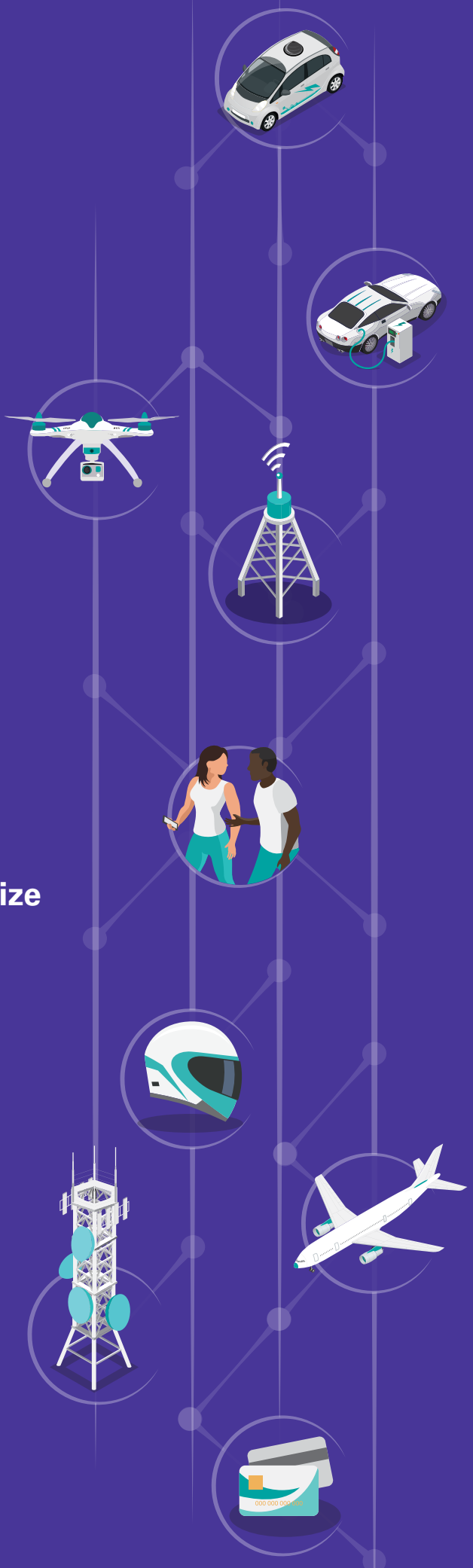
KPMG

Mobility 2030: Transforming the mobility landscape

How consumers and businesses can seize the benefits of the mobility revolution



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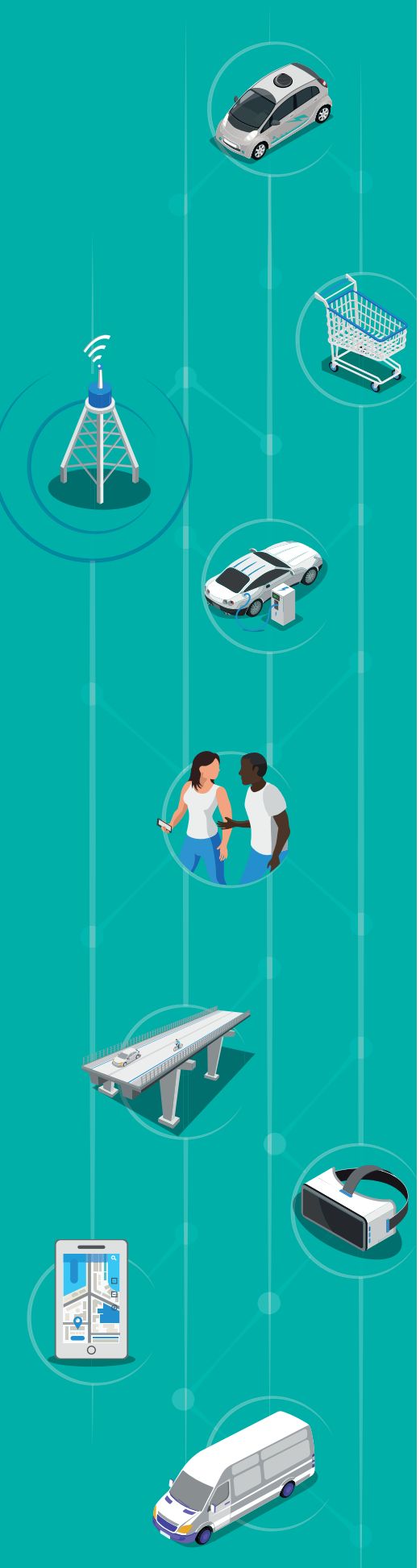
Mobility is undergoing one of the most transformational social, technological and economic shifts of a generation, shaped by three key disruptive forces: electric vehicles and alternative powertrains, connected and autonomous vehicles and on-demand mobility services. Sectors are being disrupted, with new markets emerging, while others are converging, and some are disappearing entirely. The winners are likely to be those that can truly understand the impact and timing of disruption, and seize the right emerging opportunities. This means swiftly adapting business and operating models and securing the right partnerships and acquisition targets.



The future mobility ecosystem

Three cross-sector megatrends are fundamentally reshaping mobility for consumers and businesses.

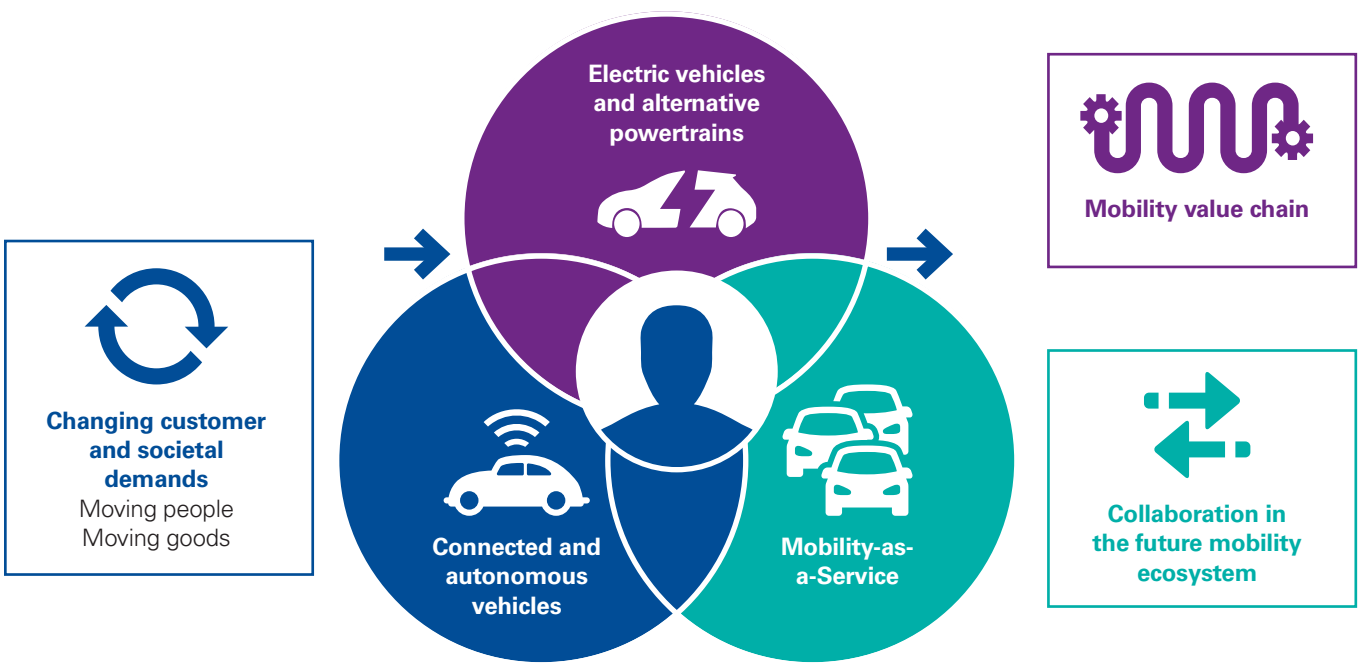
The automotive, transport and wider mobility market is undergoing a transformational social, technological and economic shift, fundamentally changing the way people and products are moved. Many sectors, beyond automotive and transport, are being disrupted, with new markets emerging, existing ones converging, and others declining and possibly vanishing. New entrants and startups are challenging incumbents, who in turn look to leverage their experience and resources to build sustainable market positions.

