

Technology in action – the road ahead for the motor industry



Transformative technologies are shaping a new landscape in the motor industry. From telematics (black box technology), to advanced driver assistance systems (ADAS) and autonomous vehicles, this *insights* report examines where we are on the road map of change and looks at future applications which promise to be as disruptive to the automotive sector as the advent of mobile phone technology was to telecommunications.

A DYNAMIC LANDSCAPE – VEHICLE TECHNOLOGYⁱ

The journey from driver-only control to full vehicle autonomy is already well underway. Emerging technologies are disrupting existing business models and industry dynamics. The proliferation of data from telematics, for example, is altering and informing business decisions regarding driver behaviour, utilisation rates, and with the advent of in-cab closed-circuit television (CCTV) - even defensibility.

Concerns surrounding road capacity and utilisation, in addition to increasing government investment and a drive for greater safety levels, are leading to a change in the auto-value chain, with a move to fully-autonomous vehicles. New entrants to the field such as Google and Apple, with their expertise in the “Internet of Things” (as well as telecoms giants, such as Telefonica and Nokia) are entering the arena, alongside traditional and non-traditional auto manufacturers.

TELEMATICS

The adoption of telematics is a fundamental adjustment in the motor insurance industry. The development of more sophisticated technologies, the struggle for profitability for motor insurers, and regulatory and government scrutiny are resulting in considerable

impetus for organisations to look to telemetric systems to help drive down fleet risk costs.

WHAT IS TELEMATICS?

Telematics is a form of black box technology, which uses wireless devices to transmit data in real time back to an organisation, similar to that already used in the airline industry. Collecting data using the global positioning system (GPS) and CCTV to determine location, speed, distance travelled, and the type of road used, the data provides an insight into the way the vehicle is being driven and the risk the driver presents.

The commercial use of telematics in the professional driving arena is becoming more prevalent in mature markets, and Europe has become one of the most important. With developments in technology, your average system is now easier to install, often smart-phone enabled, and available at a price that is conducive to small fleets.

Tracking this information provides a strong incentive for organisations to improve the behaviour of their drivers as these devices capture date, time, location, speed, cornering, harsh braking, and frequent lane changing. Acting upon the information to influence driver behaviour can reduce the number of accidents and therefore result in fewer insurance claims.



SPOTLIGHT

BLURRED LINES

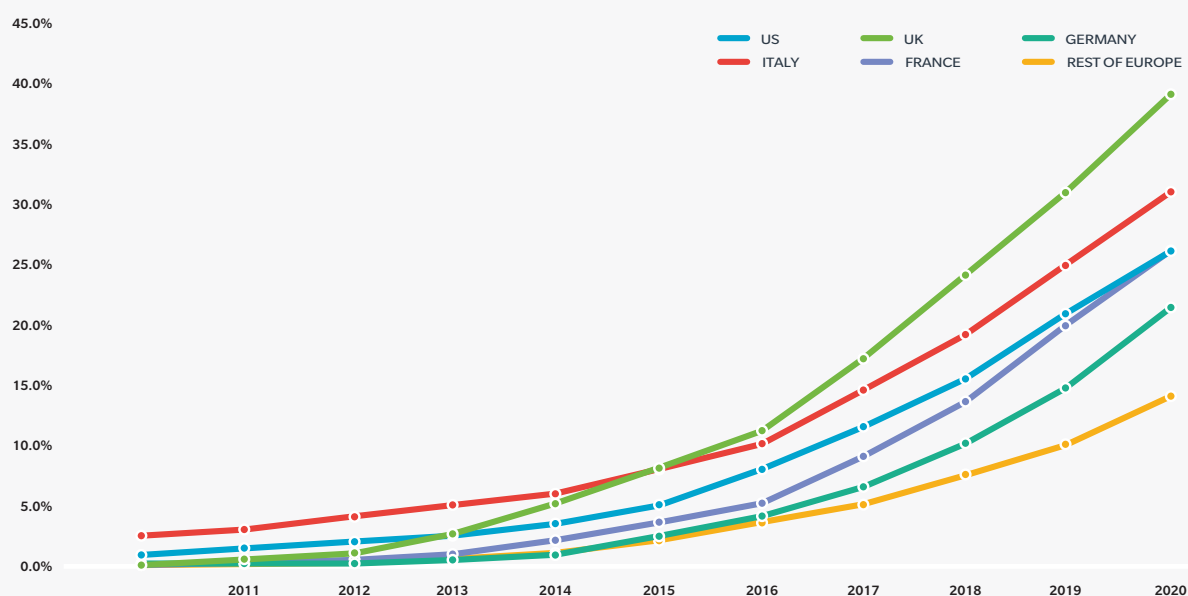
The sale of telematics-based insurer, Insure the Box, to Aioi Nissay Dowa (which has strong links to Toyota) is a sign of the collaboration between manufacturers and insurers in developing an understanding of the technology.ⁱⁱ This deal may signal a step of tying-in customers through both selling insurance and holding information through telematics.

