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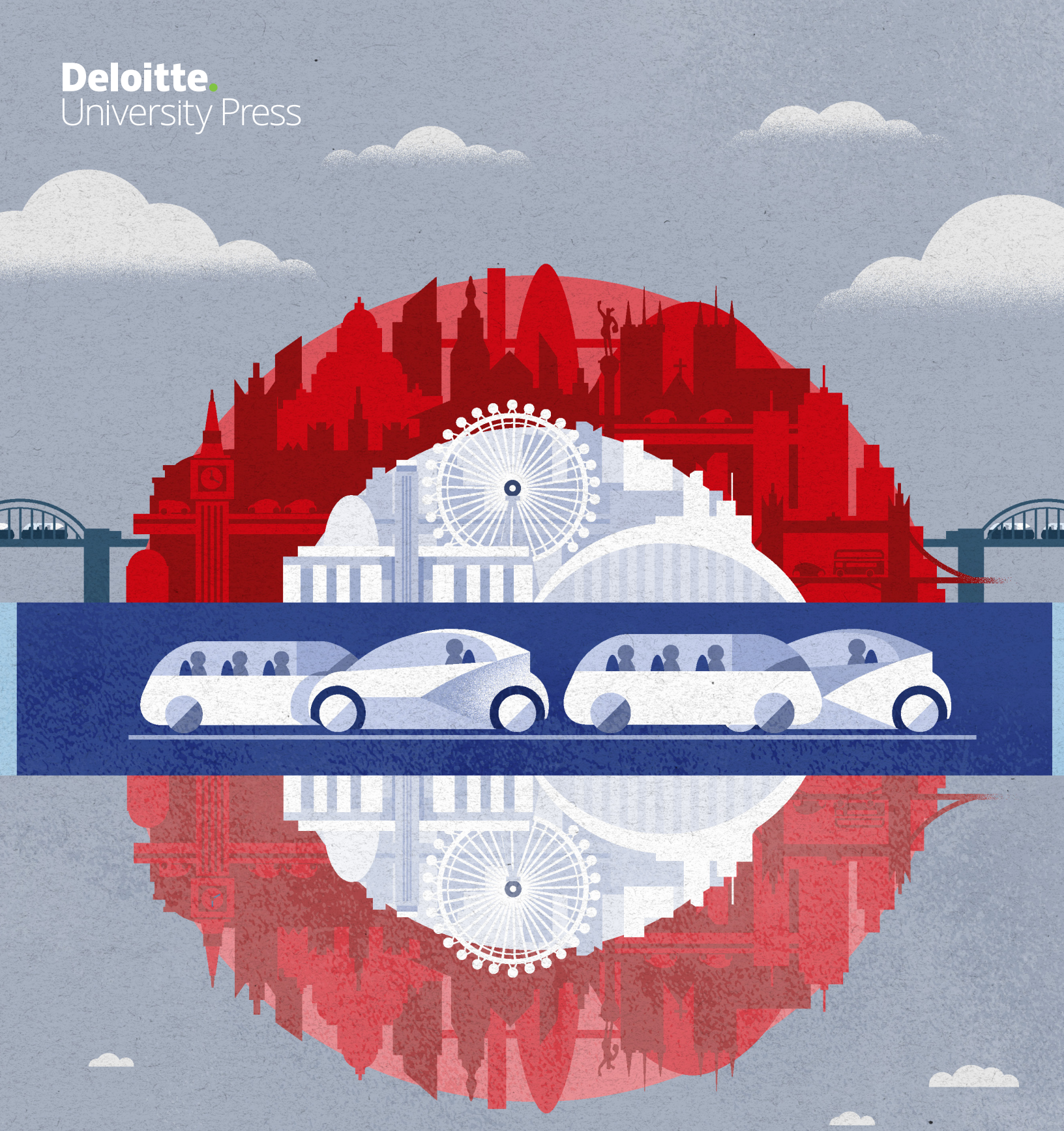

Development of self-driving vehicles in the United Kingdom

Where science fiction meets science fact

Deloitte's cyber risk services have been used extensively by automobile manufacturers to strengthen vehicle security and protect connected systems. As connected and driverless automobiles evolve, the underlying technologies will become less an accessory and more a critical component. Connected automobiles will play a growing role in logistics, transport, and urban design, and companies and individuals will expect the automobile components, systems and services to be safe and secure. Contact the authors for more information or **read more about our cyber risk services**.

COVER IMAGE BY: DIETER BRAUN

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The race is on!

THE widespread deployment of self-driving vehicles, once thought of as science fiction, is just a few years away. It will usher in sweeping change and have wide-ranging implications. Businesses, even those—or especially those—not normally thought of as involved in mobility, should start thinking about it now.

Because, to the victor go the spoils.

Automation means vehicles can operate more cheaply and consistently, reliably and safely. Sharing of these assets will increase utilisation, create economies of scale, and reduce unit costs. These two trends, combined with the adoption of new vehicle materials and powertrains (such as electric and fuel cell) and increasing connectivity will revolutionise mobility. New types of businesses will be created, and new players will enter existing businesses, blurring industry lines. Incumbents will be forced to develop new skills, and to forge new partnerships.[1]

But the new mobility landscape will not be shaped by the private sector alone; governments will also play a critical role. Initial commercialisation efforts will likely begin as public-private partnerships. It's still early days for the industry and government policies do matter. Already, eight auto manufacturing nations are in a pitched battle for first-mover advantages in what is shaping up into a $10 trillion industry.[2]

The United Kingdom has enough competitive advantage in key sectors (auto manufacturing, technology and finance) and supporting industries (insurance) to be a contender in this contest. Being among the leaders in the future of mobility could offer a significant source of domestic revenue and act as a boost to companies that can compete globally.