Amidst continued population growth, urbanisation and environmental concerns, new forms of mobility are critical to support tomorrow's population hubs and economic activity. Today's mobility systems suffer from congestion, inefficiency, accidents and high prices. But the future promises convenient, safe and economic mobility, with less impact to health and the environment.

Mobility transformation is fuelled by three key technology-driven disruptive trends: electrification of vehicles (EVs) and alternative powertrains, connected and autonomous vehicles (CAVs) and Mobility-as-a-Service (MaaS). Taken independently, each would significantly disrupt the ecosystem; but in combination, they should drive unprecedented change.

These advances are set to replace our current vehicle-centric system with a radically more efficient, data-enabled and driverless ecosystem – with consumers at its heart. Users would be able to seamlessly transition between public, private, on-demand and scheduled modes of transport, with dynamic travel information enabling mid-journey changes.

As the mobility ecosystem evolves, its global value is forecast to grow to more than US$1 trillion by 2030.[1]



At the same time, value will also shift and we expect to see different business models emerging. For example, with OEMs we see two dominant archetypes: 'Metalsmiths' manufacturing ever more sophisticated hardware (i.e. vehicles), alongside a new archetype, the 'Gridmaster'. The latter would manufacture vehicles, but also provide a platform for a variety of value-adding customer services. As with all disruptive change, we expect there to be clear winners and losers.

However, the roll-out could vary significantly at both a country and city level depending on degree of urbanisation, household choice, existing options, infrastructure, and of course, local policies. Government support significantly influences all three disruptive trends. It also impacts the shape and pace of development of the new ecosystem.

From a private sector perspective, we believe change will not be driven by any one company or sector. Instead it requires unprecedented collaboration, to develop the right mobility solutions. A fast-shifting ecosystem calls for swift decisions on changes to business and operating models, partnerships and acquisitions.

In the following pages we look at the evolving mobility landscape in greater detail, considering each of the three technology-driven disruptive trends in terms of timing, impact and implications for market participants.

Electric vehicles

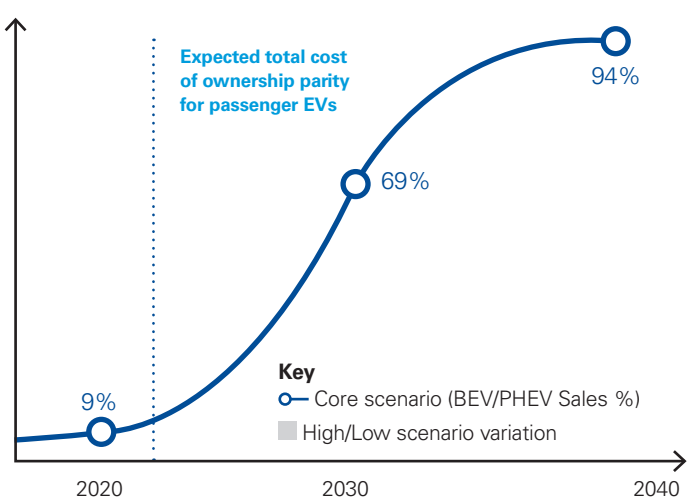
A promising start, but with the need to accelerate.

By the end of 2017, there were more than 3 million electric vehicles worldwide.[2] Although this is less than 1 percent of the total parc, electrification is undoubtedly at the top of OEMs' agendas. With future bans announced for internal combustion engine (ICE) vehicles across much of the developed world, OEMs have little choice but to adapt. Volvo has pledged to manufacture only fully electric or hybrid models by 2019 and it is not alone; almost every major automaker has pledged significant investments in electric technology. Given these trends, OEMs are striving to win the battery technology race and secure access to essential raw materials.

From a consumer perspective, uptake has varied significantly by country, heavily affected by local policies. For example, the Norwegian government's generous subsidies meant that nearly 40 percent of new passenger vehicle sales were for either battery electric vehicles (BEVs) or plug-in hybrid vehicles (PHEVs) in 2017. Similarly, US and China have both offered strong financial incentives, and in combination now make up well over half of the current global EV parc.[3] The UK has also made steady progress, with growth set to accelerate to 2030, by which time EVs could account for 69 percent of passenger car sales and 57 percent of light commercial vehicle (LCV) sales.[4] In its strategy paper *The Road to Zero*[5], the UK government has reaffirmed its proposed 2040 ban on conventional cars, setting a clear direction and aligning itself with similar commitments in France, China, Norway and India, amongst others.

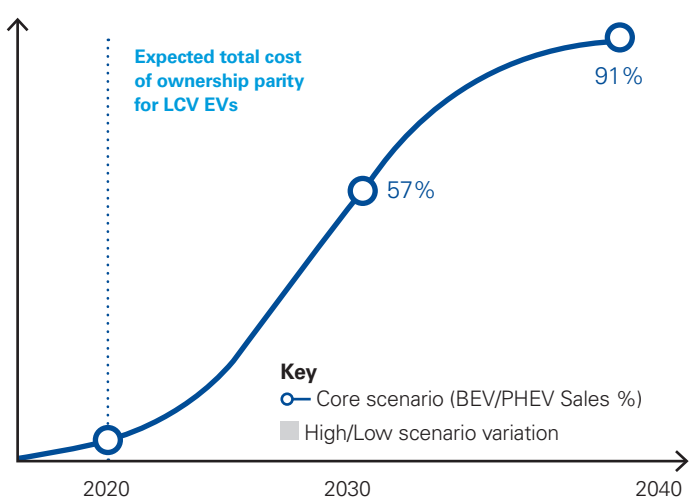
Passenger car

Scenarios for forecast UK passenger EV growth (% Sales)[6]



LCV

Scenarios for forecast UK LCV EV growth (% Sales)[7]



The UK government's environmental and health policies are arguably the biggest catalyst for consumers going electric. These include higher vehicle excise duty (VED) on diesel cars, continuation of the plug-in car grant and London's 'T-charge' (emissions surcharge) zone – all introduced in 2017. Such incentives will complement the roll-out of the supporting charging infrastructure, rising consumer awareness, and reductions in total cost of ownership (TCO), which is expected to achieve parity with ICE by 2021.