ⁱ KPMG/SMMT. *Connected and Autonomous Vehicles - The UK Economic Opportunity*, 2015.

ⁱⁱ Keighley T. “Insure The Box sells majority stake to Japanese insurer in £105m deal,” in *The Journal*, available at <http://www.thejournal.co.uk/business/business-news/insure-box-sells-majority-stake-8343397>, accessed 2 September 2015.

FIGURE 1 Market size – share of telematics-enabled insurance policies in Europe and the US

Source: PTOLEMUS. Global Insurance Telematics Study, 2012



For a fleet manager, this awareness can also help in optimising their vehicles by way of more effective route planning and lower fuel costs; in sum, a lower overall average cost of utilisation.

With a proliferation of suppliers and technology that is constantly evolving, the challenge for insurers is in assessing the risks and benefits of investment alongside the need to keep abreast of the latest changes. The nature of discussions with clients will also have to change as insurers will need to amend the way they assess risk profiles in light of new technological developments. For the buyer, we expect more creative insurance solutions will emerge in the future.

Although the use of telematics is expected to increase over the coming years, the shift to automation in the future may eventually see this technology made redundant, as automated vehicles take more and more control.

CCTV AND DEFENSIBILITY

It is common for drivers to work alone. In accidents this can lead to disputes over responsibility, the search for witnesses, and wasteful quarrels. CCTV will start to eliminate this and will provide better proof of the position and speed of a vehicle. Disputes will therefore reduce and be judged on facts as opposed to opinion and/or memory. For a driver who relies on a license for a living, this will provide critical protection.

“By 2030, connected and autonomous vehicles could save over 2,500 lives and prevent more than 25,000 serious accidents in the UK.”ⁱⁱⁱ

ⁱⁱⁱ KPMG/SMMT. *Connected and Autonomous Vehicles - The UK Economic Opportunity*, 2015

SAFETY AND DRIVER ASSISTANCE – REDUCING COLLISIONS

The development of a combination of technologies by auto manufacturers, motivated by the need to make driving safer, is already incrementally changing the driver experience.

Human error is a factor in more than 90% of collisions. Mis-judging other road users' movements, being distracted, and failing to look properly are the most common causes of collisions on today's roads. Manufacturers are therefore developing assistance systems to make travel safer – some of which are in the experimental stage, while others are already on the market. There is already a significant level of connectivity and autonomy in vehicles compared to a decade ago.

Many current production vehicles already feature ADAS. Features such as adaptive cruise control and lane-keeping technologies allow the automated control of acceleration, braking, and steering for periods of time on motorways, major A-roads, and also in congested traffic. Advanced emergency braking systems automatically apply the brakes to help drivers avoid a

collision while self-parking systems allow a vehicle to parallel or reverse park hands free.

These features give a car a degree of autonomy and have the potential to move us closer to a time when a vehicle could become completely “driverless”.

