



COUNCIL FOR
SCIENCE AND
TECHNOLOGY

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10 Downing Street
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23 July 2015

Dear Prime Minister

CAPTURING VALUE IN THE AUTONOMOUS AND CONNECTED VEHICLES INDUSTRY: AN AMBITIOUS PLAN FOR THE UK

There are significant claims for the value of the market for autonomous and connected vehicles. These range from social and economic benefits to the UK of over £50bn a year by 2030, to an estimated market for intelligent mobility of £900bn worldwide by 2025.¹ This market includes semi-autonomous vehicles, which might incorporate features like parking assistance, autonomous emergency braking and cruise control, as well as vehicles that can drive without any human assistance. It also includes the communication and data systems that allow them to operate, which is where much of the potential value lies.

A number of government initiatives are already under way to harness the opportunities in this sector. These includes the Spring Budget 2015 announcement of £100m towards the development of autonomous vehicles (match-funded by industry to £200m), three driverless car projects, a UK Code of Practice and a review of domestic legislation relevant to autonomous vehicles. The challenge is to ensure that the UK can generate a productive and sustainable industry from the measures it takes.

In order to do so, we recommend the UK develops a coherent and ambitious vision to capture the highest value parts of the value chain. In the case of autonomous and connected vehicles, and potentially for other emerging technologies, we believe this lies in taking steps to own parts of the operating systems that run the new technology.

We make five recommendations which as a package would help seize this opportunity for the UK. We would highlight recommendations 1-3 in particular for their potential to capture value:

Recommendation 1: The government should work with business to create the world's first 'real-world lab': an area in a busy UK town where autonomous and connected vehicles and their networks can be used and tried. This could

¹ Transport Systems Catapult (2013) *Five-Year Delivery Plan to March 2018*; Connected and Autonomous Vehicles - The UK Economic Opportunity, KPMG, March 2015

welcome all comers, once they pass a feasibility stage, and would require that they conform to certain standards to participate (also see recommendation 2). The UK should not just be a playground to test autonomous and connected vehicles without retaining any of the value.

The three existing driverless car projects - planned in Greenwich, Bristol and Milton Keynes/ Coventry - could be a useful first phase towards implementing this recommendation. Indeed, a key outcome from these projects could be to clarify the requirements for a real-world lab open to international business: either to identify the best location or to set the parameters for a competition to select one.

An open data platform could be built alongside the 'lab', to ensure that research, experimentation and development takes place within the UK and creates opportunities for international collaboration and partnership.

The UK should act quickly while it retains an international advantage in its regulatory and infrastructure environment. We are unique in already having a regulatory system that allows testing of autonomous vehicles on public roads without special permits or surety bonds; the only requirements are insurance and proof that the vehicle is roadworthy. The UK has never ratified the Vienna Convention which requires that "every driver shall at all times be able to control his vehicle". The UK is already home to world-class vehicle testing facilities at Thatcham Research Centre, Millbrook Technology Park and MIRA Technology Park.

The US, Singapore, Germany and Sweden are working to overtake us. This summer, Michigan is launching a 23 acre mini-metropolis for vehicle makers to test their cars. Four US states (Michigan, Nevada, Florida and California) allow autonomous vehicles to be driven on public roads, albeit with three requiring a US\$5m surety bond. Singapore is developing a Smart Mobility test bed and Sweden is trialling self-driving cars in Gothenburg for public testing by 2017.

Recommendation 2: The government should identify areas where it can usefully develop standards for key parts of the operating systems for autonomous and connected vehicles. It should work with business, the British Standards Institution and international partners to develop relevant standards and to promote their international adoption. Where appropriate, standards may include related UK-owned intellectual property.

The government needs to prioritise technologies which meet two criteria: they are fundamental to the sector's future development, and there is a realistic likelihood that the UK might own the relevant property rights. Satellite communications and laser guidance systems are two possible examples.

Developing a robust and early set of draft standards will allow the UK to help shape the market and cement its role within it. Embedding globally-filed UK patents within a standard will allow the UK to maintain some control over future versions. Even if the platform eventually becomes an open standard, some economic advantage would remain. This model was implemented successfully by GSM (Global System for Mobile Communications), which became the default global standard for mobile communications in 2014 with over 90% market share.

Two issues need to be addressed as this is taken forward:

- timeliness. Develop a standard too early and it may impede innovation, too late and others may already have done it.
- retaining flexibility. While value in the standard can be retained through embedded patents, the inclusion of too many may make it unattractive for others to adopt.

Recommendation 3: The government and business should involve the insurance sector as part of the development of standards.

Insurers look to standards to develop policies and assess claims. Standards influence the production of insured products and the environments in which insurers can operate. As standards are developed, the government and other relevant parties need to work with the insurance sector.

Recommendation 4: The government should prioritise its review of domestic legislation to accommodate autonomous vehicles.

The government has already announced that it will review domestic regulations by summer 2017 to accommodate driverless vehicle technology, and a Code of Practice for testing automated vehicle technologies will be published by the Department for Transport this summer. This should also consider the difficult questions around civil and criminal liability. We welcome this work and recognise that it forms a crucial component in making the UK an attractive place for companies to test their technology.

Recommendation 5: The government could focus its future research competitions on practical schemes that will enhance the capability and useability of autonomous and connected vehicles.

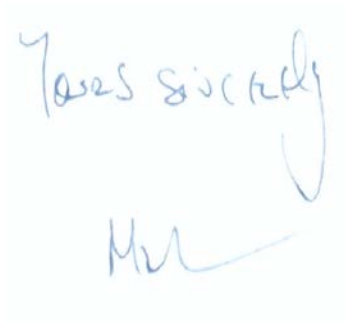
The government currently plans to run five annual competitions for connected and autonomous vehicle collaborating with others to generate research and development worth a total value of £200m. We suggest that some of this research could focus on the following:

- How best to enhance the capability of autonomous and connected vehicles: for example, creating a system to plan and manage the journeys of autonomous vehicles could help increase capacity and more efficient use of the road network. Similarly, creating a systems for differential pricing, depending on the route or time of day for instance, could help spread out demand on the road network.
- Understanding system interdependencies: This should span digital and virtual infrastructure including communications, as well as physical infrastructure like roads, lighting and signals. This work could help identify any gaps in the necessary infrastructure across the country and prepare for contingencies in case of a system failure.
- Public acceptance will be crucial to the uptake of autonomous technology and it is essential to understand public attitudes to autonomous vehicles. We are pleased that this issue, amongst others, will be explored in the government's first research and development competition.

We welcome the establishment of a joint DfT and BIS Centre for Connected and Autonomous Vehicles (C-CAV) to coordinate activity across Whitehall and beyond. We suggest that this may be a good home to take forward those recommendations which are for government, and provide support for those taken forward by industry and others.

We would of course be happy to discuss these issues and our recommendations further with you or your ministerial colleagues.

We are copying this letter to Oliver Letwin, Patrick McLoughlin, Sajid Javid and Francis Maude.

A handwritten signature in blue ink on a light blue background. The text reads "Yours sincerely" followed by a large, stylized initial "M" and a horizontal line.

Sir Mark Walport
Co-Chair

A handwritten signature in blue ink on a light blue background. The text reads "Nancy Rothwell" in a cursive script.

Professor Dame Nancy Rothwell
Co-Chair