And the economics for LCVs are even more compelling, thanks to fleet scale economies and high utilisation, which should bring TCO parity earlier than for passenger vehicles. The acute price and TCO sensitivity of LCV has the potential to make this sector a leader in EV adoption; however, a lack of sufficient viable models on the market means that adoption currently lags behind that of passenger vehicles. Heavier commercial vehicles, on the other hand, may take considerably longer to go electric, due to the large battery sizes required for long-distance haulage and the time taken to charge. Alternative fuels such as natural gas and hydrogen remain realistic alternatives.

EV take-up may have gathered momentum, but requires a number of societal and behavioural changes to become truly widespread, with three key barriers remaining:

1. **TCO:** Achieving TCO parity with ICE vehicles will be critical for EV adoption. In the absence of further government incentives, we expect this to occur around 2020 for LCVs, with passenger vehicles to follow soon after, driven by a number of developments:
   - **Falling battery pack costs:** the cost of battery packs – which typically account for 40 percent of the cost of an entire EV – has declined by over 70 per cent[8] in the past 7 years and is expected to further halve by 2030 due to technological developments (such as cell chemistry) and production scale economies.
   - **Lower running costs:** predominantly driven by:
     - decreasing 'fuel' costs: EV charging should be significantly cheaper than petrol/diesel on a per mile basis, aided by technologies such as smart chargers and vehicle-to-grid (V2G) energy trading
     - 40-50 percent lower service, maintenance and repair (SMR) costs, due to substantially fewer moving parts.[9]
   - **Improved residual values (RVs) for EVs:** RVs currently fall much faster than for ICE equivalents, due to concerns about battery degradation (and the risk of replacement), and fast-declining prices for new EVs. These conditions should remain over the next 1-3 years, but are then likely to improve thanks to battery and range improvements in newer, higher-quality, mass-market models and supportive regulation.
   - **Increased range resulting in 'productivity parity':** This predominantly affects mobility services fleets and LCV fleets, which are highly utilised and, in the case of LCVs, carry a payload that reduces range. Productivity falls when a vehicle is taken off the road for a 'top-up' charge, but improvements in battery range, charging network coverage and charging speeds should help to mitigate this.
   - **EV choice and performance:** mass-market availability is still extremely limited, but is likely to improve significantly as OEMs continue to invest in new models for both premium and mass-market segments. With several of our clients, we see demand for some EV models far outstripping available supply from manufacturers, both a promising indicator and a call to action to raise production.

2. **Education:**
   - **'Range anxiety'** still deters some buyers, with drivers fearing getting stranded. However, our analysis indicates that such worries are mostly unfounded, with 99.3 percent of current UK journeys within current EV ranges[10] – a fact that should, over time, change views.
   - **Published comparisons** are not widely available to generate insight on potential consumer cost savings, revenue generation and other EV benefits. We expect this to change over time.
3. **Infrastructure:** A significant increase in public charging points is required to give users confidence and to support the UK government's vision for EV uptake. Although EV charging is currently dominated by home charging, we expect public charging to make up an increasing proportion of charging behaviour over time (please refer to appendix 1 for more information). Infrastructure roll-out presents a dilemma, with the business case for comprehensive charging coverage largely unproven until mass take-up, which cannot happen without network scale.

   Add to this the infrastructure required to provide more electricity, and it is clear that public and private collaboration is needed to facilitate roll-out, with either party potentially taking the lead. The UK government has already announced a >US$500 million private/public charging infrastructure investment fund (CIIF). Although this is a good start, far more capital will be needed.

The benefits case for EV adoption is clear: cleaner air, quieter streets, and a chance to meet global carbon emissions reduction targets to address climate change. Governments also see an opportunity to stake a leadership position for domestic industries in the emerging EV value chain. Overall, this is a promising start, but progress depends upon continued collaboration from the various ecosystem participants.

The rise of on-demand mobility and MaaS

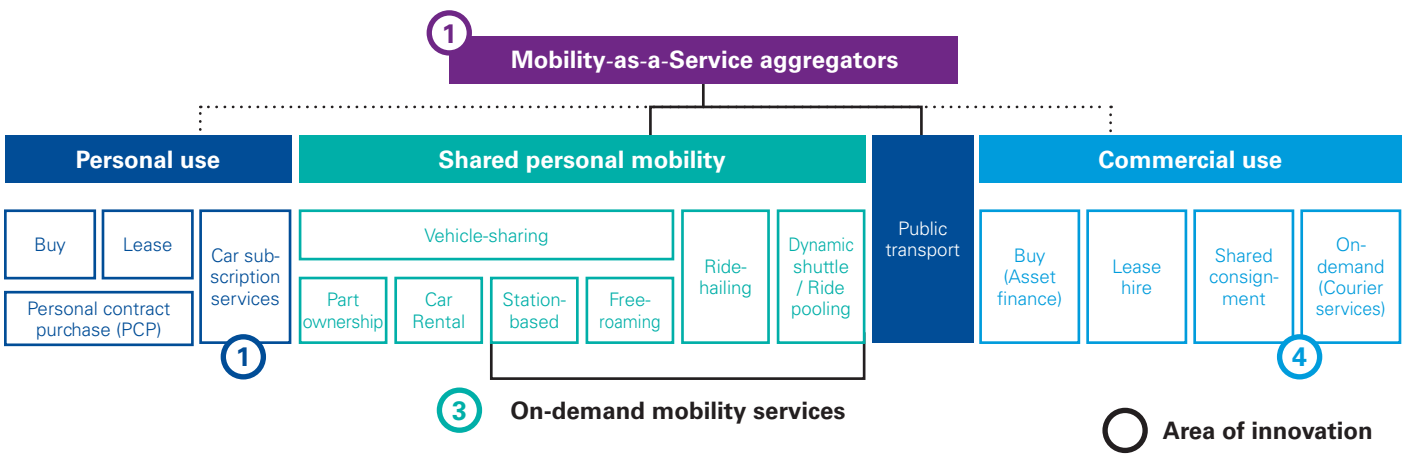
Experimentation to date – now for coherent future mobility strategies.

In many markets, we see a clear shift in the way consumers view mobility, not least in their views towards vehicle ownership. This trend is particularly pronounced within urban areas, where people have greater mobility choice. In KPMG's *Global Automotive Executive Survey 2019*, the opinion of decreasing ownership of vehicles is also shared by 39% of surveyed consumers, which shows that half of car owners know today that they will no longer want to own a personal vehicle by 2025.[11] Similarly, UK Department for Transport figures show the percentage of men in England aged 17-20 holding a full UK driver's license falling from 51 percent in the mid-1990s to just 29 percent in 2017 (and from 81 percent to 69 percent for men aged 21-29).[12] These shifts can be partly attributed to the demand for consumer mobility 'as a service' as an alternative to ownership. Most notably through the emergence of on-demand private car hire firms such as Uber and Lyft, which have rapidly become commonplace in cities worldwide.

Mobility-as-a-Service is an evolving concept of how consumers and businesses move away from vehicle ownership towards service-based transport. In this sense, MaaS includes multi-modal aggregation of transport modes as well as on-demand mobility.

In the overall landscape of mobility we highlight four areas where organisations are innovating to create new business and service models.

The emerging mobility services landscape



1

Multi-modal MaaS aggregation:

There are many examples around the world where customers can travel on different modes of transport (from different providers) via one payment platform.

