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Strategic Advisors

DHL

# The New Value Chain In **Auto-Mobility**

Exploring and Understanding Stakeholders in The Mobility Revolution

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# TABLE OF CONTENTS

Introduction 3

The Mobility Revolution: Status Quo 6

- Connecting the Wheels 8
- Electrifying the Mobility Revolution 9
- Transforming the Industry, Autonomously 10
- Transforming Industry with Shared Modes 14
- Transforming the Industry with Ever-More Modes 16
- The Rise of Mobility-as-a-Service (MaaS) 19
- Logistics-as-a-Service (LaaS) 20
- Hurdles and Opportunities 22

A New Value Chain for (Auto)Mobility 23

- Deep Dive: Technology and Autonomous Systems 24
- Deep Dive: Vehicle Manufacturers and Integrators 27
- Deep Dive: Systems & Data 31
- Deep Dive: Fleet Management 36
- Deep Dive: Mobility Operators 42
- Deep Dive: Mobility Aggregators 46

Quo Vadis, OEMs? 48

- The Car Manufacturer's DNA is B2B not B2C 48
- Not the Biggest Players Anymore 49

Conclusion: What it Means to Logistics 52

Acknowledgements 53

Authors 54

References 55


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# 1. Introduction

Like the proverbial snowball rolling down a hill, the Mobility Revolution continues to gain speed and grow, absorbing more and more industries and leaving trampled ground in its wake. This disruption in transportation, which started with a few instances of carsharing, a decades-old dream of self-driving vehicles, and the increasingly successful electrification of cars, now has incorporated additional industries - from energy and tech to telecommunications changing urban design and infrastructure with it. Within the next five years, the economic impact of the Mobility Revolution will be measured in the hundreds of billions of Dollars, perhaps even trillions. Of course, this transformation will engulf logistics as well, with significant potential to be leveraged.

The automotive industry has a long history, with vehicles available commercially for over a century. Its structure, its key actors, and its significant elements are familiar and deeply ingrained in both the economic and social fabric of our world. Car manufacturers have risen to be leading employers from Detroit to Shanghai, from Johannesburg to Stuttgart.

Dealerships have become integral parts of their communities, and fleet management companies are essential service providers to companies and their vehicles. And between each segment of the traditional automotive value chain sits logistics.

### The automotive value chain

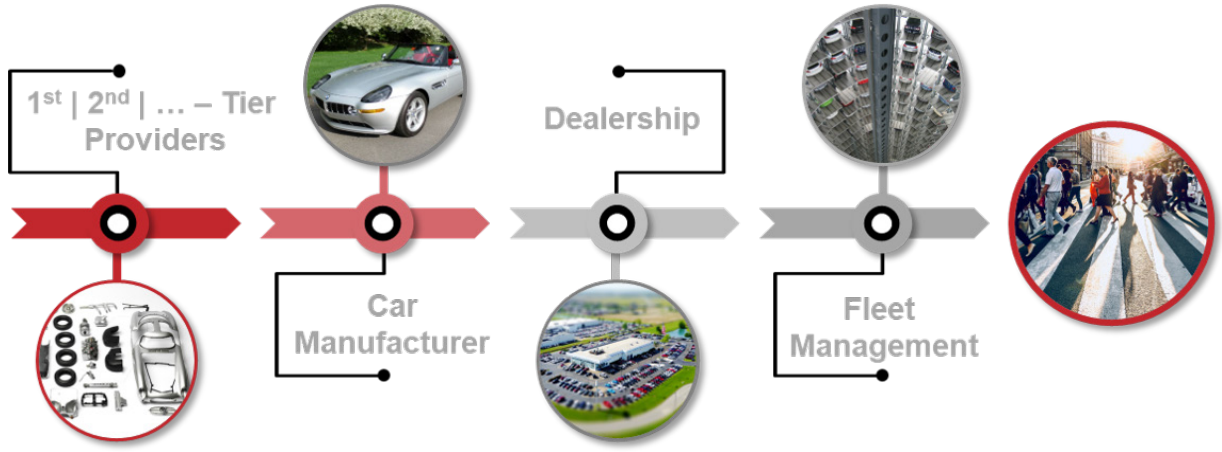



*Figure 1: Neckermann Strategic Advisors, 2020*

A core assumption in this long-standing model is the behavior of the end user – those individuals at the very end of the value chain who, quite naturally, rely on an automobile for their transport needs. From shopping to school, from work to working out, the private car has gotten us from A to B. However a slate of megatrends-urbanization, the sharing economy, and app-based lifestyles - along with external shocks such as the coronavirus have upended traditional models. In cities, grocery-delivery services are commonplace, restaurant food is being delivered, and work-outs are happening via Zoom in the living room - with uptake accelerated by the 2020 pandemic. Even while rural areas depend on cars as much as ever, in high-density urban areas the need to own a private car continues to decrease. Indeed, across the world, car usership (seen here by way of transport energy-usage per capita) decreases with increasing urban densities. The tighter-knit the city, the fewer kilometers are driven.

## Individual private transport energy use and urban density

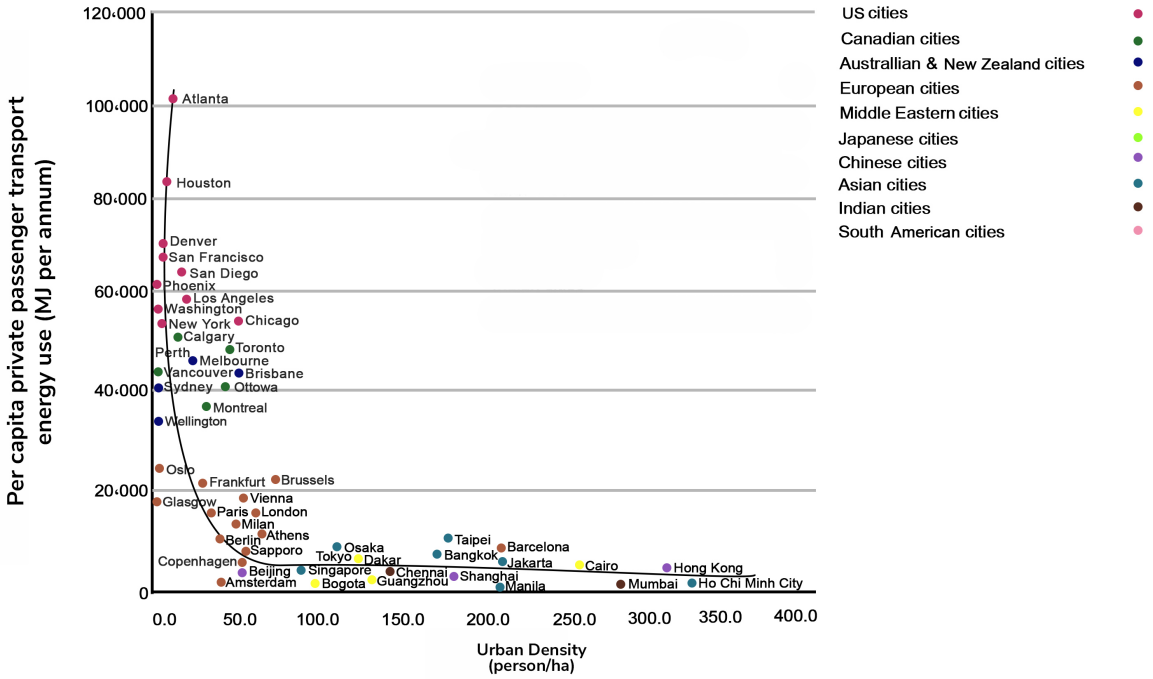



*Figure 2: Newman, 2014*

As more people shop online, eat at home, and use shared modes of transport, the role of logistics - in the wider sense of the word - changes as well. The last mile is no longer about just packages and letters, it is about safety and security, especially in an age of coronavirus. Cyclists and moped riders from Deliveroo and Uber Eats dominate evening traffic across London and Paris, Amazon packages are delivered multiple times a day to homes and businesses, and groceries are delivered from companies like Ocado that do not even have storefronts.

The desire for convenience is driving innovation. “The expectation among private customers is now ‘I can get anything delivered at any time’,” notes Senior Director of European Fleet Management at DHL Express, Thore Meurer. “22:00 at night? We will have to take care of that, but also short-range, short-notice changes in delivery schedules. When the customer asks, 15 minutes before delivery, to have a package delivered to the neighbor’s house, we need to manage that.”

As this desire for instant gratification, as well as the role and ownership of cars changes in the coming years, so too will the definition of automotive logistics. Key to this change is the transformation of the value chain - it is changing from automotive to (autonomous) mobility. According to Meurer, “The same, higher individualization of the delivery chain for private customers also holds true for some of our B2B customers.”




*Figure 3: Images from Mikael Buck / Deliveroo, Ocado*

# 2. The Mobility Revolution: Status Quo

Every American on the road loses an average of 99 hours per year due to traffic congestion, according to traffic-management company INRIX.[1] In the US, the haulage industry is said to lose USD $27 billion per year in fuel costs and lost time.[2] A similar picture emerges for the 45% of goods transported by road in Europe - congestion disrupts supply chains and generates increased costs.[3]

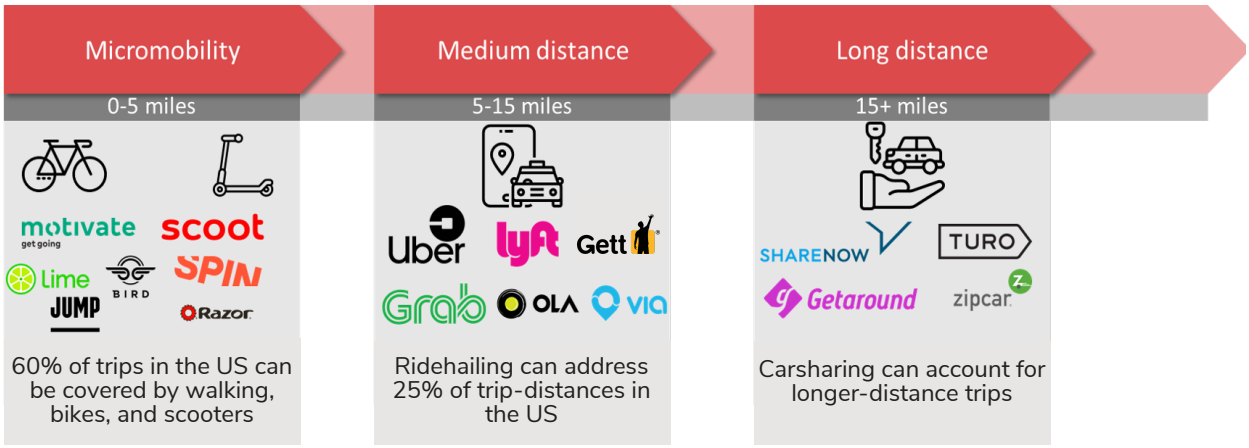
The challenges extend beyond economic efficiency, however. Urban mobility represents some 10% of greenhouse gas emissions, and the European Environment Agency estimates over 400,000 people die prematurely due to particulate matter ($PM_{2.5}$) and other emissions, at a systemic cost of over €500 billion per year.[4] Conversely, an OECD study suggests that a 10% reduction in $PM_{2.5}$ would "increase European GDP by €100-200 billion".[5]

Although Covid-19 lockdowns improved air quality, reaching emission reductions in a sustainable way will not require the economy to similarly come to a halt - it will simply require re-evaluation. Mark Thomas, VP of Alliances at shared mobility tech company Ridecell notes, "Covid-19 is firming up new habits, with more people trialling shared mobility and especially e-bicycles. Furthermore, shared mobility is inversely related to the economic situation. As the economy declines, there is potential for increases in carsharing, rather than car ownership."



