

DRIVING OPPORTUNITY: DEPLOYING GROWTH
MINDSET ON THE JOURNEY TO 2030

Connectivity and the migration to mobility



- > Driverless and shared vehicles
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CONNECTIVITY AND THE MIGRATION TO MOBILITY

New transport concepts



"The automotive sector has moved from a manufacturing-led industry to one that is driven by technology and data."

Philip Nothard - Insight & Strategy Director, Cox Automotive

More consumers are choosing to use vehicles as and when they need them as opposed to owning them outright. The trend is accelerating due to changes in working and living patterns post-pandemic. The definition of ownership is also being redefined, driven by evolving finance and lease models. Vehicle manufacturers, fleets and dealer groups are also all wrestling with the opportunity to offer subscription-based, flexible ownership and multi-user products. One size does not fit all.

However, while consumers were increasingly accepting of alternative shared mobility solutions prior to COVID-19, there has been a shift back post-pandemic. The recent Cox Automotive 2021 Evolution of Mobility Study in the US suggests cost, convenience and safety are the top considerations when it comes to choosing a transport solution. Almost half (46%) of consumers surveyed changed their habits during the pandemic, including halting their use of public transport and ride-hailing services, preferring to drive their own vehicle. Traditional vehicle ownership is still viewed as the most convenient (78%), practical (78%) and flexible (58%) option for day-to-day travel.

When discussing mobility, there is a plethora of technologies and solutions which could fall under this banner. The Insight Report is primarily concerned with the vehicles themselves, and specifically the automotive sector. Although there are significant developments in rail, marine and aviation, as well as micro-mobility, the emphasis for the automotive sector is on how passenger cars and vans can be redeployed to suit new travel patterns, consumer concerns, and business needs.

What mobility means for Cox Automotive?

Paul Humphreys, Managing Director at Cox Automotive Mobility Solutions - International: "The emerging transport ecosystem is autonomous, connected, electric and shared. We are evolving our offer to enable customers to keep their fleets and people moving safely and sustainably for years to come. This means harnessing data and connecting partners to simplify and accelerate business with proven mobility technology and services."

Introduction

“We are focused on data-driven fleet operations, as well as software and technology developments that power a flexible approach to buying, selling, driving, and disposing of vehicles and enable innovative customer experiences. On the electric and autonomous side of the industry, we are investing in battery health, accurate valuations, vehicle-sensor diagnostics and calibration. We are committed to optimising the life cycle management of battery packs within electric vehicle fleets, through repair, remanufacturing, refurbishing and repurposing.

“New mobility solutions represent a catalyst for evolution and revolution, prompting the automotive industry to innovate by developing mobility solutions of their own and experiment with new business models and new revenue sources. At Cox Automotive, we are working with our customers and partners to deliver data-driven insights which will support the journey that lies ahead.”

From manufacturer rental fleet to subscription model

Sebastian Fuchs, Managing Director Manheim and RMS Automotive Continental Europe: “The way in which we use vehicles is changing. Most vehicle manufacturers now offer a version of a mobility scheme, whether that is through personal leasing, subscription, flexi-rent or another model. The challenge for all of them is how to make this work effectively and efficiently. We’ve seen several manufacturers dip their toe in the water and then withdraw to re-evaluate their approach.

“Manufacturers used to own rental fleets. It feels like we might be seeing a return to that space, albeit under a different name. There is also a potentially untapped mobility solution in the used car fleet, which could be deployed through rental and subscription solutions as well as the more traditional sales route.”



Introduction

The rise of subscription

This report has already explored electrification in chapter 2.0; however, the remaining elements of CASE or ACES (Autonomy, Connectivity and Shared Mobility) are discussed below. While the latter has been significantly impacted by concerns over sanitisation and transmission of the COVID-19 virus, with ride-hailing and car-sharing falling off during the pandemic, the concept of subscription is beginning to make real traction. For example, in the UK, 15% of retail sales for Volvo came from the Swedish manufacturer's subscription brand, Care by Volvo, in its first year of operation.

Opportunities for vehicles in a 24/7 economy

Didier Van Bouwel, Chief Operating Officer of Modix International: "We certainly need to consider questions like whether a consumer actually requires their vehicle 24/7. As air quality, congestion and other environmental concerns take centre stage, is it better for a vehicle to be parked on a driveway or side street or in use constantly but with different drivers, thus lowering the total volume of vehicles required. Clearly the location is going to be key – drivers in cities may have less need of immediate access to transport than those in rural areas, where public infrastructure is less frequent."