Although such services are typically restricted to public transport, new, integrated private/public versions are emerging. MaaS Global operates a MaaS platform in Helsinki, Finland, and is also trialling a scheme in other countries including the UK. The company has developed a travel product called Whim with a monthly subscription. Customers can plan and pay for individual journeys via train, bus, taxi, car-rental and bike-share on a single app, or purchase an 'all-in' subscription covering all their transport needs in the city for a fixed price.

And Helsinki is not alone. Denver, Los Angeles, Las Vegas, Singapore, Barcelona, Hanover, Vienna, Montpelier, Gothenburg, Paris and Eindhoven have all piloted some kind of MaaS solution at the time of writing. Despite these exciting developments, public authorities still struggle to balance the user experience offered by MaaS, with policy objectives of economic growth, social inclusion, space optimisation, environmental benefit, and citizen health and wellbeing. There is also a huge opportunity for MaaS to replace company cars, although this will require significant shifts in tax policy. *KPMG's MaaS Requirements Index*[13] enables operators and authorities to understand the optimum level of regulation and policy needed to achieve their objectives, while balancing the commercial needs of operators.

2

Car subscription services:

Over the past year, we have seen innovation in new car subscription services. Traditional personal contracts or long-term leasing arrangements are being replaced by more flexible monthly contracts bundling insurance, maintenance and other costs within an all-inclusive price, accessed online. With consumers increasingly tempted to forgo personal vehicle ownership for more flexible access, subscription services could be a 'middle ground' for those who still want full-time access to a vehicle and flexibility to change models or 'pause' their usage.

OEMs and independent platforms are both introducing new subscription schemes, and testing out new business and operating models. Importantly for OEMs, these schemes represent an opportunity to maintain relationships with customers and wrest back control from on-demand platform providers.

3

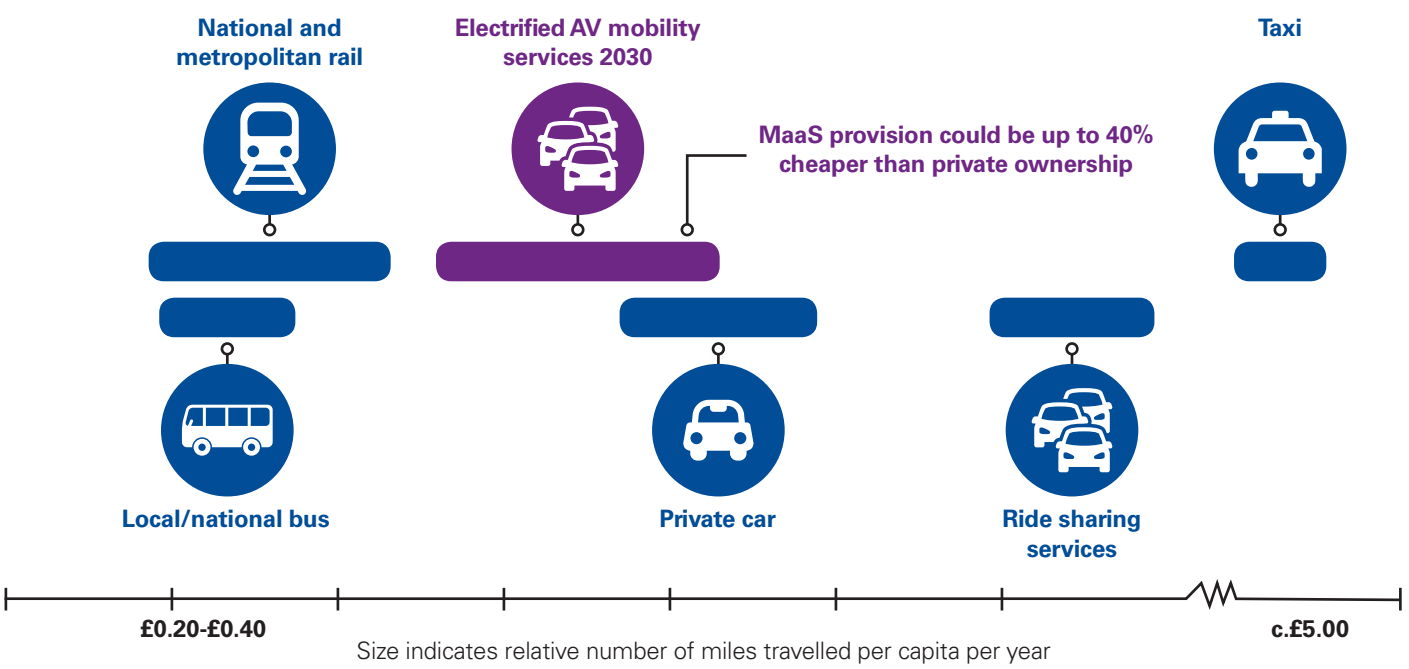
On-demand mobility:

Demand-responsive, private hire car providers are growing in popularity. They offer customer connectivity, account-based payments, intelligent routing algorithms and a large pool of drivers (often prepared to work in the so-called 'gig-economy'), and can be paid for in arrears and on account. The most prominent example is Uber, introduced to the UK in 2012, which recorded over 20 million journeys in its first 4 years.[14] By early 2017, half of the UK population had access to Uber services.

However, ride-hailing is not the only on-demand model. We have seen sustained interest in car-sharing schemes, such as BMW's DriveNow. Another innovation is dynamic shuttle services, also known as demand responsive transit (like ViaVan) that combine elements of mass transit with dynamic routing.

Penetration of such services is only expected to grow further with the advent of autonomous vehicles (AV), with an associated pronounced decline in vehicle ownership, particularly in urban areas. Roughly half the cost of on-demand private hire vehicles relates to the driver and as a result, we estimate that AV MaaS provision could be up to 40 percent cheaper than private vehicle ownership by 2030.[15]

Cost per mile – UK modes[16]



Size indicates relative number of miles travelled per capita per year

4

Commercial vehicle innovation:

While passenger transport is often the focus when considering the benefits of mobility, commercial vehicles and logistics should not be forgotten, given the significant economic and sustainability impact. There is widespread innovation in business models – with the rise of peer-to-peer logistics platforms and consignment sharing – as well as new modes like drone delivery (as tested by several large technology players).

While alternative fuels, connectivity and automation should eventually impact most of the supply chain, we expect an initial focus on lower emissions for heavier vehicles and innovations in last-mile deliveries.

Companies such as Starship Technologies – with autonomous robotic delivery pods – are shaking up the future urban logistics landscape. We shall address each of these topics in more detail in a forthcoming series of articles on the commercial vehicle market.

In these four focus areas, we expect to see increasing innovation and experimentation in new business models, which should attract venture capital and investment. However, we believe true step-change will come as mobility services are coupled with driverless technology (discussed in the following section) that enables an integrated and automated transport ecosystem.

The rise of connected and autonomous vehicles (CAVs)

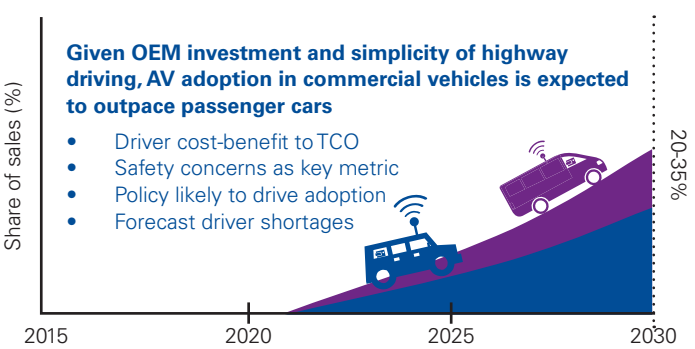
CAV is set to revolutionise global transport.