Whether driven by trends or by moral and economic convictions, investments into alternatives to the automobile have flooded onto the market. McKinsey estimates over $220 billion has been invested into over 1,100 companies developing new mobility solutions since 2010.[6]

The result is a virtuous cycle between these investments and changes in user behavior. Launches of carsharing, ridehailing, bike sharing, and e-scooter sharing offerings have given consumers additional choice, depending on the distance to be travelled or perhaps on cost, comfort, and speed.



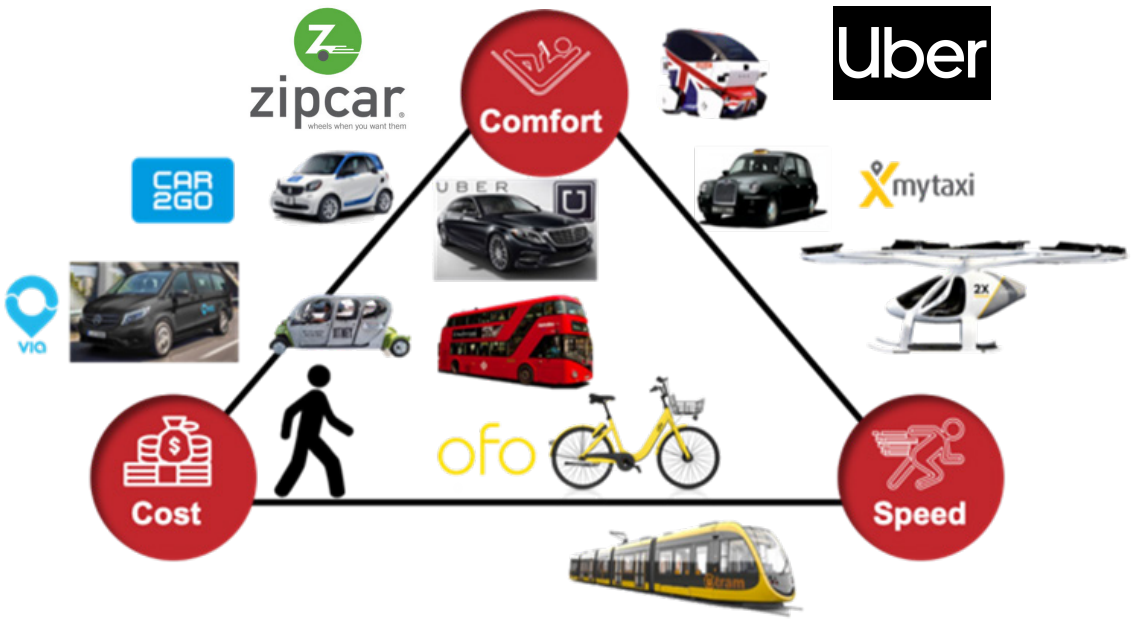




*Figure 4: CB Insights, Neckermann Strategic Advisors*

Among the largest investments, and greatest disruptors, is Uber. With a valuation comfortably (and consistently) higher than all but the biggest Original Equipment Manufacturers, or OEMs, it aims to fully supplant private ownership of the automobile - and more. Fred Jones, Head of New Mobility at Uber said, "Over time, it's our goal to help people replace their car with their phone by offering a range of mobility options - whether cars, bikes, or public transport - all in the Uber app."[7] Similarly the company has committed over $200 million to expand its Uber Freight division - connecting packages and goods with unaffiliated truck drivers.[8]

Of the so-called "CASE" trends impacting automotive (Connectivity, Automation, Sharing, Electrification), connectivity and electrification are the most pervasive. Moving to connected and electrified vehicles will impact every part of the existing value chain, while automation and sharing will disrupt the value chain itself.

## Connecting the Wheels

To a certain extent, connectivity is a given.  By most projections, all new vehicles will be "connected" vehicles by 2025.

In Europe, regulations enforcing connected features for new vehicles started as early as 2015 with the eCall function as a native requirement for new cars by 2018.[9]  In March 2019, another important move by the European Commission confirmed the obligations for OEMs by 2022 to natively include 30 advanced safety systems, most of them requiring connectivity. The Commission said the purpose is to "pave the way for connected and automated mobility of the future".[10]

Connectivity also brings the promise of greater safety and efficiency.  Impending vehicle-to-vehicle communications (V2V) mean that vehicles will "talk" to each other about upcoming road hazards or perhaps about current load levels and how many spare parts of a certain type are onboard. This could enable service fleets to downsize, as each vehicle would no longer have to carry all parts. Vehicle-to-grid (V2G) is most significant in the context of electrification; this enables bidirectional charging allowing electric vehicle batteries to support - rather than just draw energy from - the grid in times of peak demand. Overall, with connectivity, vehicles can be made much more productive, even generating new revenue streams for fleet owners.

## Electrifying the Mobility Revolution

Like connectivity, it is clear that more and more vehicles will be electrified (initially) and fully electric in due time. Daimler has confirmed its willingness to fully electrify its fleet by 2039, Volkswagen has announced it will launch over 70 new electric models by 2028, and announced in 2018 that the next vehicle generation will be the last with petrol.

The electrification of mobility is not only impacting passenger cars but also commercial vehicles. Although trucks represent only 9% of the global vehicle fleet, due to the long distances they travel, they are responsible for 39% of total transport $CO_2$ emissions. This, in turn, is the equivalent to 5% of the global $CO_2$ emissions across industries around the world.[11] Therefore, there is a need to develop sustainable commercial transportation modes through electric vehicles. Manufacturers have understood this opportunity and are actively working on developing entire ranges of light to heavy trucks. While much of this nascent portfolio is focused on short-range vehicles (less than 400 km), some longer-distance trucks are also in planning, including models using hydrogen fuel cells.[12]

### Zero-emission medium and heavy-duty trucks by technology and production status

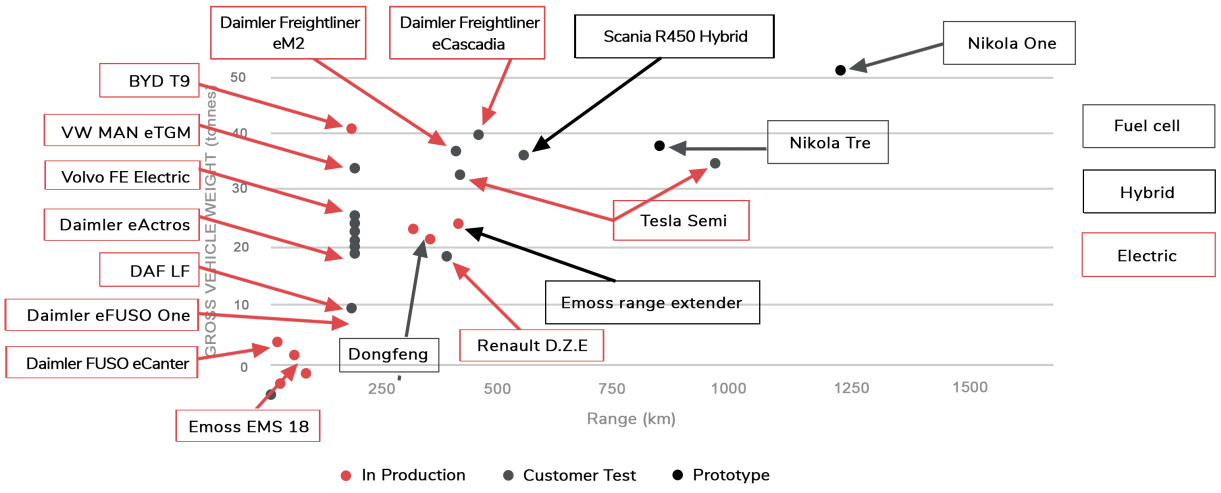



*Figure 5: IDTechEX Electric Trucks 2020-2030, IEA, 2020*

Major retailers and logistics companies have already made the leap to electrify their fleets at meaningful scale. And this is without considering the electrification of cargo bikes, mopeds, and other vehicles adapted for logistics.

### Excerpt of top purchasers of electric delivery vehicles

| Purchaser | Vehicle manufacturer | Number of vehicles |
|---|---|---|
| Amazon | Rivian | 100,000 |
| | Mercedes-Benz | 1,800 |
| | StreetScooter | 40 |
| DHL | StreetScooter | 10,000 |
| | Renault | 10 |
| | Workhorse | 63 |
| | Mitsubishi Fuso | 50 |
| UPS | Arrival | 10,035 |
| | Workhorse | 950 |
| | Tesla | 125 |
| Hermes | Mercedes-Benz | 1,500 |
| Ambev | VW | 1,600 |
| | Nikola | 800 |
| | Tesla | 40 |
| | BYD | 21 |
| FedEx | Chanje | 1,000 |
| | Tesla | 20 |
| | Workhorse | 1 |
| Total | | 126,355 |

*Figure 6: Interact Analysis, 2020*

On a smaller scale but with the same high levels of innovation, there are electrified cargo bikes. Both public authorities and last-mile delivery services have embraced these to change the face of delivery. A European Union report found that "25% of all goods and 50% of all light deliveries in urban settings could be serviced by cargo bikes."[13] DHL is among the pioneers of this bicycle rebirth, considering two-wheelers as one of the game-changing solutions for more sustainable urban logistics not only with its Copenhagen City Hub (where 40,000 cargo bikes are used every day across the city) but also with its involvement in the new New York City program to deploy electric-assisted cargo bikes.[14]

## Transforming the Industry, Autonomously

As regards automation, its simplest form is the advanced driver assistance systems (ADAS) that can already support drivers in maintaining speed, distance, and direction within a lane. Some of these systems are even enabled for low-speed maneuvers such as parking. Where it's possible to identify vehicles with ADAS, these systems have resulted in a reduction of accidents (and potentially, of insurance premiums). This safety benefit merits universal integration into vehicles, although it alone doesn't yet provide for business-model changes.

