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Disruption in the automotive industry

Enhancing the customer experience through connectivity

Contents

Foreword

I am pleased to share with you this point of view on the role of connectivity in the future of the automotive industry.

The industry is in a state of flux, the likes of which have not been seen since the invention of the internal combustion engine. Every aspect of our mobility experience is undergoing disruption, from driverless vehicles to the application of blockchain and the Internet of Things. Customer expectations in the industry are also increasing thanks in part to innovation in consumer electronics and smartphones.

In response to this disruption, many automotive Original Equipment Manufacturers are building strategies around four key pillars of change: Connected, autonomous, sharing and electric.

Developing a clear strategy which focuses on these pillars is vital for Original Equipment Manufacturers to remain competitive. A concerted strategy will also play a key role in developing new services, business models and revenue streams.

To prepare companies for the transformation occurring in the automotive industry, we have undertaken a detailed analysis of the 'connected' opportunity. Looking at the potential impact of individual use cases across key business metrics allowed us to prioritise opportunities with the aim of finding the best approach to bring them to market.

I hope you find this report insightful and thought-provoking and welcome your feedback.

Michael Woodward
North West Europe Automotive Leader, Deloitte

Executive summary

The automotive industry of the future has the potential to be unrecognisable from that of today and one of the key pillars underpinning any transformation will be increasing connectivity. While the penetration of in-vehicle connectivity is currently limited to certain Original Equipment Manufacturers (OEMs) and certain segments, we expect significantly increased penetration over the next five years. This change will be driven by a number of factors including customer demand, technological advancements and new legislation. For example, with eCall mandatory since April 2018, OEMs are now required to sell new cars that can communicate with emergency services automatically in the event of a collision.

One of the key challenges facing OEMs today is the business model behind connected services: What are customers willing to pay for? Who owns the data? What are the data privacy concerns and what is the value of these services? We expect the market to resolve these fundamental questions around return on investment as OEMs launch more services in the next two to three years. But before that, these challenges will have a profound impact on the ability of OEMs both to prioritise and maximise opportunities associated with connectivity.

Deloitte has evaluated a large number of connected vehicle use cases, looking at both their potential to add value and the complexity of their implementation. In order to prioritise opportunities, we have mapped the use cases into the following segments:

1. Quick wins

This connected service group is relatively low in complexity to implement and has high potential value to the business. The lower complexity is either because the benefits of the services are improvements in existing OEM operations or because it is considered the logical next step in the market and therefore already being tested.

2. Transformative

These are services that look towards the future, have higher relative complexity alongside high potential value to the business. In the future many such use cases may become minimum requirements for customers. First mover advantage will position OEMs as innovators in this space.

3. Value add

Highly complex to implement but potentially lower on relative value, these are services that OEMs might elect to outsource to partners as they may not have the resources necessary to build and deliver efficiently in-house. Such partners are able to deliver services more efficiently or exploit economies of scale.

4. Standard issue

Scoring relatively low on both complexity and potential business value, these are services that are likely already in the market having been developed or bought-in by most OEMs. Customers are familiar with them and will demand them as standard.

As connectivity becomes a strategic priority for the automotive industry, we expect a significant increase in investment of resources into this space. But in the nascent stages of this transformational technology, OEMs and other players in the supply chain will require an agile/start-up mentality to drive innovation and services. OEMs will have to keep a keen eye along the value chain and identify opportunities to acquire or collaborate with unlikely partners. Given the expertise that exists outside of the automotive industry, OEMs will have to adapt their approach to R&D to stay ahead of the competition. For example, OEMs will start to work closely with developer communities that can design customer facing apps and interfaces quickly. OEMs will also need to recruit people with a different skill set and could therefore find themselves competing for talent against established software companies.

Disruption in the automotive industry

The importance of transport in our lives is unlikely to change in the foreseeable future. However, what is likely to change is the way we use and interact with products from across the automotive industry. Customer interactions with vehicles will change not just as a result of demand but also through technology choices made by manufacturers. Meanwhile, new business models will impact purchasing decisions as customers are able to choose between new types of ownership based on both the economic and environmental feasibility.