CAV offers an opportunity to transform the world by fundamentally altering the way people and goods are moved. It could improve safety and congestion, while opening up independent mobility to excluded people such as younger or older travellers. It could also increase productivity, bring a new travel experience, change the roles of future employees and free up valuable urban land like parking lots.

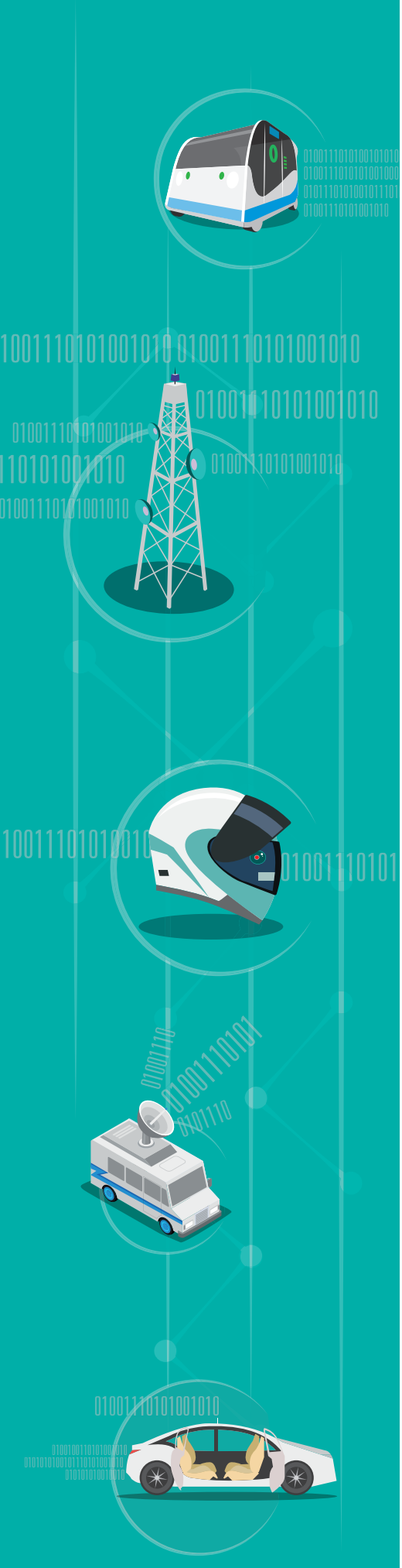
Momentum towards highly automated (Level 4) CAVs continues apace. At least 15 OEMs have pledged to release Level 4 AVs between 2019-2025[17], with much of the early deployment expected to be in urban areas. Alphabet subsidiary Waymo has already formally launched its commercial self-driving car service in Arizona.[18] Level 5 autonomy – full autonomy in all locations and conditions – may not arrive before 2030. Even this may be an unrealistic target, with the market instead launching iterations of Level 4 autonomy, gradually expanding the areas where such vehicles can travel.

Although the onset of CAV should decrease the overall number of vehicles, the number of journeys and total distance travelled is likely to increase. Initial projections for the UK suggest that total passenger miles travelled could rise by as much as 10 percent between 2015 and 2030.[19] This will be driven by more affordable on-demand mobility services, as well as greater access to groups currently excluded (e.g. the young and elderly). These vehicles will increasingly be owned by fleets and, like taxis, will be heavily utilised assets. This is in stark contrast to the average passenger car, which currently stands idle 95 percent of the time.[20] With less need to own a vehicle, we expect a pronounced decline in car sales by 2030.

Scenario for forecast UK AV (L4/5) growth in new car and LCV sales



But the speed of adoption is likely to vary significantly by region, based on four key pillars underlying AV adoption: availability of infrastructure, AV technology research & development (R&D), public acceptance of the technology, and the regulatory environment. These factors are considered in detail within KPMG's *AV Readiness Index*.[21]



The emergence of CAV, supported by new technologies and a maturing digital and physical infrastructure, will create an explosion in new value opportunities.

As increasingly connected cars evolve to become "computers on wheels", they will generate more data than ever before, which can benefit consumers by increasing the safety, convenience and enjoyment of journeys. Maintenance can go from being reactive to predictive, new parts can be ordered automatically and whole fleets can be dynamically managed. In addition, over-the-air software updates can improve vehicle performance without anyone even coming into contact with the vehicle.

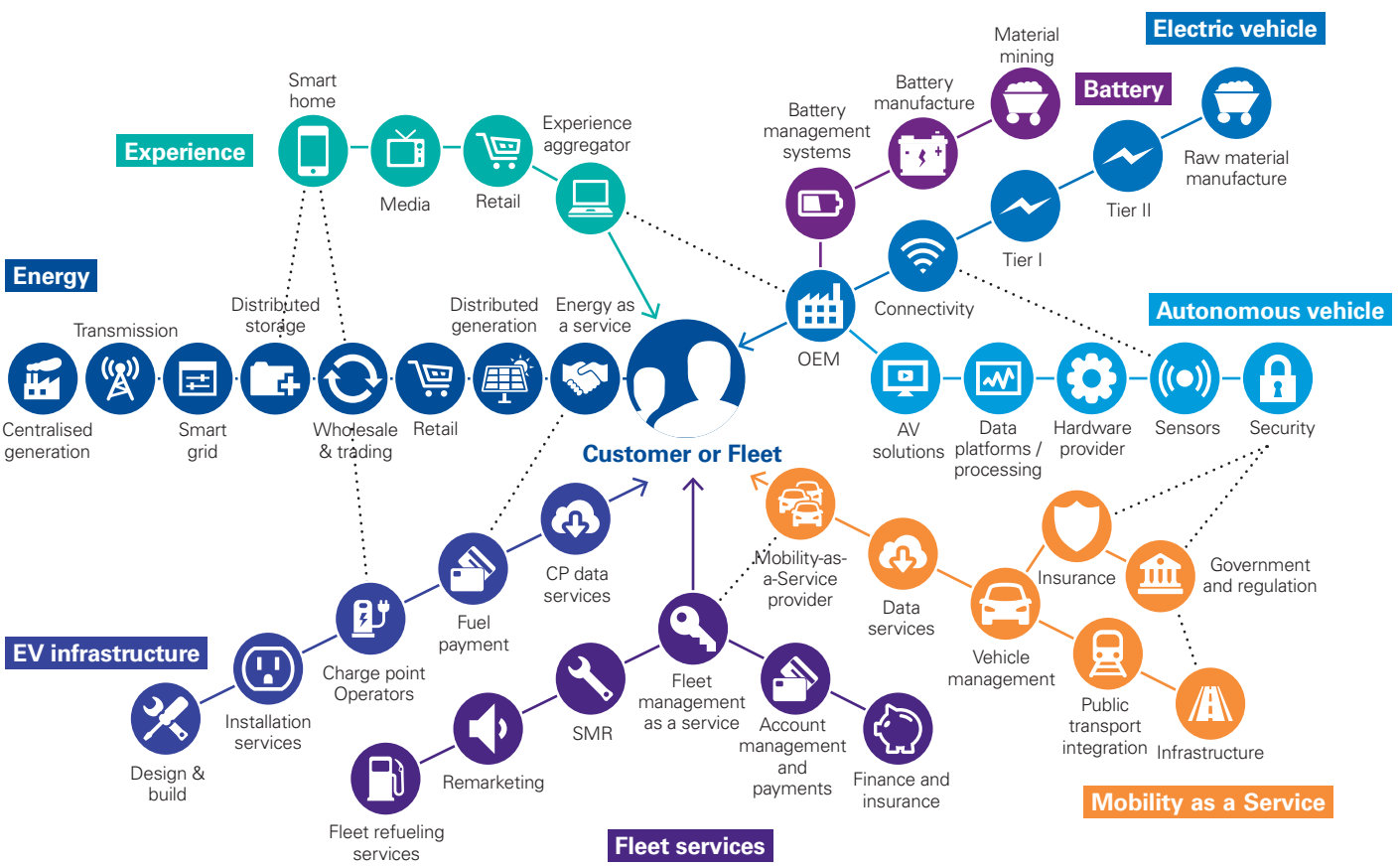
From a passenger experience perspective, connectivity should significantly broaden the scope of in-vehicle entertainment, commerce, health and working opportunities. CAV should also enhance road management, enabling transport authorities to manage capacity on busy routes, using CAV communications infrastructure to keep traffic flowing and reduce congestion. But this scale and breadth of connectivity also has implications for cyber security[22], which is likely to be a major issue area to be addressed through to 2030.