YOUR AUTONOMOUS VEHICLE HAS ARRIVED SIR

Driverless vehicle technology has the potential to be a game changer on the UK's roads, delivering major benefits for road safety, emissions, and congestion. The desire to go where we want, whenever we want, together with the perception that such mobility is becoming increasingly expensive and inefficient are powerful drivers for change; change that is - to a large extent - already here.

The UK Government is providing GBP19 million for the launch of four driverless car trials in Greenwich, Milton Keynes, Coventry, and Bristol, to allow the testing of automated vehicle technology^{iv} as it concluded that there was “no barrier to testing driverless technology on UK roads”. It has promised a full review of current legislation by the

FIGURE 2 Levels of autonomy – where are we on the road map for change?

Source: Adapted from Thatcham Research/Lloyd's. *Autonomous Vehicles – Handing over Control: Risks and Opportunities in Insurance*, 2014.

NEW TECHNOLOGIES	LEVEL OF AUTONOMY	TECHNOLOGY
DRIVER ONLY	Entirely under human control, with some automated systems.	Cruise control, anti-lock brakes.
DRIVER ASSISTANCE	Steering /and or acceleration automated, other functions driver-controlled.	Adaptive cruise control, parking assistant.
PARTIAL AUTONOMY	Automated steering and acceleration. Driver can take back control at any time.	Adaptive cruise control, lane keeping, traffic jam assistance.
HIGH AUTONOMY	Operate autonomously with transfer back to the driver.	Prototype vehicles.
FULL AUTONOMY	Vehicles operate driver unaided.	None.

^{iv} *The Pathway to Driverless Cars - Summary report and action plan*, UK Department for Transport, February 2015, available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401562/pathway-driverless-cars-summary.pdf, accessed 2 September 2015.

^v “Heathrow pods transport passengers to the future,” available at <http://www.ultraglobalprt.com/heathrow-pods-transport-passengers-to-the-future/>, accessed 2 September 2015.



SPOTLIGHT

AUTOMATION ON THE ROAD

Debuted in the autumn of 2013, the Mercedes S-Class has integrated the sensors, controls, and 36 separate technologies — of which 11 are new or updated — to work together in a bundle, which it calls *Intelligent Drive*. The package includes systems to help prevent collisions, a pedestrian and animal recognition feature, lane keeping, parking assistance, rear-crash monitoring, cross-wind stabilisation, and distance control. In the mid and small car categories, the Volkswagen Touareg and Vauxhall Viva are fitted with lane-departure warning, cruise control, speed limiter, and city-mode steering.



SPOTLIGHT

PODS AT THE AIRPORT

Heathrow Airport is already operating driverless pods, which are low-energy, battery-powered, zero-emission vehicles capable of carrying up to four passengers and their luggage. The system consists of 21 vehicles which will carry the 500,000 passengers travelling between the Terminal 5 business car park and the main terminal each year, along a total of 3.8 kilometres of one-way guide way. The journey is “on demand” and non-stop from start to destination at the touch of a computer screen.^v

summer of 2017, which may include a review of existing regulations governing how vehicles are used and maintained, to allow the use of automation technology. It may also involve changes to the Highway Code to include a section on automated vehicle technologies and an understanding of who would be responsible in the event of a collision and how to ensure the safety of drivers and pedestrians.

There is also a great deal of global hype and press coverage in this growing sector:

- Google has been lobbying the US Government to permit the testing of these vehicles.
- The state of Nevada gave its approval to test self-driving cars in 2011, followed by Florida and then California in 2012.
- Google's driverless cars have clocked up thousands of miles and are producing prototype vehicles without steering wheels and pedals.
- Nissan is testing its driverless vehicles on Japanese motorways. Meanwhile, Volvo has permission to test 1,000 driverless cars in Gothenberg in 2017.
- Audi, BMW, and Mercedes-Benz have struck a deal with Nokia to acquire its mapping and location services business Here for GBP1.9 billion.^{vi}

For the automotive industry, this reflects a desire to integrate new assistance systems and ultimately fully-autonomous driving as these technologies require an up-to-date plan of a vehicle's surroundings in order to react in real time.