We believe that taking a leading position in the future mobility ecosystem can be the UK government's "moon shot" mission. Success requires a far-reaching vision, astute planning and selective government action. Thankfully, many of the efforts needed to foster this sector align with "pillars" of the government's recent Industrial Strategy green paper:

- Investing in science, research and technology
- Upgrading infrastructure
- Supporting businesses to start and grow
- Delivering affordable energy and clean growth
- Creating world leading sectors
- Creating the right institutions to bring together sectors and places[3]

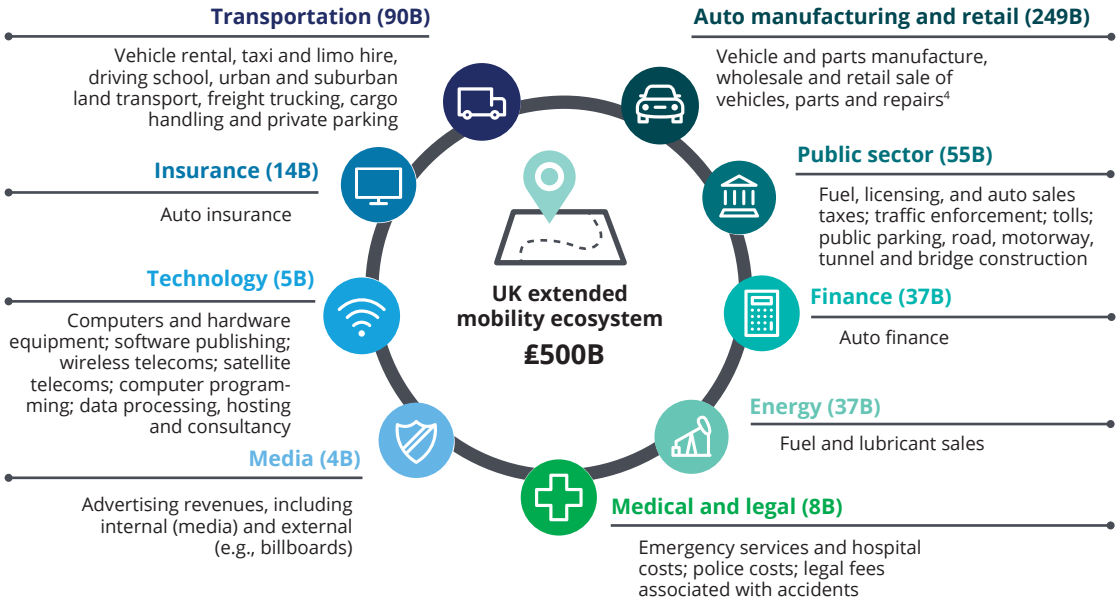
But more can be done. To inform the UK government's efforts, this paper looks at the extended mobility ecosystem in the United Kingdom, to estimate the size and scope of potential gains and identify where the United Kingdom could stake a claim. While this ecosystem is large and complex, driven by a series of converging trends, we explore more deeply one of its defining features: self-driving vehicles. We look at popular views on automated driving, because astute government policy must be informed by those who will drive uptake and acceptance: consumers. We explore commercialisation efforts to date of driverless vehicles and the UK government efforts in this space. Finally, we look at what should happen next. The questions we want to answer: Is the United Kingdom doing enough, and what should it do to be at the top when it comes to driverless cars?

The extended mobility ecosystem

Deloitte has estimated that the extended mobility value chain in the United Kingdom generated £500 billion in annual sales/turnover in 2014—15 (see figure 1). That is to say, the areas we expect to be impacted by the arrival of autonomous vehicles account for around 15 percent of the United Kingdom's gross output—larger than the manufacturing sector.

The stakes are high. If, as we expect, the widespread adoption of driverless vehicles causes significant reduction in the cost of transport, the knock-on effects will be felt across the ecosystem. Some sectors will face deep disruption, making existing business models obsolete. Conversely, sectors not traditionally seen as part of a "mobility ecosystem," such as the tech and media sectors, are poised to see high rates of growth.

Figure 1. UK extended mobility ecosystem (2014–15 sales/turnover) (£B)