The significant and deciding leap, for both efficiency and business models, comes from shifting responsibility from the driver to the vehicle automation itself (i.e. from so-called Level 2 to Level 4 autonomous systems). This transformation is enabling entirely new form factors and vehicle shapes in passenger and cargo transport, many of which are being trialled around the world.

**Global AV test beds: More than 100 cities testing vehicles**

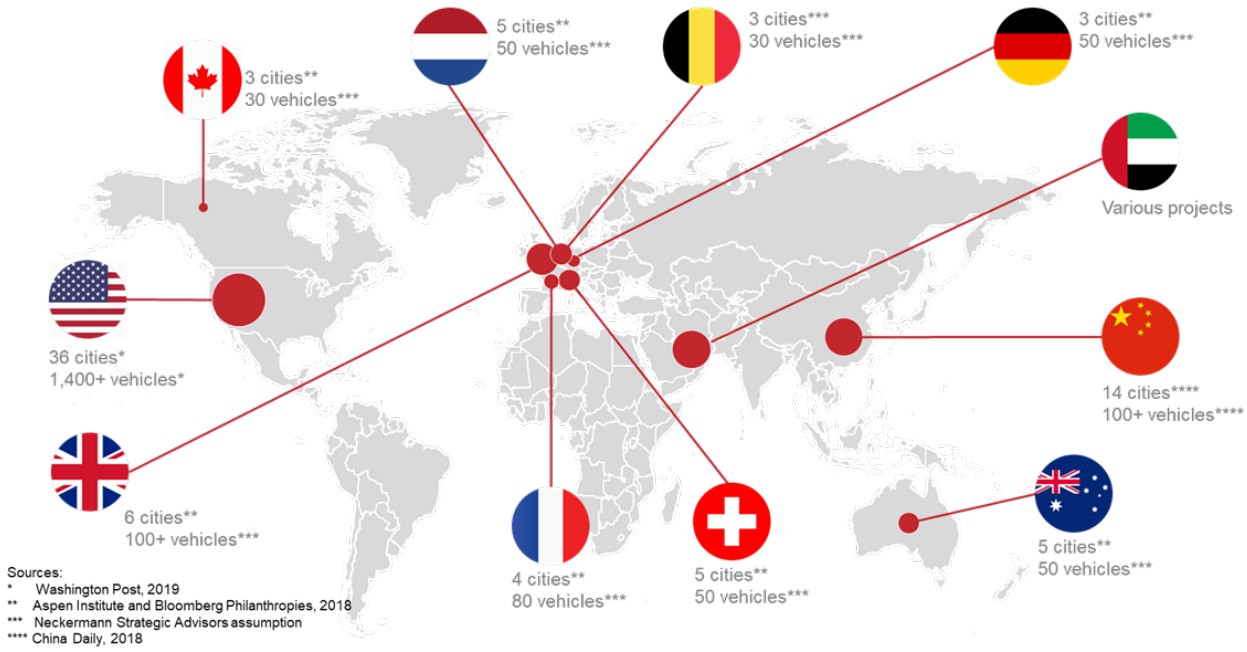



*Figure 7: Neckermann Strategic Advisors, 2020*

According to Jean-Francois Gaillet from Belgian road-safety research institute VIAS, "Our own trials on public roads in different cities in Belgium and other initiatives we are involved in show that low-speed shuttles can be a promising solution for private and public mobility services." Although, "There are still hurdles to overcome. This includes the technical robustness of those vehicles to allow operations in various weather and traffic conditions, as well as legal constraints."

For logistics, autonomous trucking could be a game changer, reducing operating costs by 45%. Data analytics and artificial intelligence supporting route optimization could also cut warehouse inventories by 75%, reducing related costs by to 30%.[15]

And these costs can be lowered even further by bringing automation inside with warehouse robots. While the short-term benefits are agility and safety (robots can carry dangerous and heavy goods), the long-term advantages include more transparency and predictive analytics.

Companies have understood potential benefits, and are now trying automation technologies on open roads. Waymo, probably better known for its robotaxi service, is among several companies trialling autonomous trucks. Waymo Via trucks are being tested in California, Arizona, Texas, and New Mexico, in anticipation of a launch of Level 4 or teleoperated services from 2023, according to IDTechEx.[16]




*Figure 8: Waymo truck*

The real promise of autonomous technology for logistics will come from fully automated, last-mile delivery vehicles such as the Nuro (Figure 9). Essentially, these vehicles will be able to deliver freight, food, and groceries to the car-less urbanite, much like a larger, on-road version of the Starship delivery robots that already deliver pizzas on college campuses across the US.[17] Founded in Estonia by the co-founders of Skype, Starship units are making home deliveries around the world with over 5,000 autonomous pods. The Covid-19 crisis may even act as an accelerator of autonomous roll-out; during the pandemic, US startup Beep engaged four autonomous (but supervised) Navya vehicles to shuttle tests and supplies across campus at Florida's Mayo Clinic.

Deutsche Post DHL is also trialling semi-autonomous technology to support its post-carriers; the PostBOT has been following humans around in the German town of Bad Hersfeld since 2017.




*Figure 9: Nuro, Starship, Deutsche Post DHL*

## Transforming Industry with Shared Modes

There is an increasingly diversified portfolio of shared mobility services available mostly to city dwellers. These include both mobility-as-a-service (MaaS) and public transport (which may represent the ultimate stage of sharing), as well as ridehailing and carsharing. We've seen not just OEMs and dealerships expand into new areas of shared and temporary mobility since the mid-2010s (at the same time, we've seen rental car companies and mobility services companies go into areas once dominated by OEMs and captive finance companies).

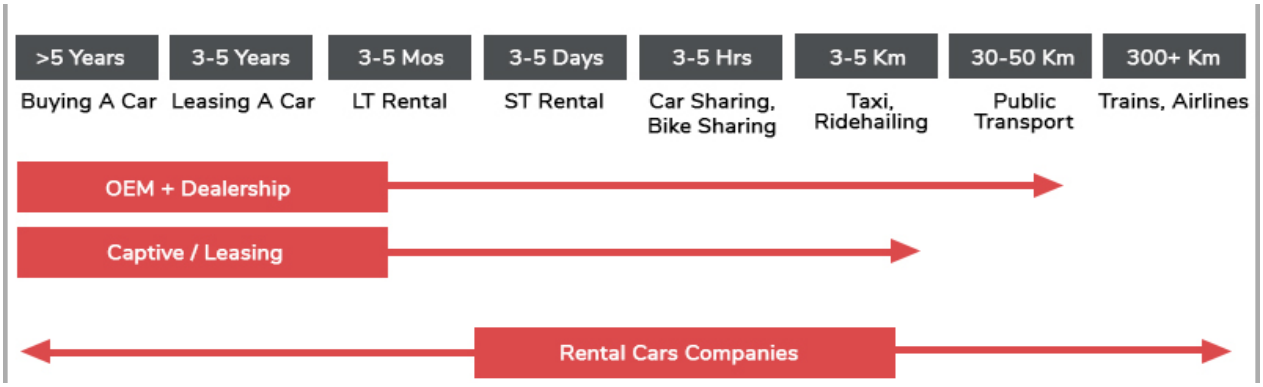



*Figure 10: Neckermann Strategic Advisors, 2020*

Developing shared modes of transport implies that people are adapting their mobility behavior to new services. There is an adoption barrier to this shift, and its intensity mostly depends on local cultural specificities. A report from Ipsos (2018) based on 106,740 respondents shows that, for example, China in particular is highly receptive to the convenience and cost of shared mobility services.

**Shared mobility will become an alternative to ownership, as it will be more convenient and cheaper (% agreeing)**

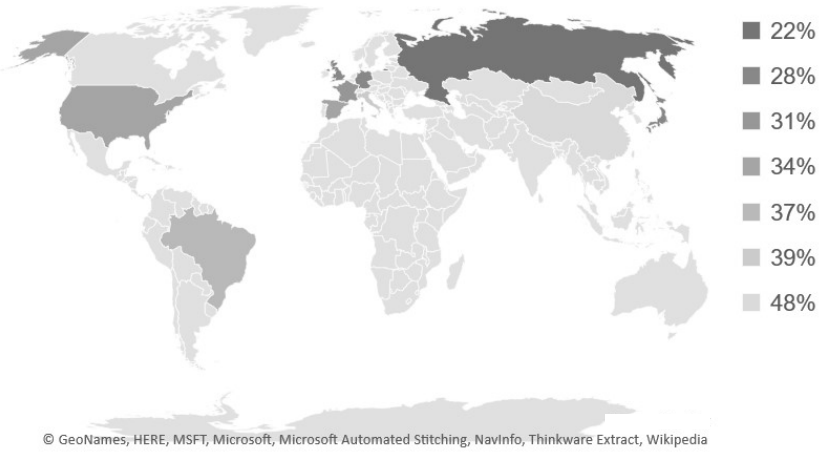



*Figure 11: Ipsos, 2018*

It is interesting to note the contrasting perceptions of automotive executives with respect to car ownership. In a 2018 KPMG Global Automotive Survey, 59% of auto executives believed that, by 2025, current car owners will still want to own a personal vehicle while only 35% of consumers feel they will.[18]

**Future of car ownership: Opinions on whether car owners will want to own their vehicle in 2025**

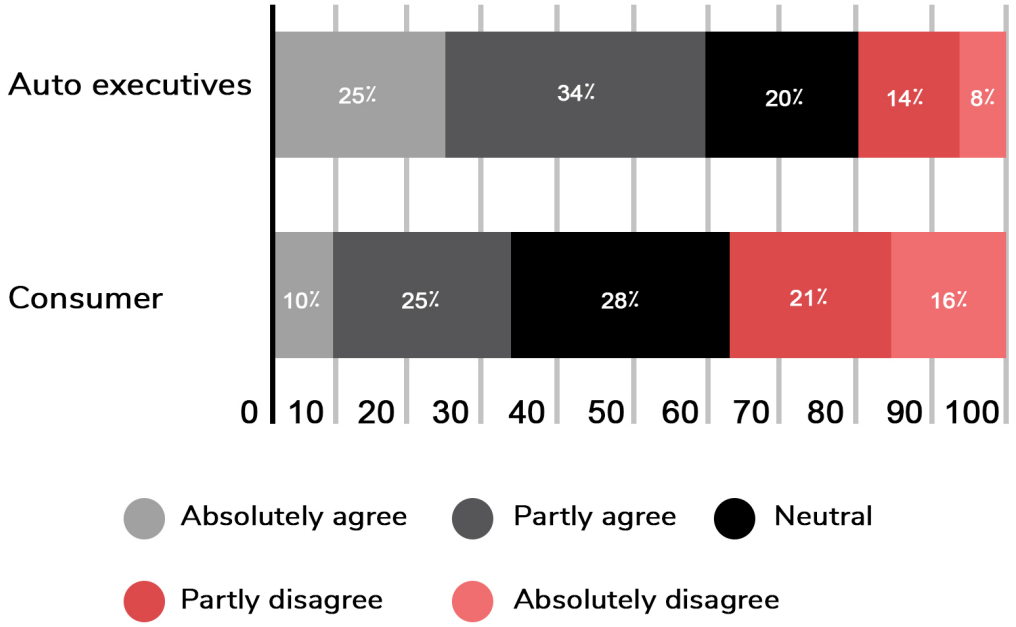



*Figure 12: KPMG, 2018*

Most experts agree that shared mobility will increase over time. This acceleration will be driven by Generations Y and Z, who appear to be more open to sharing. Indeed, in a 2019 HERE Mobility report, younger individuals are shifting away from private to shared modes of transport. This appears to be in line with studies that indicate a general decline in driver license holders among millennials.[19]




*Figure 13: HERE Mobility, 2019*

Scott Shepard, Chief Business Officer of Iomob (Internet of Mobility) stated, "As we move towards a sharing economy, the interest in owning personal automobiles amongst young professionals is diminishing. Therefore, the ability to seamlessly access multiple forms of mobility (on demand) within the urban environment will continue to boost the demand for mobility-as-a-service."[20]

## Transforming the Industry with Ever-More Modes

For the Dutch and the Danish, two-wheeled mobility is the default mode. In Denmark, 90% of the population owns a bicycle, while just 56% owns a car.[21] In Amsterdam and Copenhagen, less than a quarter of the population drives to work, while across the border in nearby (and similarly sized) Cologne, almost half of residents do.