The emerging Mobility ecosystem

From disconnected verticals to an interdependent ecosystem.

Historically, the transportation industry has operated along largely linear value chains. This is all changing. Various sectors are converging, eager to seize revenue opportunities in a new mobility ecosystem. The result is a complex web of interconnected value chains.

We expect a multitude of new entrants to take a share of this new market, with unprecedented levels of partnership and collaboration in the search for new solutions.

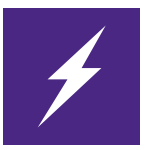


At the same time, sources of value will fundamentally shift both within value chains and across the ecosystem. The value derived from today's personal car is fairly equally split between upstream (raw materials to finished vehicles) and downstream (all other parts of the value chain). Customers typically directly buy services such as fueling, insurance and service, maintenance and repair. Downstream revenues associated with personally owned vehicles are estimated at US$45,000 over a car's lifetime.[23] But, by 2030, in an EV-CAV-MaaS world, we believe the downstream value could be as much as ten times larger, driven by new, digitally-enabled revenue streams.

Having enjoyed years of strong, steady revenues and a good share of the value chain, incumbents and perhaps even entire sectors may be completely eliminated, whilst opportunities for new services (and new entrants) will emerge. The impact is likely to be far-reaching:

Automotive:

We expect the market to divide into two main areas. Some incumbent OEMs should remain 'Metalsmiths', manufacturing ever more sophisticated vehicles but losing the end customer interface as they sell into mobility services fleets. Meanwhile, others will evolve to become new 'Gridmasters' that continue to manufacture vehicles, but also provide platforms for a variety of customer (mobility) services. Vehicle brands and driving performance may cease to be the key purchase decision criteria; customers may look instead for a strong user interface and vehicle utility. This trend could well open the door for technology players to become the main customer interface.



Energy:

The decline in ICE vehicle sales, and the subsequent impact on the vehicle parc, should significantly reduce demand for hydrocarbons. Fuel retailers will not want to be left with stranded assets, and most have already started to adapt their business models. Meanwhile, adoption of passenger EVs will increase demand for charging services, electricity, and power and utilities infrastructure, resulting in new business models oriented around the EV value chain. For heavier commercial vehicles, we expect a divergence in alternative fuel over the next 10-20 years, with companies taking bets on the technology and supply chain based upon national and even regional dynamics.

Government:

A decline in hydrocarbon fuel sales would significantly reduce tax revenues, whilst the impact on public transport systems remains uncertain. Governments globally should therefore assess the impact of this change and look at alternative sources of revenue – such as taxing miles travelled. They should also consider how to support or directly fund new technologies that could be exported for national gain. Developing new sectors is particularly important given the social impact of likely job losses in sectors like commercial driving. We expect local authorities and cities to play an important role in adoption, with policies and regulation strongly influencing market entry decisions by leading players.

Financial services:

Huge changes are expected in a sector with strong ties to high-value vehicle assets.[24] As vehicles become autonomous, individuals may no longer require insurance coverage, forcing providers to develop product liability solutions to sell into major mobility services fleets. Within the payments market, new mobility services, such as charge point payments and mobility services contracts, call for innovative new payment mechanisms. And as fleets and companies transition to new technologies and business models, there will be a huge reliance on financing from both new and traditional sources. In vehicle finance – traditionally a key driver of car sales – the focus is likely to shift from individual finance to new mobility fleets. Finance will be a key part of future automotive strategies, as demonstrated by several recent OEM acquisitions.

Infrastructure:

Aside from the immediate requirement for EV charging points, the typically slower-paced infrastructure market should be impacted in a number of ways. Private infrastructure players, such as parking lots, need to manage potentially rapid changes in driving behaviour, as AVs collect and drop off passengers (or re-charge) rather than park. This could regenerate urban landscapes, as prime real-estate gets used for last-mile delivery, charging and SMR hubs, data centers, entertainment or leisure. Local transport authorities should evolve, to manage not just physical infrastructure but also data exchanges, integration and maintenance of transport services. 'Smart' traffic management may become increasingly important, as AV-enabled mobility increases the total miles travelled.

Consumer:

With drivers freed from the shackles of driving, retail, entertainment and health providers have a great opportunity to market content for consumption during journeys, particularly as vehicles become more connected. However, there may well be a battle for the interface that consumers use to access these services – through their personal phones or the vehicle itself.

Telecommunications, media and technology:

Data – the key foundation of future mobility – presents huge opportunities for telco, media and technology organisations across the emerging interconnected ecosystem. CAVs will generate and use unprecedented levels of data, whilst mobility providers depend on digital platforms and databases to execute their services. Communications infrastructure – whether 5G or other technologies – is essential to support vehicle-to-vehicle (V2V) and vehicle-to-grid (V2G) sensing and communication applications.

Although the above is not an exhaustive list, it is clear that disruption is likely to reverberate across a multitude of sectors, providing huge opportunities, risks and even existential threats.

Staking a place in the new mobility ecosystem

Decisions made now are likely to determine the future for many companies, with some positioned for success, and others facing a fight for survival.

