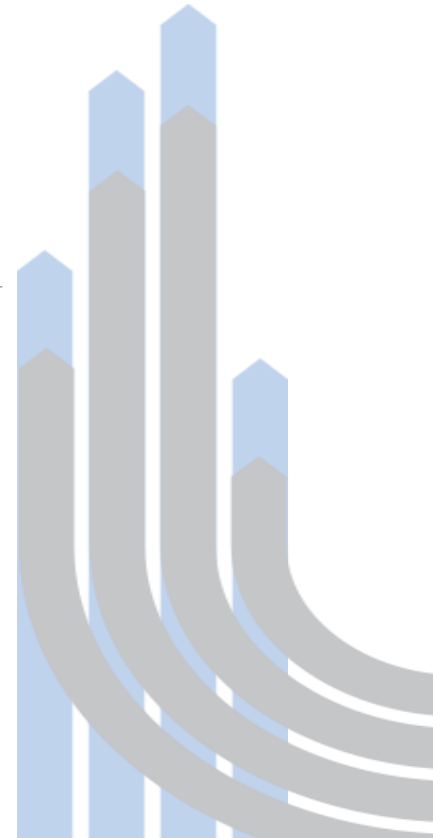


Connected and automated vehicles at the crossroads to success

Key issues from a UK perspective

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ITU Symposium on the Future Networked Car
Geneva
5 March 2020



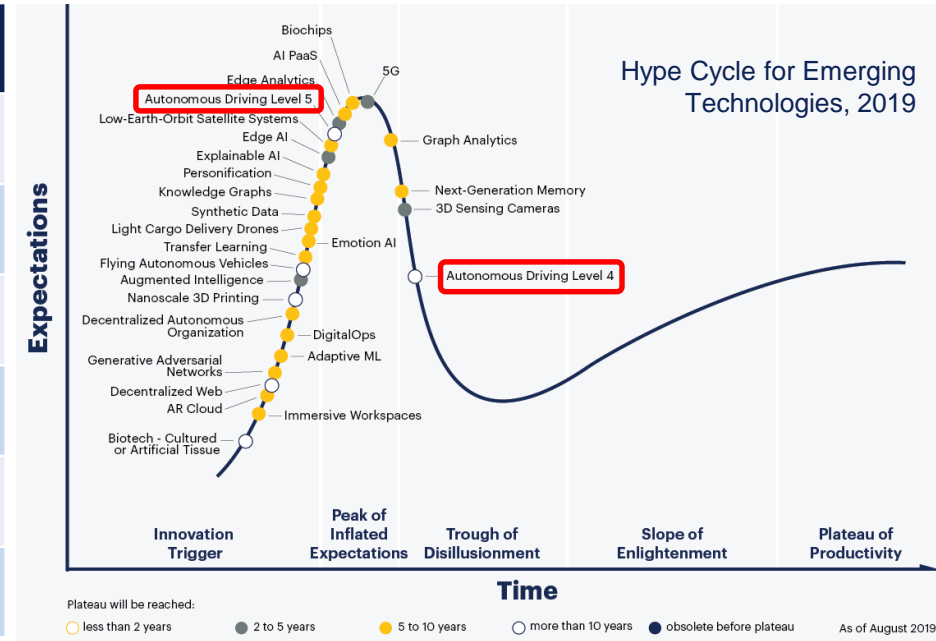
Automated vehicles: reality check

Increasing availability of ADAS, but...

...so is hot air when it comes to automated driving

| UK registrations (2018) | Fitted as standard | Available as an option | Total |
|------------------------------|--------------------|------------------------|-------------------|
| Adaptive Cruise Control | 317,635 (13.4%) | 910,127 (38.4%) | 1,227,762 (51.9%) |
| Autonomous Emergency Braking | 1,245,006 (52.6%) | 495,103 (21.0%) | 1,740,109 (73.5%) |
| Blind Junction View | 9,159 (0.4%) | 172,929 (7.3%) | 182,088 (7.7%) |
| Collision Warning System | 1,441,841 (60.9%) | 406,553 (17.2%) | 1,848,394 (78.1%) |
| Overtaking Sensor | 177,613 (7.5%) | 1,050,583 (44.4%) | 1,228,196 (51.9%) |
| Parking Assistance | 194,087 (8.2%) | 741,133 (31.3%) | 935,220 (39.5%) |

Source: JATO Dynamics analysis based on SMMT new car registration data 2018




Source: Gartner, Inc. (Aug 2019)