## Modal share of cycling to work

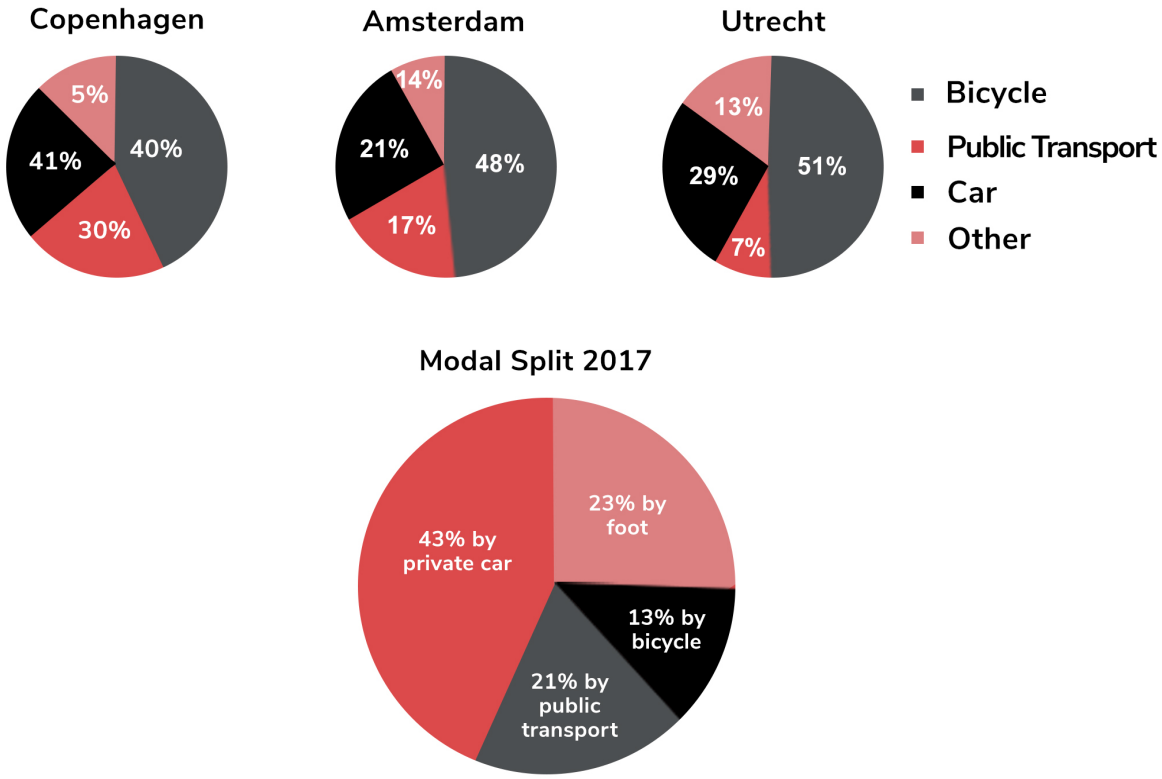



*Figure 14: Sources: See Footnote*

In the US, according to the National Association of City Transportation Officials (NACTO), communal e-bikes and e-scooters (collectively, 'shared micromobility') made 84 million trips in 2018 - an impressive doubling of trips compared with the previous year. While nascent and not yet a match for the 3.2 trillion miles that Americans travel by car, van, and SUV each year, this growth is sparking a wave of startups, with a market size estimated at $250 billion by 2030.

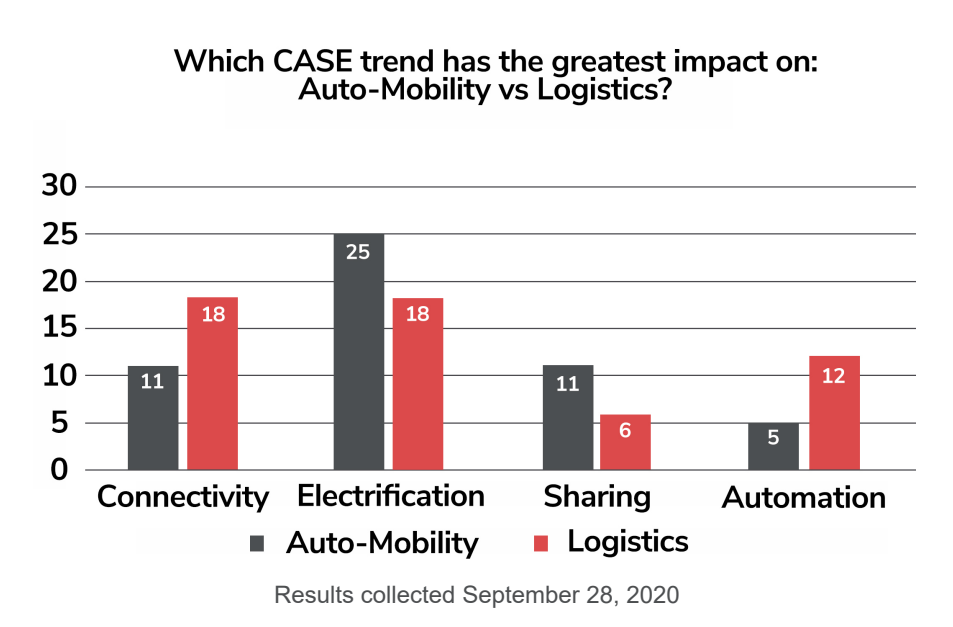
The key point here is that additional modes continue to provide new options. Ridecell's Mark Thomas summarises, "By adding modes of transport and incorporating these into an app, we gain transparency, and therefore further enable giving up the private car. It becomes second nature to just use the app."

*Copenhagen City of Cyclists, "Fact and Figures 2017"; Amsterdam & Utrecht, "Mobilitietsbeeld 2017"; KIM. Some categories combined as "Other".*

## DHL Customers' Views on: CASE

DHL customers were asked to share their opinion about the topics discussed in this report.

Respondents identified electrification as the key CASE disruptor for auto-mobility. For logistics, electrification and connectivity were equally seen as having the greatest impact. Also notable is the divergence in the perception of sharing. Respondents viewed it as important for auto-mobility, but less so for logistics.




Not all of the respondents shared the same vision. In fact, in one respondent's view, connectivity, automation and electrification could be "just 'tools' for the game-changing mindset of mobility sharing". While connectivity can be perceived as relating only to technical aspects of auto-mobility, connecting "all platforms of all participants in the logistics chain will become a huge challenge." Overall, there is common agreement that CASE trends will definitely change the face of logistics.

## The Rise of Mobility-as-a-Service (MaaS)

Just as a subscription to a software-suite on a computer is called “software-as-a-service”, using an app instead of a private vehicle is called mobility-as-a-service. There are many new apps from a range of providers, enabling both corporates and consumers greater transparency in how to move goods and themselves around. Today’s traveler might already have 20 or 30 apps from each city they visit - covering everything from carsharing to ridehailing and from bikesharing to scooter sharing.

One solution for cities is to consolidate mobility modes into a single point-of-entry for the user. Jelbi is a MaaS aggregator powered by Trafi - a company that specifically works with local authorities to help cities to launch and run their own MaaS platform. The end user is able to rent a car, take public transport, share a ride and unlock a bike from within the same smartphone app. Damian Bown, Commercial Director at Trafi described the value add of Trafi: “First, it delivers a seamless and convenient mobility experience to end users. Second, public authorities have procurement processes that are not always in line with the fast-moving mobility industry. Therefore, dealing with an experienced partner to bypass this time- and effort-consuming step is critical for public stakeholders to be equipped with an efficient tool.”

Still, most multimodal MaaS platforms such as Jelbi operate in only one city at a time. The end user who finds themselves in one city one day and another city the next still needs to navigate across multiple platforms. Philipp Mintchin, CEO of London and Singapore-based Splyt, aims to simplify even this, at least for some travelers. Splyt’s platform enables any existing consumer app to add mobility services to their offering. “What we see in Southeast Asia, is that smartphone users don’t use 30 or 40 apps but only three or four superapps. Our partners Alipay and Grab, for example, allow you to buy goods, services, or even financial-services products from within the same app. You can also book and pay for travel, hotels, and rides without ever leaving the app.” Finally, of course, there is Google – whose maps may become the one-stop shop for mobility that leads the end user to forget their own vehicle and instead navigate multiple mobility modes. Ridecell’s Mark Thomas noted, “Google has the ubiquity, and it has the scale, with billions of users already using its data platform.”

