NAFA FOUNDATION

Neckermann Strategic Advisors

THE MOBILITY REVOLUTION:
A PRIMER FOR FLEET MANAGERS

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The NAFA Foundation has teamed up with international mobility researcher and author, Lukas Neckermann, to develop an in-depth white paper that includes immediate steps for fleet managers to take to embrace mobility options. Lukas notes, “I believe that fleet professionals can be change leaders in this mobility revolution”.

“As the fleet industry makes a rapid transformation into the ‘mobility’ industry, the NAFA Foundation, in cooperation with NAFA Fleet Management Association, is providing fleet professionals with the building blocks to transform their units, teams, and personal careers to a mobility orientation,” said Phillip E. Russo, CEO of the NAFA Foundation and NAFA Fleet Management Association.

Executive Summary

Here's an overview of what fleet professionals will find in this white paper, which includes interviews with leaders from across the mobility revolution:

- What you should know about the four key pillars in the automotive sector: **Connectivity, Automation, Sharing, and Electrification**.
- **Connectivity** is a step toward fully autonomous vehicles coming to roads, and today already presents a significant opportunity for fleet managers to optimize their fleet's TCO and safety.
- While vehicle **electrification** makes for only a small share of global vehicle sales today, the trend is clear. Stringent emissions regulations and the falling cost of battery packs is creating a more favorable total cost of ownership for electrified vehicles. We explain why the electric vehicle platform supports the shared, automated mobility services that many fleets will provide.
- **Ridesharing, carsharing, ridehailing** – what do they mean? Beyond the pioneers Zipcar and Uber, most automakers have now joined in as well, forging dedicated business units with mobility services provision and autonomous driving systems.
- The actors in a **shared and autonomous value chain:** Although OEMs are making sizable investments in startups in autonomous and shared mobility, they are also becoming only pieces of a much larger puzzle.
- **Envisioning a new world** in the near future where thousands of vehicles that are autonomous, electric, and shared roam the streets. Fleet managers have a key role to play in the vision that mayors and city planners are painting to reduce the congestion, pollution, and traffic fatalities coming from vehicles.
- **The "last mile" in logistics** is changing, with new distribution chains emerging.
- **Fleet professionals are entering a renaissance** and will be well positioned to play a leading global role in the mobility revolution. But the business practices will need to continue changing as fleets adopt new ideas and practices. The transition will happen at various speeds. First responder fleets — fire, police, and emergency medical responders (EMR) — have been a platform for testing connected, automated systems such as fleet vehicle tracking earlier than other fleet segments.
- **What should the fleet manager be doing today?** These are points to consider for fleet professionals planning for change. Issues include exploration and piloting, insurance and liability issues, infrastructure, and building the business case.
- **Mini case studies** provide examples of how mobility technologies are being deployed by leading global fleets.

1. Overview of the Mobility Revolution

Four major trends – commonly known within the auto industry as "CASE" or "ACES" – are converging and driving automotive and associate industries toward a transformation:

Connectivity **Automation** **Sharing** **Electrification**

1.a. Connectivity:

Since General Motors introduced its OnStar system in 1995, some form of connectivity between vehicles and their "base" has become optional equipment in passenger vehicles (and is now even mandated in Europe). In conjunction with GPS, telematics and online infotainment, cars are becoming online computers on wheels.

For many fleet managers, it's nothing new: commercial vehicles that communicate their location and status with the base, or depot – for theft-protection, vehicle routing or even diagnostics. What's new is that within the next five years, most (if not all) new vehicles will be "connected," allowing for detailed vehicle monitoring, sharing, and over-the-air updates (the same way smartphones do). Both telematics providers and automakers are scrambling to provide new functionalities — driving directions, music channels, and wireless connection to the **Internet of Things** (IoT), along with comprehensive fleet-management systems. Beyond just improved telematics, this is a first step toward enabling fully automated driving and new mobility services. It should also reduce the need for product recalls.

Research firm Gartner forecasts that one in five vehicles on-the-road will have some form of wireless connection by 2020, bringing the total of worldwide connected vehicles up to more than 250 million. **5G networks** being deployed in smart phones and connected cars may be as much as 10 times more efficient than 4G networks. Taking wireless phone networks to the next level will mean that **communications service providers** (CSPs) will be able to work with vehicle manufacturers on autonomous vehicle functions related to driver safety and data processing and management.

Connectivity allows today's vehicles to operate more efficiently, electric vehicles to find charging as necessary, and autonomous vehicles to operate. Shared mobility also relies on it. The connected car, therefore, becomes a backbone for the "other" elements of the mobility revolution.

Image: GM CEO, Mary Barra's Twitter message of 2018. Automakers and suppliers call the trends by different names, but the key messages remain.

1.b. Automation:

Under "Automation," we understand various types of vehicle support systems – starting with the very familiar **anti-lock brake systems** (ABS) and **electronic stability program** (ESP), up to and including full autonomous driving.

These levels have been defined in broad categories from 1 to 5, as shown in the table. The first iteration, published by the **National Highway Traffic Safety Administration** (NHTSA) in 2016, has been broadly adopted by all tech companies and manufacturers within the autonomous vehicle ecosystem. Corresponding estimates for accident reduction at each level have been issued by various insurers.

NHTSA issued updated guidelines in September 2017, called Automated Driving Systems 2.0. These attempted to clarify the categories, or levels, more clearly with an emphasis on safety.

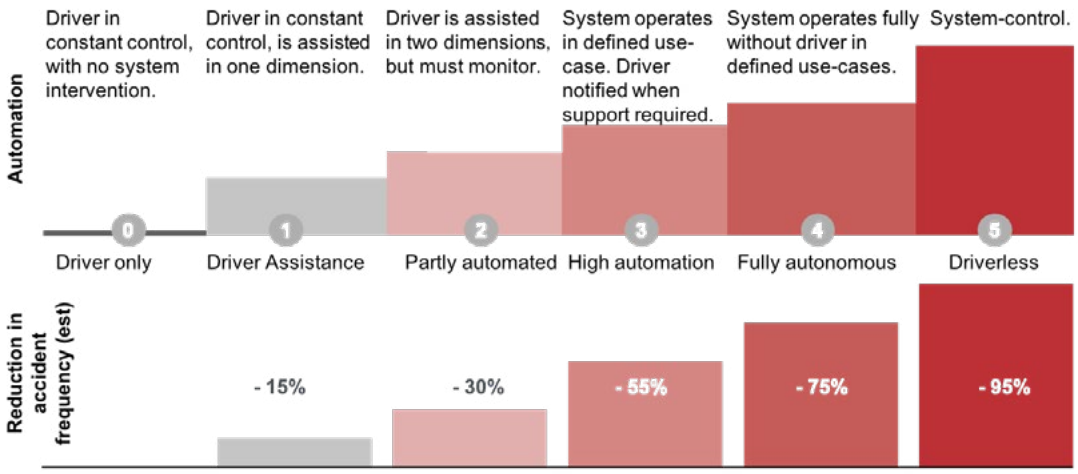


Image: Neckermann Strategic Advisors on NHTSA categories.
Accident reduction estimate: Swiss Re 2016

For Level 1, driver assistance features may be included while the driver is in control of the vehicle. That could include adaptive cruise control.

For Level 2, combined automated functions are available such as acceleration and steering, but the driver is responsible for operating the vehicle and monitoring the driving environment at all times. Examples of Level 2 technology include Audi Traffic Jam Assist, Cadillac Super Cruise, and Tesla Autopilot.

Level 3 takes some of that obligation away from the driver. The driver isn't required to constantly monitor the environment, but must be ready to take control of the vehicle at all times. Many automakers have stated that Level 3 is the most difficult to implement, given unclear regulations and the challenge of the "handover" between the driver and the machine. Nevertheless, Audi's Traffic Jam Pilot, released in early 2018, is claimed to be "the world's first system that enables highly automated driving at Level 3."

Level 4 takes vehicles to the phase of performing all driving functions autonomously under certain conditions. Outside of a defined scope of operations, an operator (on-board or remote) may take control of the vehicle. Examples of these vehicles – by Navya, EasyMile, Aurrigo, Local Motors, and May Mobility – are operating at airports, campuses, and on dedicated bus routes, particularly in European cities.

Image: Local Motors Olli

At Level 5, called full automation or driverless, the vehicle is capable of performing all driving functions under all conditions. Google previously tested out a Level 4 test car, the Firefly pod-car prototype, which had neither accelerator nor brake pedals, nor a steering wheel, and was restricted to a top speed of 25 mph. Its Waymo self-driving car unit more recently has been testing Level 5 autonomous vehicles — a fleet of Chrysler Pacifica hybrids – intended to develop its technology for production.

Among many other hurdles, reaching Level 5 will require significant data transfer capacity. The amount of data uploaded to the cloud will mushroom from 30 gigabytes per month from advanced connected cars in 2018, to 1 terabyte of vehicle and sensor data per month by 2025 from autonomous vehicles.

Passenger and pedestrian safety – a high priority for fleet managers – is also among the driving forces for autonomous technology. A Cisco study suggests that connected, automated vehicles will enable significant reductions in traffic congestion, vehicle emissions, and traffic collisions. Similarly, a study by the Eno Centre for Transportation, a non-profit organization, estimated that if 90 percent of cars on American roads were autonomous, the number of accidents would fall from 5.5 million a year to 1.3 million, and road deaths from 32,400 (in 2017) to 11,300. By L5, reinsurer Swiss Re estimates a reduction in collisions by 95%.

For trucking and logistics, the changes will be even more substantial. One of the most promising – and ultimately impactful – short-term applications of autonomous technology is **platooning** for commercial vehicles. Truck platoons link two or more commercial trucks in a convoy using connectivity technology and driver support systems. That keeps the trucks traveling close together behind the lead, significantly reducing air-drag friction, facilitating fuel savings up to 10% and emissions reductions. Truck braking systems are now automatic and immediate, which improves safety and helps fleets deliver goods faster and reduce traffic jams.


Image: Daimler

Image: Scania

Testing for platooning is being done in the Netherlands, the U.K., Japan, Singapore, the U.S., and other countries; the European Union funded a consortium that's expected to enable platooning by the early 2020s. In the U.S., Volvo and FedEx have already been conducting tests on a section of North Carolina highway 540 since early 2018, running three trucks towing two trailers each. Daimler Trucks is beginning platooning test on Oregon public highways in September 2018, and companies such as Kodiak are planning for fully autonomous trucks by the early 2020s.

A major driver for autonomous trucks is the **increasing cost of labor** as the driver shortage continues. This holds true in the U.S., but also across other high-labor cost environments, like Europe, which make these the prime markets for the implementation of autonomous vehicles, be they trucks or cars. It doesn't necessarily hold true in India, Brazil, or other environments where labor is cheap, and road regulations are somewhat less rigid.

"In the next 5-10 years, the trucking industry will see the greatest disruption from autonomous systems. It will be about 50:50, autonomous and human-driven vehicles on the highway, so, on a trip from NY to LA, the truck will drive itself fully autonomously on the highways — basically, from the outskirts of one city to another. When they get to the distribution center at the outskirts, a human driver will physically join the vehicle to take it into the city."