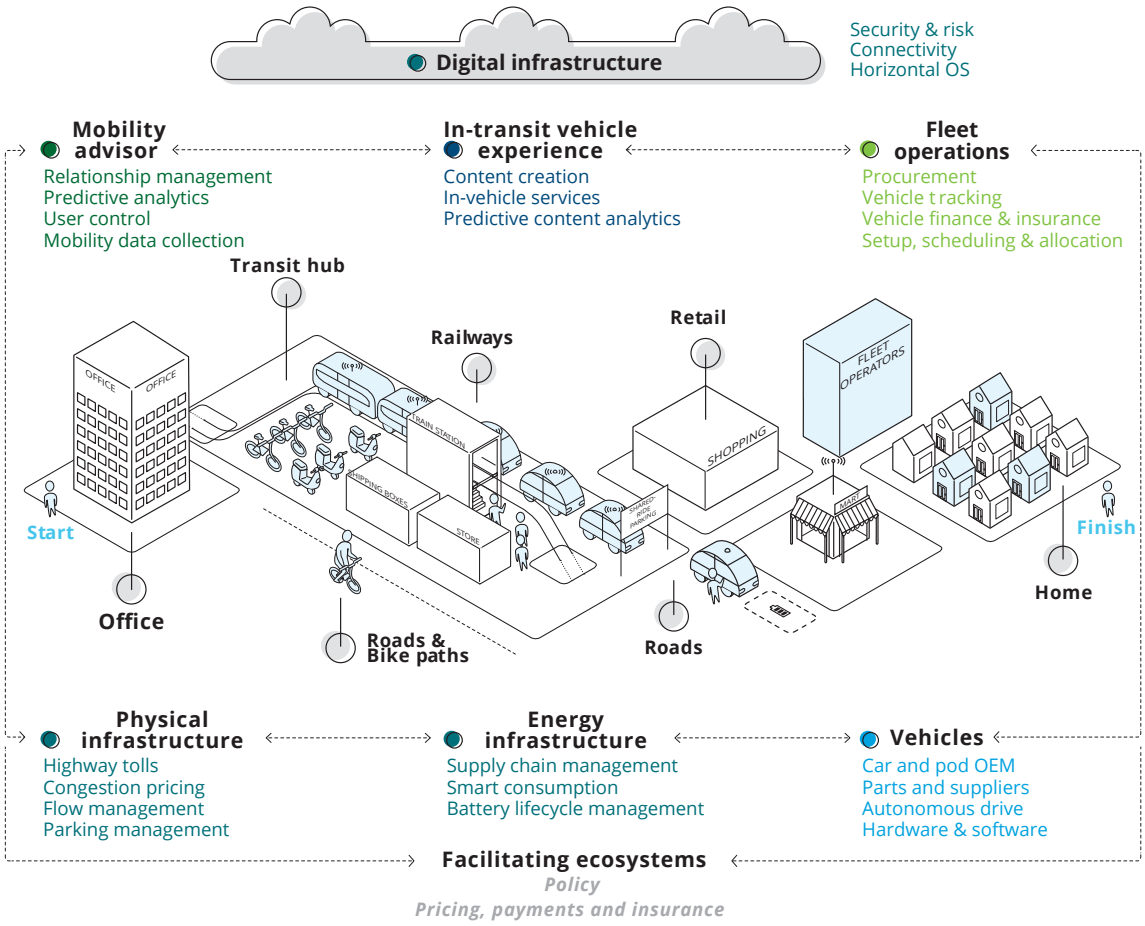


Note: Note that the UK categorisations here do not correspond exactly to the US estimates found in Deloitte University Press's original publication, The future of mobility: How transportation technology and social trends are creating a new business ecosystem*, September 24, 2015, https://dupress.deloitte.com/dup-us-en/focus/future-of-mobility/transportation-technology.html. The UK market sizing looks at the extended mobility ecosystem and includes additional elements of vehicle manufacture and retail, public infrastructure, and freight and long-haul transportation.*

Source: Deloitte analysis, with data from the Office of National Statistics, TechUK, Finance and Leasing Association, Legal Services Board, Department of Communities and Local Government, SMMT, Department for Transport, Magnetic, Statista.

Given that driverless vehicles are likely to hasten structural change and the development of new industries, Deloitte expects to see new opportunities created in mobility management, in-transit experience, fleet operations and the security needed to make it all function effectively. See figure 2 for an example of what it might look like.

Figure 2. Opportunity spaces: Where mobility is heading



Source: Deloitte analysis.

Diverging approaches to commercialisation of autonomous vehicles

OVER 33 companies are heavily involved in the development of advanced driver assistance and autonomous vehicle technologies. Players range from traditional automotive manufacturers and suppliers, to technology behemoths and upstarts that sit somewhere between the two.[5]

Figure 3 lays out the levels of automation, technological milestones, timelines and regulatory actions expected in the next two decades.

While not a hard and fast distinction, two approaches seem to be dominant, *incremental advances* and *day one full capability*. Both have the same objective, and in some cases even the same players.

Several auto manufacturers and their suppliers are on the *incremental advances* path.[7] They see advanced driving assistance systems (ADAS) as the stepping stone to fully autonomous vehicles and focus on incremental increases to the amount of hands-off, eyes-off driving capabilities.

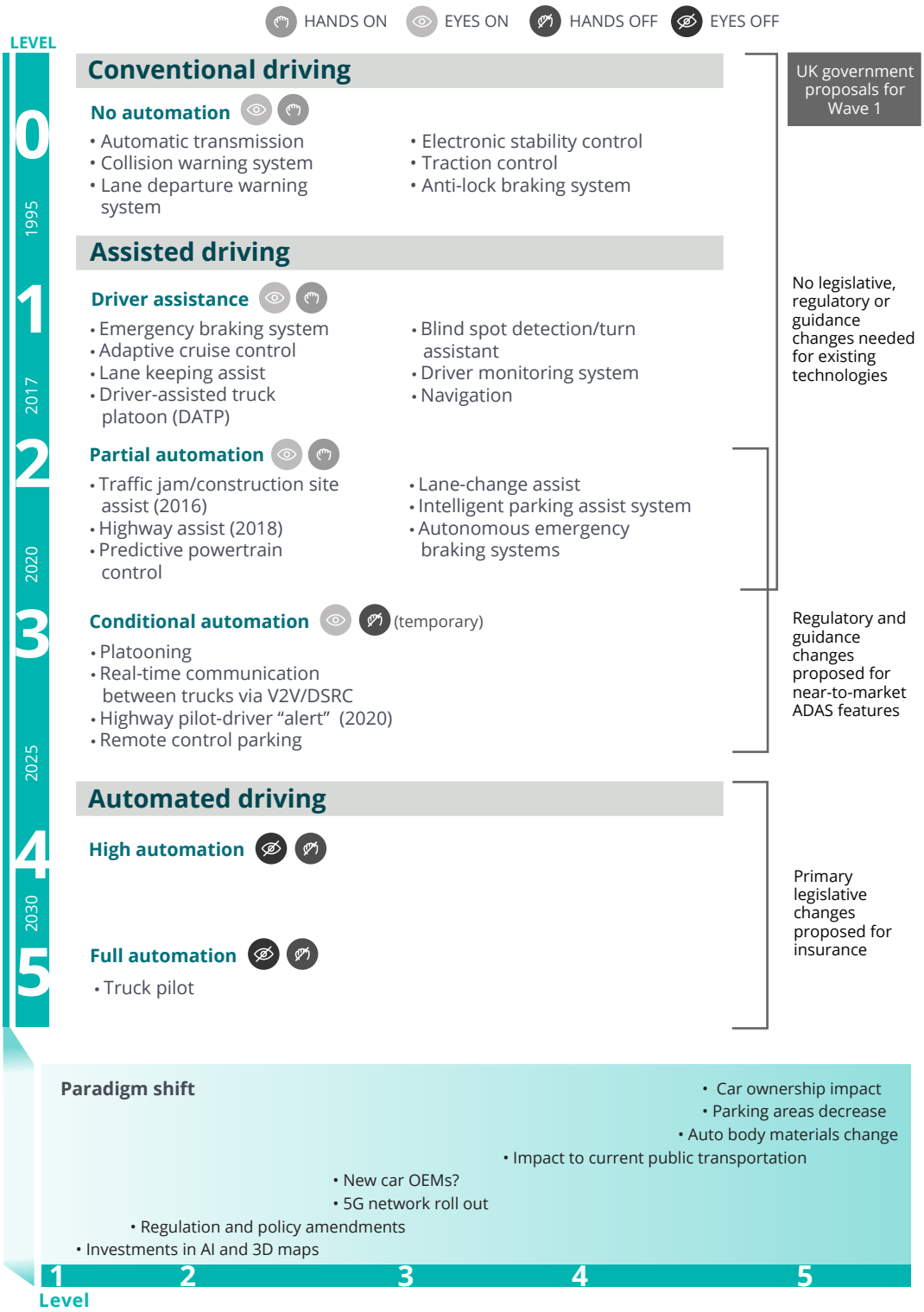
On the other hand, a number of new entrants, such as the well-capitalised tech hardware and software companies, are in pursuit of *day one full capability*, where the goal is to leapfrog the intermediary levels of automated driving to arrive at a completely autonomous vehicle. A number of premium auto manufacturers are also working to develop level 5-automation vehicles (see figure 3 for a description).