## Logistics-as-a-Service (LaaS)

The same new principles that apply to people getting from A to B also apply to goods. "What we have seen Uber do in the taxi market, we could see in other industries with other companies as well. Uber disrupted an industry that was defined by high barriers to entry, and considerable regulation," divulges DHL Express's Thore Meurer. Uber Freight's app aims to disrupt Europe's €350 billion freight-forwarding industry by matching loads with truckers and trucking companies.[22] It is already used by over 1,000 companies including the likes of AB InBev. Another example is Convoy. This alternative freight broker has raised $400 million in support of its aim to connect trucking companies and shippers in a fully automated way.[23] By the end of 2019, it reached a milestone by fully automating load pricing.[24]

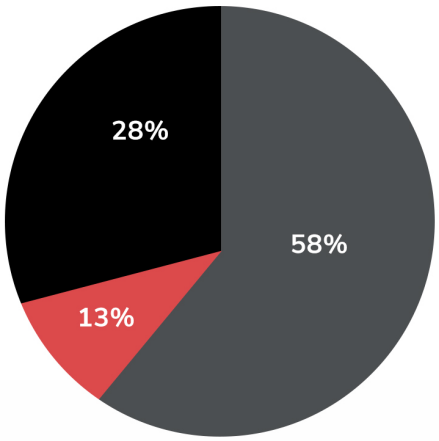
LaaS makes strong promises but certainly increases the complexity of daily operations. One of the solutions to potentially reduce this complexity is blockchain. This technology is expected to be one of the keys to unlock the full potential of LaaS. Many examples highlight the benefits of this technology for logistics, such as smart contracts (just in the US, over $140 billion is tied up every day in payment disputes),[25] customs clearance, trustworthy data flows to make informed decisions, and scalable tracking systems for short lead-time deliveries.[26] Considering that consumer loyalty positively correlates to short delivery times and that "40% of consumers use grocery delivery weekly and this number is expected to climb to 55% by 2021",[27] there are lots of opportunities for shippers and logistics providers to meet and exceed customer expectations.



## DHL Customers' Views on: LaaS

The rise of LaaS makes it more important for the logistics industry to achieve a 'glocal' (global and local) approach to future operations. One respondent noted, "While the global supply chain 'as-is' may have its issues, the trade-off between 'localization' and 'globalization' still weighs in favor of the latter." But for how long? Another interviewee commented, "More regional deliveries will become relevant in certain markets (e.g. food and beverages) as consumers got more sensitive to the local community during the coronavirus crisis." This perception seems to be shared, as the survey showed many think supply chains will have to adjust to more urban, shorter-distance deliveries.

**Do you agree a trend against global supply chains is likely, and what do you think the impact will be?**




- I somewhat agree; there will be more urban deliveries, less long-distance transport, and we need to gradually address this in our models
- I agree completely; we need to urgently pivot our models toward more local supply chains
- I don't agree; global supply chains are here to stay

Results collected September 28, 2020

## Hurdles and Opportunities

Mobility is just at the beginning of its revolution and the road is still long. Barriers and accelerators will have to be handled by smart transportation stakeholders to achieve what is and should be the core mission of the industry: improve people's lives. Since 2014, Neckermann Strategic Advisors has been advocating for a "three zeroes" framework that would each year not only save billions of euros, but also save hundreds of millions of lives globally by progressively bringing emissions, accidents, and ownership levels to their most elegant level, zero.

The Covid-19 crisis may become an accelerator for the Mobility Revolution. While in 2019, great progress and investments were made to adapt the urban landscape, enact game-changing legislative decisions, and set the prerequisites for change, it is human adoption rates that seem to be the most difficult piece of the puzzle to assemble. The pandemic may have electroshocked this side of things. With empty streets, low pollution levels and the obligation to try new transport modes due to the lockdown, end users have experienced mobility in new forms, and it is this that may lead to sustainable change.

## What About Logistics?

"Journeys in auto-mobility and in logistics have always been deeply interlinked. Companies in these industries are both product and service suppliers and, sharing customers, must evolve hand in hand," explains Fathi Tlatli, Global President of the Auto-Mobility Sector, DHL Customer Solutions & Innovation.

According to Tlatli, the recent and rapid evolution of the auto-mobility industry with new products, business models, and services is triggered by end consumers. It is transforming the way mobility products and services are manufactured, enabled, and ultimately delivered. This impacts the way DHL runs logistics operations by leveraging new cleaner, more autonomous, and potentially shared transportation assets. It also profoundly changes the way DHL supports the transformation of customer supply chains, from raw materials sourcing to the reuse and recycling of end-of-life assets.

The next section deep dives into the new mobility value chain and considers its key players. It highlights how the role of logistics must evolve to enable tomorrow's auto-mobility industry success.

# 3. A New Value Chain for (Auto)Mobility




*Figure 15: Neckermann Strategic Advisors, 2020*

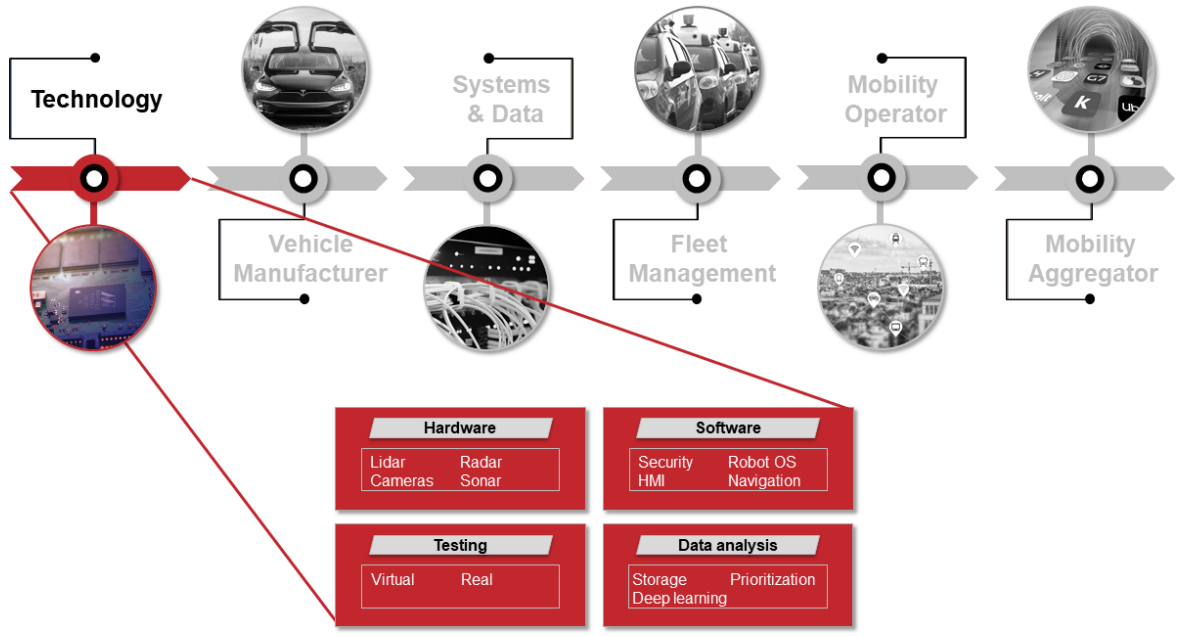
With mobility aggregators becoming the new "front-facing" end of the consumer's experience (the right-hand side of the illustration), the previously dominant role of the vehicle manufacturer is diminishing. Mobility aggregators provide end users with access to information and services provided by mobility operators; these users simply need to know availability and cost - they no longer need to know which brand to buy.

This fast-moving environment entails frequent changes and adaptations. This is exactly what traditional first-tier automotive suppliers are experiencing. The client of today might not be the same tomorrow, and suppliers have to show flexibility to work with a more diversified customer landscape. The key value-added elements of an autonomous pod are no longer the metal that shapes the vehicle, but the onboard heart and brain, powered by software and hardware.

This value chain considers a complete shift from the automotive to an (electric) autonomous mobility-as-a-service industry.  Nevertheless, even while the industry is just barely in transition to this model, its elements are already taking shape and provide learnings today.

## Deep Dive: Technology and Autonomous Systems

On the left-hand side of this new, autonomous mobility value chain, a host of new providers are emerging. This substantial element includes hardware manufacturers, such as those developing lidar and sensors, as well as software providers related to onboard security, the operating system, navigation, and interactions with people. There are two additional subsections critical to the development of AVs which focus on testing and data analysis. The former allows stakeholders to test the technology in a safe environment, and the latter takes care of the large amount of data each AV produces. Today, start-ups such as LeddarTech and Nvidia - producing sensors, cameras, hardware, and software for autonomous systems - compete with well-established players like Bosch.




In some cases, these new entrants are highly significant. Ten years ago, Nvidia was considered “merely” a supplier of graphics chips for gaming computers but has now emerged as a key supplier to the autonomous vehicle industry. Its chipsets power a significant number of current autonomous vehicles, and its market value is five times that of Daimler, and ten times that of Continental.[28] Similarly, Mobileye, bought by Intel in 2017 for €13.5 billion, has become a key supplier of autonomous systems to groups such as BMW, GM and VW. All told, the Neckermann Strategic Advisors analysis estimates this element of the autonomous mobility value chain to grow from $15 billion to $32 billion by 2025.[29]

With over 400,000 employees worldwide, more traditional first-tier suppliers such as Bosch know what is at stake, and understand that there's probably never been such an attractive opportunity to develop leading technologies for this new market.

The German firm now develops applications for both tech companies and OEMs, in order to take an active role in the Mobility Revolution. Sebastian Tietz, Director of Strategy Development at Bosch says, "The center of power is shifting from manufacturers to mobility operators." Didi, for example, is working together with first-tier suppliers and vehicle manufacturers to develop purpose-built vehicles for ridesharing and ridepooling. It is probably the first time in the history of the industry that a vehicles operator has such an influence on the design and development of the final product.

## What About Logistics?

As new connected and autonomous features become ever-more popular in vehicles, the volume of high-tech parts and components in cars continuously increases. Today it represents a large share of the value that transits the auto-mobility supply chain.

"Supply chain managers must rethink transportation modes as well as inventory strategies to efficiently integrate those high-value yet relatively lightweight parts into their flows. Going forward there is likely to be a decline in the use of ocean freight matched by additional use of rail and even air freight which will reduce "inventory on wheels" for those high-tech parts," predicts Adrien Dedieu, head of strategy and commercial development for DHL CSI Auto-Mobility Sector.

According to him, traditional automotive suppliers and integrators are investing in these new product lines, new players from the high-tech world are entering the game with strong ambitions. Their commercial and distribution habits are much different to those of the automotive industry, and heated discussions are likely around capacity allocation, delivery methods, and delay penalties.

The relatively fast obsolescence of high-tech parts such as chips may also impact the frequency of auto-mobility product launches and refreshes.

## DHL Customers' Views on: Technology Suppliers

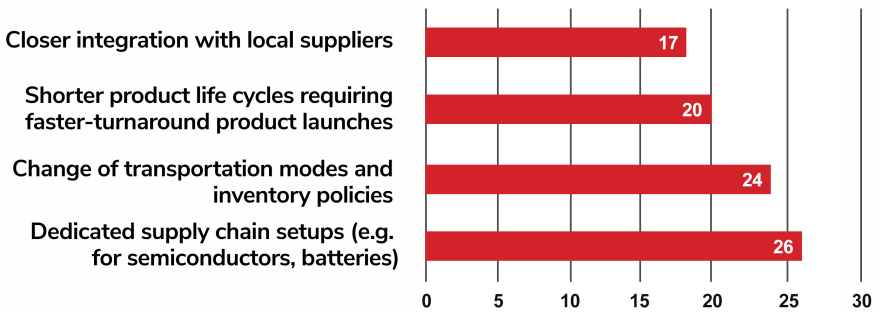
Vehicles are much closer today to a piece of technology than to an engineering masterpiece. Regardless of whether they transport goods or people, these vehicles will have to be more frequently updated and upgraded. This new trend is not dissimilar to that experience in consumer electrical goods markets such as the smartphone industry.