Mercedes-Benz, General Motors, Nissan, Google, and Volvo all have

said they will have a self-driving car on the road by 2020.

Future technology and the autonomous car have the ability to disrupt current established business models. The future of the industry invites questions regarding who will design and manufacture automobiles, who will design the consumer experience, and who will provide the software. Changes in vehicle technology will also affect transportation infrastructure and have far-reaching implications on government policy relating to modal connectivity and the way in which different forms of transport integrate.

Dedicated infrastructure pathways will be the natural choice for initial trials. Motorway automation could see early adaption as motorways tend to be more uniformly designed and better maintained, with vehicle flows being more organised.

The adoption of self-driving vehicles will of course depend on multiple, interdependent activities and forces, including those within regulatory frameworks, business cycles, technological advancements, and market dynamics. Incremental change to make them viable will creep up on us, most probably played out in discreet industries.

IT'S A PLANE, IT'S A TRAIN, IT'S A CAR

Autonomous technologies have been used productively in various applications for a number of years, so the technology is nothing new. The military are often early adopters of technology: Lockheed Martin has partnered with the U.S. Army Research Development and Engineering Center to develop fully-automated vehicles that can be used in a variety of situations.



SPOTLIGHT

GBP900 billion

Estimated value of autonomous car industry by 2025.^{vii}

Autonomous vehicles around the world:



US

The first country to introduce legislation to allow the testing of automated vehicles.



Germany and Sweden

Have reviewed their legislation.



Japan

Nissan was the first manufacturer to test automated vehicles on Japanese roads.

^{vi} Roberts G. "Audi, BMW, and Mercedes-Benz buy Here digital mapping business from Nokia," available at <http://www.fleetnews.co.uk/news/manufacturing-news/2015/08/03/audi-bmw-and-mercedes-benz-buy-here-digital-mapping-business-from-nokia>, accessed 2 September 2015.

^{vii} Topham G. "Driverless cars set to roll out for trials on UK roads" available at <http://www.theguardian.com/technology/2015/feb/11/driverless-cars-roll-out-trials-uk-roads>, accessed 2 September 2015.

In the aviation industry it is considered normal for airlines to deploy auto-pilot technology as standard equipment. Other examples include fully-automated metro and shuttle trains that operate in multiple cities and airports around the world.

CONNECTED TRANSPORT MANAGEMENT

AUTONOMOUS VEHICLES IN THE LOGISTICS INDUSTRY

Sensor-based and connected-vehicle technologies are already being utilised by logistics companies. The industry is adopting advances in self-driving technology more rapidly than many others, as the transportation of goods rather than people in the closed environment of private warehouses and depots removes many questions surrounding liability.

Warehousing operations have long been using autonomous vehicles to handle and move products around the warehouse environment along pre-defined routes. The forklifts can be used to integrate multiple processes, including loading and unloading, leading to an increase in the overall efficiency of an entire process.

A research project in Germany is using 3D camera software to enable the vehicle to recognise its environment, identify obstacles, and thereby move autonomously through the warehouse.^{viii} One of the most innovative examples is in the Harbour Container Terminal

Hamburg, Germany. Container handling there is almost completely automated; a total of 84 driverless vehicles transport containers between the wharf and the storage areas with navigation controlled by 19,000 transponders which are installed in the ground.

A Dutch consortium has also proposed to introduce self-driving trucks in and out of the Port of Rotterdam, with the aim that, within five years, technology will be available to allow logistics companies with enabled lorries to drive on public roads. In February 2015^{ix}, Scania held the first partially-autonomous self-driving truck tests on Dutch public roads. During the test, Scania trucks drove themselves in a convoy or “linked driving”, in which the lorries are within a fixed distance from each other and linked to other lorries in a way that when the first truck brakes, the others brake simultaneously.

It is perhaps in the first and last mile in the logistics value chain that self-driving vehicles will have the most impact. Delivery shuttles may travel at low speeds along dedicated routes between depots and warehouses, with the robotic delivery systems using pathways rather than, or in addition to, roadways, cutting the cost of lorry transport by 80% and with the driver eliminated.^x

In 2014,
Mercedes-Benz
launched its
prototype
driverless
truck “Future
Truck 2025”.

