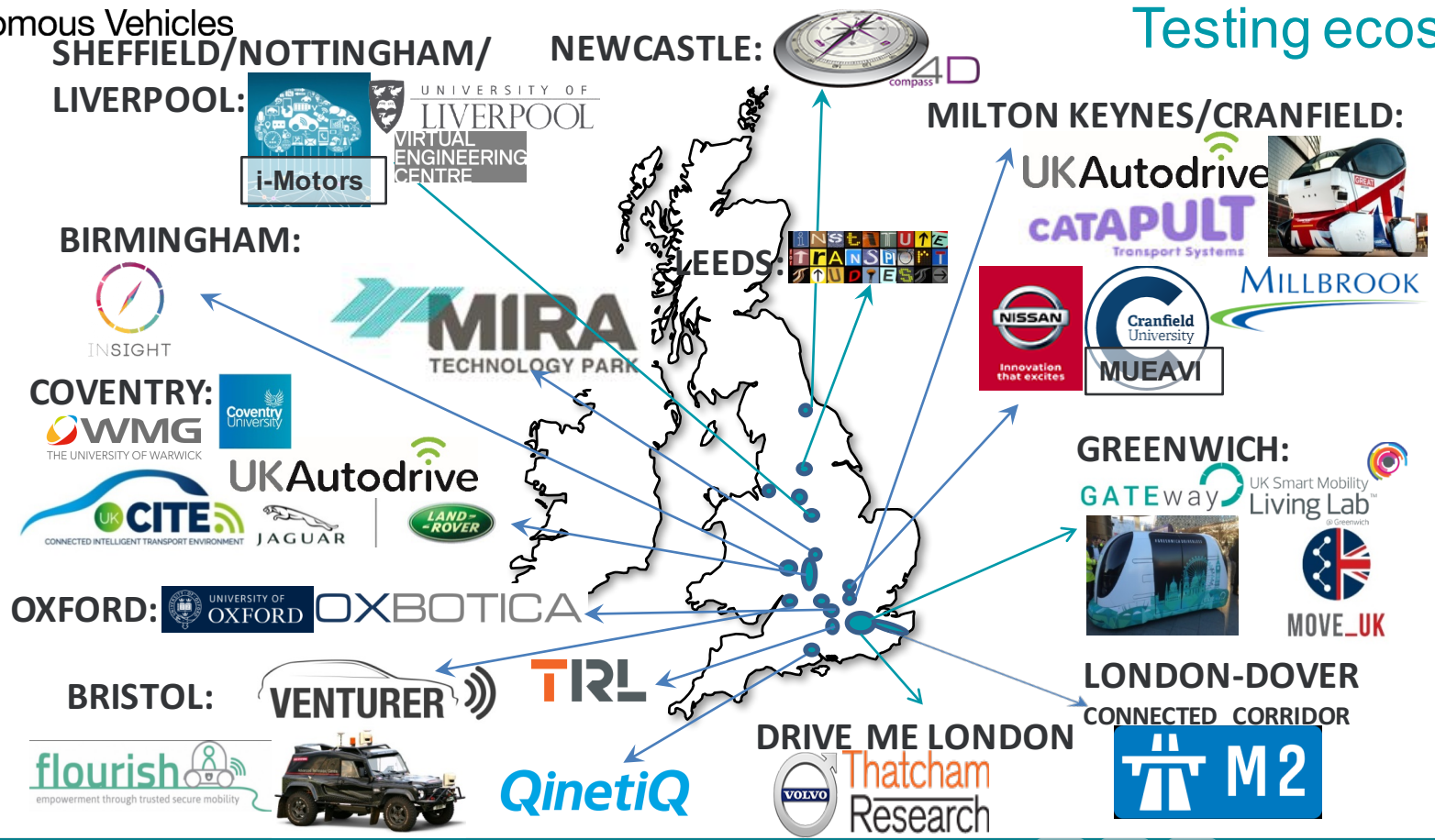
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Centre for Connected & Autonomous Vehicles

Testing ecosystem





Centre for Connected & Autonomous Vehicles

Testing ecosystem





Notice

Competition brief: connected and autonomous vehicles test bed

Updated 19 April 2017

Contents

1. Dates and deadline
2. The competition scope
3. Projects that we won't fund
4. Find out if you are eligible to apply
5. Funding and project details
6. How to apply
7. Background and further information

New: funding for CAV testing infrastructure

- ▶ In November 2016, Government announced **£100 million for new connected and autonomous vehicle (CAV) testing infrastructure.** (A different fund from the 2015 Intelligent Mobility Fund)
- ▶ **First £55 million competition closes 19 July**

<https://www.gov.uk/government/publications/funding-competition-connected-and-autonomous-vehicles-test-bed/competition-brief-connected-and-autonomous-vehicles-test-bed>





Challenges remain ...

Up to 100 million lines of code in a for a premium vehicle

1/3 of software is for diagnostics

70% of the time taken to develop a hybrid transmission is for control software

Up to 100 distributed microprocessors

Software and electronics represent up to 40% of vehicle cost

Conservative estimates place the cost of developing 1 line of code at \$10

2000 to 3000 software functions

50% of warranty costs relate to electronics and embedded software

There are 120 million lines of code (equivalent) in a mouse genome





- ▶ If connected and autonomous vehicles no longer crash, it could herald a revolution in vehicle powertrain requirements, light-weighting of chassis, materials, and design.

... and so do opportunities

▶
This “Stained glass driverless sleeper car” (aka mini-Cathedral) was part of the 2014 London Design Festival.



<http://dominicwilcox.com/portfolio/stained-glass-driverless-sleeper-car-of-the-future/>





Centre for Connected
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Thank you

OXBOTICA



enquiries@ccav.gov.uk



<http://tinyurl.com/ccavhome>



[@ccavgovuk](https://twitter.com/ccavgovuk)