Conditional automation: Traffic Jam Pilot is near to market but requires regulatory reform



| Level | L0 | L1 | L2 | L3 | L4 | L5 |
|------------|---|---|---|---|---|---|
| Driver | Driver only | Assisted | Partial Automation | Conditional automation | High automation | Full automation |
| Automation | Driver continuously in control of speed and direction | Driver continuously performs the longitudinal or lateral dynamic driving task | Driver must monitor the dynamic driving task and the driving environment at all times | Driver does not need to monitor the dynamic driving task nor the driving environment at all times; must always be in a position to resume control | Driver is not required during defined use case | System performs the lateral and longitudinal dynamic driving task in all situations encountered during the entire journey. No driver required |
| | No intervening vehicle system active | The other driving task is performed by the system | System performs longitudinal and lateral driving task in a defined use case | System performs longitudinal and lateral driving task in a defined use case. Recognises its performance limits and requests driver to resume the dynamic driving task with sufficient time margin | System performs the lateral and longitudinal dynamic driving task in all situations in a defined use case | |
| Example: | | Park Assist | Traffic Jam Assist | Highway Patrol | Urban Automated Driving | Full end-to-end Journey |

ELIZABETH II c. 52



Road Traffic Act 1988

1988 CHAPTER 52

An Act to consolidate certain enactments relating to road traffic with amendments to give effect to recommendations of the Law Commission and the Scottish Law Commission.

[15th November 1988]

BE IT ENACTED by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—



2018 No. 592

ROAD TRAFFIC

The Road Vehicles (Construction and Use) (Amendment) Regulations 2018

Made 10th May 2018
Laid before Parliament 16th May 2018
Coming into force 11th June 2018

The Secretary of State makes these Regulations in exercise of the powers conferred by section 41(1) and (5) of the Road Traffic Act 1988 ("the Act").

The Secretary of State has consulted representative organisations in accordance with section 19(2) of the Act and Scottish Ministers in accordance with section 41(2)(2) of the Act.

UK has the potential for wider connected vehicle services deployment (based on cellular Uu)

| | CAV Index / Benchmarking | Enabling Regulations | | | | Enabling Infrastructure | | | | | Market Readiness | | | | |
|---------------------------|--------------------------|----------------------|--------------------------------------|-------------------|--------------------------|--|--|------------------|-----------------------|------------------------|------------------|----------------------|-------------|----------------|--------------------------|
| | | General Regulation | Civil Liability/ Insurance Framework | Road Traffic Laws | Total Score (Out of 3.5) | Digital Infrastructure 4G Speed (Mbps) | Digital Infrastructure 4G Coverage (%) | 5G Pilots/ Tests | Deployable Road Miles | Total Score (Out of 3) | ADAS uptake | Connected Car Uptake | MaaS Uptake | DRT Fleet Size | Total Score (Out of 3.5) |
| Countries/ Weights | 100% | 10% | 12.5% | 12.5% | | 5% | 10% | 5% | 10% | | 10% | 10% | 7.5% | 7.5% | |
| United Kingdom | 8.4 | 8.0 | 8.0 | 9.0 | 2.9 | 4.0 | 7.7 | 6.0 | 9.0 | 2.2 | 9.0 | 9.0 | 10.0 | 10.0 | 3.3 |
| France | 6.1 | 6.0 | 4.0 | 6.0 | 1.9 | 4.5 | 6.8 | 4.0 | 6.0 | 1.7 | 8.0 | 9.0 | 8.0 | 3.0 | 2.5 |
| Germany | 7.2 | 8.0 | 4.0 | 10.0 | 2.6 | 3.9 | 6.6 | 6.0 | 7.0 | 1.9 | 10.0 | 9.0 | 10.0 | 2.0 | 2.8 |
| Netherlands | 6.4 | 8.0 | 4.0 | 7.0 | 2.2 | 8.2 | 9.0 | 2.0 | 7.0 | 2.1 | 8.0 | 6.0 | 8.0 | 2.0 | 2.2 |
| United States | 8.0 | 10.0 | 4.0 | 9.0 | 2.6 | 2.5 | 9.0 | 10.0 | 8.0 | 2.3 | 8.0 | 10.0 | 8.0 | 8.0 | 3.0 |
| Japan | 6.2 | 6.0 | 6.0 | 6.0 | 2.1 | 4.5 | 9.5 | 6.0 | 8.0 | 2.3 | 9.0 | 4.0 | 6.0 | 1.0 | 1.8 |
| China | 5.2 | 4.0 | 2.0 | 6.0 | 1.4 | 3.7 | 8.7 | 6.0 | 6.0 | 2.0 | 6.0 | 5.0 | 6.0 | 4.0 | 1.9 |
| South Korea | 6.2 | 8.0 | 6.0 | 7.0 | 2.4 | 7.9 | 9.7 | 8.0 | 5.0 | 2.3 | 7.0 | 3.0 | 6.0 | 1.0 | 1.5 |

Source: SMMT / Frost & Sullivan (2019), Connected and Autonomous Vehicles: Winning the Global Race to Market.

