



The Pathway to Driverless Cars

Future Networked Car
5th March 2015
Duncan Kay





Timeline of developments so far..

February 2013: **Oxford Mobile Robotics Group** unveiled a highly automated Nissan Leaf vehicle, ready for testing on UK roads

December 2013: **Review of regulations** for driverless cars announced in Autumn Statement as part of the National Infrastructure Plan

July 2014: The **government launched a competition** to host a driverless cars trial, with towns and cities invited to apply for a share of the £10m prize fund

August 2014: **DfT launched consultation** on regulatory framework for the safe testing of self-driving cars on UK roads

December 2014: **Bristol, Coventry, Milton Keynes and Greenwich** announced as prize fund locations for testing of automated vehicle technologies starting in 2015

February 2015: Publication of *The Pathway to Driverless Cars* review and official launch of the driverless cars trials.





Benefits of driverless vehicles

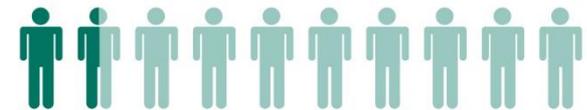
Fewer deaths and injuries



Opens up access to cars for **everyone** increasing social inclusion



31% **women** do not hold a full driving licence



14% **men** do not hold a full driving licence



46% **17-30 year olds** do not hold a full driving licence

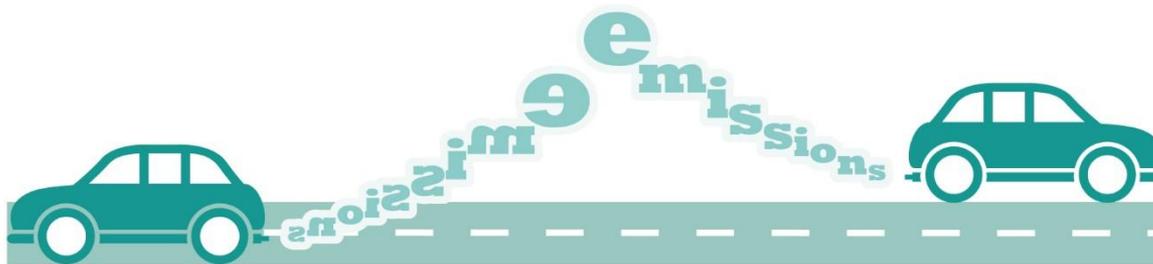


Benefits of driverless vehicles

Improving the **efficiency** with which we use our **road network**



The average driver in England can save up to **6 working weeks** a year driving time



Reduce pollution

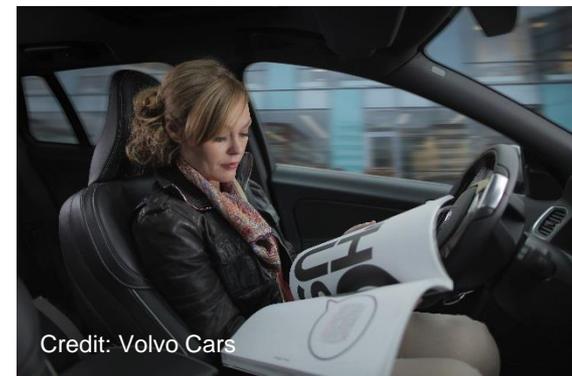
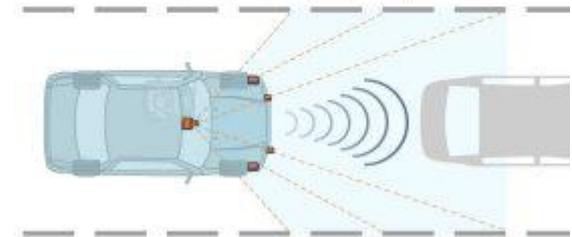
What do we mean by “driverless”?

- Existing levels of automation are all essentially ‘advanced driver assistance systems’ (ADAS)
 - Adaptive cruise control / lane keeping assist
 - Traffic jam assist
 - Park assist
 - Highway assistance e.g. GM’s Super cruise - “to increase the comfort of an attentive driver”
- All require the driver remains “in the loop” (which is becoming increasingly challenging).
- The **defining difference** for “driverless” technologies is **the driver can be “out of the loop”**.
- The driver can then undertake other activities while the vehicle is operating autonomously.



CADILLAC DEVELOPING “SUPER CRUISE”

“Super Cruise” does full-speed range adaptive cruise control and lane centering, using cameras and other sensors to automatically steer and brake in highway driving.





Definitions

- Highly automated:
 - a vehicle in which **a driver is required to be present and may need to take manual control** for some parts of the journey. Under certain traffic, road or weather conditions, the vehicle's automation systems may request the driver to take control.
- Fully automated:
 - a vehicle in which a driver is not necessary. The **vehicle is designed to be capable of safely completing journeys without the need for a driver** in all normally encountered traffic, road and weather conditions. This can be seen as the most advanced form of such technology.





The Pathway to Driverless Cars

UK Government published detailed review of regulations on 11 February 2015:

<https://www.gov.uk/government/publications/driverless-cars-in-the-uk-a-regulatory-review>

Main conclusions:

- **“Driverless vehicles can legally be tested on public roads in the UK today ..** providing a test driver is present and takes responsibility for the safe operation of the vehicle; and that the vehicle can be used compatibly with road traffic law.”
- **A Code of Practice** will be published in spring 2015 for those wishing to test driverless vehicles on UK roads.
- **Review and amend domestic regulations** by summer 2017 to accommodate driverless vehicle technology.
- **Liaise at an international level** with an aim to amend international regulations by the end of 2018.