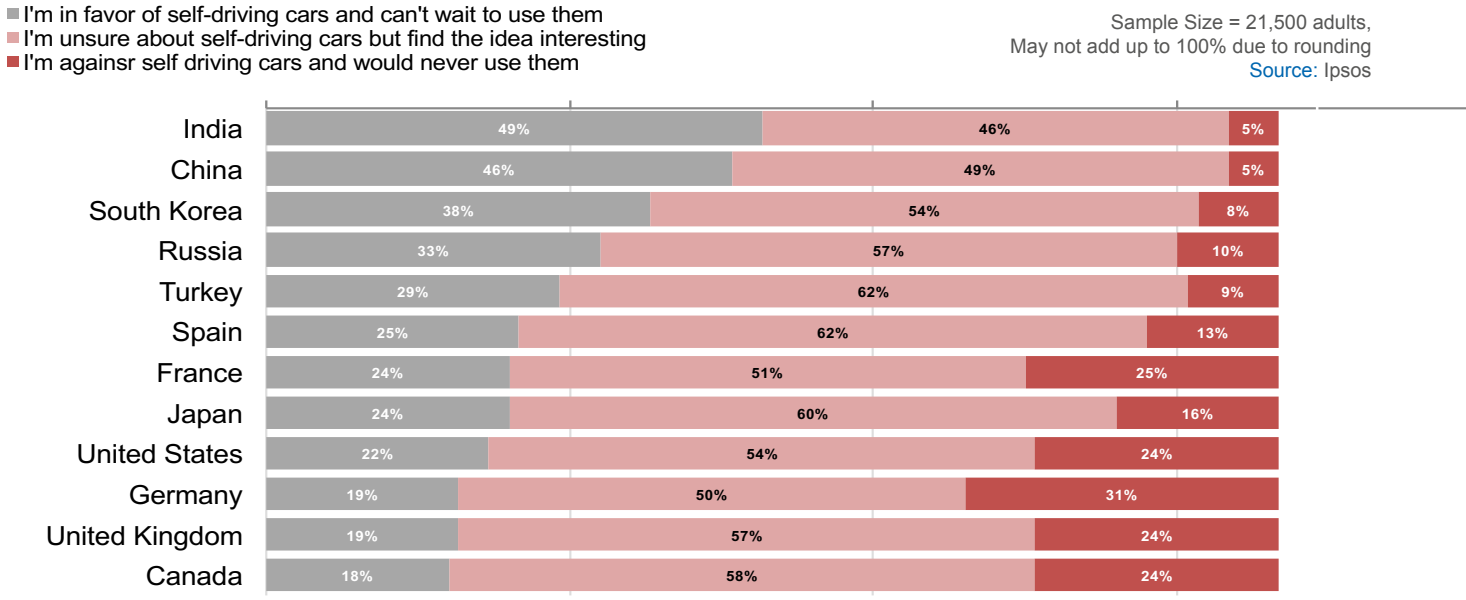
"The interstate highways are under the auspices of NHTSA, so there are no regulatory, inter-state burdens. When NHTSA permits the autonomous drive, and I am convinced that the U.S. will be the first to do so, then this is a done deal."

Steven Choi, Autonomy Product Lead at Uber

Individual, mass adoption of autonomous technology appears to be the greatest hurdle for autonomous technology in various applications, although we should expect fleet operators to lead the way. The safety benefits, especially at aggregated, fleet level, cannot and should not be ignored by companies. Beyond this are the economic benefits. Globally, we spend **40 billion hours per year behind the wheel of a car**, driving. The economic benefit of "releasing" these hours for other activities suggest a productivity benefit in the trillions of USD.

Global Opinion Divided on Self-Driving Cars

Share in favor, unsure about and against self-driving cars in selected countries (2018)



As regards **social acceptance of fully self-driving vehicles**, we can see differences. In those countries in which driving has not had high relevance in the past (such as China and India), adoption is expected to occur. In other countries, including the U.S. and Germany, where driving is part of the "lifeblood," there is still resistance. Initial studies have shown that exposure to various levels of self-driving allows for this to dissipate, but support for fully autonomous vehicles may be years away.

1.c. Sharing:

We expect that new vehicle sales in established markets will decline globally over the next decade and beyond as new ownership and shared-use models emerge. Consumers will own or lease fewer personal vehicles and fleets will acquire fewer passenger and commercial vehicles. It will become economically feasible to share vehicles supplied by mobility companies rather than acquire cars, vans, pickups, buses, and commercial trucks that spend most of their time stored in parking lots.

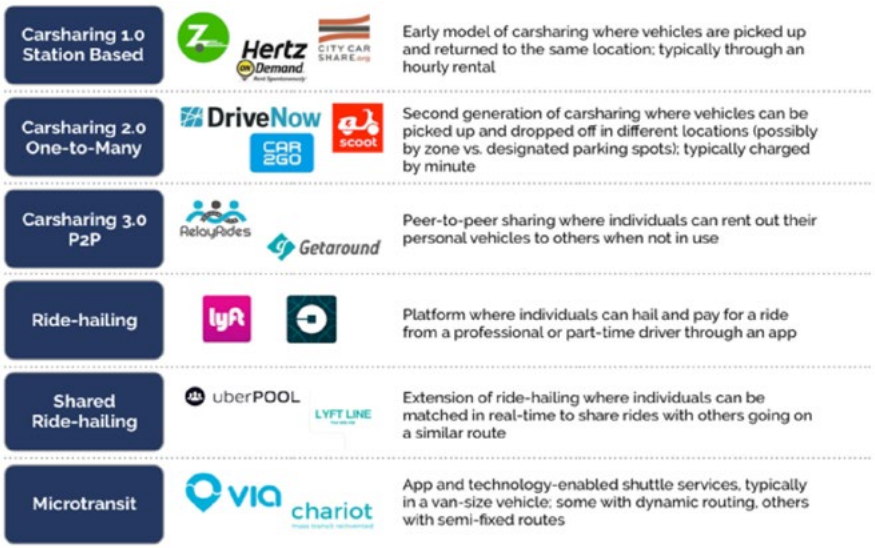


Image: UC Davis Institute of Transportation Studies, October 2017

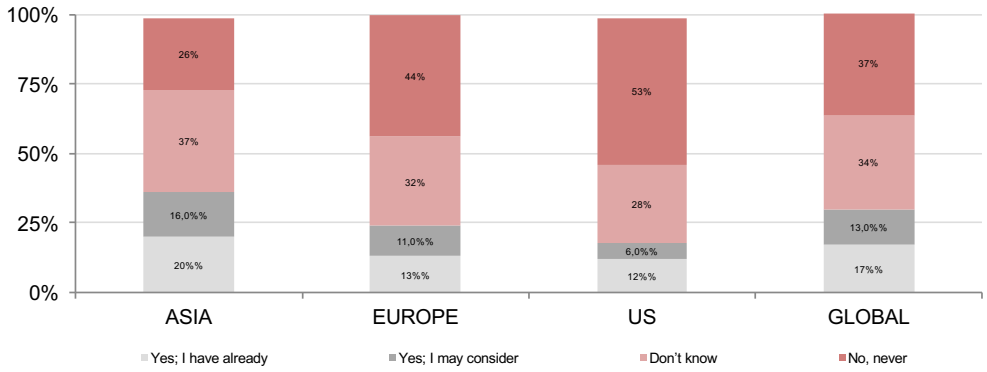
In the U.S., the sharing movement was marked by two key events: the launching of car-sharing market leader Zipcar in 2000 with so-called "station-based" **carsharing**; the largest global operator is now Daimler's car2go. The second breakthrough moment was the launch of Uber **ride-hailing** in 2010. The list of global mobility companies has meanwhile extended to include additional models, either bringing numerous individuals into vehicles headed in the same direction ("**ridepooling**," "**ridesharing**," or "**shared ride-hailing**"), or sharing vehicles among individuals ("**peer-to-peer carsharing**" or "**P2P carsharing**"). Thousands of players have emerged, with millions of users. Ridehailing, ridesharing, and carsharing companies have seen global markets grow rapidly in the past five years as millennials embrace the convenience, low cost, and freedom from car ownership. Congested cities with more traffic jams and expensive parking have increased that appeal.

Image: Car2Go

From a fleet perspective, **corporate carsharing** has emerged as a replacement for pool cars in some countries. Examples include Fleetster, Zipcar, and Enterprise Car Share, which is popular among municipality-owned fleets and on college campuses. In some cases, cities and corporate fleets even choose to make shared vehicles available to the community or the public outside of working hours.

Collectively, these car-based services are known as **mobility services**. When combined with other on-demand transport modes – such as public transport and bikesharing – it is called **mobility-as-a-service** (more on this later). A recent study shows the level of interest in mobility services in Asia, Europe, and the U.S. (see chart). Comparatively, Americans still hold the most loyalty to car ownership, although according to a study by Bank of America Merrill Lynch, one out of six Americans either already has gotten rid of, or is intending to get rid of, their car in favor of mobility services. This is clearly higher in urban areas and among younger respondents.

Would you get rid of a car and rely on mobility services instead?
(e.g.: ride-hailing, carsharing, taxis/ cab services)



Sample Size = 26,022
Source: BofA Merril Lynch Global Research

Truck fleet operators are experienced and will be familiar with the concept of sharing through logistics management and freight hauling, where distance and storage space are monetized. This presents an opportunity to explore how sharing can be extended to more local, smaller freight as well.

Startup companies are already using the sharing model to become "**aggregated shared logistics providers**" for the delivery of meals, groceries, business supplies, and packages. Deliveroo, UberEats, GrubHub, and Postmates are battling to take the lead in restaurant meal delivery. Some of them are competing to break into "last mile" logistics, still dominated by majors such as FedEx, UPS, and DHL. Amazon is crossing over from its original identity as an Internet portal for retail shopping into a major competitor for package and food delivery – including taking a dominant role in postal delivery in the U.S.

There is an understanding that shared mobility and autonomous technology are mutually supportive. Uber, Lyft, and Didi have joined partners to test autonomous vehicles that will be used for shared rides, and several automakers have expressed interest in starting up autonomous shared ride business units.

1.d. Electrification:

Automakers have taken on ambitious targets to roll out electrified vehicles through 2025, including battery electric (**BEV**), plug-in hybrid (**PHEV**), and to a lesser degree, range-extended electric vehicles (**E-REV**) and fuel-cell electric vehicles (**FCEV**). Any type of plug-in electric vehicle is known as a **PEV**. Countless manufacturers have made commitments to producing electrified vehicles – both plug-in hybrid and fully-electrified vehicles – for all new models they release, among them Volvo, Volkswagen, Daimler, BMW, and Toyota. Similarly, electrified commercial vehicles – both vans and trucks – are beginning to become available.

Driving the change are a combination of political, environmental and legislative factors. Governments in China, South Korea, the U.S., Germany, France, the U.K., Sweden, the Netherlands, Denmark, and India, are offering vehicle manufacturers and car buyers generous **incentives** to produce and purchase electrified vehicles. Charging infrastructures are also seeing support through government incentives with an emphasis on installing fast **chargers** in densely populated cities.

From a fleet perspective, a major driver of the change will be simple economics: the **total cost-of-ownership** (TCO) of electric vehicles in some cases already is superior to gasoline or diesel vehicles; where it's not, it will be within the coming years.