Along with this consumerization of mobility, the increasing integration of batteries has consequences for technology suppliers, according to survey respondents. To meet these new challenges, there will need to be changes in dedicated supply chain setups (e.g. for batteries) and changes in transportation modes and inventory policies.

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**Today's connected , electrified, and autonomous vehicles are much more technological than earlier vehicles. High-tech components will gain importance and may impact the design and management of the auto-mobility supply chain. What changes do you predict?**

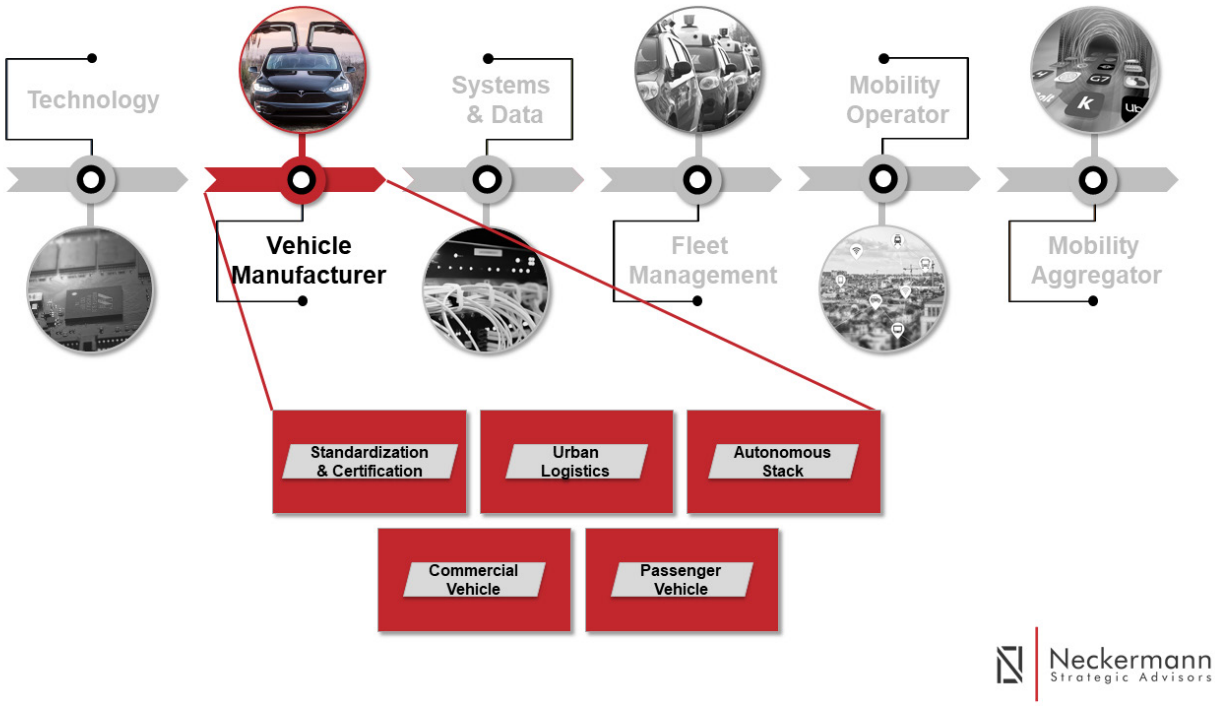



Results collected September 28, 2020

## Deep Dive: Vehicle Manufacturers and Integrators

The next element of the value chain would seem familiar to the casual observer - if we weren't in the midst of a Mobility Revolution. While the top-10 automotive OEMs dominated more than 75% of the world's automobile production in 2019, the range of tomorrow's autonomous mobility manufacturers is much broader.[30]

Neckermann Strategic Advisors has identified over 75 vehicle manufacturers specifically dedicated to building electric, automated transport vehicles and close to 90% of them are privately owned. This means that they may exist under the radar of most analysts and stakeholders.[31]




Valuated at $11 billion in 2020 and predicted to reach $37 billion within five years, this market is expected to be highly consolidated, albeit with very distinct vehicle types: for urban logistics, urban passenger transportation, commercial vehicles (extra urban), and passenger vehicles.

As the value of vehicles shifts from hardware to commoditized software and from manufacture to design, there is an opportunity for new manufacturers to build vehicles that are custom-designed for specific use cases. Original Design Manufacturers or ODMs have been commonplace across many industries, but are only just becoming more relevant in auto-mobility as well. Foxconn, Pegatron, Quanta Computer, Wistron,

Workhorse, and Lightning Systems are all Original Design Manufacturers for vehicles. Some producers may choose to only offer a stack that another provider integrates into its vehicle production process. Certification organizations watch over this to ensure production complies with defined standards.

“We are working with manufacturers to customize vehicle design for the specific use cases for which they are designed,” notes Deutsche Post DHL Vice President of eMobility Design and Development, Lars Pappe. “For example, in some countries and regions we have routes where the vehicle only travels only few kilometers per day - there is no need for a large battery capacity. We can save cost and protect the environment by utilizing vehicles that are custom designed for such use cases.”

To evaluate the capabilities of new manufacturers, DHL was among the first to order the all-electric Tesla Semi - with high expectations. President of Transportation at DHL Supply Chain, Jim Monkmeyer, suggests “We are estimating that we could have payback within a year-and-a-half based on energy usage as well as lower maintenance cost.” A large caveat for integrating new manufacturers into a logistics fleet such as DHL’s is serviceability. Monkmeyer continues, “The biggest issue is going to be how is that grid provided and how is it supported and how quickly can we get a network out there for use nationwide, throughout North America, throughout the world.”

DHL is testing custom-designed vehicles from both Workhorse and Lightning Systems. Lars Pappe expands on this: “We are deeply involved in working with manufacturing startups that make sense for our business. Key issues are the scalability and the efficiency, but also if they can establish the network of aftersales support that is necessary for the intense needs of a logistics network.”

Many of the rising stars commit to this challenge by focusing only on the new. While brands such as BMW and Daimler retain some focus on the development of petrol SUVs, other companies - especially Chinese players - seldom dilute their resources across non-sustainable initiatives but rather concentrate their effort on models that are likely to define the industry in the next decades. Tesla, SAIC, Geely, Dongfeng, and BYD focus specifically on vehicle types that will dominate the business of tomorrow. As such, they should be perceived as a serious threat to traditional OEMs.

Global first-tier suppliers extending into the manufacture of vehicles is also not unfeasible. Many have the experience, the plants, and the skillset to engineer and assemble the pieces, especially as electric vehicles are considerably simpler to manufacture than traditional vehicles. Many of the suppliers know very well what a future car should look like, as they take part in the development cycle from A to Z. Bosch has publicly stated that it has the short-term capability to produce autonomous vehicles without the support of any OEMs. While Bosch has no immediate plans to do so, it would not be a surprise if a similar supplier produces white-label vehicles for mobility operators and fleet owners.




*Figure 16: DHL Workhorse, DHL Tesla Semi*

In turn, because many traditional OEMs still lack many of the capabilities necessary for electrified and autonomous vehicles, partnerships will again play a key role in their survival. Fiat-Chrysler Automobiles (FCA) is exploring the manufacture of future electric vehicles with Foxconn (best known as a producer of iPhones). The question around this alliance might well be, however, who benefits most from this alliance? Indeed, technology ODMs hold a robust position in their industry and may be able to strengthen their position to a similar extent in the auto-mobility industry. Thinking still further ahead, 3D printing could be considered yet another potential disruptive force. Already, car dealers can print certain vehicle elements, effectively reducing the regular and challenging logistics of maintaining warehouse inventories and delivering thousands of spare parts to dealerships. The benefits to the industry are clear: immediate availability of all parts and therefore less downtime for vehicles in service. The challenge for logistics would then no longer be to provide just-in-time spare parts to dealers, but plastics and metals to 3D printing facilities.

# What About Logistics?

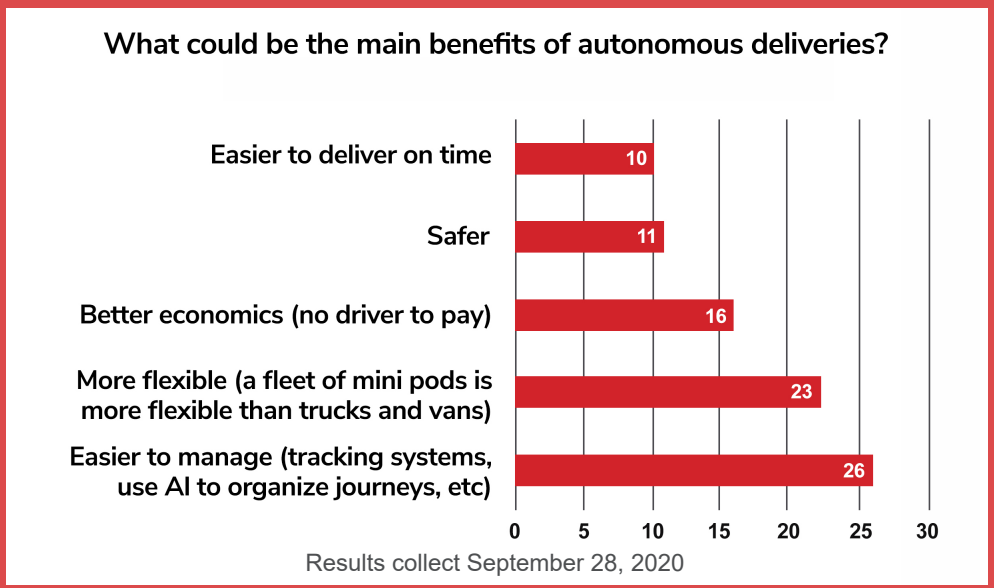
Many new vehicle manufacturers are entering the industry with little knowledge and expertise about efficient logistics and manufacturing processes. In some cases, this gap has accelerated the failure of promising new companies. In a low-margin industry (vehicle manufacturing and sales) that is expected to lose direct contact with end consumers, the mastering of logistics costs and efficiency may make or break a new player's ambitions.

"With more and more custom vehicle development and more design collaboration across the value chain, it is likely that the frequency and intensity of vehicle design and launch projects will increase dramatically. These processes are known to bring a lot of very specific logistics challenges, such as prototype parts and vehicle transport for testing and certification, promotion event management, industrialization, and much more. These challanges must be closely monitored and managed in future," states Fathi Tlatli, Auto-Mobility Sector President at DHL.