Several auto manufacturers and their suppliers are on the *incremental advances* path.

Both approaches are necessary to advance the technological and acceptance frontiers, and the lines between them are growing increasingly blurred as players from both camps ally and collaborate with one another. *Day one full capability* gives people a glimpse of the fully automated future, the technology at work and the role driverless vehicles can play in a new mobility ecosystem. Deloitte expects to see deployment first in luxury segments and in commercial areas, such as haulage and ride-sharing, where payback can be quicker.[8] *Incremental advances* are already available in the volume segment, and is how most consumers will likely come to own (semi-)autonomous vehicles. The results of Deloitte's Automotive Consumer Survey, discussed below, corroborate this view.[9]

Navigating the incremental and full capability approaches to driverless cars will be a key challenge for policymakers. In many instances, the regulations favoured by one camp (for example, easing requirements about when a "driver" needs to be present) will be opposed by the other. An important role the government can play is to follow the partnerships and technological breakthroughs, attempt to incentivise these companies to site their research and testing locally and regulate the use of driverless vehicles on the streets.

Figure 3. Driverless technologies timelines[6]



Source: SAE, CCAV, Credit Suisse, Macquarie, UBS.

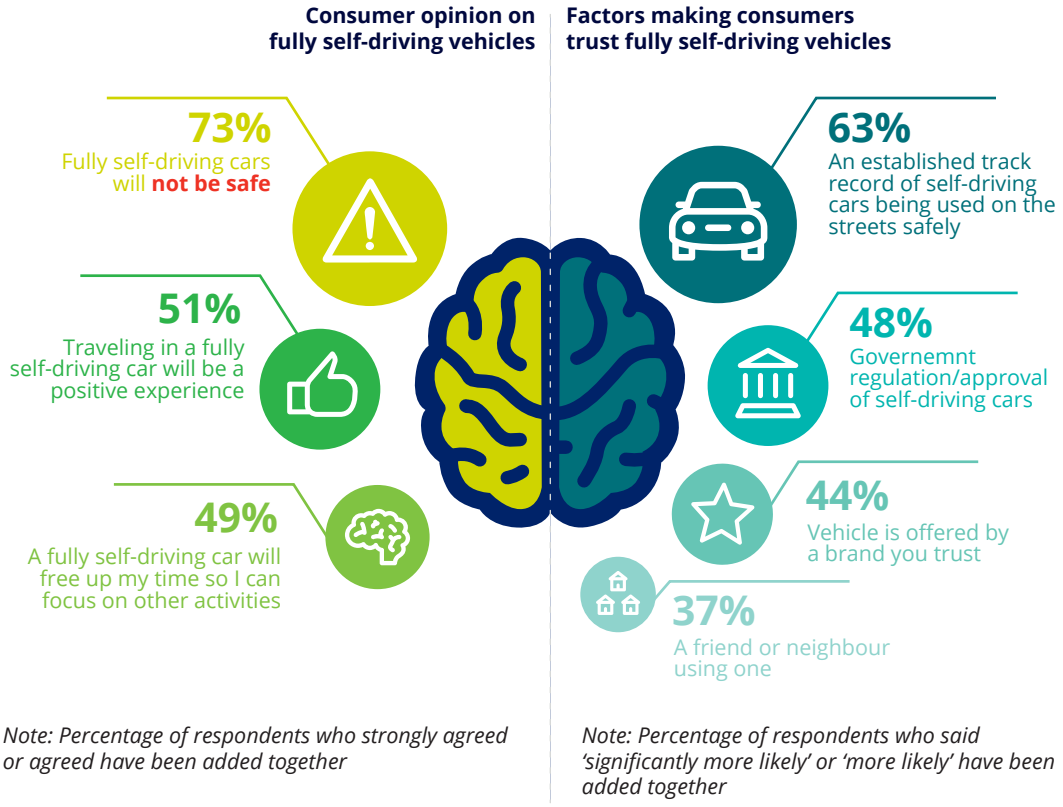
What do consumers think?

No matter how hard the government tries to promote driverless vehicles, it is consumer acceptance that will drive mass adoption. Deloitte has been tracking views on automotive technologies in its own consumer survey. In the summer of 2016, it polled over 22,000 respondents in 17 global markets.[10]

The results suggest that UK consumers are curious but cautious and contradictions abound. They are sceptical about the safety and usefulness of driverless cars and about whether they'd like to ride in or own one. Figure 4 examines some of the views consumers have about driverless vehicles. 59% said they do not want the government to allow fully self-driving cars to be sold in the next five years

Compared to two years ago, consumer desirability for limited and fully self-driving cars was basically unchanged. See figure 5.

Figure 4. UK consumer views on driverless vehicles



Sample size: [N=1,089]
Source: 2016 and 2014 Global automotive consumer survey, Deloitte.

However, consumers' top picks for technologies they'd most like to see in cars are safety features—the building blocks of autonomous driving—suggesting that they feel comfortable with cars that do more and more of the driving, but prefer at this point to remain in control. See figure 6 for a ranking of desired features.