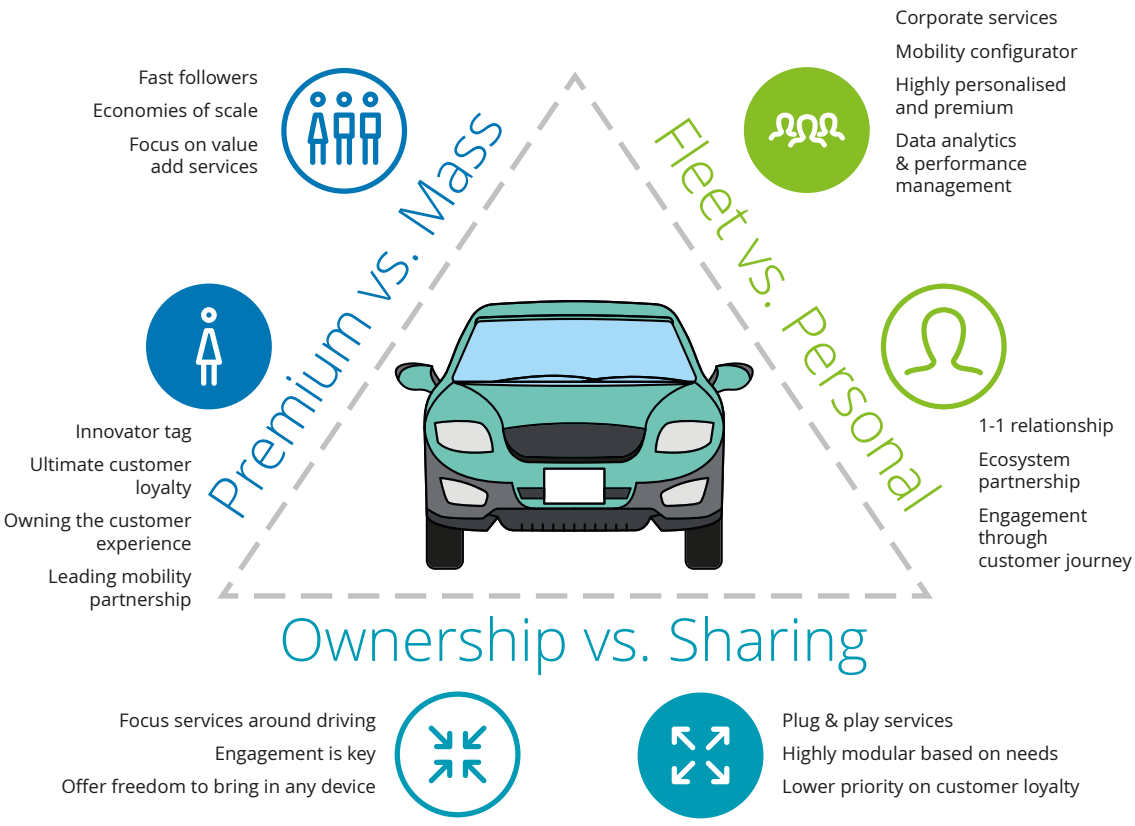
How is the customer engagement model changing?

The customer's digital experience is continually changing in step with advances in technology.

Seamless interaction between devices and applications experienced in a variety of 'smart' environments requires OEMs to ensure a similar experience inside their vehicles. Digitally savvy customers also expect a personalised and flexible experience irrespective of how brief their interaction may be with a service provider.

Despite a considerable amount of discussion about connectivity within the industry, no one is fully clear on the business model behind it and how to pay for heavy development costs. The reason is that OEMs have the unenviable task of designing platforms that can service a number of customer needs. Figure 1 highlights the characteristics of the customer of the future.

Figure 1. Who are the OEMs trying to sell to?



Digital disruption and the role of connectivity

In response to the challenges facing the industry, OEMs are building their strategies around four pillars of change; Connected, autonomous, sharing and electric.

This chapter outlines key characteristics of the connected pillar, looking at vehicle connectivity and its growth in the automotive industry.

The connectivity roadmap

Despite the renewed focus, connectivity in the automotive industry is not a recent phenomenon. For years, connectivity has been called by another name – telematics – which refers to "the technology of sending, receiving and storing information via telecommunication devices in conjunction with effecting control on remote objects"[1].

And while telematics has been used by the majority of OEMs, the range of applications for connected technology is changing. Given what we know about connected technology in other industries, there is a clear roadmap for how the technology is likely to develop in the automotive industry. The connected car of the future will have to deliver an immersive driving experience during autonomous driving scenarios while giving control back to the driver in a controlled manner if required. Looking further into the future, technologies such as virtual and augmented reality will further transform the in-vehicle experience, expanding the potential use cases for connected services. Figure 2 shows the potential roadmap for the connected car to 2025.

Types of connectivity

Connectivity is typically defined by the way it is integrated into the vehicle. Tethered and embedded are the two main forms of connectivity in the automotive industry.

Tethered connectivity is when you connect your smartphone and use its intelligence and interface to replicate a similar experience inside the car. While this solution offers the flexibility of creating an experience you are familiar with – it may not be as comprehensive as an embedded solution. Despite this, tethered connectivity will remain the ideal way to 'digitise' millions of existing vehicles across the world. Dongle devices are a form of tethered connectivity and are currently the preferred mode of connectivity for usage based insurance providers.

Embedded connectivity is where the vehicle manufacturer integrates the information and entertainment platforms into the fundamental design of the car. The majority of OEMs have adopted this approach as it is likely to become the preferred mode of connectivity for the industry in the future, especially with the launch of driverless cars. Customers and OEMs require a more integrated and embedded experience offering maximum safety. The challenge facing OEMs is the ability to match hardware and product development life-cycles, typically five to six years, to that of software services, typically 12–18 months or less.

Given what we know about connected technology in other industries, there is a clear roadmap for how the technology is likely to develop in the automotive industry.