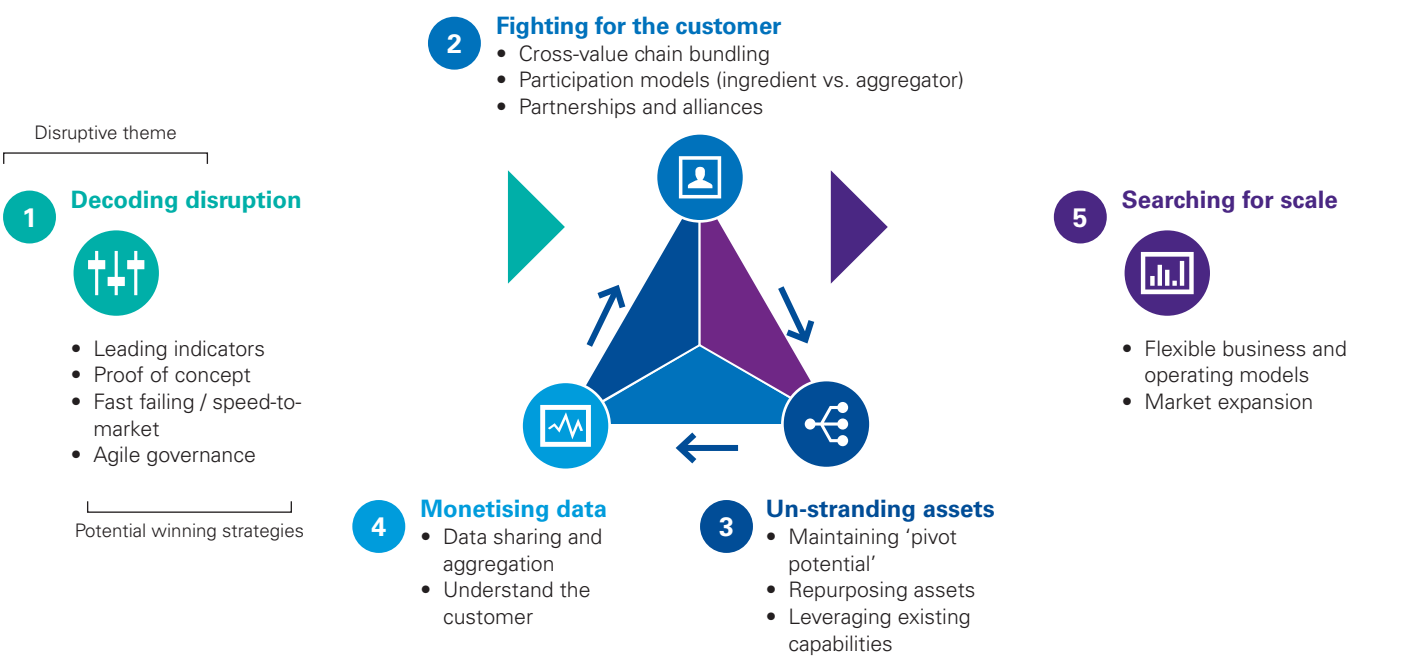
As incumbents, new entrants and startups compete for a share of the mobility market, each should consider where to play and how to win. Companies only have a small window of opportunity to get ahead and position themselves to shape the future ecosystem. This means being a fast mover, by securing beneficial partnerships, acquisition targets and structuring internal financial, business and operating models.

In this disruptive context, organisational leaders may well feel overwhelmed and uncertain of the steps they need to take.

And while the shape of the future mobility ecosystem remains unclear, it is already in the process of transformation.

Through our extensive work with existing and new mobility players, we observe a consistent set of disruptive themes. The following framework is designed to help players develop appropriate strategies to overcome these challenges.

Five themes: Making sense of mobility disruption



1. Decoding disruption (and overcoming 'action paralysis')

The first challenge for many businesses is to understand the nature of disruption: the likelihood, and scale and timing of potential impacts. In some cases, uncertainty and lack of tangible, proven options may cause 'action paralysis', as organisations wait for others to make the first move. In other cases, a few enlightened individuals may struggle to convey a sense of urgency across their organisations.

Whilst these delays may represent a significant risk, there are ways to accelerate change. Organisations could distill the key leading indicator(s) of disruption (for instance, for a fuel forecourt business this may be national EV adoption rates), and monitor for when corrective action needs to be taken. This may take the form of a 'playbook', with clearly defined trigger points and associated actions. A more proactive approach (seen in the rise of corporate venture capital in the mobility sector) is to devote resources to small-scale pilots or ventures, to test new ideas and provide potential platforms for future growth. New governance may be needed to enable a swift reaction to market changes.

2. Fighting for the customer

With emerging value chains, breakdown of sector boundaries and the rise of aggregator business models, there should be increasing competition for consumer ownership. At the same time, shifts in consumer preferences are placing further pressures on incumbents, who may not have the agility to quickly launch new products, due to the legacy of older manufacturing plants and IT systems. For instance, as consumers move away from personal vehicle ownership towards on-demand mobility services, their direct relationship may shift from the car brand to a vehicle-agnostic platform such as Uber or Lyft. At the same time, technology giants loom large over the sector; these players have both the brand and the customer journey to significantly disrupt the industry.

In response, some players are creating joint propositions across different parts of the value chain to improve customer convenience and capture share. Examples include the bundling of insurance and servicing into a flexible vehicle subscription, or combining home energy with roaming EV charging. In both cases, the ability to develop cross-sector partnerships and alliances quickly is key to securing capabilities, suppliers and channels.

Highly specialised companies could also aim to dominate non-customer facing segments of new value chains. However, they should be wary of becoming commoditised, and work with future customer 'owners' to ensure they deliver real value.

3. Un-stranding assets

Many players view the evolving mobility landscape through the lens of their existing assets. They need to 'un-strand' these assets and position themselves to access emerging opportunities.

Consider a parking lot in a city center. In a world of AV taxis, vehicles may no longer require long and expensive stays. Instead robo-taxis, powered by algorithms, will either be constantly on the move or stored in out-of-town depots. But this opens up opportunities to re-use the land – perhaps as a logistics hub for last-mile urban AV deliveries. Far-sighted owners may even have put in place the legal and physical infrastructure to quickly execute such a change. And they may also have realised the benefit of bringing in a partner to provide complementary capabilities, bringing competitive advantage and increasing speed to market.

4. Monetising data

Given its immense potential value, data is often referred to as 'the new oil'. In future, more data will be captured than ever before, through connectivity, sensor technology and the needs of AV, with consumers increasingly willing to share personal information in exchange for an appropriate return.

Making best use of and monetising this data is likely to drive two trends:

1) The continued use of data to better understand customers, and drive value through better targeting of individuals and organisations.
2) The rise of data aggregation and processing platforms that share pooled data from disparate sources for mutual benefit. For example, EV charger usage data could be fed to chargepoint operators, power utilities, consumers, OEMs and city planners to create the most efficient network.

5. Searching (and planning) for scale

Once the nature of the potential disruption is understood, and an appropriate response designed, the next step is to scale the new proposition. This may involve rolling out a successful pilot of a new mobility business model (e.g. MaaS aggregator platform), or developing a leading-edge technology (e.g. solid state battery).

In the new mobility landscape, the ability to scale and commercialise quicker than your competitors could be critical; platform models, data-driven AI, manufacturing supply chains and brands all benefit from scale economies. Organisations should therefore consider how they grow across multiple markets and segments, and how their supporting operating model is structured. Financing growth is another important issue; funds will need to be diverted from other projects, sourced from the market, or spread across partnerships or other innovative mechanisms.

A successful strategy calls for alignment of financial, business and operating models – something that can be often neglected.