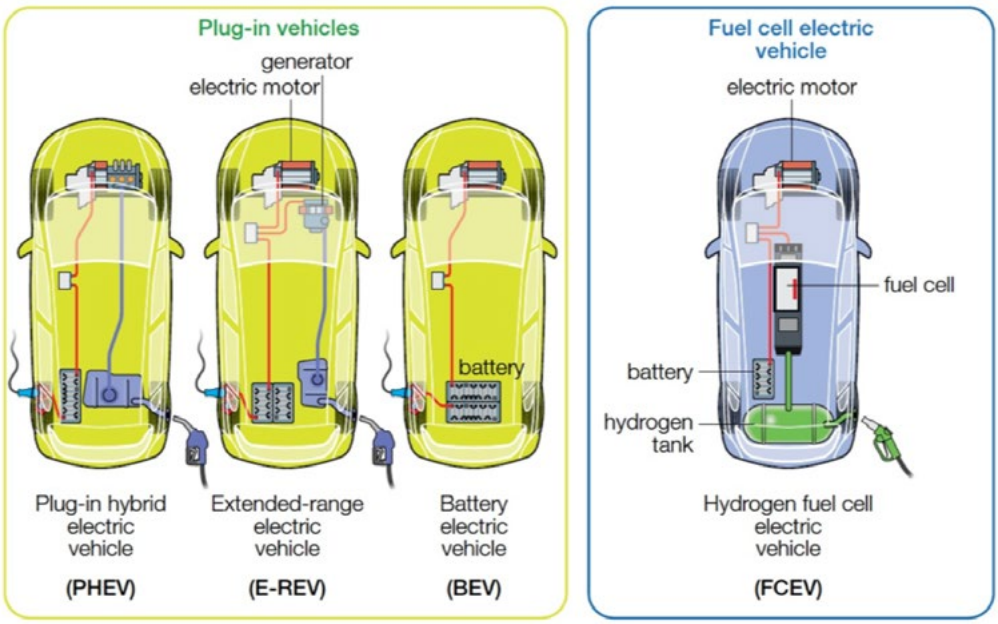
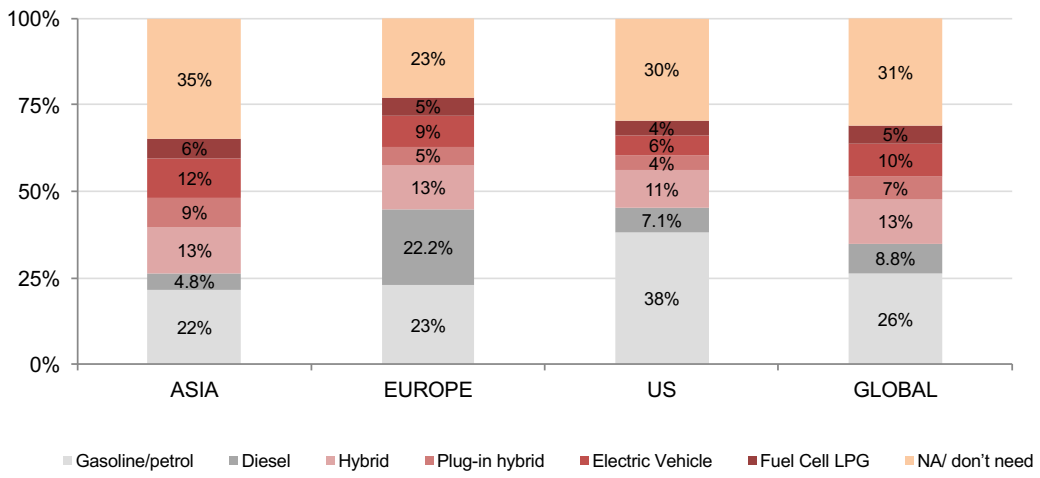


Image: Neckermann Strategic Advisors

Both in intention to acquire, and in actual sales, the U.S. lags behind Europe and Asia. Fully half of respondents to a Bank of America Merrill Lynch survey in Asia intend for their new vehicle to be either a BEV, PHEV or HEV. In Europe, it was a third, while in the US it was approximately a quarter. Key limiting factor at the moment, however, is not the lack of demand, but the lack of supply. Too few electric vehicle models have been available for fleet and individual deciders.

If you were to acquire a new vehicle today, what kind would you choose?



Sample Size= 26,022
Source: BofA Merril Lynch Global Research

The International Energy Agency's Global Electric Vehicles Outlook found that the number of plug-in electric vehicles (battery electric and plug-in hybrid vehicles) on roads around the world made it to 3 million in 2017, a 54% increase over 2016. As for new plug-in vehicles sold, China accounted for nearly half the volume last year at nearly 580,000 units sold. The country's generous "new energy vehicle" policies have provided the needed incentives for vehicle manufacturers and buyers — both consumers and fleets — to drive sales up 72% over the previous years. The U.S. had the second-highest sales rate at about 280,000 **PEV**s sold in 2017, up from 160,000 in 2016. Nordic countries led the way in terms of total percentage of new vehicles sales. **PEV**s made up close to 40% of new vehicles sales in Norway last year, while Iceland had 12% and Sweden was at 6%. China continues to dominate two growing segments in **PEV**s — **electric buses** and **two-wheeled motorcycles and scooters** — making up over 99% of global share.

Questions for fleet managers:

1. What are the pre-conditions for each of the four major trends to take hold? Have they been met?
2. What are the timelines you expect each of these four major trends to make a real difference for fleet professionals? How are your preparing for it?
3. How do you see these new technologies and systems affecting fleet safety? Efficiency? TCO?

2. The convergence of autonomy and sharing

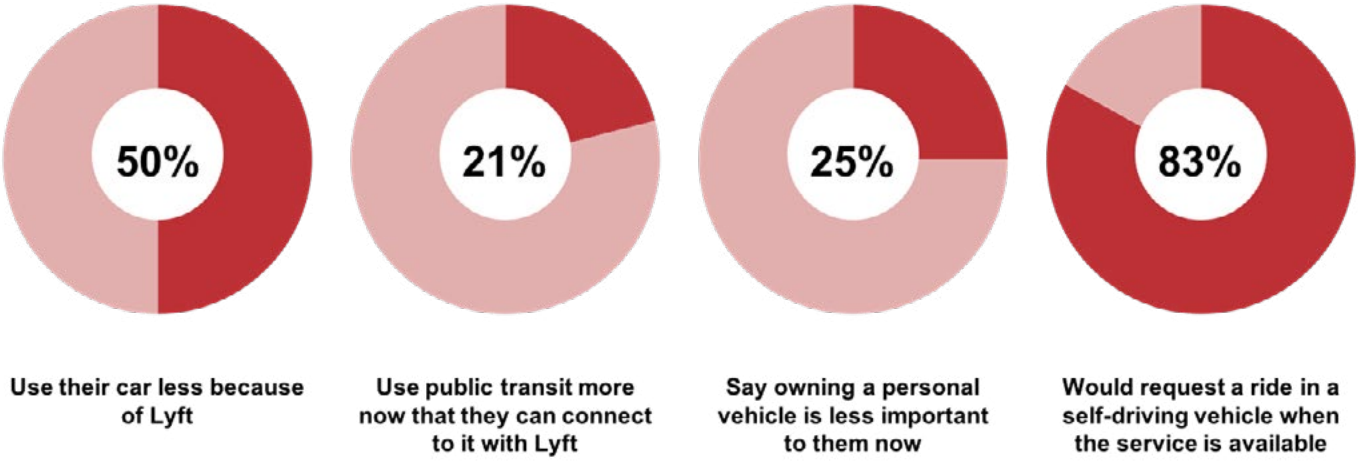
Imagine hundreds, if not thousands, of autonomous, electric, and shared vehicles roaming the streets, available to users at the click of an app. This is the vision of the new, **driverless on-demand mobility** system of the future – perhaps 10 years away in urban centers. Along the way, however, there will be countless iterations and developments that are impacting automakers and their suppliers, as well as fleet managers. Because the question is: **who will run these fleets of on-demand vehicles?**

The current model – where each individual owns (or leases) a car and uses it for primary transport, is beginning to fade. Younger generations across the globe are choosing to live in cities rather than suburbs or small towns, which implies greater habitation densities. Car ownership is much less important to young consumers than previous generations as they choose to take shared rides, mobility services, transit services, ride a bike, or walk to their destination, over owning a car. Urbanization rates already exceed 70% in North and South America, as well as in Europe. Researchers anticipate more of the world's population to be living in cities in the decades ahead.

Many new technologies, vehicles, and mobility services are first being deployed and tested in the U.S. — including autonomous vehicle test runs in several states, with 29 states enacting legislation governing autonomous vehicles as of August 2018. But there is evidence that the mobility revolution will diverge in its impact between the coasts and the heartland of the U.S.

Already, California, New York and other states have adopted diverging emissions standards and other measures, which have led to increased adoption of electrified vehicles. Urban areas and university campuses – especially at the coasts – are also home to more ridesharing, ridehailing and carsharing offers. Researcher Charlotta Mellander analyzed data on disparities in demographics, economics, and politics in the U.S. and how transportation choices fit into the market dynamics. Metropolitan areas where people depend on their cars and trucks to get to work tend be lower in income and education level than those living in cities with a higher proportion of commuters using transit, walking, or biking, she determined. The study also found that Americans are still attached to their cars when it comes to commuting — with 85% driving alone to work. This figure is skewed by the less-dense rural and suburban areas in the heartland of the U.S.; the coastal and global pictures vary significantly.

Anne Mellano, Co-Founder at Bestmile, an autonomous mobility platform provider, notes "There is a big difference between city centers, the rest of the cities, and the rest of the world outside. We will really begin to see [shared] autonomous systems in city centers in the next two to five years." Indeed, coastal U.S. cities and younger people have driven fast growth in ride-hailing and carsharing services. Uber serves about 260 U.S. cities, while chief competitor Lyft serves more than 100. Uber started up in San Francisco and New York City, while both companies have engaged in competitive fights for share in cities along both coasts.



Source: Lyft Economic Impact Study 2018 of 30,000 passengers and 37,000 drivers in 50 US cities

In a study of over 30,000 of its passengers and drivers in the U.S. – most all in cities – Lyft found that owning a personal car is less important to one-quarter of users now. Remarkably, well over three-quarters would opt to use self-driving ride-hailing, when it becomes available. Our concept diagram illustrates the path users might take, over time, to get from owning and driving a car, to relying on **driverless mobility-on-demand**.

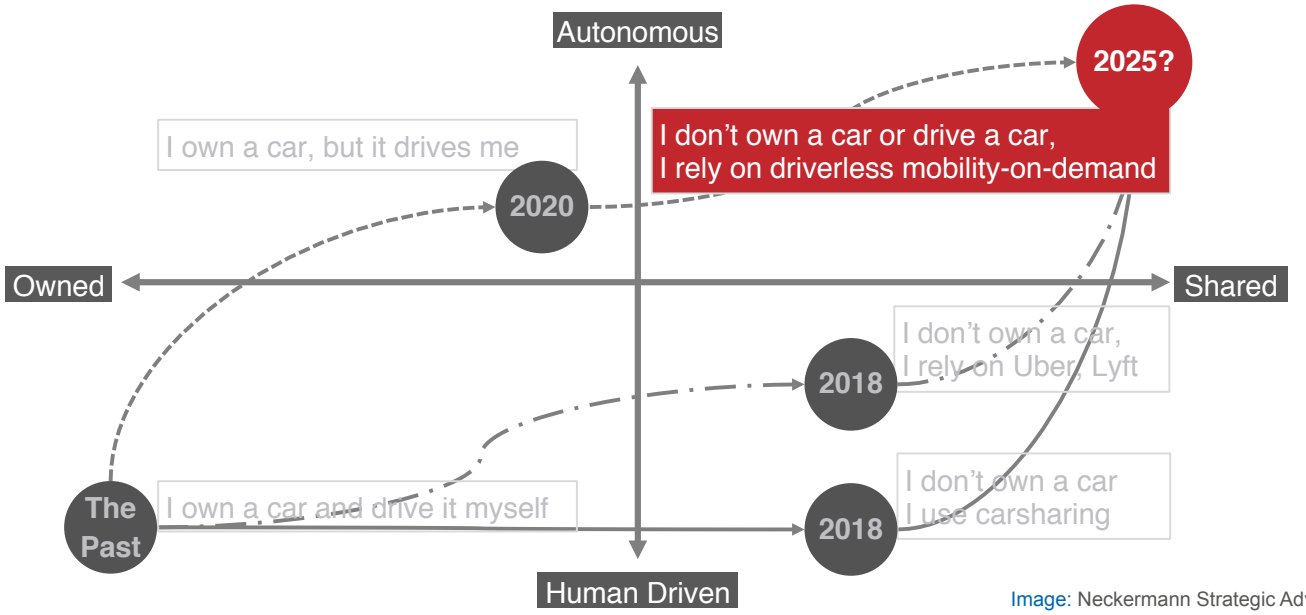


Image: Neckermann Strategic Advisors

The starting point for most individuals – and most fleet-operators – may be the bottom left quadrant, in other words everyone has and drives a car. For urban residents, ride-hailing and carsharing is becoming a more common practice. They are moving toward the right of the diagram – toward shared modes of mobility. For more rural residents, the idea of getting into a vehicle (passenger or commercial) that drives itself, will be very appealing. They are anxious for a vertical move on this diagram – toward autonomy. Ultimately, however, there will be a convergence of technologies and business models, whereby driving and owning will become less commonplace. Is that in 2025? Perhaps, perhaps not. But it will happen.