1. Definition of telematics; https://en.wikipedia.org/wiki/Telematics

Figure 2. Roadmap of the connected car (CC) evolution

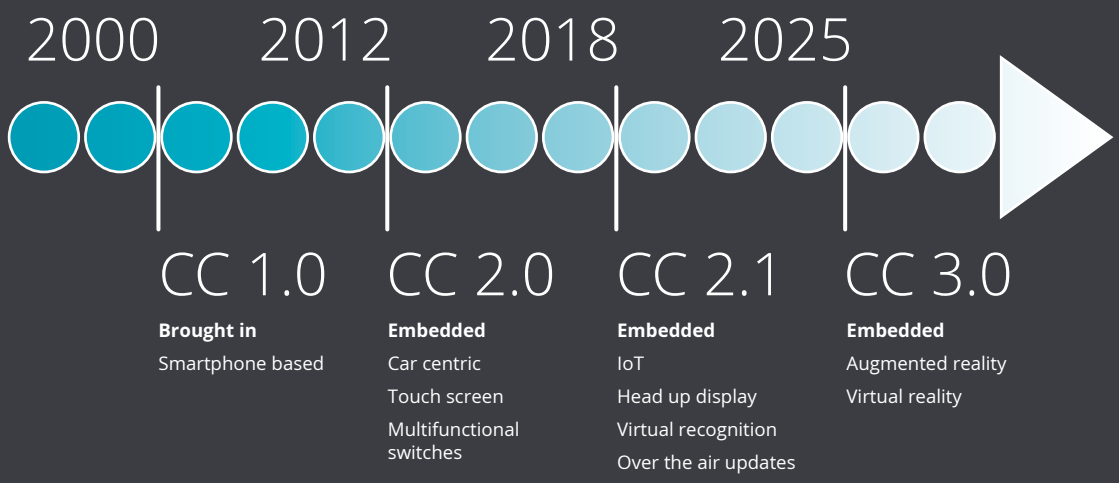


Figure 3. Connected car segmentation

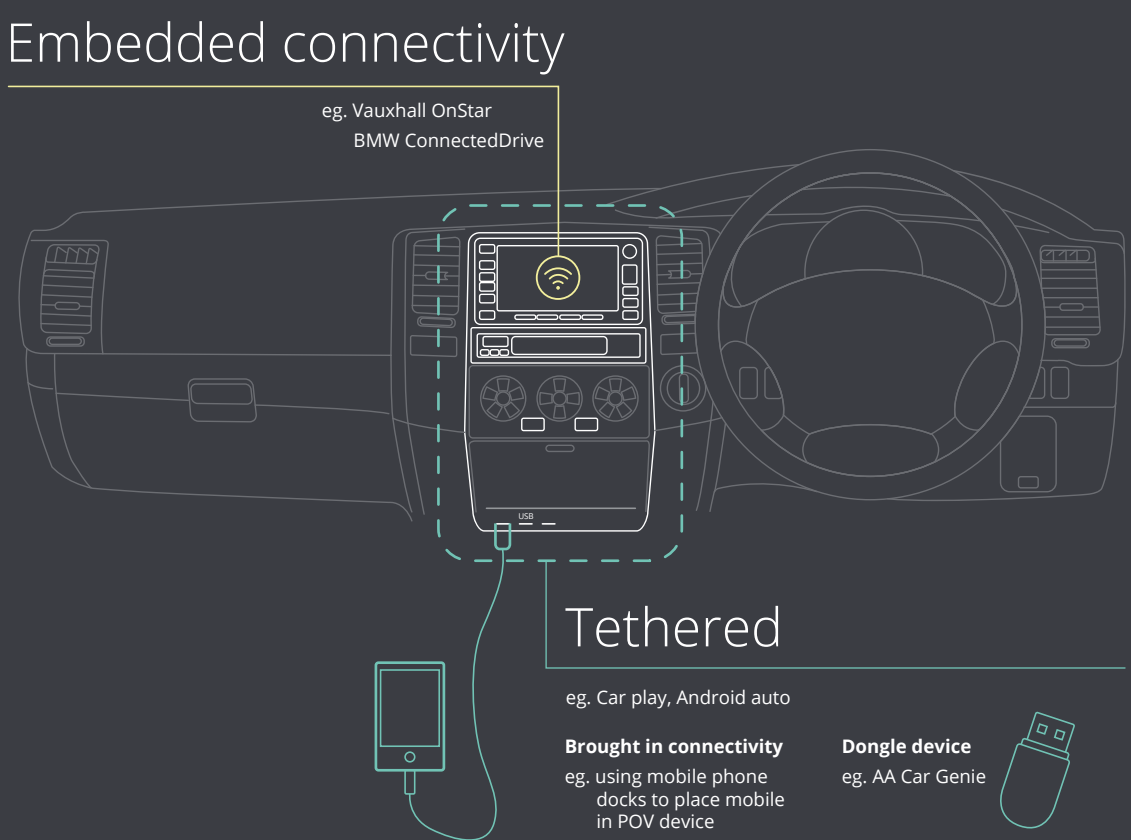
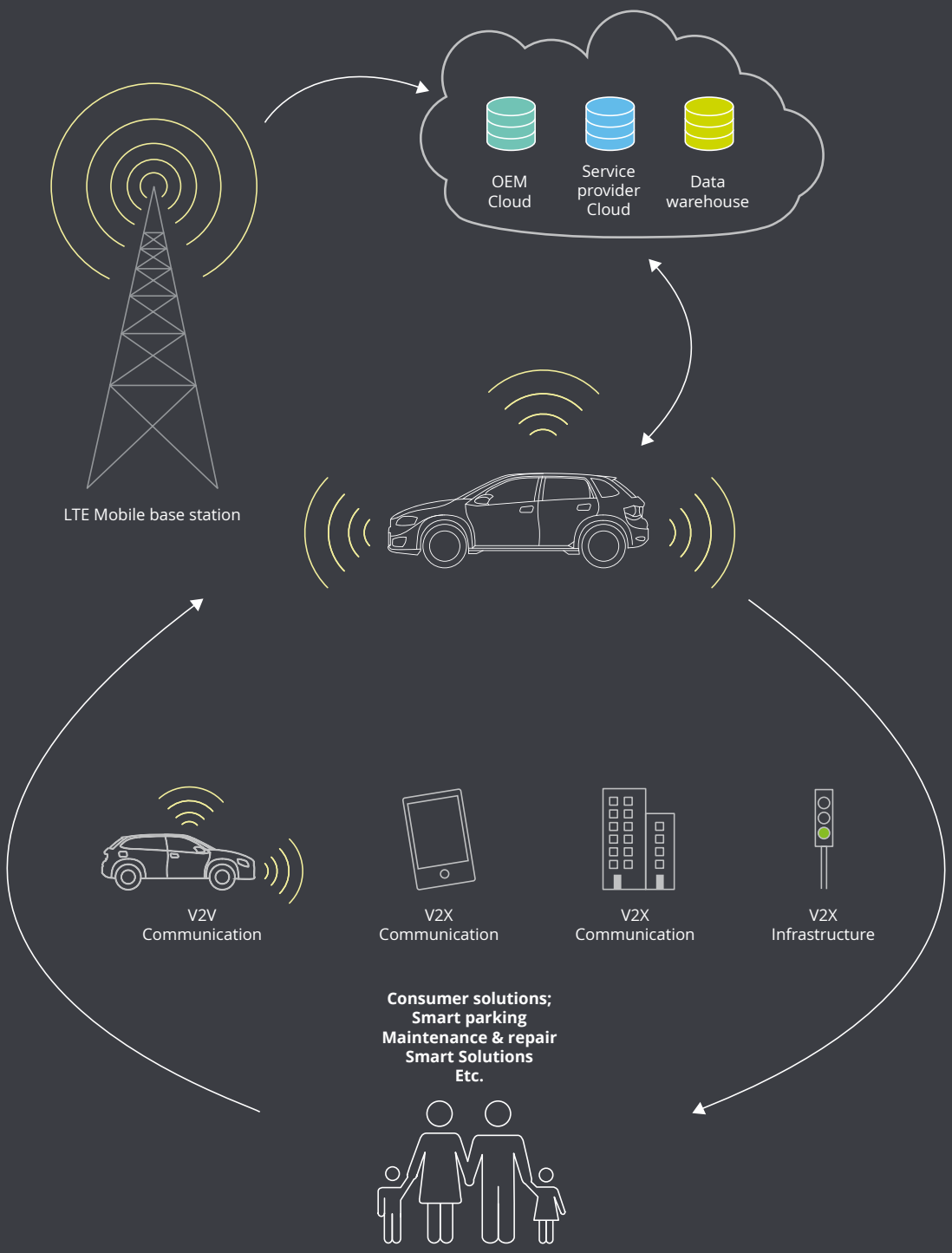