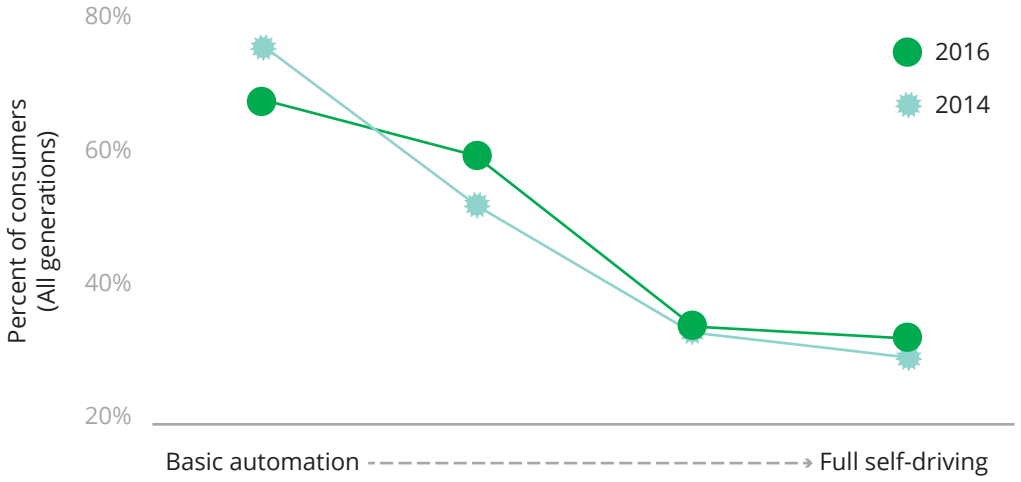
A lot of the scepticism may be due to unfamiliarity—most respondents have never interacted with a driverless car in person. It is hard for them to imagine what it might be like, and what its benefits would be. We are reminded of the apocryphal quotation attributed to Henry Ford: "If I'd asked my customers what they wanted, they would have said a faster horse."

In the United Kingdom, over half of the consumers trust traditional car manufacturers most—over the new entrants—to bring fully self-driving cars to market. Of the 17 markets surveyed, the United Kingdom was one of only five countries to feel this way, along with Brazil, France, Germany and Japan. See figure 7.

In the United Kingdom, over half of the consumers trust traditional car manufacturers most to bring fully self-driving cars to market.

Respondents in the other 12 markets said they trust existing technology companies or new autonomous specialists most to bring fully self-driving cars to the market. Auto manufacturers better pay attention!

Figure 5. UK consumer interest in driverless vehicles declines



Source: 2016 and 2014 Global automotive consumer survey, Deloitte.

Figure 6. Ranking of desired auto technologies

Category	Rank	Technology that:
Safety	1	Recognizes objects on road and avoids collision
Safety	2	Informs driver of dangerous driving situations
Safety	3	Blocks driver from dangerous driving situations
Safety	4	Takes steps in medical emergency or accident
Connectivity	5	Diagnoses and sends maintenance notifications
Cybersecurity	6	Enables remote shutdown of stolen vehicle
Fuel efficiency	7	Helps enhance fuel efficiency
Cybersecurity	8	Prevents theft by restricting unauthorized access
Fuel efficiency	9	Enables use of advanced lightweight materials
Environment	10	Lowers the impact on the environment
Connectivity	11	Enables vehicle-to-vehicle and road communication
Environment	12	Enables usage of alternative fuels
Cybersecurity	13	Prevents hacking into vehicle systems
Safety	14	Monitors the physical health of the driver
Environment	15	Assists in locating, reserving and navigating to a parking space
Cost efficiency	16	Coaches the driver to drive safely
Convenience	17	Automates tasks for comfort and convenience
Convenience	18	Enables interactive vehicle operational information
Self-drive	19	Enables full self-driving capabilities
Connectivity	20	Enables remote/automatic software updates of the vehicle
Self-drive	21	Enables high-speed, long-distance, highway 'auto-pilot' mode
Convenience	22	Enables hands-free interior controls
Self-drive	23	Enables low-speed urban 'auto-pilot' mode
Micellaneous	24	Enables the use of self-healing paint
Service enabler	25	Automatically pays parking and toll fees
Performance	26	Makes available adjustable settings to enhance vehicle performance
Micellaneous	27	Empowers customer to personalise vehicles
Service enabler	28	Allows the driver to control automated home systems
Connectivity	29	Allows use of smartphone applications through the vehicle dashboard
Service enabler	30	Provides notifications when places of interest are near
Convenience	31	Provides passengers with customised entertainment while driving
Convenience	32	Helps manage daily activities

Most useful **Moderately useful** **Least useful**

Note: Break points for most, moderate and least preferred technologies are derived based on percentage of times a technology is rated the best. Sample size: [N=1,246]

Source: 2016 and 2014 global automotive consumer survey, Deloitte.

Figure 7. Who do consumers trust to bring a driverless car to market

UK consumers trust traditional car manufacturers more to bring self-driving technology to market

Source: 2016 and 2014 Global automotive consumer survey, Deloitte.

These results conform to the two-track approach described above: Auto manufacturers will convince the mass audience through incremental additions of automation, but it's the fully autonomous trials run by the likes of Google and Uber that can show people what the cars can do and that will convince a doubtful public of the overall merits of driverless vehicles.

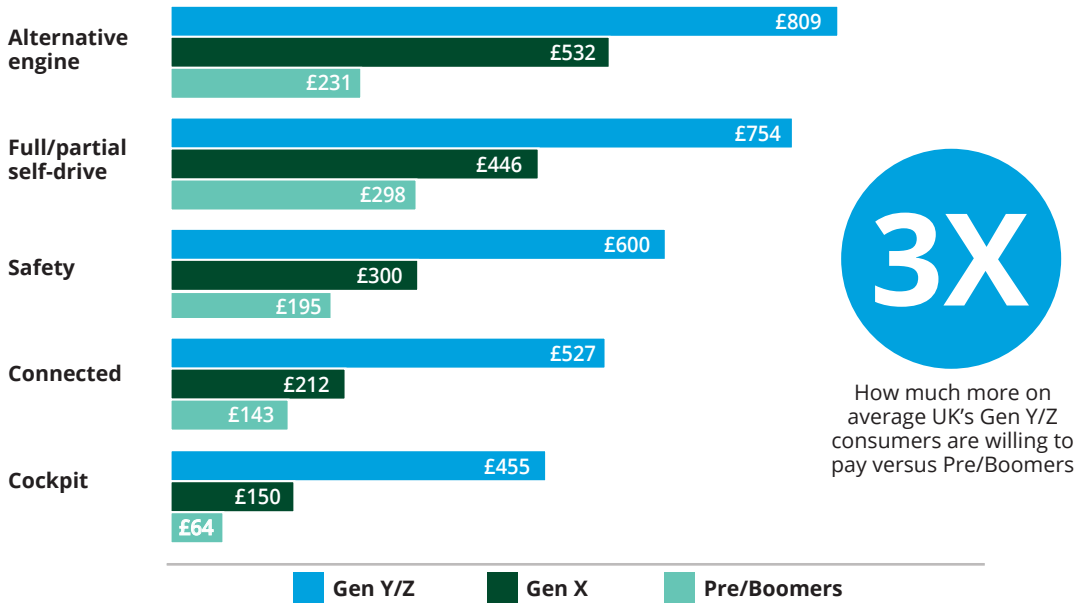
The good news is that younger consumers are not only much more accepting of fully self-driving cars, they also signal much more willingness to pay for new technologies. See figure 8 to see how big this gap is.