Image: Voyage

In urban areas especially, we should expect to see shared, autonomous transport solutions become established quickly, especially in controlled and defined environments – such as airports, parking lots, shopping centers, and university or company campuses. Startup autonomous vehicle service provider Voyage is bringing its autonomous fleet to senior citizens in communities such as The Village in San Jose, Calif., which currently has 125,000 residents. Over the past year, Voyage has been working with communities across the country to deploy its self-driving taxi service.

Other providers, such as May Mobility, Navya, EasyMile, and the (previously mentioned) Local Motors, have launched (L4 automation) shuttles for the so-called "last-mile" of transport. Notable is that these vehicles stray far away from the preconceived notion of "self-driving cars" – they in fact create a new category of vehicles altogether. This in itself is a key component of the transformation: we will see vehicle types wholly unfamiliar to us today.

Questions for fleet managers:

1. Where is a rise in shared mobility most evident today? Which apps are most favored by employees?
2. What types of company environments might be suitable today for the implementation of shared, autonomous vehicles? Are there campuses, parking lots, production sites or warehouses that are suitable?
3. Which technologies and systems does your fleet utilize that you expect to bridge the gap to the next phase? (Examples might include telematics, mobile communications, and company carpools.)

3. Mobility-as-a-service: a global consequence of urbanization

Globally, urbanization is becoming the norm throughout the developed economic regions in Asia, Europe, and North America. As a consequence, city planners are raising concerns over driver and pedestrian safety, traffic congestion gridlock, air pollution, and climate change. Connected, shared, autonomous, and electrified transport are becoming widely accepted as part of the solution, but so are efforts to reduce individual transport altogether.

The so-called **Barcelona Superblocks** are an area in the coastal city of Spain that has eliminated non-essential travel on two of three streets (see image). Pedestrians and bicycles are prioritized, and vehicles are limited to walking-speed. It's an extreme example of what is happening across dense metropolitan areas, even in North America.

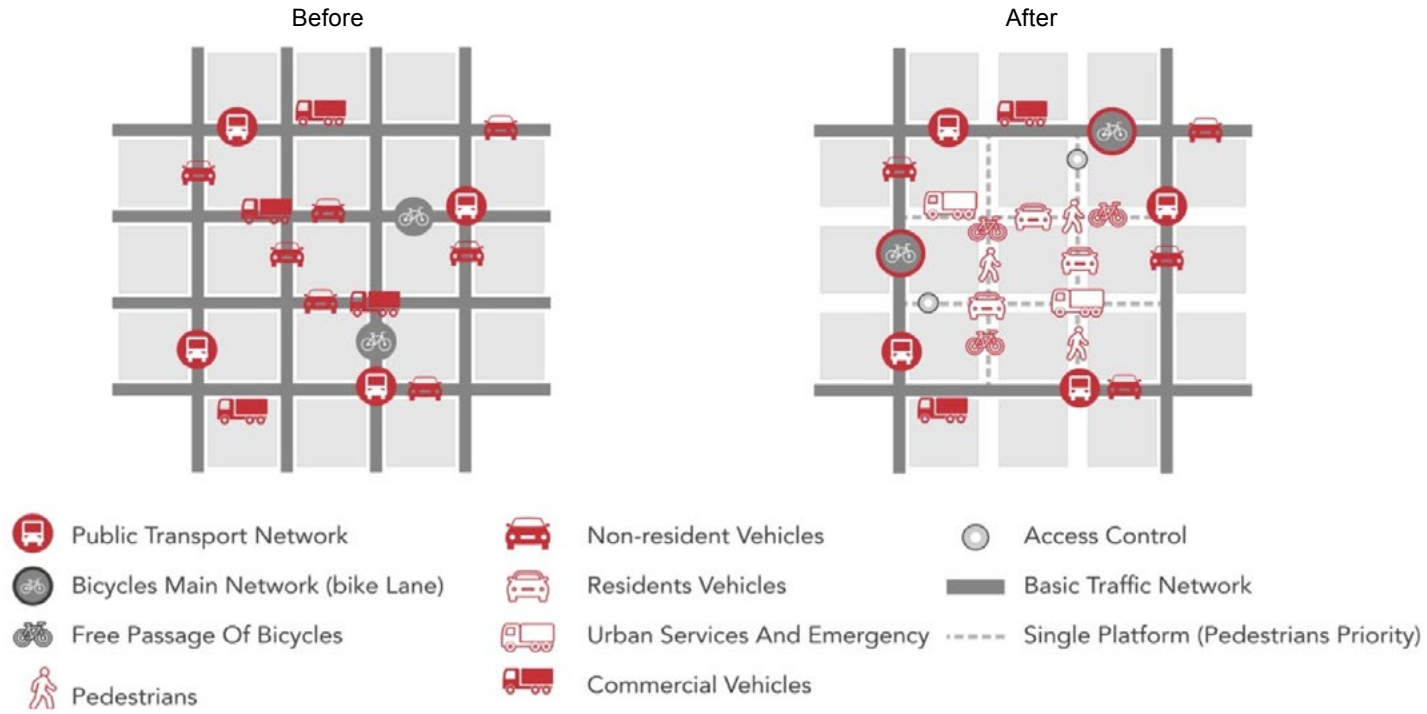


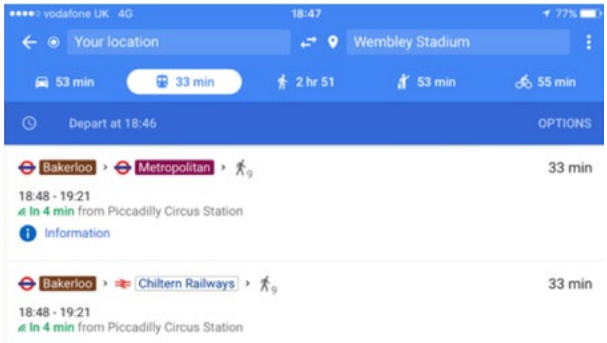
Image: Barcelona Superblocks.
Source: University of Barcelona

The openness toward new mobility options in megacities (those cities with more than 10 million residents) is driven by necessity above all; using a car is often simply not the fastest way to get around, as the image to the right suggests: driving from one place in London to another would take 20 minutes more than public transport, or roughly the same as taking a bicycle.

Across Europe, integrated concepts that combine public transport, carsharing, ridehailing, and even bikesharing into a monthly flat-rate are emerging under the banner of "**mobility-as-a-service**" (**MaaS**). With more millennials moving to cities, the concept is taking off as a business model, especially as more shared ride services emerge through public/private alliances. A leading example is Helsinki's "Whim" app, by Maas Global.

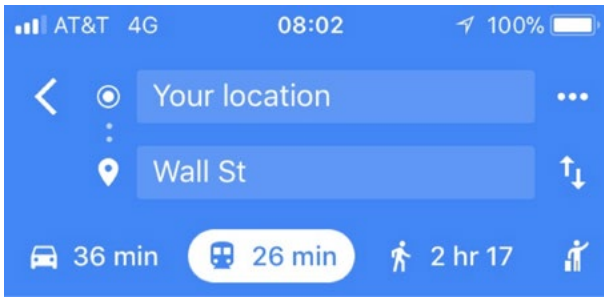
Image: WHIM app, by MaaS Global

Getting around in Megacities:



This Google Maps screenshot illustrates times per transport mode to a given destination – in this case, Wembley Stadium: 53 minutes by car or ride-hailing, 55 minutes by bicycle, and 33 minutes by public transport.

A similar picture emerges in New York, where a trip to Wall Street at 8 a.m. would take 10 minutes longer by car (not including time to park) than by public transport.



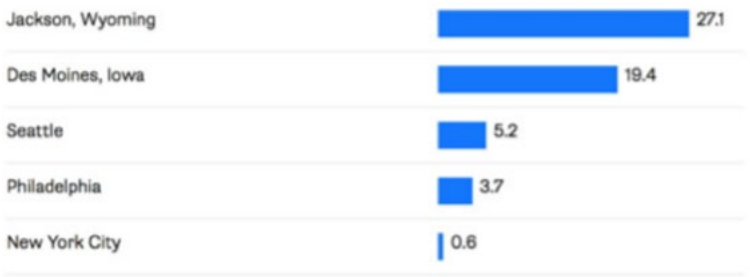
Consulting firm PricewaterhouseCoopers estimates the market for MaaS will be worth $156 billion by 2022.

While the U.S. is far behind Europe and Asia in bicycling, walking, and metro rides, a number of U.S. cities are taking measures to support bike users. Atlanta, Austin, Baltimore, Chicago, Detroit, Minneapolis, Philadelphia, Portland, and Seattle are credited for setting up bike lanes, bike-sharing groups, bridge and lakeside routes, and safe locking mounts.

City planners are also addressing another key issue that is closely related to car-ownership: **parking**. Data from Parkingmill and Research Institute for Housing America illustrates differences in coastal versus heartland. Crowded coastal cities such as Seattle, Philadelphia, and New York City are finding deep revenue pockets from parking fees, driving up the cost of car ownership in recent years (in turn, making alternatives to ownership more attractive). While cities like Jackson, Wyoming, and Des Moines, Iowa, have more open space for parking and more access for drivers, space-constrained coastal cities are seeing more demand for ride-hailing, carsharing, secure bike stands, and transit services.

Uber, Lyft, Zipcar, Didi, Motivate, Ofo, Via, and eight other mobility companies, generating about 77 million passenger trips per day, have joined together to support an initiative to promote a unified framework for the future of mobility and its integration with autonomous vehicles. The coalition – started by Robin Chase, co-founder of Zipcar and Veniam – has established guidelines for businesses, city governments, and NGOs called the "**Shared mobility principles for livable cities**." Among these (below), are a commitment to designing cities for people, and not vehicles.

Parking stalls per household



Sources: Parkingmill, Research Institute for Housing America

1. We plan our cities and their mobility together
2. We prioritize people over vehicles
3. We support the shared and efficient use of vehicles, lanes, curbs, and land
4. We engage with stakeholders
5. We promote equity
6. We lead the transition toward a zero-emission future and renewable energy
7. We support fair user fees across all modes
8. We aim for public benefits via open data
9. We work towards integration and seamless connectivity
10. We support that autonomous vehicles in dense urban areas should be operated only in shared fleets

Other countries and regions are taking on huge commitments in the mobility revolution, with China leading the way in PEV sales and its governments pushing for the country to be seen as a leader in autonomous vehicle testing and deployment. Europe is seeing a faster growth rate in electric mobility than North America.

Questions for fleet managers:

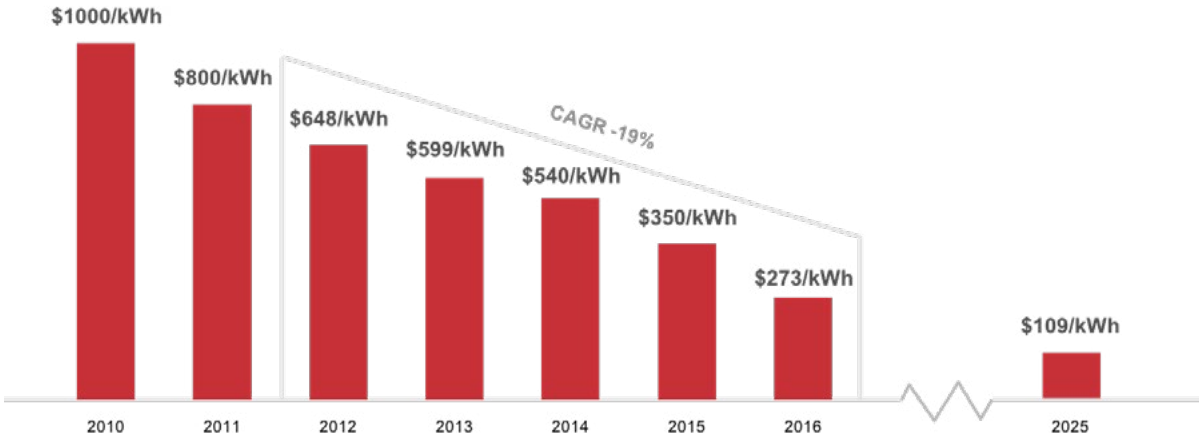
1. How are U.S. urban areas and other global cities different?
2. Which traits of cities make them prime candidates for implementation of alternatives? What do they have in common? Will it be necessary to implement different fleet strategies in these cities? How different?
3. Can mobility-as-a-service work in all types of environments? In a corporate environment?