Autonomy and the space race

No longer a novelty, all new vehicles come with some degree of automated driver assistance systems (ADAS), and many have elements of sophisticated connectivity. However, there have been several high-profile issues with autonomous vehicles causing or being part of accidents. This is leaving many consumers wary, but so-called robo-taxis are already rolling out in various geographies around the world including Germany, the US and China. These tend to operate in controlled areas where innovation and acceptance of change is already high, like San Francisco.

For driverless vehicles to be practical, the connectivity challenge needs to be resolved. This requires investment in telecommunications networks and infrastructure and upgrading legacy systems. In addition, satellite technology that supports communications needs to be enhanced to consider increased data transfer. Tesla is a prime example, with hundreds of thousands of Low Earth Orbit (LEO)

satellites in operation and permission being sought to use these to interact with moving vehicles.

Philip Nothard, Insight and Strategy Director, Cox Automotive: "Going fully autonomous without investment in connectivity is like sticking a Scalextric car on the carpet. It just won't work. Until the telecommunications infrastructure is in place, there could be the most sophisticated vehicles on the road, but they won't be able to talk to each other or the road furniture, rendering them almost useless."

Cybersecurity

With more data being moved around, there is also an increased risk of accidental or malicious damage. Cybersecurity is a new priority for automotive but one which is symbolic of the sector's shift from a manufacturing to technology-led approach. As noted in our 2020 Insight Report, the data generated by a vehicle is technically owned by the vehicle owner/operator/driver. But, in a shared mobility era, these could all be different people or organisations. Add to that the service providers who will need access to provide customer support, and there are going to be plenty of open doors for hackers to potentially exploit. This is an area that must move quickly if trust in connected and autonomous vehicles is to be generated and maintained.

Read more about the Cox Automotive perspective on mobility solutions and vehicle ownership trends in the Cox Automotive trend definition document #2: The migration to mobility and diversification of ownership models.

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Driverless and shared vehicles

Rise of the Robotaxi

In most cases, autonomy, connectivity and electrification go hand-in-hand. The majority of companies developing driverless technology are doing so on the back of advances in electric vehicles. Large numbers of driverless vehicles are also being designed with shared mobility or logistics and delivery in mind. Therefore, the question of what the journey to mobility will look like is heavily intertwined with the road to electrification and whether vehicles will need to be owned or merely used in the future. While still in trials, the Robotaxi is already on roads around the world, and several delivery companies are exploring options with remote piloted vehicles.

Sebastian Fuchs, Managing Director Manheim and RMS Automotive Continental Europe: “Shared mobility services come with a host of challenges. Vehicle manufacturers will need direct to consumer access to facilitate engagement. It is also important to consider how vehicles are managed and maintained between drivers, whether that is every three months, three weeks, or three days. Tools like our RMS self-inspection app could be one part of the picture, allowing drivers to complete AI-supported damage reports on collection and drop-off of the vehicle.”

Do consumers actually want driverless vehicles?

AA research from March 2021 found almost three-quarters of UK drivers (72%) don't think they would feel at ease riding in an autonomous vehicle, even if they knew it was statistically safe. Less than a third (29%) thought that advances in science and engineering would allow autonomous vehicles to be safer than human drivers. Half of those surveyed did not believe that autonomous vehicles would be widely available by 2025.

Source: AA Yonder Poll March 2021.

In the US, the most recent Cox Automotive 2021 Evolution of Mobility Study found that only two fifths (40%) of consumers agreed “roadways would be safer if vehicles were fully autonomous”, down from 44% in 2018, and 63% in 2016. However, there is increasing demand for vehicle safety technologies, with more than half (56%) of consumers thinking the more safety features a vehicle has, the safer it is. Almost all of those surveyed (93%) felt that ADAS features are must-haves or nice-to-haves in their next vehicle.

Source: Cox Automotive 2021 Evolution of Mobility Study

Driverless and shared vehicles



Human not included

From minders in vehicles to remote human control, drivers being told to stay engaged and autopilot not entirely living up to the promise, there is clearly some way to go until vehicles are completely driverless. However, given where the industry was when the first Insight Report came out in 2018, things have come a long way. Despite the odd challenge, like Toyota's driverless pods hitting a visually impaired athlete in Tokyo over the summer, there is cautious optimism in the industry for autonomous technology to find a place in specific use cases. Multiple vehicle manufacturers, technology companies, and joint ventures now have vehicles on the roads around the world operating in a variety of semi-autonomous ways.