Millennials, a big cohort, are not wedded in the same way as older generations to the traditional idea of the car, either in terms of who owns it or who drives it.

All consumers have concerns about data protection and privacy. (Yet they still use mobile phones and apps on those phones that require handing over their data!) Figure 9 looks at some of the mixed feelings consumers have.

That said, they are more trusting of auto manufacturers and dealers than other parties when it comes to who has their data. And they are willing to share their data if they know what they are sharing, and they get "significant" benefits.

Figure 8. Willingness to pay for new technologies, by generation



Source: 2016 and 2014 Global automotive consumer survey, Deloitte.

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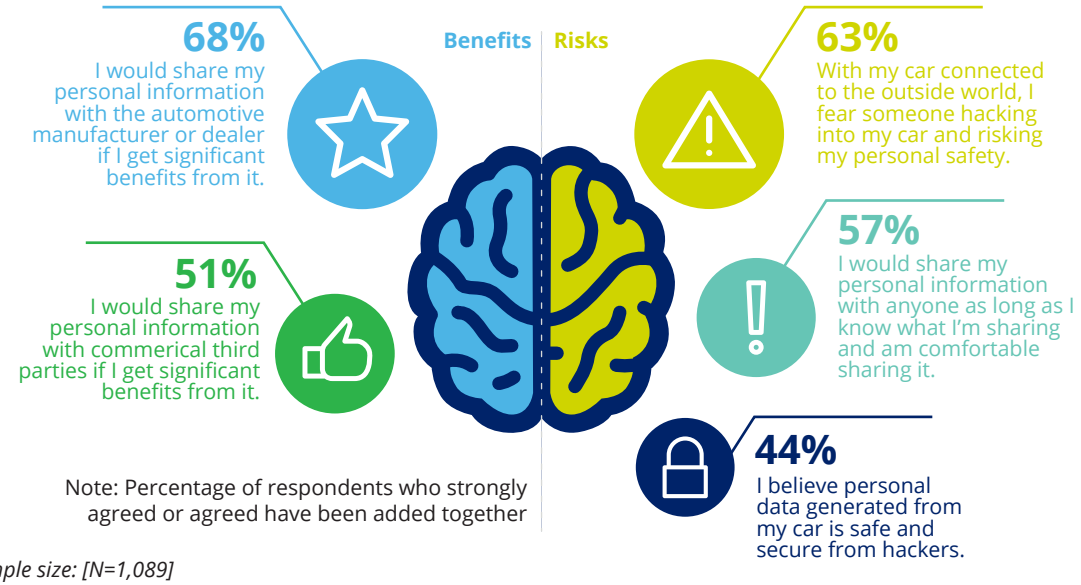
Figure 9. Consumer opinion on personal data sharing and privacy



Sample size: [N=1,089]
Source: 2016 and 2014 Global automotive consumer survey, Deloitte.

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The United Kingdom's bid to be the best

THE United Kingdom's steps to nurture its burgeoning driverless car ecosystem rate highly owing to its strong research capabilities in areas of relevance to driverless technologies and its favourable legal frameworks for testing.

The Transport Systems Catapult, a non-profit technology and innovation centre set up by the government, conducted a survey of the intelligent mobility market and assessed the United Kingdom's capabilities over 17 different segments.[11] It assessed the nation's competitive advantage highest in the following areas:

- Data management and analysis
- Monitoring and management systems for road infrastructure
- Internet of Things road asset management
- Security, resilience, safety and cyber security
- Autonomous vehicles[12]

There are good reasons for the UK government to focus investment and innovation in these areas: These segments penetrate the entire mobility ecosystem and so the growth rate is expected to be high,

Table 1. UK government actions on driverless vehicles

Four cities selected for driverless car trials	Collaborative consortia-led projects announced in February 2015 for four cities: Bristol, Greenwich, Milton Keynes and Coventry.
Regulatory review	Detailed review of existing regulations to enable real-world testing without need for special permits or provision of surety bond
Code of Practice	Recommendations for testing driverless vehicles that maintain road safety and enable innovation
Centre for Connected & Autonomous Vehicles	A joint unit between the transport and business departments to provide a single point of contact for industry and to coordinate government activity
£100 million R&D programme	In March 2015, announced funding for Intelligent Mobility projects, to be matched by industry. Announced first round of £20 million in February 2016. Second round of £30 million announced in February 2017.
Consultation on advanced driver assistance programs and automated vehicle technologies	Solicited views on three areas around driverless cars: • Advances in near-to-market ADAS technologies • Developing insurance policies that cover product liability • Modifications to the highway code

Source: Gov.uk. "Driverless vehicles: Connected and autonomous technologies,"https://www.gov.uk/government/collections/driverless-vehicles-connected-and-autonomous-technologies.

Table 2. Driver assistance systems in new cars in the United Kingdom, 2015[15]

	Fitted as standard (%)	Optional fitment	Total
Adaptive cruise control	5.6	26.1	31.7
Autonomous emergency braking	18	21	39
Blind spot monitoring	3.4	32.4	35.8
Collision warning system	30.7	27.4	58.1

Source: Society of Motor Manufacturers and Traders, *Connected and autonomous vehicles*, position paper, February 2017.

and there are no dominant leaders in the space as yet.