4. The electrification imperative in fleet

Countries are moving toward banning the sale of fossil fuel burning vehicles and mandating adoption of zero emission vehicles. France will stop selling fossil fuel cars by 2040. China, the world's largest auto market, followed suit with a 2040 ban and progressively increasing quotas until this point; countries setting similar targets include India, Germany and Norway. Just as they are aggressively promoting alternatives to cars, the world's largest cities are effectively setting industrial policy with respect to electrification. Paris voted to ban gasoline and diesel burning vehicles by 2030 to curb air pollution from fossil fuels. Led by London, the U.K. also is setting targets to end the sale of internal-combustion engine vehicles.

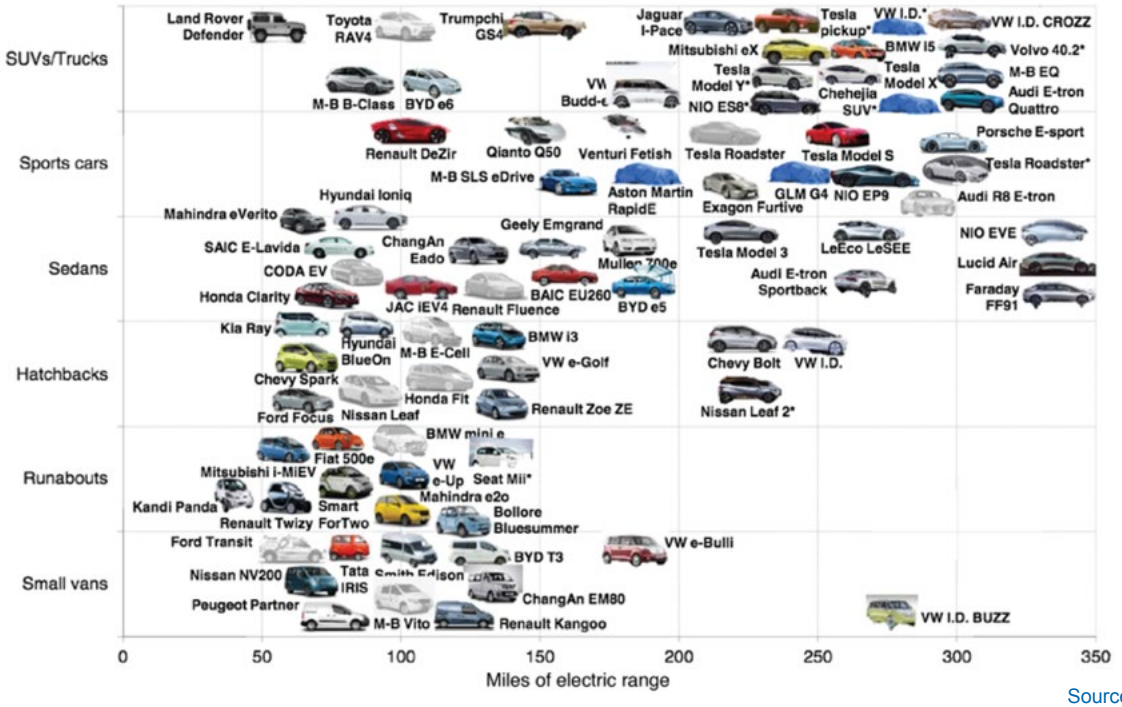
PricewaterhouseCoopers expects global "**Diesel car sales to fall off a cliff by the end of this decade**" – or, within two years, due to regulations. Gasoline vehicles will suffer a similar fate at the hands of an improved ownership proposition by electric vehicles.

As lithium-ion prices drop by 15-20% year-on-year (see image), the price-per-mile of range for electric vehicles decreases, virtually proportionately.



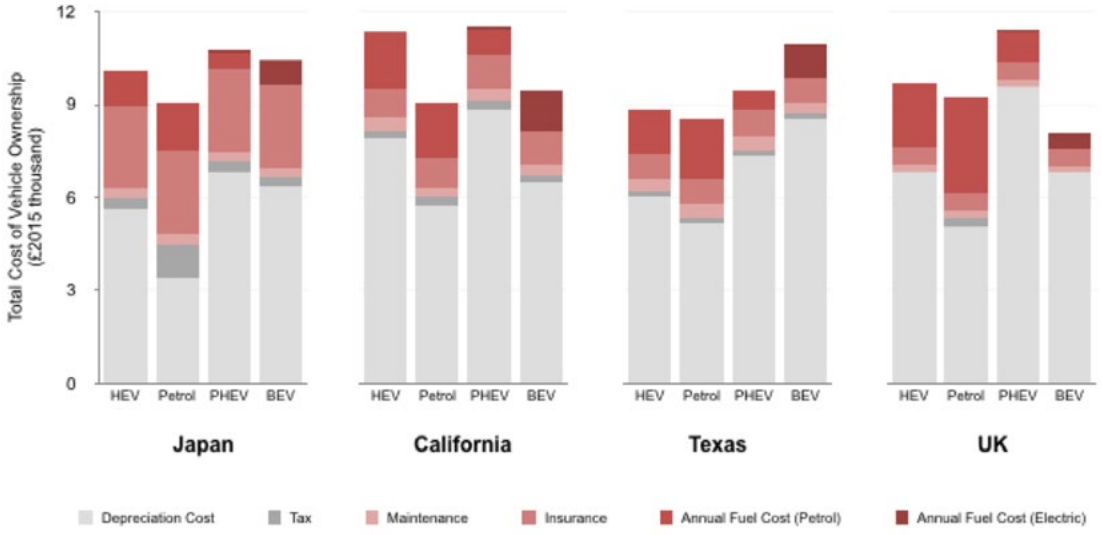
Sources: Bloomberg New Energy Finance 2017

Alongside the drop in demand for internal-combustion engine vehicles, and a decrease in battery prices, will come a massive increase in the types of new vehicles available to fleets and private consumers. As of mid-2018, there are about **65 electric vehicle models** available around the world, with that number expected to more than double by 2020. The largest selling models, including the Nissan Leaf, Renault Zoe, Tesla Model S, Chevrolet Bolt, Chevrolet Volt, Tesla Model 3, and Toyota Prius Prime, have done well with consumers through dealerships, while many of these new electric vehicles are trucks, vans, and SUVs targeted toward fleet operators. China's leading edge in "new energy vehicle" sales has been affected by passenger vehicles, buses, and trucks going to municipalities and other fleets.



Sources: Bloomberg New Energy Finance

As demonstrated in the chart from Bloomberg New Energy Finance, investments in electric vehicles by automakers are expanding the line-up of new vehicles in the next few model years – with over 200 new models expected across virtually all vehicle categories, and with ranges up to 350 miles. A key driver for fleets, however, is total cost of ownership (TCO), and fleet managers may be surprised to see how PEVs are more than competitive. The journal Applied Energy assessed the TCO of conventional, hybrid, plug-in hybrid, and battery-electric vehicles in the U.K., California, Texas and Japan from 1997 to 2015. "Costs were found to be cheaper for electric vehicles due to less wear on the brakes and fewer moving parts," according to the study.



Source: Applied Energy

Importantly, the study identified significant differences between geographies; in Texas, the gasoline engine vehicles were still most efficient, while in the U.K., the tide has already turned for BEVs. As ever, the core differences lie in the itemized costs (fuel, insurance, maintenance) per geography, but also in what is included in the TCO calculation. Fleet-managers who include a wider, full-picture of costs – downtime, accident-repair, tolls and congestion charging, even driver happiness and engagement – may see that electric vehicles are considerably more favorable in each of these points, even today.. Furthermore, fleet managers who have a clear view on daily vehicle mileage requirements, and whose vehicles return to a base with charging capabilities, will be more open to implementing electrified vehicles.

> "In my experience, if a driver doesn't like his vehicle, he'll drive it like it's been stolen. I haven't seen that with drivers of our fully-electric vans. They really like the vehicles and as a result, we are seeing not just lower repair costs, but also less downtime."
>
> **– U.K. fleet manager**

Forbes reported yet another calculation:

> "The average cost to operate an EV in the United States is $485 per year, while the average for a gasoline-powered vehicle is $1,117, according to the study by Michael Sivak and Brandon Schoettle of Michigan's Transportation Research Institute.
> "This study only examined fuel costs, but the maintenance cost for electric vehicles has also been found to be lower because they have fewer moving parts, no exhaust system, less need for cooling, less abrasive braking options, and no need to change oil, fan belt, air filters, timing belts, head gaskets, cylinder heads and spark plugs."

Fleets will see greater, explicit cost savings when adopting electric vehicles in the future as lithium-ion battery packs become cheaper. The electric motors and battery storage capacity will also see improvements, reducing purchase cost and extending range per charge.

Most leasing companies and some OEMs are beginning to develop tools by which to evaluate suitability and cost of electrification for their clients' fleets. Importantly, these need to be regularly updated, as the variety of vehicles is continually increasing, their costs are decreasing, and the residual values become more predictable. Once the TCO case becomes clearer, PEV acquisition will become the most obvious choice for fleets

Questions for fleet managers:

1. Does your TCO calculation include downtime? Tolls and parking? Ability to use High-Occupancy and Zero Emissions lanes?
2. Do you have a clear picture of the mileage requirements of each vehicle, per day or per week? Which vehicles in your fleet come back to a depot or base station? Do these have charging capabilities?
3. Have you made electric or hybrid-electric vehicles available to your staff as part of your fleet choices?

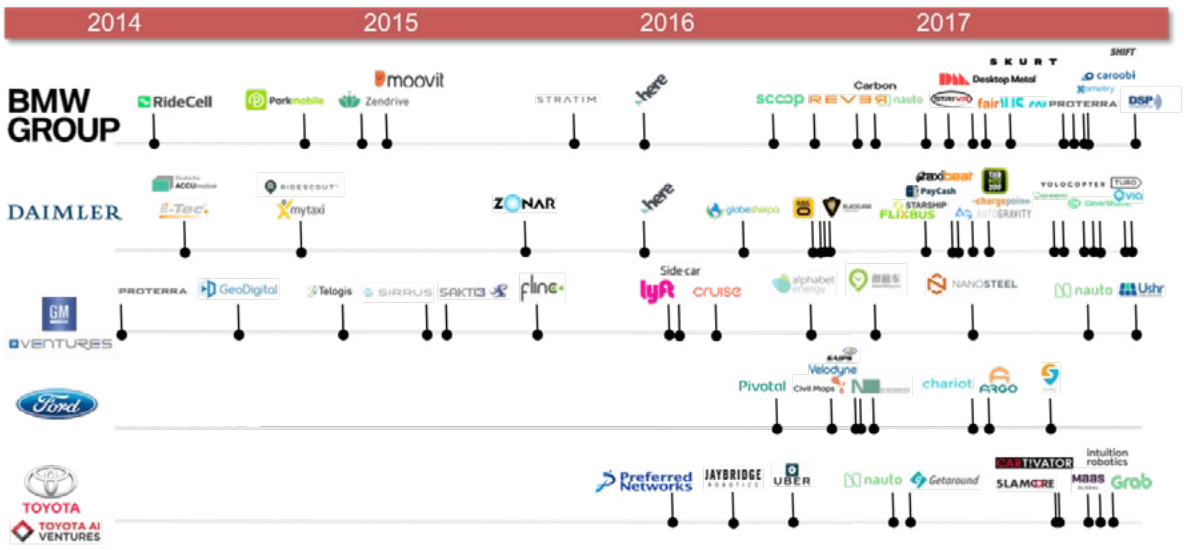
5. A new industry value chain, with new partners

Tony Candeloro, Senior Vice President, Technology and Operations at Holman Strategic Ventures (owners of ARI Fleet Management) is certain that "in five years, we will see fewer owned vehicles, and more shared vehicles. We will see fewer consumer miles driven, and more fleet miles driven. Additionally, autonomous technology will be clear enough so that fleet managers can plan their impact." This implies a significant impact on the way automakers and the industry is currently structured.