But mobile network coverage on the UK road network remains wanting

Almost 5,540 miles (2%) of British roads have no 2G coverage from any network provider, whereas only 124,570 miles (51%) and 173,635 miles (71%) have full 4G and 3G coverage respectively.

| | Miles (%) of road in Britain with... | | |
|----|--------------------------------------|--------------------------|-----------------------|
| | Full network coverage | Partial network coverage | No network coverage |
| 2G | 195,797 (80%) | 44,368 (18%) | 5,540 (2%) |
| 3G | 173,635 (71%) | 66,619 (27%) | 5,452 (2%) |
| 4G | 124,570 (51%) | 107,187 (44%) | 13,948 (6%) |

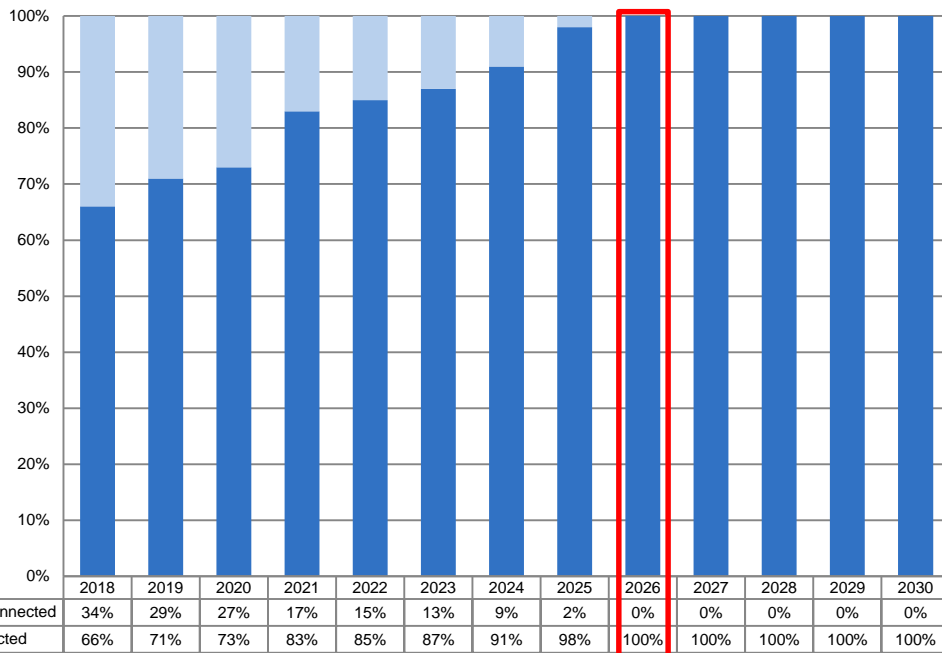
eCall is useless here

Note: percentages might not add up to 100% because of rounding. Partial network coverage means that at least one, but no more than three, of the four network providers – Vodafone, O2, EE, Three - offers a signal.

Source: RAC Foundation analysis using Ofcom data, Dec 2018.

Looking into the future

Forecast of connected cars as a proportion of UK new passenger car registrations



Potential 5G use cases

5G NR C-V2X

Communication augments autonomous driving



Illustration courtesy of Qualcomm



Perception
Sharing of high throughput sensor data and real world model



Path planning
Intention and trajectory sharing for faster, yet safe maneuvers



Real-time local updates
Real-time sharing of local data with infrastructure and other vehicles (e.g. 3D HD maps)



Coordinated driving
Exchanging intention and sensor data for more predictable, coordinated autonomous driving



Source: SMMT / Frost & Sullivan (2019), Connected and Autonomous Vehicles: Winning the Global Race to Market.

Only to be greeted by the potential 2G/3G switch-off later this decade

While 3G switch-off for the refarming of spectrum for 5G has long been expected, the potential ramifications of poorly planned 2G switch-off may be more damaging



eCall (pending NG eCall development)



Some telematics and connected vehicle services



Smart metering and smart (managed) charging

Thank you

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