Since 2014, the government has taken a number of steps to create a hospitable environment for promoting driverless vehicles (see table 1). It had a consultation in the summer of 2016 on the creation of a flagship test bed and will announce the results later in 2017.[13]

Despite these efforts, penetration and testing in real-world conditions remain limited. The number of vehicles sold in the volume segment that are fitted with driver assistance features (adaptive cruise control, autonomous emergency braking, blind spot monitoring and collision warning systems) is low, too. See table 2 for fitment rates. Few have ADAS features—a potential gateway to fully self-driving cars—fitted as standard. Many have the possibility to upgrade as an option although sources say the uptake is quite low.[14]

Testing of driverless cars commenced in 2016 but has been confined to controlled environments. From 2017, the United Kingdom is testing on the road.

The first tests will be run in London. So far, two auto manufacturers have signed up. Volvo announced a UK test called Drive Me London that will trial special versions of existing vehicles equipped with cameras and sensors.[16] The goal is both to assess people's acceptance of driverless vehicles on the road and to get real-time feedback in a complex urban environment. Nissan commenced its first EU tests in London in March 2017.[17] This test is limited to a fixed route in one of London's outer boroughs, and one objective is to address consumer concerns about shortcomings in driverless technologies.

Contrast these tentative efforts with those of the United States, where both technology companies and automakers have been testing self-driving systems for years on public roadways, racking up many millions of kilometres' worth of critical data and experience.

The goal is both to assess people's acceptance of driverless vehicles on the road and to get real-time feedback in a complex urban environment.

A planned test of heavy-goods vehicle platoons—a number of trucks driving close together in a convoy—in the north of England is set to be announced later in 2017 (see sidebar, *Autonomous trucking takes delivery of the technological promise*).[18]

AUTONOMOUS TRUCKING TAKES DELIVERY OF THE TECHNOLOGICAL PROMISE

Trucking is one area where the promise of driverless technology could be realised first. Trucks have fixed uses and drive on predetermined routes, mostly highways, thought to be an easier proposition for driverless vehicle computers to manage. It's also a smaller market: The heavy goods vehicle population in the United Kingdom is 473,000,[19] compared to the car population of 38 million.[20]

The potential benefits are also clear: Driverless truck platoons can increase a truck's fuel efficiency by permitting the trucks to travel much closer together. Drag accounts for up to 25 percent of a truck's fuel consumption.[21] Fully autonomous networks of long-haul trucks could operate for extended time periods and cover longer distances with lower labour costs. The United Kingdom currently has a shortage of 60,000 truck drivers, according to the Road Haulage Association. Driverless trucks can also be put to work in challenging environments, as Rio Tinto has done with over 70 trucks in its mines in Australia.[22] These vehicles can operate on unsealed roads and in changing environments and are monitored and operated from 1000 miles away.

The technology is almost ready for commercial launches—as evidenced by the recent delivery of 50,000 beers in Colorado using autonomous trucks.[23] Advanced systems for platooning, fuel efficiency and autonomous fleet management systems should be on the market in the next year or two, as shown in figure 2.

In April 2016, the EU sponsored the European Truck platooning challenge. Six platoons, representing all major truck OEMs, drove across Europe to Rotterdam. The longest journey, lasting a week, covered 1,500 kilometres from Gothenburg, Sweden, crossing five national borders in the process. The event gave manufacturers an opportunity to test autonomous technologies in a real-time setting, and gave governments a better understanding of the regulatory issues involved.[24]

Next steps

THE UK government is not alone in recognising the importance of the new mobility ecosystem as a catalyst for technological, economic and social developments. The United States, Germany and Japan are the front-runners in developing a fully self-driving vehicle ready for the market. The United States benefits from its home-field advantage in technology innovation and its large car market. In Europe, Germany's premium OEMs have invested significantly in expanding their research and are able to exploit their brand-driven margin advantages.

China, France, Italy, Sweden and South Korea are also seeking to leverage their domestic auto manufacturing capability and their comparative advantages in research, technology or market size to achieve dominance in the space. All are subsidising testing and demonstrations of driverless cars.[25]

The UK government has adopted a rolling program of regulatory reform, addressing technologies that are expected to come to market in the next two to four years.[26] But to become a global leader in autonomous vehicles, the UK government should accelerate its efforts, particularly in some key areas.

Road testing

Real-time road testing of driverless vehicles has been limited thus far. The UK has licensed eight tests and will start two on public roads this year. None of the large technology or new autonomy players have signed up yet for road testing in the United Kingdom.

In contrast, California alone has licensed 27 companies to conduct driverless tests, up from seven in 2015. More than 180 cars are licensed for testing.[27]

ADAS adoption

Government can drive adoption of cars equipped with the latest ADAS technologies through stricter standards and scrappage incentives (similar to what it did for electric vehicles with the HM Treasury Plug-In Car Grant).

Public trust

Consumers want proof over time that driverless cars are safer than driver-driven vehicles. Government plans to promote widespread testing of driverless cars can serve to familiarise the public with this technology. Survey results suggest that, in fact, consumers look to the government to regulate and certify driverless cars as safe—despite over half of respondents not wanting the government to allow them in the first place. As figure 4 shows, 65 percent want to see an established track record of self-driving cars, and 48 percent think government regulation/approval of self-driving cars will signal they are safe.

That means establishing a robust testing protocol and creating the necessary regulations to assure the public that driverless vehicles are as safe as or safer than any human-operated car.

Cybersecurity

Recent government guidance on driverless cars has focussed on cybersecurity and hacking as it relates to insurance and accident liability. While clarification in this area is an essential step to encourage investment and enable testing on public roads, there are other aspects of cybersecurity that also merit consideration.

Securing the future of mobility is a daunting challenge and the stakes are high. Thankfully, many of the cyber risks posed by driverless cars have been confronted before. By taking the lessons learned from other industries, such as consumer technology, banking and financial services, the UK government and the automotive industry can keep themselves ahead of their adversaries.