"If we think about this future of transportation, a lot of the car companies are going to be finding themselves on the wrong end of this transformation. Who are going to be on the right end are fleet managers, because if we think of the percentage of vehicles and the percentage of miles that are driven today in a fleet situation, [they will have a bright] future because sharing vehicles is now so simple and so economically preferred."

– Robin Chase, Cofounder of Zipcar and Veniam

Automakers are following development in electric, shared rides from mobility companies such as Uber and Zipcar. Although OEMs such as BMW, Daimler, GM and others are making sizable investments (see image) in startups in autonomous and shared mobility, they are also becoming only pieces of a much larger puzzle.



Sources: Compiled by CB Insights, February 2018

Ford Autonomous Vehicles LLC

Notably, Ford has created a subsidiary with a $4 billion investment to oversee all its autonomous vehicle (AV) research and the self-driving car network the automaker plans to launch in 2021. Of that total, $1 billion will go to Argo AI, a Pittsburgh-based partner for AV system development. It will be separate from Ford Smart Mobility LLC, a unit dedicated to emerging mobility products and services such as Chariot, a San Francisco-based shuttle service.

Ford Autonomous Vehicles LLC will include Ford's self-driving systems integration, autonomous vehicle research and advanced engineering, AV transportation-as-a-service network development, user experience, business strategy and business development teams. In August 2018, the teams posted a 44-page guideline on developing self-driving vehicles. "You don't bolt on safety. It has to be ingrained in your culture and every decision you make," Bryan Salesky, CEO of one of Ford's autonomous vehicle development partners, told *Automotive News*.

General Motor's Cruise Automation division is already testing autonomous all-electric Chevrolet Bolts. In January 2018, GM announced it will be mass producing fully autonomous vehicles in 2019, built on the fourth-generation Chevrolet Bolt electric car. They were being tested on the streets of San Francisco and Phoenix at that time, with plans to later deploy them in various cities as "robotaxis" or ride-hailing services. The autonomous Bolts will be rolling off GM's assembly line in Orion, Michigan; future versions have already been envisioned without steering wheels.

Partnerships between tech-companies and smaller automakers also abound. In March 2018, Jaguar Land Rover and Alphabet's Waymo division announced a project to design and engineer the world's first premium electric, fully self-driving vehicle, built for Waymo's transportation service, a Jaguar I-PACE. Waymo continues to lead the way in self-driving vehicle testing and is forging alliances with other automakers as well, including Fiat Chrysler Automobiles and its Chrysler Pacifica minivans.

Image: GM / Cruise Automation

When shared and autonomous mobility comes together, it also fundamentally changes the value chain of the industry. No longer will carmakers have to continue to play a leading role in testing and deployment of the new technology through internal R&D and external strategic alliances, as illustrated in this chart.

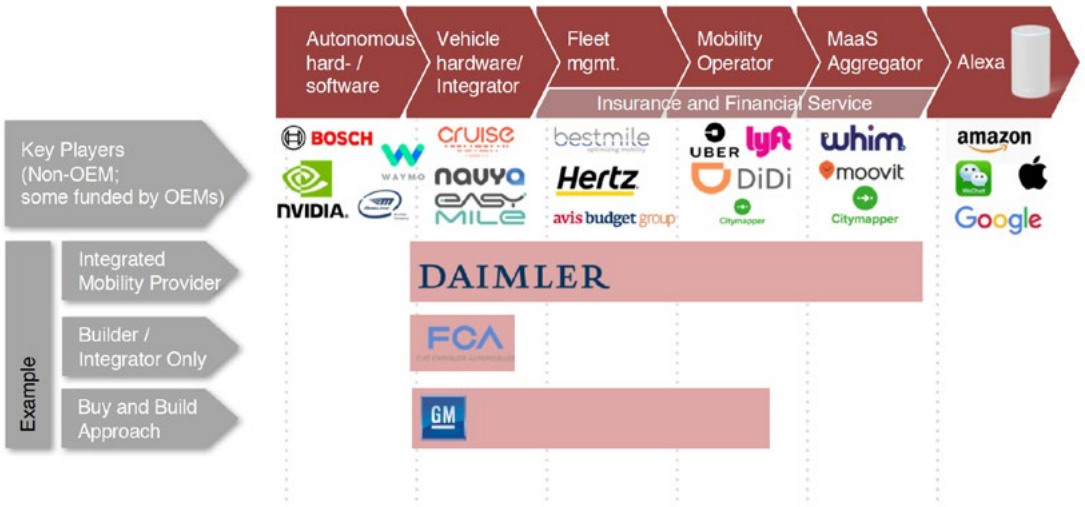


Image: Neckermann Strategic Advisors

At the beginning of the chain, stand the autonomous hard- and software suppliers. LiDAR, radar, graphics processing units (GPU), and artificial intelligence are coming through alliances forged by automakers and tech startups such as Mobileye, Cruise Automation, and NVIDIA.

"We expect over the next three-to-five years to have a number of rollouts. Actually starting as early as next year we expect to see some autonomous car platforms being not just tested but being deployed in some areas. Some of them are for robotaxi, but most of what we're seeing in terms of deployments are shuttles, and transit – whether public or private transit. We're seeing a number of companies working with our solutions, but also competing solutions, to have fully autonomous shuttles in the market on specific campuses or specific roads."

—Frantz Saintellemy, President & COO, LeddarTech, which develops LiDAR detection and ranging solutions

Next in the chain are those companies that integrate new vehicles with shared mobility services. We used to know them as automakers or OEMs, until they declared themselves to be "mobility companies," although this means different things to different companies. Toyota, Daimler, General Motors, BMW, and Ford have been launching mobility divisions in recent years that sometimes work in alliance with companies such as Uber, Zipcar, and Lyft, yet also prepare to compete in the burgeoning global market. Arguably furthest along is Daimler through its Daimler Mobility Services GmbH financial holding company – including Car2go, Moovel, MyTaxi, and Ride4Hire. Among the independent aggregators of autonomous vehicles are Navya and EasyMile.

The third element along the value chain is the key element of fleet management, although this will encompass new roles. U.S.- and Europe-based Bestmile already today works with mobility providers to deploy, manage, and optimize autonomous and conventional driven vehicle fleets. In an interview for this whitepaper, Anne Mellano, Founder & VP Operations EMEA of Bestmile, expects autonomous systems to be in place in city centers in the next two-to-five years.

"Bestmile's platform enables mobility service providers to deploy, supervise and manage fleets of vehicles, including autonomous vehicles. We receive a lot of data from the vehicles, such as their position, speed, level of battery or any type of data the vehicles are able to send us. We then run optimization algorithms to decide which vehicle should do what and finally send missions to the vehicles to tell them what to do, in real-time. The goal is to optimize the vehicles as a whole system, not just as individual robots, to achieve the best transportation service for the users, and best use of the fleet for the mobility providers."

- Anne Mellano, Founder & VP Operations EMEA, Bestmile

Auto rental, fleet management and leasing companies are well positioned to continue forging alliances and acquisitions in connected, automated mobility services. The Avis Budget Group has previously acquired Zipcar, and has already signed an agreement to manage the self-driving fleet of Waymo vehicles. Partnership potential with technology companies and suppliers is growing for Hertz, LeasePlan, Arval, as well as startup companies.

"We started out as a car washing company and grew to become the market leader for car-sharing fleet management in North America. Using that experience, we decided to build technology which can help automate the process to manage fleets. We have a system which helps maximize the assets. For example, a fleet vehicle might be used for corporate car share during the day, and might be used for consumer car share during non-work hours."

- Hayden Pham, Vice President of Sales and Marketing, Ecomobix

Next along the value chain are the mobility companies and mobility aggregators which we have discussed previously. One-third of American households already have a smart speaker, which means that at the end of the chain is not a smartphone, but voice-command. A user may simply say, "Alexa, I need a ride to the airport, now," which ultimately, will set off a chain of events.

Key to this value chain, however, is a new division of responsibilities among partners – companies that perhaps previously have never interacted (Google and Jaguar Land Rover, Uber and Volvo, Mobileye and BMW). Others might become competitors. Car-rental company Sixt sold its stake in DriveNow to BMW, shortly thereafter announcing its own "mobility" proposition.

In the aggregation of all the elements of a self-driving, on-demand mobility value-chain, the Japanese conglomerate SoftBank Group is emerging as the global leader. Its "Vision Fund" of $100 billion is overshadowing the efforts of all automakers combined (and indeed, the market caps of any individual OEM). Over 90% of ride-hailing trips globally are coming from companies in which Japanese conglomerate Softbank has an investment.

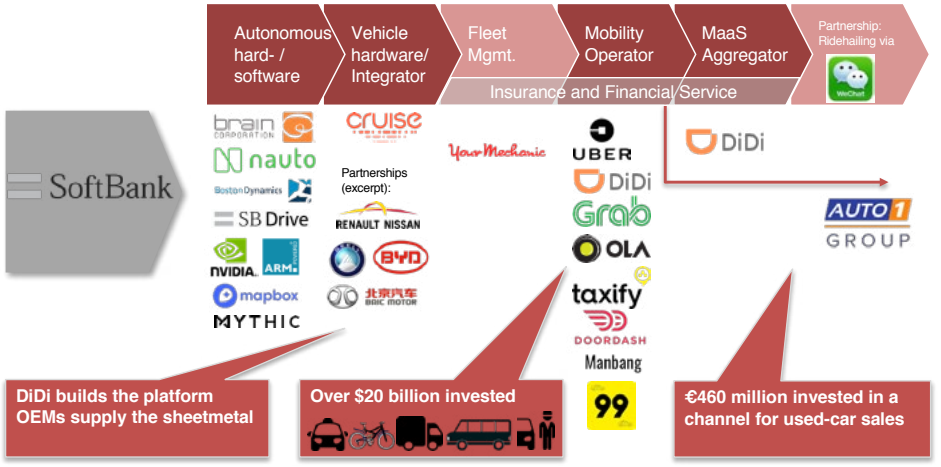


Image: Neckermann Strategic Advisors

Among countless other investments, Softbank in May 2018 contributed $5 billion to a record fundraising by Chinese ride-hailing giant Didi Chuxing. The two companies are exploring robo-taxis. Didi also signed an agreement with German automotive supplier Continental AG to cooperate in developing Internet-connected, electric cars tailor-made for Didi's ride-hailing services.

Questions for fleet managers:

1. Which industry sectors do you see playing the leading role in advancement of the new technology and systems? Which companies are leading? Who is lagging?
2. How will the relationship between automakers and fleet management evolve over the next 5-10 years?
3. Which new partners might become relevant to the role of a fleet manager, as companies pilot, deploy, and manage fleets of shared, autonomous vehicles?