Figure 4. The connected infrastructure



Connectivity requirements

There are different types of connected services – some require real-time connectivity while others afford a certain level of latency in the service being offered. The complexity of the solution will have different data requirements.

Typically connected services will require in-vehicle data collection and processing, OEM data platforms to process and analyse the information, data analytics platforms to derive intelligent solutions and products for customers, and some form of delivering the service to the customer, either in the car or through an external connected device. Figure 4 shows the infrastructure required for connected services.

Connected services require a certain level of reliability and accuracy designed into the system to achieve the high performance standards typical of the automotive industry. For example, in-vehicle connectivity should be able to perform at the required levels using 4G connectivity, or 5G and beyond in the future. Connectivity as a service will underpin a number of other advancements and technologies that will be introduced to the market over the next few years.

The connected services challenge

OEMs may have historically kept the vehicle at the centre of their business model but increasingly owning the customer experience and connection is key to developing a successful strategy. Connected services can help to solve key customer requirements while also generating new revenue sources. While some OEMs already see a clear business case for implementing connected car services, and have developed a number of partnerships with vendors to bring such services to market, others are lagging behind. Connected services and the underlying strategy require significant investment from OEMs. This will force OEMs to identify areas that need to be owned and developed internally while outsourcing areas that may be complex to offer and deliver less value to the business. The analysis provided in this report should help OEMs structure these critical decisions.

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Practical applications of connectivity

While there are a number of connectivity-based use cases in the automotive industry, our analysis focuses on a selection of 16 use case groups.