As all vehicle manufacturers are electrifying their product ranges, logistics professionals must take a fresh look at the design of their supply chains. As mentioned by DHL's Adrien Dedieu, "Electric vehicles (EVs) have 50% fewer parts (and weight) than combustion engine vehicles and they introduce a new logistics challenge: transporting and storing dangerous, heavy, and bulky lithium-ion batteries, considered as dangerous goods." The inbound-to-manufacturing supply chain and the aftermarket supply chain for electric vehicles may look completely different to the ones that are familiar today.

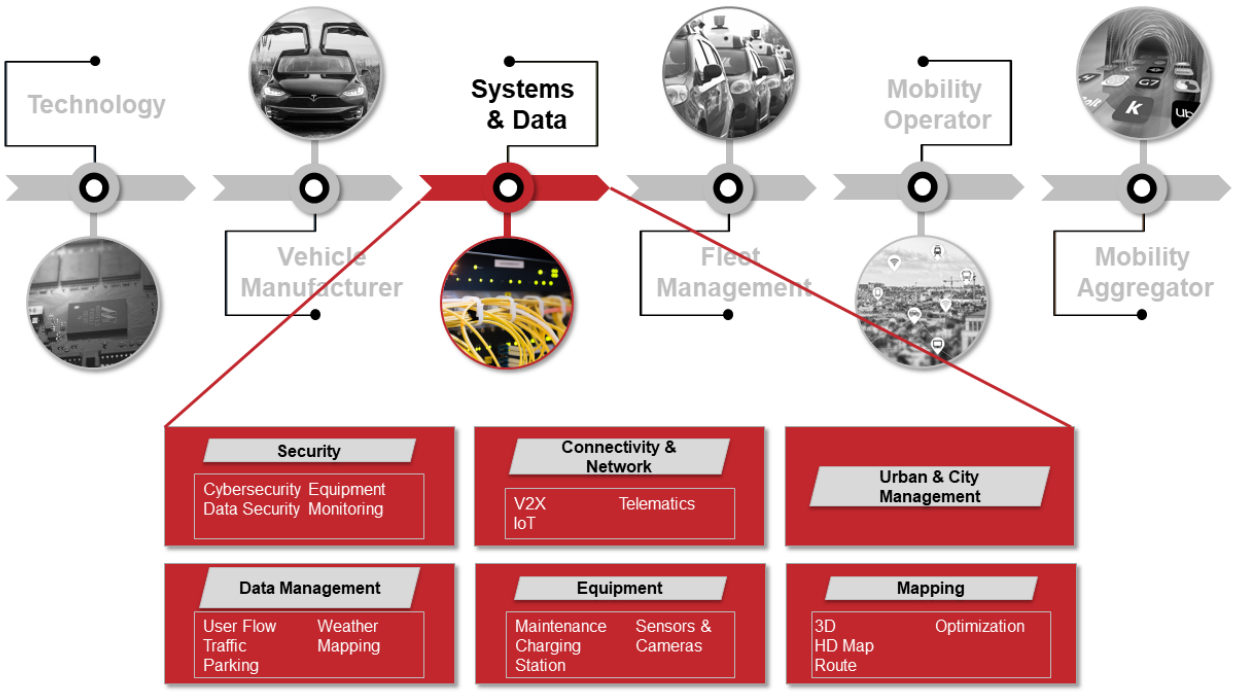
## DHL Customers' Views on: Logistics Vehicle Manufacturers

Vehicle makers will certainly have to adapt to a continuously changing mobility market because, as one respondent said, "customer demands and expectations [keep] getting higher". As part of these new demands, some of the benefits promised by autonomous deliveries will be more impactful than others. Respondents identified key advantages as easier order management (provided by features such as tracking systems) and more flexible delivery timeslots. Manufacturers should try to integrate these features into the development of their vehicles.




## Deep Dive: Systems & Data

The deployment of automated vehicles on our streets will require a new, if not adapted, infrastructure to handle the connectivity, security, and interactions between the machine and its environment. This infrastructure, focused on systems and data, will include security companies looking at cybersecurity and equipment monitoring, vehicle-to-everything (V2X) communication and telematics firms, stakeholders providing data for urban and city management, data management companies, and mapping system providers and equipment firms. Expected to increase from $13 billion to $40.5 billion between 2020 and 2025, this part of the value chain is one of the pillars supporting the autonomous architecture.[31]




Matthias Braun, Head of Digitalization and Concepts at Volkswagen Group Logistics, notes the importance of this topic, especially for existing companies in logistics, “Companies need to become excellent in data processing. Significant added value will come from this as each data point lets me ask: which further digitalization possibilities do I have?”

Connectivity, enhanced by the deployment of new technologies such as 5G, is probably the most ambiguous elements of this section - but it can be explained. Thanks to connected devices called the internet of things or IoT, connectivity, V2X communication opens up  a new world of opportunities for mobility and surrounding applications. V2X is an aggregated term for various connectivity features:

- V2P [vehicle-to-pedestrian communication]: Connected wearable devices and other smartphones will interact with vehicles to improve the mobility user experience and safety. One application would be notifying pedestrians when it is safe to cross at a traffic light.

- V2V [vehicle-to-vehicle communication]: Vehicles can communicate with each other about road hazards or the viability of overtaking a truck on a narrow road.

- V2I [vehicle-to-infrastructure communication]: Interactions between urban infrastructure and vehicles support the implementation of smart traffic lights, digital road signs, and more.

- V2N [vehicle-to-network communication]: Connected to the cloud and a cellular network, a vehicle can give the driver access to infotainment.

- V2G [vehicle-to-grid communication]: Electric vehicles could use this to send energy to the grid and recharge their batteries. This bidirectional energy flow may be the key to managing peak and low demand pressures on megacity electricity grids.

Connecting vehicles to their environment is critical to enabling V2X applications. Most of these opportunities would require the deployment of a 5G network and high data storage capacities. As of January 2020, there were 378 cities across 34 countries with commercial 5G networks. South Korea leads the way with 85 cities followed by China (57) and the US (50).[33] Faster connectivity - with higher reliability and less latency – will enable fleet managers and vehicle owners to take better advantage of V2G applications. And while 5G is just at its beginning, China is already exploring 6G, which is 100 times faster than 5G.

Along with connectivity, the deployment of the charging network is seen as a key enabler for electrification. While essential to e-vehicles, the supply of energy was not previously considered part of the automotive value chain. Oil companies arose in parallel, separate from the automotive industry. In the new value chain, supporting electrified vehicles it is important to integrate and implement charging points and critical to generate clean energy. With a growing interest in sustainability, especially from younger generations, and dramatically falling costs, it is not surprising that demand for 'green' electricity will explode in the next few years. Today, renewable energy accounts for 26% of the world's electricity but, for at least a decade, each subsequent study from the International Energy Agency (IEA) found that the roll-out of such power generation is going faster than expected. The global share of clean energy could reach 30% within the next four years.[34]

Tesla has shown that energy is not just an afterthought, but is of crucial value to stakeholders within the value chain. For example, Tesla's Supercharger network - with over 1,850 stations offering some 17,000 Superchargers around the world – is seen as essential to the success of the company; it's been speculatively valued at up to €50 billion as a standalone entity.[35] Similarly, Volkswagen has supported the roll-out of 400 stations in the US, and launched its own network across Europe.

**Open supercharger stations (not stalls)**

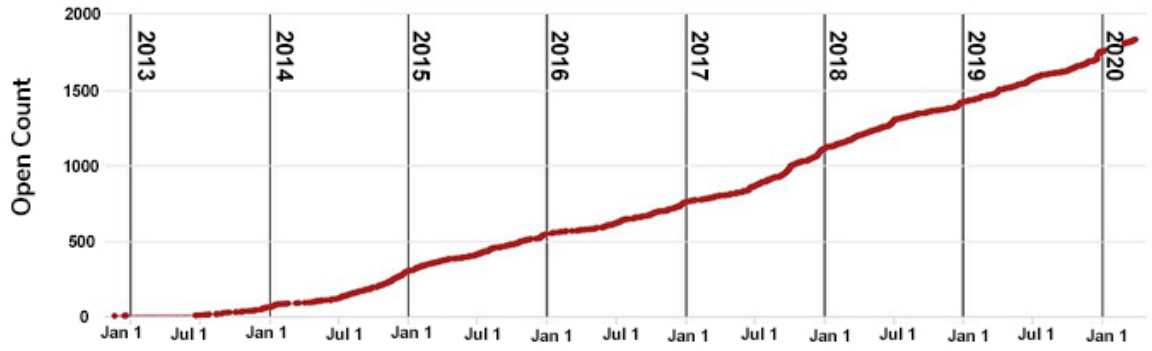



*Figure 17: Supercharge.info, March 29, 2020*

# What About Logistics?

As consumer preference increases for autonomous and electric vehicles, auto-mobility companies must engage in a far more intense dialog with the telecommunication and energy industries to formulate the right commercial model.

Connected and autonomous vehicles are already common between the four walls of a warehouse, where AGVs and robots are working alongside humans in an environment that is much easier to control and monitor than urban roads, for example. Logistics operations can usefully serve as a laboratory for connected vehicle development.

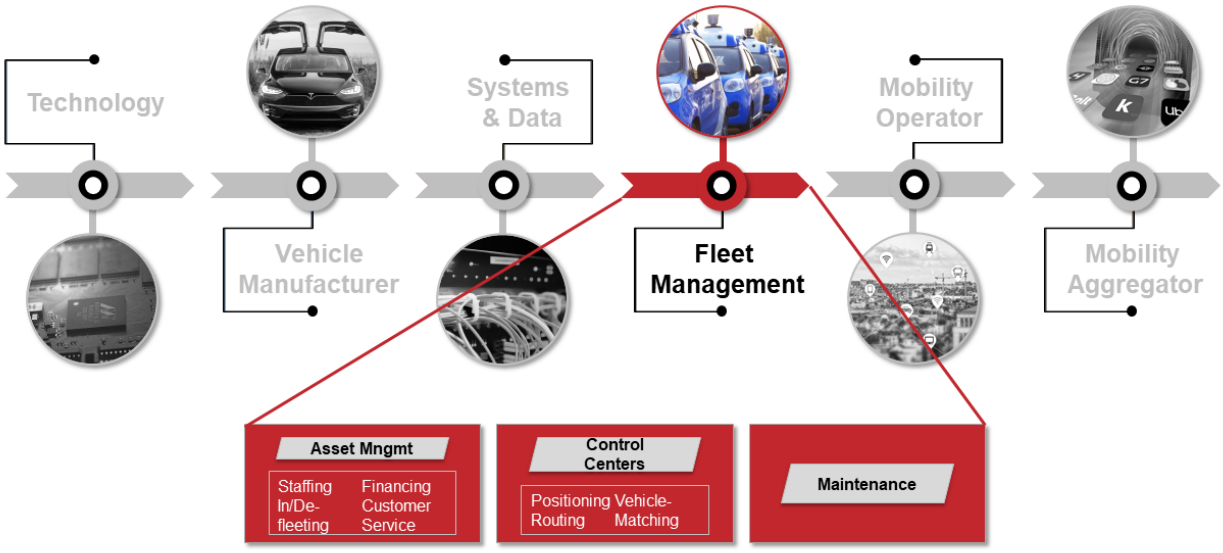
“To achieve future mobility, infrastructure must be deployed faster and maintained better than ever before. This will ensure rapid consumer adoption, and logistics will have a key role to play. For example, an EV business model can only be achieved with a sufficient and reliable charging infrastructure,” summarizes DHL’s Fathi Tlatli.