6. Logistics, dealers, and insurance: a future reimagined

According to Technavio, a market research company, the rise in online shopping has become a growth opportunity for distribution and logistics – with 9.7% annualized growth through 2020 expected. With this comes a need for more technology, and a re-evaluation of business models. *Logistics Magazine* noted,

> "One of the major trends set to emerge in the e-commerce logistics market is an increase in investments in technology to help logistics service providers enhance their delivery services and monitor the movement of goods accurately given the short lead times. The use of software technologies such as warehouse management software, automated material handling equipment, warehouse control software, and other evolving technologies, such as mobile technology, global positioning systems, trailer seals, RFID, and biometrics, is expected to help logistics providers maintain a balance in inventory levels and monitor products correctly."

The simultaneous increase in demand, densification of cities, decrease in available parking and implementation of pass-through restrictions presents freight forwarders and logistics companies with new challenges, however. Rather than being able to send a 40-ton truck into cities for deliveries, megacities in particular have prompted them to adopt more suburban distribution centers, with smaller vehicles for the final 20 miles (and then, for the "**last-mile**"). A new, multi-step distribution model results:

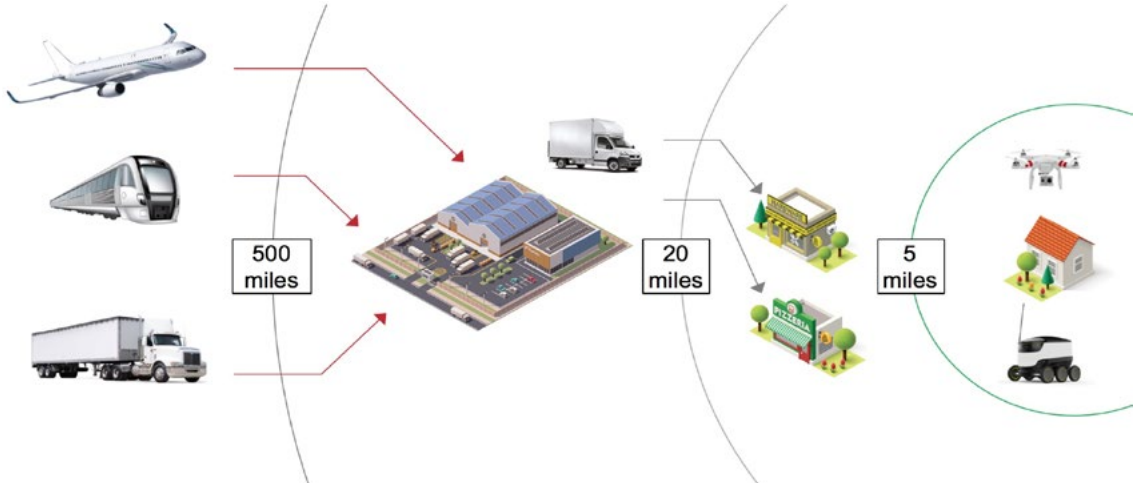


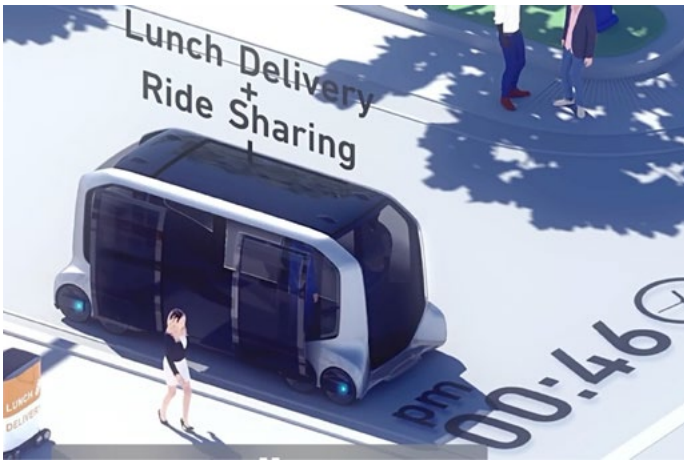
Image: Neckermann Strategic Advisors

Uber's Steven Choi notes, "The concept of the 'last mile' is actually more of the last 20 or so miles. Long-haul trips may need a combination of human drivers and automation in the near-future scenario. In some larger cities, especially in Europe, the big rigs will actually never see a human driver, as the load is then transferred into smaller, 3.5-ton to 7.5-ton vehicles for the last mile." In some cities, these **last-mile options may also include drones, cargo bicycles, or autonomous shuttles**. For example, DHL has actively rolled out various cargo-bicycle concepts across European cities, and Toyota has showed off its ePalette concept – which aims to autonomously bring shops to the customer.

In any case, especially the autonomous modes need to be monitored, whether on the open-highway, or on city streets. When there are issues with the vehicle, or a driver needs to be dispatched, "the AAA, or the Hertz and Avis maintenance operations, will dispatch emergency services or drivers as necessary," noted Choi. There is potential for other companies as well, if they act now. "Leasing companies should come up with a 20-year strategy plan on mobility-as-a-service. They risk the same fate as Hollywood or Blockbuster when content-as-a-service emerged," Choi said.

New, last-mile distribution options

DHL Delivery Bicycles



Toyota ePalette Concept

What happens to dealers?

Like leasing providers, rental car companies and the car companies themselves, the role that auto dealerships will be playing in the future of automated vehicles and mobility services is still open. Concerns over dealer management, sales staff, and service technicians being properly trained and educated in connectivity, automation, and electric drivetrains are one thing. But when vehicle ownership numbers – and with them, repairs – are reduced, their fundamental business model is thrown into question.

In the short-term, dealers can leverage the opportunities provided by new ownership models, such as "**car-as-a-service**" (CaaS) – effectively a highly flexible leasing model now being offered by a number of OEM captives. Rather than committing to one vehicle for three or four years, fleet and retail customers are offered multiple vehicle-types to use, all within their leasing agreement and without operational hassle.

"The biggest opportunity will be the introduction of car-as-a-service to dealerships, i.e. the introduction of things like subscriptions, carsharing, other sharing ideas around the vehicle. They need to be moving away from buying and leasing to sharing. The role of car-as-a-service at dealerships will continue to grow over time."

– James Carter, Principal Consultant at Vision Mobility

More significant in the longer-term, however, are how the connected and autonomous technologies can be leveraged. Connectivity especially brings with it a wealth of immediate opportunities for retail and B2B dealerships. In the longer-term, dealers that are skilled in assessing, servicing, and repairing advanced, electric, automated vehicles will be in demand with fleet and retail customers.

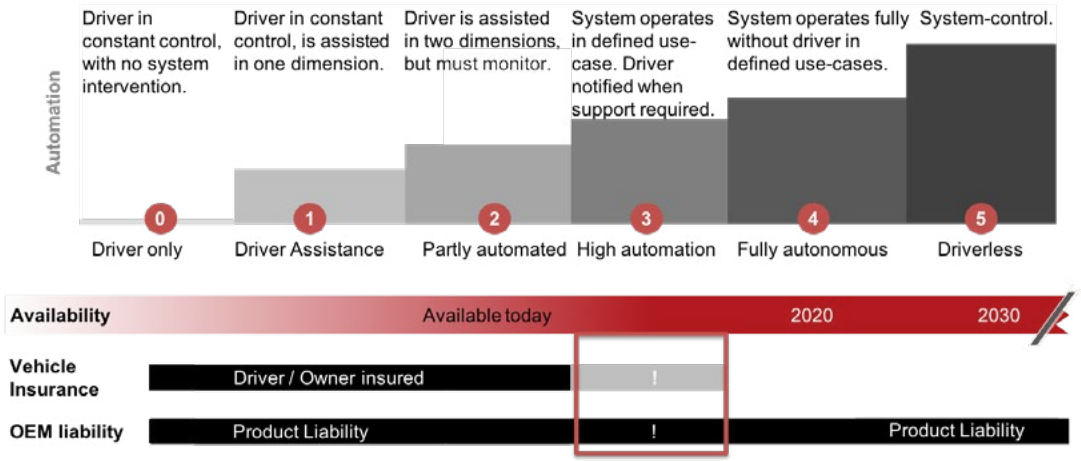
"The connected car brings huge opportunities to the dealership network to look sharp, tech-savvy, and customer-focused. We built a dealership lot and loaner-management tool whereby each loaner vehicle is connected via a telematics application. When a customer is on his way back to the shop with a loaner vehicle, 20 minutes before they arrive the service group gets an alert. They are then able to proactively prepare the customer's vehicle for handover."

– Tony Candeloro, Senior Vice President, Technology and Operations at Holman Strategic Ventures

Insurance in the mobility revolution

For insurance companies, the mobility revolution presents a special challenge. Just in the US, the retail auto insurance market is worth roughly $200 billion annually, with premiums calculated on the basis of **accident rates** and **vehicle usage,** and policies being linked to individuals and their cars. This model for automotive insurance is doomed in a future with next to zero accidents and a significant change in the usage model – due to shared, autonomous vehicles.

First, a move from ownership to sharing erodes the base of insurable vehicles. This also represents a fundamental shift from a business-to-consumer (B2C) to a business-to-business (B2B) model. **Second**, greater autonomous technology means lower accident rates (although not necessarily lower incident costs). What is beneficial for society and the client also means that insurance premiums will erode. **Third**, a lack of available data makes calculating premiums in the interim data difficult; vehicle identification numbers don't necessarily contain data on safety and autonomous technology features. **Fourth**, and most crucially, insurance companies are currently being asked to define liability along NHTSA's five levels of autonomy. While it's clear at levels 1 and 2 (the driver is liable), and at levels 4 and 5 (the vehicle manufacturer or fleet operator is liable), level 3 – which requires a handover between the vehicle and a driver – still is not clearly defined (see image below). At all levels, product liability remains a constant.



Lloyd's of London studied the insurance implications of an autonomous vehicle rollout in considerable detail. Already in 2014, it outlined a future where "drivers become more like systems supervisors." It speculates prospects for motor insurance where the need for motor-liability insurance will be minimized, although "some element of risk would be retained... Damage or theft can still occur when a car is parked in a driveway… It is possible that this risk could become part of household contents policy coverage." Instead of owning and insuring a car, an "umbrella" policy might just cover liability and collision insurance for your occasional use of autonomous transport.

It's too early to write the obituaries for our friends in insurance, however, as there are countless opportunities for creative providers. Many providers now offer telematics-supported, usage-based car insurance policies - a first half-step toward universally insuring a vehicle's user/operator, no longer the car itself. Other companies already focus on the lucrative opportunity that is Uber drivers, on selling supplementary insurance if you are a ZipCar user, or are beginning to provide coverage for peer-to-peer sharing models.

Most importantly for the fleet professional, is that they leverage the opportunities presented as connected vehicles and autonomous technologies drive insurers toward new product solutions.

Questions for fleet managers:

1. If greater flexibility for increasing and decreasing fleet sizes, or varying fleet vehicles is a requirement, have you considered or discussed long-term rental, or highly variable leasing options, such as subscription models?

2. Many insurance providers offer discounts for fleets with a full suite of Advanced Driver Assistance Systems (ADAS). Which discounts have you negotiated?

3. Do your fleets operate in cities that are imposing restrictions? Will your distribution model need to change?

7. The renaissance of the fleet professional

Fleets are today playing a critical role in testing, and in rolling out these new technologies. We believe fleet managers have a key role to play in the vision that mayors and city planners are painting to reduce the congestion, pollution, and traffic fatalities coming from vehicles jammed into city streets – and with it, the rollout and implementation of connected, autonomous, shared and electric vehicles.

To do so, however, some business practices will need to evolve as fleets adopt new ideas and practices. Fleets will – over time – transition from owned and operated in-house vehicles, to shared, automated cars, vans, delivery trucks, and cargo-hauling heavy-duty vehicles. This transition will happen at various speeds – depending on the makeup of the fleet, the environment (and countries) in which the companies operate, and the demands placed on the fleet by management. In some cases, the fleet manager's tasks will grow together with those of the travel manager and align with facilities management.