Although there is plenty of noise about Tesla's driver assistance systems, there is little to no reported autonomous testing activity. However, the likes of Waymo by Alphabet and Cruise by General Motors already have many millions of miles of testing completed in the US. Motional from Hyundai and Aptiv has revealed plans for its programme of robotaxis which will be offered through Lyft from 2023. In Europe, Mobileye and Sixt, in conjunction with the Moovit app, intend to have a test programme live at the end of 2022. Vay is also looking to roll out services in Europe, with 'Teledrivers' piloting vehicles to be delivered to people's homes and workplaces.

One of the reasons Germany is acting as a testbed for many of these companies, with the likes of Argo AI from Volkswagen and Ford also choosing the country for pilots, is because of a recent change in the law permitting autonomous vehicles on the country's roads. If Germany is the home of autonomous vehicle testing in Europe, California is the location in the US. In contrast, while New York City has recently announced new rules to grant permits to companies which want to test driverless technology, the conditions are fairly stringent.

Opportunities for logistics and delivery

In the UK, Oxbotica and AppliedEV are working together on a platform for driverless last mile delivery vehicles. In the US, Swedish self-driving truck business Einride has raised significant sums for vehicles which, when operational, will be supported by remote human pilots. Wayve and Asda are trialling driverless delivery vans in the UK from next year, with safety drivers on board. On a smaller level, Alibaba is deploying last-mile delivery bots in China to support ecommerce; Argo AI is working with Walmart in the US; and UK retailer Wilko has taken a stake in StreetDrone, which aims to have driverless vehicles on the roads by 2023.

While still fundamentally in the pilot phase, the number of organisations now investing in semi-autonomous and fully driverless technology has grown significantly over the past 12 months. The cost of developing the systems means that ecommerce and last-mile delivery offer significant opportunities, perhaps more so than transporting people, as the online shopping boom looks set to continue post-pandemic. With last mile delivery a continuing challenge for the retail and logistics sectors, many organisations are watching to see whether those early adopters can make a viable proposition of pods, bots, and drones.

Philip Nothard, Insight and Strategy Director, Cox Automotive: "We are already seeing many vehicles fitted with all kinds of advanced driver assistance systems. Full autonomy might well be relatively close behind. There are clearly all kinds of implications and opportunities attached to these vehicles, ranging from official standards adopted and ensuring security through to who is responsible for their use and misuse."

CONNECTIVITY AND THE
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Network, 6G and beyond

Delivering on technology's potential

FIRMWARE UPDATE

Do not switch off the ignition!

SWL Ongoing: System has limited functionality

Image: Alexander - stock.adobe.com

Philip Nothard, Insight and Strategy Director, Cox Automotive: "While we are not yet driving around in the equivalent of a smartphone or wearable device, consumers are expecting an increasingly connected experience. As drivers, we are prepared to trade a little of our privacy to make the whole driving experience more seamless and integrated with the rest of our lives."

Over-The-Air (OTA) updates

Although Tesla is the manufacturer best known for OTA updates, others are now getting in on the action. In recent weeks, Volkswagen has launched OTA for all its ID models, suggesting updates every 12 weeks could become part of a future driver revenue stream. They are also anticipated to be instrumental in autonomous vehicle development. Toyota and Lexus are expected to follow suit in the next five years, with the launch of the Arene operating system software.

OTA updates are focused on infotainment systems and ADAS technology in the first place, but the potential applications are considerable. Geofencing, vehicle health, and EV charging management are also likely to see OTA play an increasingly significant role. Smart connected vehicles could choose when to dynamically charge while on the move based on location data around traffic patterns, while battery life could be extended through software patches and new lines of code.

While there are challenges with OTA updates which in the worst case could leave owners frozen out of their vehicles – or trapped within them, the opportunities are substantial. Through connecting to the vehicle remotely, unnecessary trips to service centres can be reduced; vehicle manufacturers can be certain that updates have been applied where required from a safety perspective; and consumers can enjoy greater convenience as they don't have to drop their vehicle off for a garage appointment. When it comes to vehicle values and resale, OTA updates can help a vehicle retain its value because it is running the latest software.