^{viii} DHL. *Self-Driving Vehicles in Logistics - A DHL perspective on implications and use cases for the logistics industry*, 2014.

^{ix} Savelle T. “Self-driving trucks tested on Dutch highway,” available at <http://www.nltimes.nl/2015/02/10/self-driving-trucks-tested-dutch-highway>, accessed on 2 September 2015.

^x Day P. “Look no hands: Self-driving cars on a road near you?,” available at <http://www.bbc.com/news/business-33702394>, accessed 2 September 2015.

PASSENGER TRANSPORT – THE NEXT BUS WILL BE...

The same technology that is being developed in autonomous cars and lorries will have a considerable effect on bus operations. The industry could see a rapid transit lane similar to those being pioneered in the logistics sector, with moving buses queued up end-to-end at a fixed distance operating more like a train. Automated buses could result in substantial reductions in bus operating costs. On average, around 40% of bus operating costs are accounted for by the driver's wages.^{xi}

Although roads in the UK may not always be open to full automation, particularly in major urban areas, enhanced driving features such as automatic braking and collision danger warnings are currently being tested by many of the major players. In major cities, buses are already trialling this technology, with the intention of reducing the number of collisions with pedestrians and cyclists. The sensor technology directly alerts bus drivers when pedestrians and cyclists are moving close to their vehicles, helping to reduce collisions.^{xii} Intelligent speed adaptation (ISA) is also being trialled on London Buses to regulate speed across the bus network. The technology links to a digital speed map, which shows the current speed limit of every road in London, helping to ensure that the vehicle keeps to the relevant limit.

Additional levels of automation would help reduce road accidents while also allowing traffic speed to be managed thus maximising road capacity.

THE CHANGING NATURE OF RISK

As technology develops, we will see a change to the automotive value chain as new entrants invest in connected and autonomous technologies. The industry will witness a move away from the traditional automotive manufacturers, with innovators playing a more significant role.

The matter of liability will be a major consideration, and the most commonly asked question with regard to the increasing use of autonomous vehicles will be as to whose fault it would be if there was a collision. Would it be the responsibility of the vehicle drivers, vehicle owners, vehicle operators, vehicle manufacturers, vehicle suppliers/importers, service providers, or data providers?

Each of these parties may be found to be civilly, or in some cases criminally, liable to a greater or lesser extent depending on the exact circumstances of the situation. In the event of a collision where the parties are unable to resolve where liability lies, this process would probably take place in a court of law.^{xiii}

Over time, there will likely be a move towards manufacturers taking on greater responsibility for liability as vehicles become more autonomous and the use of telematics increases.

As is usually the case with change resulting from developments in technology, legislators may be seen to be playing catch up in an environment where the pace of technology change increases, particularly while “traditional” driver-operated vehicles remain on the road.



SPOTLIGHT

AUTOMATION AND RECALL WOES

In July 2015, Fiat Chrysler announced a recall of about 1.4 million cars to prevent hackers from gaining remote control of the engine, steering, and other systems after reports that cyber-security researchers used a wireless connection to turn off a Jeep Cherokee's engine as it drove, increasing concerns about the safety of internet-enabled vehicles.^{xiv}

^{xi} Begg D/Clear Channel. *A 2050 Vision for London: What are the implications of driverless transport*, 2015.

^{xii} Dedring I. “New Bus Sensor Technology Trial,” available at <https://tfl.gov.uk/info-for/media/press-releases/2014/august/new-bus-sensor-technology-trial>, accessed 2 September 2015.

^{xiii} Department for Transport. *The Pathway to Driverless Cars: A detailed review of regulations for automated vehicle technologies*, 2015.

^{xiv} Woodhall B, Menn J. “Fiat Chrysler US to recall vehicles to prevent hacking,” available at <http://www.reuters.com/article/2015/07/24/us-fiat-chrysler-recall-idUSKCN0PY1U920150724>, accessed 2 September 2015.