The Code of Practice

- A 'Code of Practice' for safe testing is currently being drafted in consultation with key stakeholders
- Recommendations are likely to include:
 - Test driver, or operator, able to take control and holds appropriate licence.
 - Test driver or operator has received appropriate training.
 - Vehicle should be fitted with 'event data recorder'.
 - Vehicle should be protected from unauthorised access ('hacking')
 - Vehicle technology should have been proven on closed roads or test tracks
- Failure to follow the guidance in a Code of Practice would be considered a clear indicator of negligence.

The GATEway project in Greenwich, London



- Driverless passenger shuttle transport
- Autonomous valet parking of electric cars
- Road going self-driving car

Government backed trials

UK Autodrive – Milton Keynes and Coventry



- Lightweight self-driving ‘pods’
- Road-going self-driving cars



Department
for Transport

Government backed trials

The Venturer project in Bristol



- BAE Wildcat autonomous vehicle
- Lightweight self-driving 'pods'
- Road-going self-driving cars

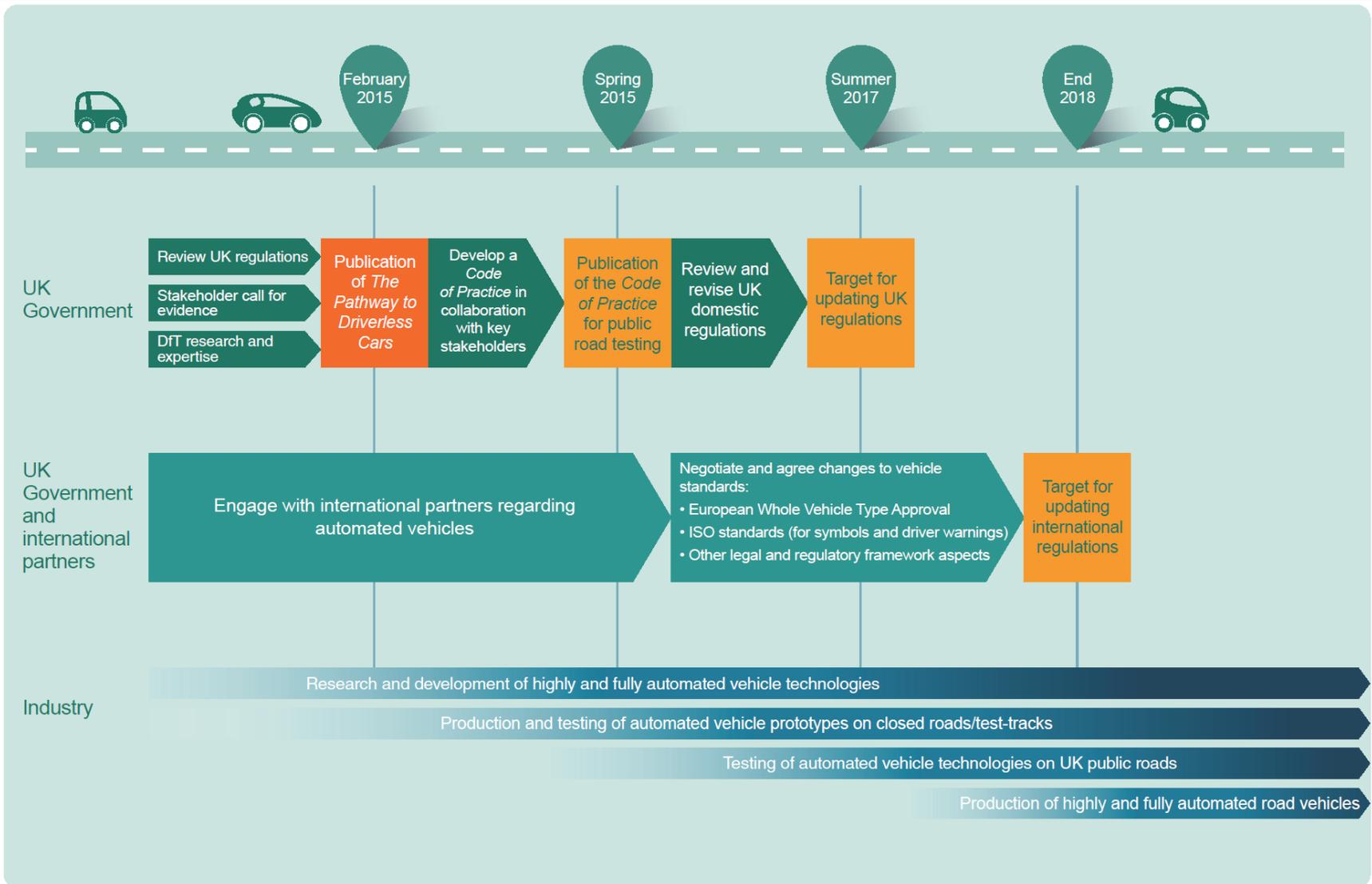


Behavioural study

- A study is being commissioned examining driver and road user behaviour
- Expected to study the impact of driverless vehicles on other road users including
 - Cyclists
 - Horse riders
 - Disabled road users
- In addition the government backed trials are also monitoring public reaction to driverless vehicles



Timeline for driverless vehicles





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