There is, however, a legitimate concern for consumers who fear the car they bought second or third hand could have technology removed or disabled after money has been transferred. Furthermore, with vehicles being used rather than owned, it is possible, though currently unlikely, that manufacturers could tweak settings to create a different experience for each driver depending on how much they have paid to access the vehicle or how they intend to use it. This could cause real headaches for the valuations market which is used to pricing a vehicle based on its specification. If that can change post-sale, then how do organisations set accurate valuations?

Network, 6G and beyond

The link between connectivity and charging

Alongside OTA updates, which are now primarily driven by the road to electrification, another buzz concept of 2021 is smart charging and load balancing. With a sharp uplift in the volume of vehicles connecting to the grid, and governments worldwide starting to mandate investment in public and domestic charging infrastructure, it is important to consider how to manage the additional demand on legacy power systems. In the UK, for example, recent consultations have explored requirements for all domestic chargers to have a default off-peak charging mode.

Advances in technology will enable smart chargers to communicate with each other as well as the grid to determine the most efficient and cost-effective times to charge. Consumers could plug in overnight but set their vehicle to only charge at the cheapest tariff times, and only up to 80%, for example. Likewise, for Vehicle to Grid (V2G) to be a viable option, the connectivity infrastructure supporting the communications between the vehicle and the power network needs to improve.

Beyond the 'dumb' socket

Tom Callow, Head of Insight and External Affairs at bp pulse: "Connectivity is actually one of the most important aspects of charging infrastructure right now. There is a significant shift in the market from 'dumb' wall sockets to smart connectors which manage load balancing and report insights back to the driver, business or infrastructure provider. This is especially relevant when it comes to the perennial discussion about grid anxiety. While the transmission system will cope with increased demand, there could be challenges around local power distribution.

"Multibillion pound investment is required to upgrade distribution networks for the electrification of heat, and this will ultimately support electric vehicles too. In the meantime, 'time of use' and dynamic tariffs to manage charging demand are becoming more significant. There is broad consensus among industry and policymakers that home charging will need to happen off-peak. We will also see legislation requiring all domestic charging units to come with a default off-peak mode."

5G, 6G and beyond

If the development trend continues, then 6G technology would be expected by the end of the decade. However, with 5G using up a great deal of power and many systems still running on legacy 3G and 4G platforms, the reality is that 6G may be a step too far for telecommunications providers who have yet to recoup their previous investments. However, for many of the driverless mobility systems being announced to become a reality, there will be a requirement to speed up signal communications and deliver more efficient data transfer processes. From a safety perspective, it wouldn't be acceptable for connection to drop while remote piloting a vehicle on public roads.

In the meantime, while the 5G network deployment is accelerating, it still covers a comparatively low proportion of the world. Countries like South Korea, China and Japan are pushing ahead with investment in 6G research; but markets like India and Africa are only just starting to explore 5G trials. There could be large parts of the world still operating on 3G and 4G, when other countries make the switch to 6G. The question is what this means for the automotive sector, which has much longer development cycles than smartphone devices and other personal telecoms technology.

Sebastian Fuchs, Managing Director Manheim and RMS Automotive Continental Europe: "For mobility solutions to live up to their potential, we need to see rapid deployment of the 5G network and accelerated investment in 6G to support increased connected and AI infrastructure. This is especially the case if we want to develop beyond SAE Level 4, where automated features drive the vehicle with no human input. There are still plenty of unresolved questions around 2D vs. 3D imaging, lidar vs. camera and so on. Connectivity will answer some, but not all, of those."



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Data ownership

Cybersecurity and the risk factor

Philip Nothard, Insight and Strategy Director, Cox Automotive: “Collaboration will be key to the success of connected automotive. Manufacturers, their customers, dealers, retailers, agents, fleets, suppliers and more will need to come together to create mutually beneficial commercial opportunities – which strike the right balance between privacy and convenience.”

What is happening to your data?

When discussing connectivity and mobility solutions, it is impossible not to consider questions around who owns and can use the vast quantities of data generated. There are tangible cybersecurity risks as vehicles become more akin to computers on wheels, with hackers increasingly looking to exploit loopholes in software and code. No one wants to be trapped in a vehicle which is seemingly driving itself into a potentially hazardous situation, however much it makes for a good storyline in a film or TV series.