THE “SECURITY OF THINGS”

Increasing connectivity will play a pivotal role in the changing motor landscape. Telematics offerings and autonomous vehicles will have evolved to provide real-time data over mobile networks and/or the internet, either through the driver's smartphone or through a subscriber identity module (SIM) embedded in the vehicle. In the future, connecting vehicles to other devices and infrastructure will result in fewer accidents but will present data protection concerns and cyber risks, which will need to be carefully considered.

New threats to personal data will drive questions surrounding the ownership of data, creating requests for new privacy as well as ethics policies. This is particularly the case as the technology becomes more widespread and is installed by the motor manufacturer, insurer, or the fleet manager. Unauthorised parties or hackers could capture data or alter records, adding another dimension for the industry to consider. The data itself will become a valuable commodity.

As autonomous vehicles form connected transport systems and sensor-based technology becomes more prevalent, malicious hacking or even terrorist activity could bring down a network with all the associated business interruption costs attached.

To mitigate this risk, attention needs to be paid to the security and strength of data connections and how networking with other cars and infrastructure could impact the cyber security of the car, with back-up options considered if connections fail.

DATA, DATA, EVERYWHERE – CALLS FOR ANALYTICS

The amount and variety of data collected not only brings to the fore privacy issues, but also concerns as to how the data is managed needs to be considered, such as:

- What data about a drivers' behaviour and vehicle use should be collected?
- How should it be collected?
- How should it be organised and stored?^{xv}

The explosion of data from many different providers, all with data in different formats, requires the recoding of information, such as: date, time, speed, longitude, latitude, acceleration or deceleration, mileage, and fuel consumption.

How effectively is the data collected, managed, used, and acted upon? Organisations are struggling to keep pace with the increasing amount of data and/or failing to adopt analytics capabilities to understand the data captured. Technology is fundamental to change as additional data variables can be analysed in shorter times, with decisions being informed by analytics. Capturing the value in this data will be a feature of those businesses that gain from these changes.^{xvi}

EVOLVING INSURANCE DISCUSSIONS

The motivation for technological development in the auto industry is primarily driven by safety concerns and the desire for a more efficient utilisation of our fleets and transport systems. However, with new technologies come new risks and,

although the potential for change is significant, these risks will need to be managed accordingly.

Technology is changing the way that risk is assessed. This new landscape will offer new ways to manage risks, with opportunities for those who look to technological advances to help manage risk effectively.

Thatcham Research envisages a three-stage shift in the insurance industry: starting with risk “reduction”, where accidents caused by human error decrease; then risk “slicing”, where there is a shift away from traditional motor policies towards product liability policies, as the role and responsibility of the driver gradually diminishes and the technology takes over; and finally, risk “elimination”, whereby accidents on the road diminish in scale and impact.^{xvii}

Insurance risk discussions will therefore evolve as vehicles become safer, resulting in fewer claims, leading to lower premiums. The increased use of computerisation and data will result in an opportunity to offer more bespoke products and services and a technological approach to premium pricing.

It is difficult to predict the timescale of change, although there is little doubt that we are on the continuum, with increasing incremental changes taking place. Foreseen and unforeseen risks will be amplified by the accelerating speed and complexity of technological development.^{xviii}

^{xv} Deloitte. *Telematics: Driving the automobile insurance market through disruption 2012*.

^{xvi} London Market Claims Council. *Predicting the unknown: Making the use of predictive analysis in the London insurance market 2014*.

^{xvii} Kidman, D. “Driverless cars: evaluating risk”, available at <http://www.actuarialpost.co.uk/article/driverless-cars:-evaluating-risk-7597.htm>, accessed 2 September 2015.

^{xviii} World Economic Forum. *Global Risks 2015*.



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About this report

This report examines how technological change is redefining the nature of risk in the motor industry. Marsh's Transportation Practice in the UK sees understanding and keeping at the forefront of technological change as key to providing best client advice and enhancing the benefits we can deliver to clients businesses.

Notes

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