The high-level goal should be to design secure and resilient systems that can resist, detect and contain attacks, and recover quickly when damage has been inflicted. It is at the next level of prioritisation that specifics are needed and difficult choices have to be made. These include:

Incentivising security by design: The government should draw on its economic and regulatory capabilities to ensure security is an integral consideration for driverless vehicle (and component) designers and manufacturers.

Harmonising safety and security standards: The government should empower a new or existing body to establish rules and guidelines applicable to progressive levels of vehicle autonomy.[28] This body should also coordinate with organisations whose remit touches on autonomous vehicles, such as the Automotive Council, the Centre for Connected and Autonomous Vehicles (CCAV) and Euro NCAP.

Minimising conflicts of interest: Manufacturers will naturally encounter a tension between complete transparency and commercial incentives to protect intellectual property. Given that inadequate safety or security could place lives at risk, the government should use independent third parties to verify adherence to safety and security standards (to, for example, conduct penetration testing).

Infrastructure for roads and cities

While the essential driving functions of fully autonomous vehicles can be self-contained and technically may not require digital connectivity, creating smart infrastructure can play an important role for partially autonomous vehicles and the broader category of connected—but still driver-driven—cars.

Highways England committed £15 million in March 2016 to a "connected corridor" trial on the 112 kilometre A2/M2 motorway between London and the Port of Dover. The Wi-Fi-enabled road infrastructure is designed to send the latest journey information wirelessly to specially adapted vehicles, updating them on traffic conditions.[29]

A step in the right direction, but there is much more that can be done. The World Economic Forum ranks the country 24th globally in overall transport infrastructure (the second lowest of the G7).[30] If the United Kingdom is to become a top site for driverless vehicles, both as a creator and as a consumer, it will need to improve its infrastructure.

NETWORKS

The level of connectivity required for operating autonomous and semi-autonomous cars places heavy demands on network capacity and requires more extensive mobile networks with sufficient geographical coverage and bandwidth. The expectation is that the roll out in 2020 of 5G networks may help spur driverless vehicle adoption.

In the 2016 Autumn Statement, the chancellor committed £740 million to fund extension of the telecom network and the establishment of 5G trials. It offered a further £400 million, to be matched by private finance, to stimulate network investment by smaller players. Such policies are important if the United Kingdom wishes to be a leader in connected and autonomous technologies.

MAPPING

High-definition 3D mapping of most major infrastructure can be layered on top of existing maps and include the location of lanes, stop lines, guardrails, and the shapes of buildings, for example. The 3D maps also support ADAS, highly automated driving and location-based services.

Private sector players have taken the lead on mapping, with a number of technology companies and auto manufacturers expanding their mapping operations or partnering on new initiatives.

The government can further the adoption of driverless cars by making sure the country is fully mapped. As an example, the government can use some of the funds promised in last year's Autumn Statement to implement challenge-style projects managed by Ordnance Survey, the United Kingdom's national mapping agency. Similar to the driverless vehicle projects mentioned above, the mapping projects could involve consortia of tech companies, data providers, and other mobility players to create 3D maps of areas where driverless cars are likely to appear first.

CHARGING

Electric autonomous vehicles will need a denser and more convenient network of charging stations. As an example, Germany is expected to have just over 1 million charging stations by 2020, while the United Kingdom currently has around 12,500.[31]

Longer term, a transition to autonomous vehicles as a major component of an intelligent mobility ecosystem would entail a rethink of how roads, residential, retail and office areas are designed.

Insurance

In the recent consultation, *Pathway to driverless cars*, in which insurance was a major point of inquiry, the government explored modifications to motor vehicle insurance to cover driverless vehicles.[32] It announced in January 2017 that a new "single insurer model" will be created in the upcoming Vehicle Technology and Aviation Bill.

However, it has left some fundamental issues to be resolved in the future. Motor insurance in the United Kingdom is based on compulsory coverage of the driver, not the vehicle. At the current stage of development of autonomous vehicles, this is not a problem: Drivers still have to monitor the vehicle and remain alert throughout the journey, meaning they still control the vehicle. Once fully self-driving vehicles are on the road, the government will need to define more clearly who or what a driver is.

For fully autonomous vehicles, vehicle owners (whether a private individual or a mobility management provider) may need comprehensive coverage, even though the technological advancements may significantly decrease loss frequency in this category. For example, self-driving cars would be difficult or impossible to steal, and could be programmed to seek shelter in the event of a severe storm or rising flood waters. OS providers may choose coverage more akin to product liability policies to insure against new sources of risk, such as malfunctioning hardware or software, flawed algorithms, or security breaches. Those that self-insure may need stop-loss or other types of catastrophic coverage.[33]

> Once fully self-driving vehicles are on the road, the government will need to define more clearly who or what a driver is.

The government needs to balance public demand for a product that the insurer is also prepared to underwrite. It may be compulsory for drivers to have insurance, but it is not compulsory for insurers to provide coverage. The government should seek to avoid a situation that could inadvertently result in big premiums for early adopters of driverless vehicles.

Conclusion

THE UK government has made it clear that it wants "to secure the UK's position at the forefront of this change for the development, construction, and use of automated vehicle technologies."[34] It has started to get involved—as it should.

The potential benefits to the UK economy are enormous but right now the industry is not big enough or coordinated enough to organise on its own. The small, niche technology players that are ripe for scaling up need opportunities to play in the space. The United Kingdom has a highly developed finance sector but investors need guarantees.

While some might worry about government overreach, a bigger concern is that government steps to date have been too tentative and sub-scale. This is a big play and it requires bold action.

ENDNOTES

1. This and other topics are discussed in Deloitte's other work on the "Future of Mobility," Deloitte University Press, https://dupress.deloitte.com/dup-us-en/focus/future-of-mobility.html.
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ACKNOWLEDGEMENTS

The authors would like to thank the following Deloitte colleagues for their contributions to this article: **Warwick Goodall, Simon Dixon, Haris Irshad, Ben Perkins, Andrew Tong, Derek Pankratz, Mike Woodward, Hokkie Blogg, Stephen Wray, Mark Smith, Elizabeth Cathles, Richard Blackwell, Paul Lee,** and **Jason Warnes.**

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