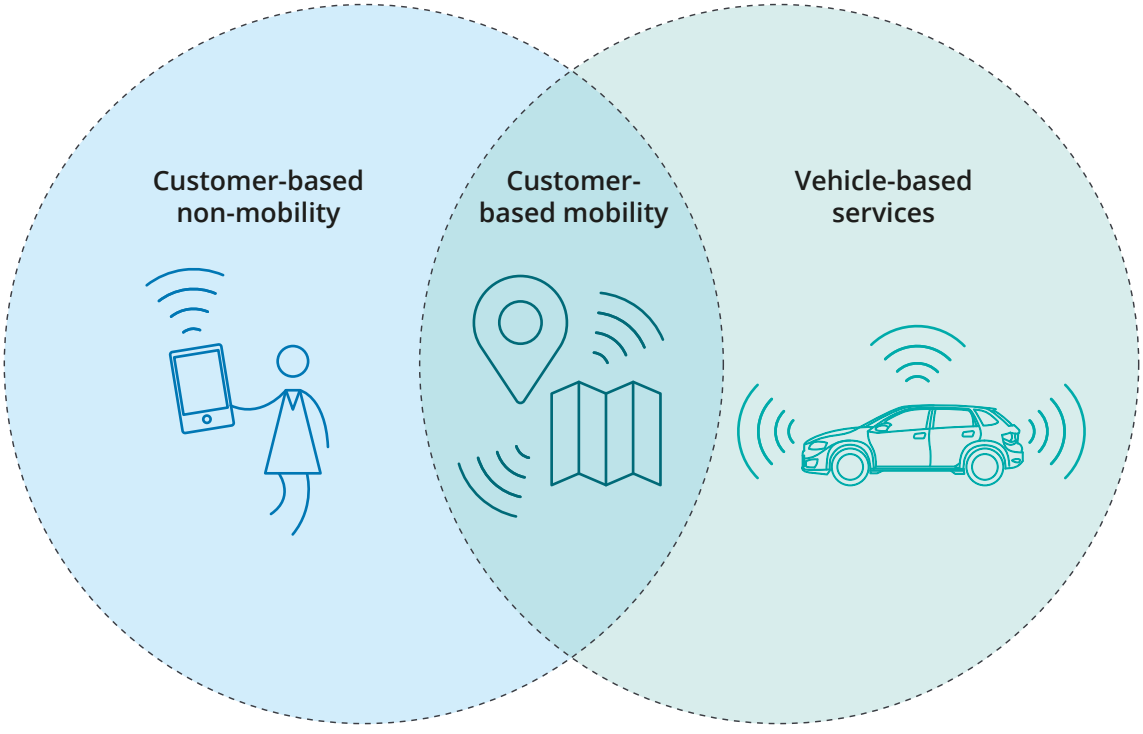
The use case groups were developed from an initial analysis of over 50 use cases, which were then shortlisted and combined to cover the breadth of the customer journey and a range of possible connected services applications. Individual use cases are not assessed separately, but rather as part of a use case group. In practice, individual use cases and use case groups may be combined.

This report does not take into consideration applications for connectivity across areas outside the vehicle and customer environments, for example impact on digital supply networks, manufacturing or automation.

The use case groups have been allocated to a 'use case purpose' depending on the core purpose for the connected service application. The three use case purposes are:

- **Customer-based non-mobility** – offering customers non-mobility related services.
- **Customer-based mobility** – offering customers mobility related services.
- **Vehicle-based services** – offering connected services that focus on vehicle performance.

A description of each of the use case groups assessed in this report is provided on the next page. An example of a service is also provided for context but it should be noted that more examples exist in the market.



Customer-based non-mobility

The four use case groups within **Customer-based non–mobility** are described below.

Use case group	Description	Example
Health and wellbeing 	This group offers customers health and wellbeing services. It can be linked to fitness trackers and other devices that are able to provide health related data points In the future, vehicle dashboards/wind screens can be used to display health data.	**Driver drowsiness detection** – using eyeball tracking and other health indicators to make sure driver is focused on driving tasks and intervene with alerts in case the driver is distracted.
Smart home services 	The growing smart home market and the need to connect drivers/customers to their external environment is forcing automotive OEMs to reconsider their development and partnerships strategies. A number of OEMs are integrating voice control platforms such as Alexa into the car. Building a connection to the wider smart infrastructure will require a number of partnerships and platforms that have to be integrated into the vehicle.	**In-car delivery** – car is able to interact with smart fridge, identify what items need to be ordered, automate ordering from an e-commerce platform and allow the delivery person to access the boot with a digital key.
Smart work services 	Connecting work related services and functionalities such as Skype, checking calendar, reading emails and responding to them can be integrated into the vehicle. By using OTA software updates, suppliers can ensure that the latest version of the software is available to the customer. This could be especially relevant for corporate car fleets where companies would like their drivers to be connected on the move. With driverless cars, the vehicle can become a 'mobile' workspace.	**Email access and calendar location integration with satellite navigation in cars** – ability to sync to professional email in the car allowing the driver to read and reply to emails using voice. The vehicle can also sync its location with calendar meetings and advise on the best way to arrive at the meeting.
Biometric services 	Biometrics will enable a number of use cases for customers as in future more cars will be accessed by more than one customer. A vehicle in a car sharing fleet can have some form of biometric authentication (finger print, voice or iris recognition) to provide access to the vehicle for the required time frame. Digital keys/ voice-based recognition may be used by Amazon to deliver goods into cars. Personalisation of vehicle interiors can be done based on the user accessing the car. In-car payments can be done using biometric signatures.	**Car sharing fleet** – different users are identified using biometric signatures (for example, finger print scanning) and gain access to the vehicle for the period of their booking.

Customer-based mobility

The four use case groups within **Customer-based mobility** are described below.