In the next decade, there will surely be a divergence of fleet management responsibilities. For cars, there will still be the classic role of vehicle procurement and distribution. The fleet manager for the autonomous trucks of tomorrow, however, "will need to understand trucks, but will also need to be a logistics expert," said Uber's Choi. "They will monitor for delays as well as the health of the vehicle online" as each vehicle is connected and transferring data. "And they will need to be able to match vehicles and humans at the distribution centers."

Bestmile's Melano suggests that, "fleet managers will be providing a distinct and needed function in the mobility network — being managers of control centers." Similarly, Choi imagines fleet managers operating in an environment much as an AT&T or airline control center – with screens everywhere, and the task of matching people and goods to vehicles.

Most people who are doing [shared mobility] aren't going to be able to afford the $200,000 vehicles; that's something that's going to be purchased and maintained and owned by the fleet manager. So, getting into this whole car sharing business like we have today will require somebody to keep the vehicles maintained, keep them clean, keep them towed if anything happens, keep them charged.

"And I say charged because in the future these aren't going to be internal combustion engines, but they'll absolutely need to be electric to get the economies of scale of operating these. So, the fleet manager essentially is the coordinator that keeps this entire business operating smoothly."

– Mark Thomas, VP Marketing & Strategic Alliances, Ridecell

"So, the fleet manager's roles will change from being in today's world, [asking] "are the right cars being allocated to the right person? Can the cars that have been allocated fit someone?'… to some sort of efficiency-management. The mobility manager will coordinate taxi-bots, autonomous vehicles, autonomous trucks, and manage if the vehicle is available at the right time, at the right place for the people who need to be in there.

"Similarly, on the other side, are trucks. Transport managers want freight that needs to be delivered to match the trucks that need to pick it up. If the truck is too big then it's inefficient, if it's too small then that load is going nowhere. So, the important part is how does all this get optimized?

"For both of these, I can see a real future in things like deep learning, machine-learning, detailed algorithms to make sure that this really gets optimized. And I think what you'll see is that this will be moving from someone that's handling this as a job, to really a completely automated system where the automation actually allows each individual vehicle to be in that right place at the right time."

- James Carter, Principal Consultant at Vision Mobility

Over the next few years, as new options become available, fleet managers will have gone through one entire cycle of consulting their users on new mobility. They themselves will have gone on a journey from initially managing grey fleets, perk cars and commercial vehicles, to outsourcing and leasing, ending with carsharing, mixed mode mobility and even overseeing shared autonomous fleets. Almost cliché, the fleet manager will become a mobility manager.

So, what should the fleet manager be doing today?

A. Get to know your needs:

As the four major CASE trends become reality in the near future, fleets will play a role in deploying the new technology based on their real-world scenarios. Autonomous shuttle buses may make sense on corporate and university campuses, while utility and delivery fleets will be exploring electrified, automated work trucks and cargo vans appropriate to their urban environments. In most any fleet, there is potential to electrify a certain population of vehicles today - but it requires good knowledge of their usage profiles. Not all vehicles have the same range requirements and are well suited to electrification, while others might not have the charging opportunities. Again other vehicles are needed on short-notice, such as some emergency vehicles.

B. Manage fleets, or manage mobility?

Fleet managers today have more mobility options that can be offered to their users. That can include managing grey fleets, with the use of corporate carsharing, outsourcing and leasing, and tapping into mixed-mode mobility. Some are preparing to oversee shared autonomous fleets and others have added responsibility for ground-transport on employee travel. All of these fleet managers are on the path to becoming mobility managers. No matter how the fleet professional's title and duties may change, that role will become increasingly vital as mobility functions become widely adopted in the near future. The services and expertise provided by fleet professionals are needed to carry it all out.

C. Sharing is caring:

In some countries, as in some U.S. cities, the attractiveness of perk cars is yielding to the opportunities presented by a growth in "car clubs," or carsharing organizations. The market has seen growth in the business-to-business market, driven by demand and benefits such as employees becoming less reliant on personal vehicles to commute to work. The sharing model will make sense to some drivers but not all. Sales and service managers will have different uses for their fleet vehicles than urban commuters and employees taking trips to events.

D. Exploration and piloting:

Progressive fleet professionals are already testing and sharing their experiences with pilot projects - including autonomous shuttles, electric vehicles and chargers, urban delivery vans, backup energy storage, and downsizing their fleet for shared mobility. With miles driven, driver input, vehicle maintenance and repair, and integration of the new technology, their collected data and perspectives are invaluable.

E. Infrastructure:

Fleet managers are always looking for ways to increase fleet utilization, but there are other assets available for utilization ggains. Fleet managers should consider parking as a revenue stream, or a cost-saving opportunity, especially in congested urban markets. Employers are also making gains with workplace charging.

F. Stay informed on insurance and liability issues:

The level of needed insurance coverage for mobility is still in its early phase. Zipcar has been providing third-party coverage to members as either personal injury protection (PIP) or no-fault coverage, depending on the local authority requirements. Uber and Lyft drivers have been required to pay for commercial driver insurance coverage in some areas, while personal car insurance is sufficient in other areas. Concerns have been raised over how safety regulators will ultimately rule on self-driving car technologies being blamed for fatalities, which both Tesla and Uber face. Insurance companies and government regulators are still working out the liability issues, which does raise questions over how the vehicle's onboard computer was programmed, how the vehicle was instructed to operate, and the current level of automation that is considered safe and when fully autonomous vehicles will be coming to roads.

G. Build the business case for a wider impact of mobility on overall company performance:

Fleet managers had very familiar objectives in recent years — managing the total cost of ownership, prioritizing safety and maintaining vehicles for reliable performance. As fleet managers evolve into mobility managers with responsibility that encompasses a broader scope of activities, they are looking to see how elements can be integrated into their everyday lives. These new, advanced technologies and systems offer a way to integrate these four CASE targets into a wider set of corporate goals that might include sustainability targets, decreased infrastructure requirements, and employee satisfaction. A University of California, Santa Barbara study found companies installing charging stations even increased their hiring and retention rates. One study respondent found charging stations to provide, "a nice visible statement to visitors and to candidates we are trying to hire to show off another benefit to working at (our company)." In summary, the fleet manager's footprint on overall company performance can get much wider by pioneering the mobility revolution within the company.

Mini case study: DHL Deutsche Post

DHL Deutsche Post in Germany has bought StreetScooter – an electric delivery-vehicle producer – and now manufactures its own vehicles for urban fleets. This year, DHL opened a second manufacturing facility to produce up to 20,000 electric vehicles per year through its StreetScooter GmbH subsidiary, and is making these vehicles available to fleet buyers from third parties.

Image: DHL Deutsche Post StreetScooter vans at a package-depot.

Mini case study: Amazon

Amazon is competing with UPS and FedEx as a giant in warehouse storage and delivery. The United States Patent and Trademark Office has granted the company patent rights for fulfillment center towers, as well as airships that will replace the traditional warehouse model – these will be suited for Amazon's electric delivery drones to pickup and drop off Amazon packages on the "last-mile." Under the new patent, the company has the potential to turn these into airborne fulfillment centers that can remain at a high altitude — up to 45,000 feet — where drones can make the pickups and take off for deliveries.

Mini case study: First-Responder and Public Safety Vehicles

First responder fleets — fire, police, and emergency medical responders (EMR) — have been a platform for testing connected, automated systems including fleet vehicle tracking earlier than other fleet segments. In recent years, that's played out in emergency services delivered after hurricanes Katrina, Sandy, and Mathew devastated local communities through flooding, highway and bridge destruction, collapsed buildings, and disrupted utility services including power transmission.

- Energy storage in electric vehicle battery packs can be used during power outages. Several utility fleets are prepared to deliver emergency services such as repair of water and power lines. For example, emergency response teams were able to provide heat, light, and food to local residents following Hurricane Sandy. Mobility services and systems will add to that capacity.
- Autonomous utility vehicles can be ideal for fleet managers to utilize for emergency response services, taking the human factor out and minimizing risk. Autonomous robots are in some cases implemented in rescue environments with low visibility or that are highly complex or dangerous: forest, mountains, burning buildings. Because robots can be deployed in great numbers without fatigue, there is great promise in such applications.
- The Technical University of Delft in The Netherlands illustrated the potential of mounting an emergency defibrillator to a drone. It is able to reach a patient much more quickly than an ambulance can, and any user can be directed by smartphone or attached screen as to its use.
- In the U.K., the National Health Services are adding electric vehicles to their fleet in recognition of their role as health leaders, and mindful of the actual, limited mile range required by some cars.
- The New York Police Department's Deputy Commissioner Bob Martinez operates perhaps the largest green fleet of police vehicles in the world, with over 1,800 hybrid vehicles. He says, "It's time that every government fleet consider getting on board." With the launch of the Chevrolet Bolt with a range of over 230 miles, "these new electric vehicles can be used for non-patrol functions, traffic control, school safety, and administrative assignments." Cities across the U.S., including New York, Chicago, Houston, Boston, Denver and Kansas City, have joined an electric vehicle buying consortium representing over 100,000 vehicles.

Mini case study: UPS

The delivery company is famous for optimizing driver behavior (such as being not allowed to turn left at intersections) and for testing and deploying the latest in alternative fuels and vehicle technologies.

- Electrification: The company's fleet of 170 trucks operating in London will switch over to electric, more than doubling the current 65 EVs that UPS currently operates in the city. The company is working with U.K. Power Networks and Cross River Partnership to use on-site batteries to store energy for charging and to reduce demand from the power grid. Besides electrifying its classic-design vehicles, UPS is also collaborating with vehicle manufacturer Arrival on a pilot fleet of 35 newly designed electric vans (image). The zero emission vehicles should satisfy city officials in London and Paris, where the test projects will be able to travel 150 miles on a single charge. They'll also feature Advanced Driver Assistance Systems to reduce driver fatigue and increase safety. One of them will be what it calls a "highly advanced vehicle display," and a wraparound windshield designed to give the driver a wider and safer view.
- Delivery drones: UPS last year successfully tested a drone that launched from the top of a UPS package car, autonomously delivered a package to a home, and then returned to the vehicle while the delivery driver continued along the route to make a separate delivery. Workhorse Group built and provided the drone and electric UPS package car. This year, UPS placed an order for 50 all-electric delivery trucks from Workhorse, bringing the total up to 1,000 electric delivery trucks from the company.

Neckermann
Strategic Advisors

Lukas Neckermann is Managing Director at Neckermann Strategic Advisors, a consultancy based in London and New York with a focus on emerging new mobility trends and their strategic impact. He has 20 years of leadership experience in automotive, media, and financial services.

He began his automotive career in BMW's Central Marketing department in Munich, where he co-developed the first BMW.com website, helped launch the innovative Z8 sports car, and – as an internal consultant – recommended pricing, marketing communication, and positioning strategies for BMW's brands (BMW, MINI, Rover, Land Rover, and MG).

Lukas joined Allianz in 2002, reporting to the Group's CEO, Michael Diekmann. He rose through various strategic and line leadership functions at Allianz, including Head of Business Development for Allianz Automotive and Commercial Director and member of the Executive Board at Euler Hermes UK plc, an Allianz subsidiary and the UK and Ireland's leading credit-insurance company. While at Euler Hermes, Lukas led the most significant innovation and strategic change program in 20 years of the company's history.

Lukas is the author of three books, **The Mobility Revolution** (Matador Business Press 2015), **Corporate Mobility Breakthrough 2020** (Corporate Vehicle Observatory 2016), and **Smart Cities, Smart Mobility** (Matador Business Press 2017), which are available in four languages. He is an advisor to four start-up companies in the field of Smart Mobility: NEXT Future Transportation Inc. based in Silicon Valley, as well as Splyt, Flock, and Eliport, each based in Europe. He has co-founded Monoventure srl, MN Innovative Communication Inc. in New York, and Neckermann Ltd in London. Lukas is an Adjunct Instructor at New York University, and has lectured and taught courses to executives from over 40 countries; he is frequently called upon as a keynote speaker on "The Mobility Revolution", as well as on marketing, business development, communication, leadership, and innovation.

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