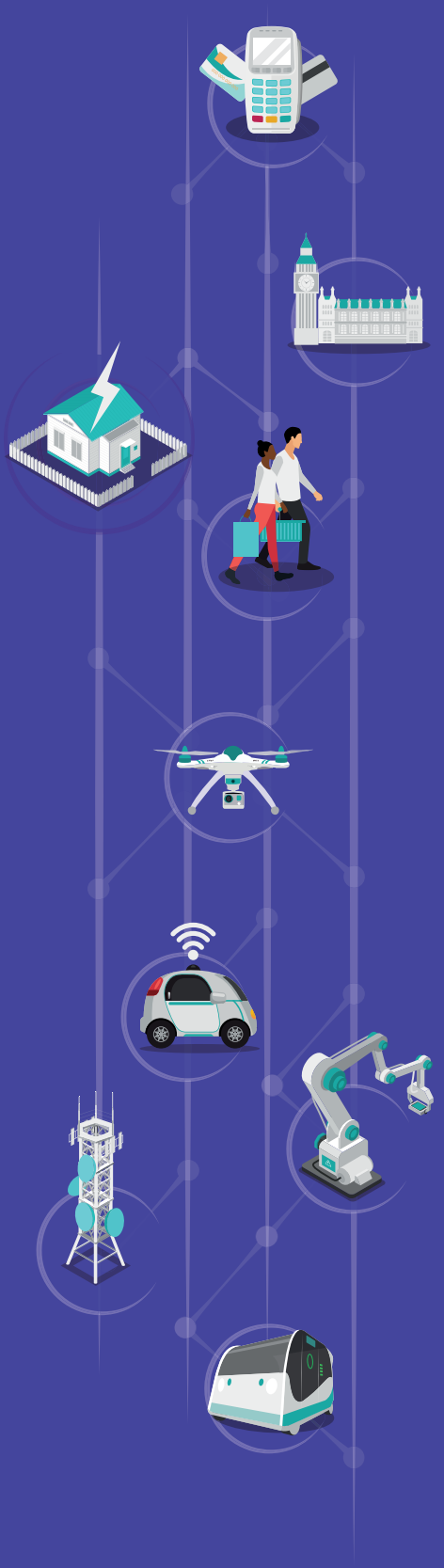
Collaborate or commiserate: Working together to build a new mobility ecosystem

We would like to offer one final observation: successful examples of collaboration in disrupted industries suggest that no single company or sector can drive change.

A unique combination of cross-sectoral capabilities is required to build enduring solutions to move people and goods. In short: collaboration is not an option, but a necessity. This may take the form of mergers, acquisitions, partnerships or strategic alliances[25], to address considerations such as speed to market, scalability, flexibility, risk appetite, long-term vision and Intellectual Property (IP). There are many examples of technology companies and OEMs collaborating (e.g. Daimler-Uber, Hyundai-Cisco, VW-Nvidia), combining deep automotive experience with new, disruptive technologies. Some collaborations may be long-term, others transitory to meet immediate capability gaps. But speed is imperative to stay ahead.

We are at the beginning of a truly transformational journey. The strength of consumer demand and regulatory pressure, and the rate of change of technological development for vehicle electrification and automation, are increasing exponentially. This disruption is likely to be significant and bring great opportunities and risks.

We believe we have offered some thought-provoking insight into the impact of disruption and the potential responses. The Mobility 2030 journey has begun, and one thing is for sure – there will be no going back.



Appendix 1

Charging behaviour assumptions (KPMG Mobility 2030 analysis)

	2020				2025			
	Transient[a]	Home[b]	Destination[c]	Hub	Transient[a]	Home[b]	Destination[c]	Hub
Private	3-8%	70-80%	17-22%	-	5-15%	65-80%	15-20%	-
Fleet car – home	3-8%	70-80%	12-22%	-	7-20%	60-75%	18-20%	-
Fleet car – hub	20-25%	-	-	75-80%	15-20%	-	-	80-85%
Fleet van – home	5-8%	70-75%	20-22%	-	10-20%	60-70%	20%	-
Fleet van – hub	20-25%	-	-	75-80%	15-20%	-	-	80-85%

	2030				2040			
	Transient[a]	Home[b]	Destination[c]	Hub	Transient[a]	Home[b]	Destination[c]	Hub
Private	15-25%	60-75%	10-15%	-	20-30%	50-65%	15-20%	-
Fleet car – home	15-30%	50-75%	10-20%	-	20-35%	45-65%	15-20%	-
Fleet car – hub	10%	-	-	90%	5-10%	-	-	90-95%
Fleet van – home	25-30%	50-55%	20%	-	25-35%	45-55%	20%	-
Fleet van – hub	10%	-	-	90%	5-10%	-	-	90-95%

Notes: (a) Includes all ultra-rapid charging, irrespective of location e.g. MSAs, destination; (b) Includes off-street parking; (c) Includes workplace and any destination location where you stop for a specific activity; (d) Charging behaviour percentages refer to the share of power being charged to a car and the location where this comes from

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KPMG's Mobility 2030 initiative

Tackling challenges with the mobility ecosystem through cross-sector collaboration.

Mobility 2030 – simply defined – is about understanding how people and goods will move in the future.

In early 2017, KPMG in the UK convened senior stakeholders from across sectors and geographies to create what is now the Mobility 2030 network. More than 200 contributors have participated to date, from some of the world's largest organisations and government departments to fast-growing start-ups. Numerous collaborative events have been held as part of the initiative, to work through critical themes, identify opportunities and risks, stimulate new partnerships and collaboration, and jointly shape the evolution of mobility. Collectively, our vision is a cleaner, safer, more efficient and more economic transport system that will underpin future societies and markets.

In parallel – and through our mobility hubs across the globe – we have employed our insight, experience and reach to support clients from across sectors to better understand the future mobility ecosystem and the implications for their financial, business and operating models.

As engagement across the value chain grows dramatically, we feel that now is the time to bring together our existing thought leadership and market knowledge to explore some of these questions, as well as broader ecosystem themes. We passionately believe that collaboration and the sharing of ideas is vital to accelerating the ecosystem's development.

We hope that these papers – covering both broad and specific topics and taking a mixture of country, regional and global perspectives – will be informative and stimulate further collaboration across the mobility ecosystem.

A number of recurring questions have emerged, including:

- **How will customers respond** to potentially radical changes to our daily lives and environments enabled by technology? What will their future behaviours be?
- **Where will value be created** across the future mobility ecosystem? How big will the 'value pools' be and how will they evolve?
- **What will the new ecosystem look like** and how will the various players' roles change? Who are the emerging customers for EVs, CAVs and MaaS? What will these customers value?
- **What are the potential participation strategy options**, given existing asset bases and capabilities? Who are the key players across the value chain? Which organisations – or countries – are set to win?
- **What are the implications for financial, business and operating models?** How should financial ambitions change? Where and when should car companies, energy providers, etc. participate? How can they evolve to participate effectively?

Charlie Simpson
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Related KPMG Thought Leadership

KPMG has published a number of other reports, surveys and thought leadership pieces on future mobility, automotive, logistics and other impacted sectors.

A suggested reading list is provided below, whilst KPMG in the UK's Mobility 2030 web page provides access to the full list of related publications: https://www.kpmg.com/uk/mobility2030

Global Automotive Executive Survey 2019, KPMG International, January 2019. https://home.kpmg/xx/en/home/insights/2019/01/global-automotive-executive-survey-2019.html

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KPMG's Global Strategy Group works with private, public and not-for-profit organisations to develop and implement strategy from 'Innovation to Results' helping clients achieve their goals and objectives. KPMG Global Strategy professionals develop insights and ideas to address organisational challenges such as growth, operating strategy, cost, deals, digital strategy and transformation.

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