Use case group	Description	Example
Driver behaviour services 	Use vehicle sensor data to provide drivers with a more engaging and rewarding experience behind the wheel. It allows OEMs to connect directly with the driver by telling them how well they are driving and could also involve an element of gamification. Drivers with higher scores can be rewarded by vouchers that keep them on the app and engaged longer. Driving behaviour scores and data can also be sold on to other service providers such as insurance companies.	**Gamification** – corporate fleet is able to track the driving behaviour of their employees and creates a community to rank drivers on their driving scores.
POI services 	Point of interest or location-based services involve targeted advertising for customers based on their location and a detailed understanding of their likes and preferences. Vouchers can be offered to customers based on their driving route, end destination or even suggestions made when they stop at a fuel station. This could be a revenue stream for OEMs who partner with retailers to deliver more value for customers.	**Providing vouchers** – driver routed to their preferred petrol station with their preferred coffee brand.
Payment services 	Providing the ability to use cars as a payment platform for products purchased such as fuel, parking or tolls. Easy and secure car-based commerce is key. BLE (Bluetooth) and QR codes can expand use of mobile payments for both merchants and customers in any environment. Visa in partnership with Honda and ParkWhiz is a good example of how fuel and parking concepts can be integrated into the connected vehicle system. This can be extended to new use cases in the future such as road tolling or usage-based insurance which can be integrated with other vehicle sensor data.	**Fuel payment** – vehicle routed to fuel station, petrol pump identified based on QR code recorded by vehicle and payment is automatically processed.
Travel preferences 	Customer preferences for travelling depending on destination, time and day of travel. Customers are increasingly requiring alternative modes of transport. Apps which can deliver the most appropriate and comfortable mode of transport for the driver/customer based on where they are going, what time of day it is, which is the most economical way of travelling. Daimler's Moovel app aims to provide such a solution for the user. Key here is that the user may not need to own a car to use such a service.	**Mobility app** – suggesting most appropriate form of transport for customer based on budget, how environmentally conscious they are, and urgency or purpose of the trip.

Vehicle-based services

The eight use case groups within **Vehicle-based services** are described below.

Use case group	Description	Example
Insurance 	Using telematics to offer smarter and pay per use insurance solutions. Providing customers with personalised insurance based on usage and requirements is key to next generation services. Providing customers with support in the event of an accident.	**UBI** – Usage-based insurance providing customers customised offering based on how they drive, where they drive and how much they drive.
Maintenance and repair 	Solutions aimed at improving maintenance and detecting failure in advance. OEMs can predict and the need for replacements in advance allowing them to stock the customer's nearest service centre with the required spare parts and suggest locations to get repairs/ replacements.	**Predictive maintenance** – providing customers with advance notice of a replacement/repair based on connected vehicle data.
Journey enhancements 	Services required to provide support for end–to-end journeys such as parking and navigation. These services help in improving the driving experience and are able to create a seamless experience for the entire journey.	**Parking** – smart parking service to identify parking spots in real time.
Safety 	eCall or bCall services which are linked to safety of the driver and the passengers. Such services are mandatory following the launch of e-call in April 2018. OEMs are required to pass eCall certification if they want to sell new vehicle models after April 2018.	**eCall** – emergency call placed to operators in the event of an accident.
Fleet management 	Commercial fleet management solutions are key for B2B customers who own large number of vehicles in the fleet.	**Fleet management system** – managing and servicing assets.
Infotainment 	Entertainment related such as Netflix, YouTube, Spotify etc. Driverless cars will provide OEMs with greater opportunities to use the vehicle as a channel for selling such services to customers.	**Spotify** – music service provider.
OTA 	Delivering software updates to connected vehicles based on new development and customer requirements. OTA can be divided into different types – firmware and software OTA.	**Powertrain upgrade** – similar to Tesla Ludicrous mode.
R&D 	Using connected vehicle data to improve back-end development and design of next generation vehicles. Every connected car is continuously generating data points which are shared with R&D teams that can then design new and improved systems for the next generation.	**Improvement in next generation design** – helping OEMs design future platforms based on data collected from vehicles in the parc.

Assessing connectivity use cases

Our analysis is aimed at identifying where connected services could have the greatest impact – both on the traditional automotive industry – and that of the future.

Value based on business benefits

The criteria used to assess the potential value to the business of the connected services are based on the Deloitte Enterprise Value Map™. This is a tool which identifies factors stimulating business growth, tailored to a specific industry sector. The criteria include factors that support organisational growth through:

- **Strong revenue growth** – including factors that support volume and price.
- **Better operating margins** – including factors that support the selling and administrative side as well as cost of goods sold.
- **Improved asset efficiency** – including the effectiveness of property, plant and equipment as well as inventory.
- **Expectations** – including factors that affect company strengths and perceptions.

Within the Deloitte Enterprise Value Map there are over 500 strategic and tactical factors that can influence these criteria and thus affect business growth. For each of these factors, a score was assigned based on whether the use case would be relevant and whether it would help solve a problem inherent in the industry or the organisation. The resulting range of value for the connected use case is show in Figure 5. A higher position represents a higher relative potential business value.

Complexity – based on ease of implementation

The complexity criteria are based on the level of business change required, unique suppliers and active customers, the number of services, whether the use case has been tested before as well as the complexity of collecting and managing the required data.