UN Regulation No.155, which entered into force in January 2021, sets out guidelines to ensure cybersecurity in vehicles. Manufacturers have been encouraged to explore possible risk factors and loopholes generated by human error as well as back-end servers, update procedures, the interface between software and hardware, communication channels and

the data/code transfer process. There is a balance to be struck between locking down all of the systems in the vehicle and providing secure access to the Cloud.

China’s Ministry of Industry and Information Technology has recently called on the automotive sector to improve data control and cybersecurity measures. However, it isn’t just the vehicles which need to be reinforced. Interoperable charging infrastructure could become vulnerable to attack, rendering large numbers of electric vehicles unable to operate in geographic territories. With sufficient charge points affected, this could also impact national grids and cause power outages. This is an extreme and unlikely example, but a possibility which needs to be addressed through robust risk management.

Opportunities for driver data

Sebastian Fuchs, Managing Director Manheim and RMS Automotive Continental Europe: “With all of these different types of mobility solution, there is a wealth of untapped driver data which is resting in between different organisations. It is logical to argue that manufacturers and breakdown companies might need access to driver and vehicle information to support predictive maintenance and improve safety. Perhaps not quite so easy to argue why the manufacturer would

Data ownership

need to know what music people listen to while driving or which routes are the most popular! Although that data certainly has commercial value.”

Keeping your data secure

Drivers may rightly be concerned about what data is being collected about them, their vehicle, and their habits while they are in possession of the car or van, but what happens when it passes to a new owner or user? In an era of increased mobility, with vehicles potentially changing hands more frequently, it is important that personally identifiable information is not passed on along with the car keys – or, indeed, the apps now replacing them.

Infotainment and telematics systems, ADAS and OTA updates; all these connection points are collecting and storing data. As convenience benefits like in-car payments and dashboard service bookings become more commonplace, the information which could be passed on to third parties creates even more potential vulnerabilities. It would be easy to determine a driver's daily habits, bank account information and more if someone wanted to fraudulently take on their identity.

For organisations in the wholesale sector, those running subscription and shared mobility schemes, and the businesses currently collecting data on driverless vehicle trials, there is a clear emphasis on designing with security in mind. Between drivers, data must be wiped. This could be as simple as clearing the sat nav history, saved home location and mobile phone connection. However, the reality is the data being collected goes much deeper. It may take specialist organisations to ensure that a vehicle has been completely purged in between users.

Liam Quegan, Managing Director, Manheim Auction Services: “The General Data Protection Regulation (GDPR), introduced in 2018, put greater responsibility on companies to keep their customer's data safe or risk hefty financial penalties. This is a particular problem in the used car market, where some vehicles have changed hands multiple times. Any company hoping to retail a vehicle therefore opens themselves up to a multitude of data breaches and penalties if proper procedures aren't followed.

“For those looking to sell used vehicles through auctions, remarketing companies can help. For example, Manheim's DataCleanse service ensures that all personal information and data is wiped from the vehicle and redacted from any documentation before it is sold at auction. Shockingly, before the launch of the DataCleanse service in 2019, we found that 51% cars audited prior to auction had data breaches, including sat-nav history, phone data and invoices with personal information, highlighting the importance of services like this.”

Maintenance, breakdown, and the aftermarket

While concerns exist over vehicle vulnerabilities and personally identifiable information, there are strong arguments for increasing connectivity and data sharing when it comes to predictive maintenance, proactively managing breakdown scenarios, and supporting servicing in the aftermarket. From minimising downtime to increasing convenience, preventing accidents and improving safety, the data being collected by vehicles offers plenty of opportunities to create smoother driver and user experiences, as well as supporting revenue streams at different stages of the automotive lifecycle.

Beyond the hardware, there are also significant applications being developed by third party suppliers within the industry to support the driver experience – all while collecting large volumes of behavioural data. It is perfectly possible that operators could use the data collected to build up a picture of traffic patterns to support city planners or highlight recurring faults with vehicle makes or models to inform manufacturers. Tracking retail preferences could support advertising, while looking at where and when people charge could determine where local authorities should invest in new infrastructure. The potential is huge, but with Big Data comes big responsibility.

Frederik De Witte, Co-founder of FleetMaster: “Effective use of data and technology can fundamentally change the way in which organisations are able to embrace the developing mobility agenda. Fleets, rental and lease companies, dealers, manufacturers, and new mobility businesses all need powerful back-office systems to manage their internal processes successfully and to provide services to their clients in the best possible way. That demand will only increase over the coming years.”

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year's Insight Report**

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