The potential range of complexity or ease of implementation of the connected service is shown in Figure 5 on the next page. A position further to the right represents a more complex implementation and adoption process.

Strategic choices will affect the attractiveness of use cases

Based on our analysis, we prioritised the use cases according to their potential impact

1. Quick wins

OEMs should consider investing and controlling services in this segments as they are low in complexity to implement while being high on overall value for the business. Payment services is an excellent example of how OEMs can form partnerships with organisations such as payment service providers and open up the car as a payment gateway for smart services accessed in the car. This will make the car capable of activities such as payments. It is likely that such services will become the norm in the industry.

2. Transformative

Services in this segment have the potential to become major value contributors to OEMs' business models. Maintenance and repair is a key issue that can be addressed by offering the customer increased connectivity. OEMs can predict failures before they happen, ensuring smart logistics and warehouse utilisation, as well as guide the interactions of their customers with service and repair shops. This could prove to be a key differentiator moving forward, with customers willing to pay more for services that save them time and reduce hassle.

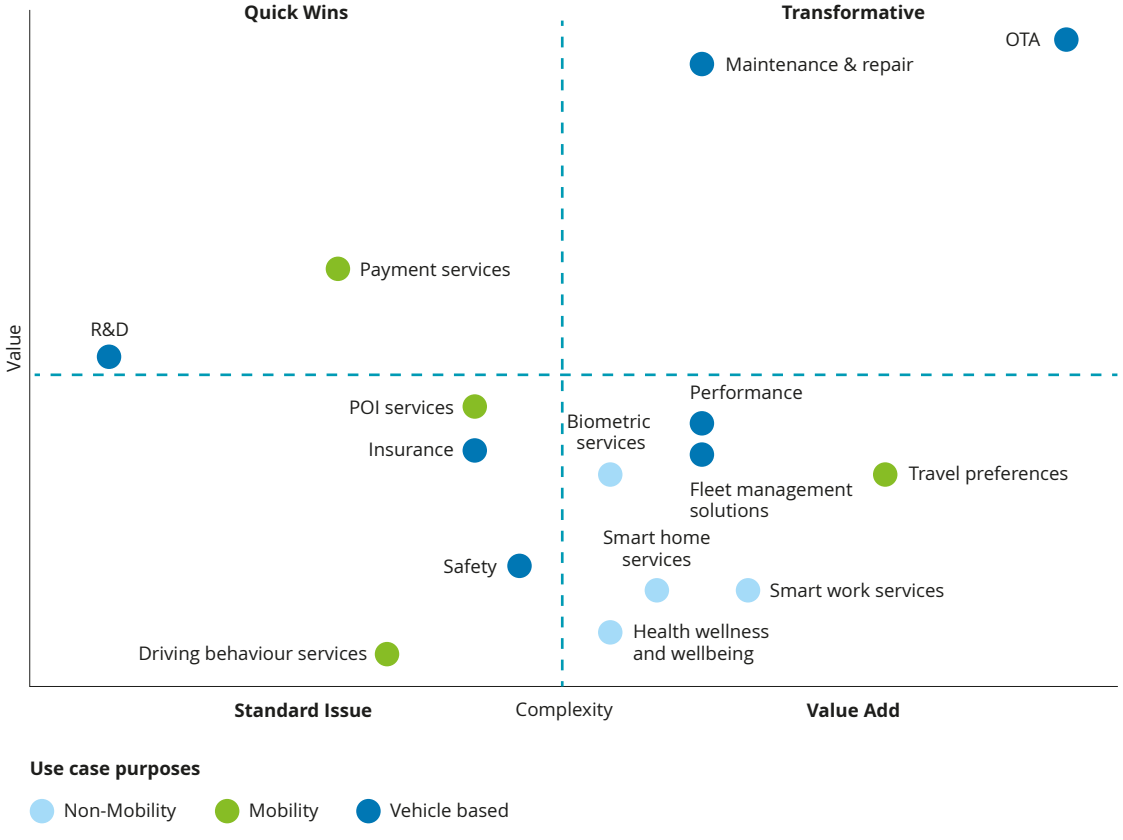
3. Value add

This group will be the 'hook' to ensure customers stay in the OEM value chain because of the breadth and depth of partnerships they are able to bring to the mobility experience. The majority of the use case groups in 'Customer-based non-mobility' fall into this quadrant. The integration of Amazon's Alexa home hub, or a work calendar into the vehicle is a good example of how customers can feel connected to their world outside the vehicle. While customers may not be willing to pay for these services, they will be able to offer an indirect return on investment through continued patronage.

4. Standard issue

These services are common in the market today and will be expected across all customer segments as 'standard issue'. OEMs already have some experience in offering these services which will likely become commoditised in the future due to increased personalisation and customisation.

Figure 5. Connected car use case mapping Value vs. Complexity



Prioritising connected services development

Our analysis confirms significant correlations between use case groups and the potential value to a business and the complexity of delivering these services. OEMs need to consider their next steps, specifically around what to develop internally, what to outsource to suppliers and what elements are crucial in maintaining their competitive edge against disruptors.

Focus on the basics with an eye on the future

The analysis in this report can be used to help review the potential value of connected services to the business. OEMs can choose services based on their complexity and value for the business.

The key challenges for OEMs remain around creating the right business model with a view to recouping their investment over time. This is crucial for OEMs as there are substantial costs in terms of time and resources in developing these services for the market. The business model chosen will influence decisions such as whether to outsource certain services to partners and develop others in-house. Many OEMs are hedging their bets, choosing to invest in start-ups or partner with suppliers to test a variety of possibilities.

The introduction of driverless cars will have an impact on the value and complexity of connected services. Some services may increase in value as driverless cars could lead to reduced regulation around driver distraction, while others may decrease in complexity due to concerns around data privacy and security.

Open ecosystems provide opportunity

OEMs need to consider the nature of their connected ecosystem quite early on in the process of design and development. The nature of the ecosystem will influence how much they are able to accelerate development by crowdsourcing to the wider developer community. However, a disparate developer community could lead to looser controls over the development of such ecosystems.

Partnerships are crucial

In any technologically advanced service offering, developing a number of strategic partnerships will be important to achieving targets around connected services. OEMs should look to develop partnerships around infrastructure, infotainment platforms, cyber security, and application design and development.

Address privacy concerns proactively

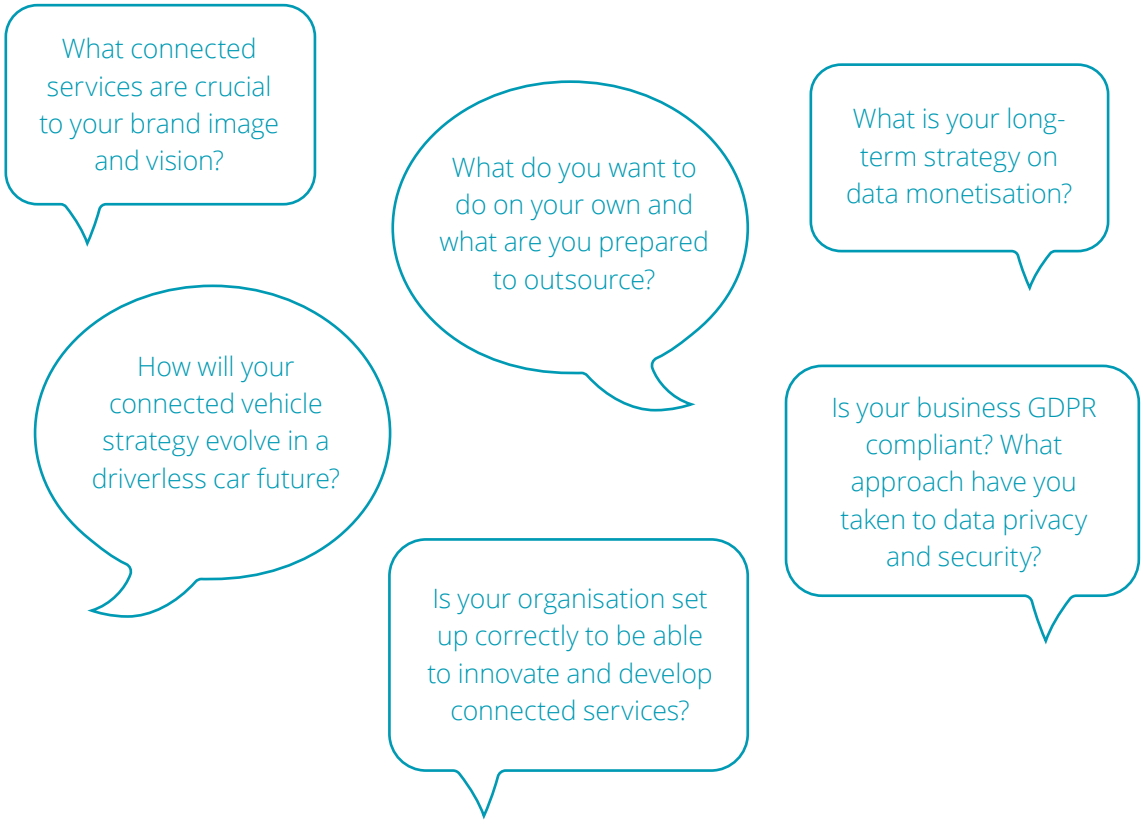
An overarching theme for a successful connected vehicle strategy is ensuring the security and integrity of any service that uses customer/vehicle data. Companies need to consider the impact of the recent General Data Protection Regulations (GDPR), confirming that any and all privacy concerns are addressed when collecting/using or sharing customer data.

The key challenges for OEMs remain around creating the right business model with a view to recouping their investment over time. This is crucial for OEMs as there are substantial costs in terms of time and resources in developing these services for the market.

Next steps

To realise the benefits of a comprehensive connectivity strategy, organisations need to understand which services can benefit them most. At the very least, this will include an evaluation of strategic objectives and assessment of use cases most relevant to each organisation.

The key questions business leaders should be asking include:



We believe the key for all businesses is to ensure their connected vehicle strategy is able to address critical customer needs and support all potential driverless futures. Organisations should also review their readiness to comply with legislative requirements around safety and data privacy while simultaneously convincing customers of the value of their connected services.

Organisations that do not seriously consider the impact of connectivity risk losing touch with their customers and being relegated to the role of a hardware manufacturer.

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