Logistics will greatly benefit from progress in vehicle connectivity. Logistics providers must be able to capture and analyze data in order to offer supply chain visibility data, journey and route optimization, and further efficiency gains in transportation. DHL is highly committed to exploiting the potential of data and vehicle connectivity. Indeed, after successfully launching DHL Resilience360, a platform providing risk management tools for supply chain professionals, the organization now also offers Greenplan, a powerful algorithm for individual route optimization. This new-generation algorithm is capable of leveraging massive amounts of data to optimize extremely complex logistics and delivery setups at urban, regional, and even national levels.

## Deep Dive: Fleet Management

The development of driverless vehicles raises the question of who will own these assets. From the traditional asset management and maintenance firms to autonomous control centers, fleet management and leasing companies have an important role to play in the future mobility landscape.






All told, Neckermann Strategic Advisors expects this element of the autonomous value chain to be valued at $61 billion by 2025, a 26% CAGR increase from 2020.[36]

Why so high? With a reduction in private ownership of vehicles, it is likely there will be a shift in value to collective fleet ownership and fleet management. Focusing on usage and enabling multi-mode transportation and logistics is all well and good, "But someone still needs to own and manage the assets. Who will take on the risk, and who has the financial strength to actually run shared fleets of cars and trucks?" asks Volkswagen's Matthias Braun. "If I don't have an asset to use and direct, there is also no chance for an asset-light model." Ridecell's Mark Thomas adds, "If we compare this to the airline industry - the most attractive, most profitable parts of the industry are not necessarily the airlines themselves. It's the leasing companies."

When considering autonomous, we also see the necessity - and opportunity - of telemonitoring or teleoperation of driverless vehicles. Just as a control center in logistics operates with countless screens, monitoring hundreds of vehicles at a time, so will



*Figure 18: Autonomous vehicle control center; Source: Designated Driver*

teleoperation centers monitor - and provide backup control for - autonomously operating delivery bots, robotaxis, and long-distance trucks.

Even Bosch is involved in this element of the new mobility value chain. The company has developed control center applications to monitor every aspect and variable such as the maintenance needs and cleanliness of autonomous transport. These autonomous teleoperation centers are little discussed but are critical to the operation of AVs. One such company, Designated Driver, is a US-based start-up that aims to capture 20% of this market by offering autonomous teleoperation center kits.

Additionally, and certainly within the context of a post-Covid-19 world, the issue of vehicle cleaning must be considered within the fleet management part of the value chain. CleanAI, a German start-up, has understood this need. The company has developed a shareware system, including cameras and sensors, working in conjunction with AI to monitor vehicle status autonomously and in real time, with a view on safety (vandalism, graffiti, and more) and cleanliness (dirt and lost property).

# What About Logistics?

In the near future most vehicles will be owned by fleets and no longer by private individuals. This change in the vehicle ownership model is critical, as serving a private vehicle owner or a fleet manager are completely different things, especially in the aftermarket arena.

Within fleets, vehicles become commercial assets for which uptime must be maximized to ensure an acceptable return on investment (ROI). This will bring a lot more attention to the effectiveness and speed of aftersales logistics, and new models are likely to be invented.

Bringing spares closer to main consumption areas and storing them in urban or local distribution centers may be the way to serve repair shops and dealerships faster. This in turn ensures fleet vehicles are back on the road faster. To enable these improvements, aftersales managers may leverage new technologies such as blockchain to secure and facilitate aftermarket flows.

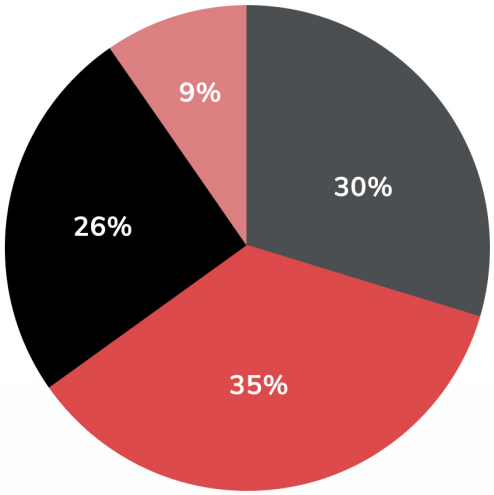
Another option that logistics providers are considering according to DHL's Adrien Dedieu is bringing the repair crew to the vehicle. "Flying mechanics and engineers" equipped to fix the most common problems may be a good way to maximize vehicle uptime as this would limit vehicle immobilization at the garage.

When using fleet vehicles (shared, corporate, or leased) consumers typically want more convenience. Usually they are not keen to deal with the obligations that comes with vehicle ownership such as maintenance, cleaning, or even refueling. Yet these things must be performed either by fleet management companies or by logistics operators. Many OEMs are currently looking at how to improve the consumer experience of vehicle delivery and handover as the rise of e-commerce spreads to auto-mobility sales (including finished vehicles).

## DHL Customers' Views on: Fleet Management

While it is most likely that current fleet firms, including smaller companies, would stay involved in the ownership of the passenger vehicles of tomorrow, survey respondents identified fleet ownership as a potential new role for OEMs. This could be a game changer for the traditional automotive industry, which is unaccustomed to managing products outside plants and dealerships. Just over a third of respondents noted that customers looking for a differentiated experience may still want to turn to specialized fleet companies.

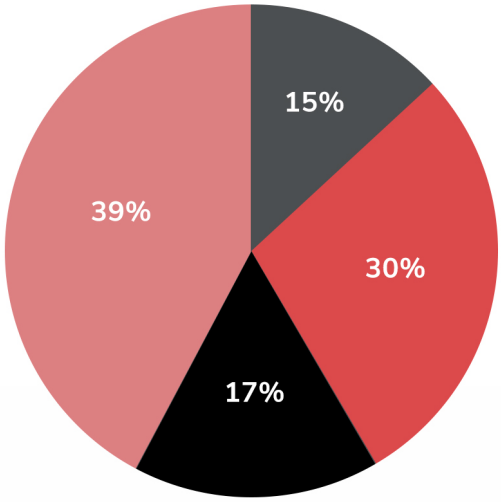
**Given new and emerging asset-light business models in passenger transport, which party is most likely to become (or remain) the fleet owner?**




Results collected September 28, 2020

In the context of logistics, the current vehicle ownership market is dominated by specialized fleet companies and no significant change is anticipated for logistics companies in the future. Yet "more specialization will appear" which could prove the entry point for mobility operators such as Uber Freight, as noted by almost one in five of survey respondents.

**Given new and emerging asset-light business models in logistics, which party is most likely to become (or remain) the fleet owner?**

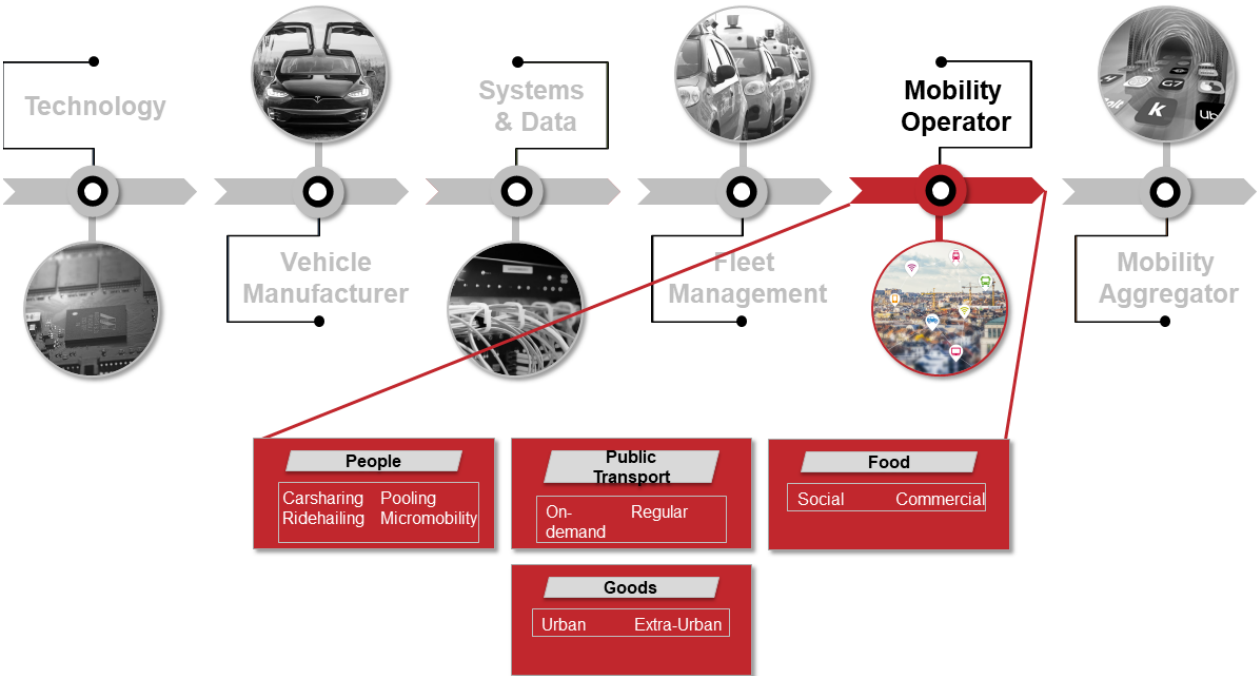



- Mobility operators (e.g. Uber, Ola, Didi) will begin to own fleets of vehicles
- Specialized fleet companies (including smaller fleet owners)
- Captives (e.g. BMW Financial Services) and leasing companies (e.g. Arval, LeasePlan)
- Today's logistics companies (e.g DHL) will continue to own and operate fleets

Results collected September 28, 2020

## Deep Dive: Mobility Operators

Many mobility operators that move people, goods, and food are waiting for autonomy to improve their profitability. Similarly, public transport operators are considering adopting automation into future services. With market forecasts quite volatile, certainly not helped by the Covid-19 crisis, it is difficult to assess the value of the autonomous part of this section. With some assumptions, Neckermann Strategic Advisors expects the market for autonomous mobility operators will grow to over $40 billion by 2025.




It's not hard to imagine a world dominated by fleets of automated vehicles. Indeed, any observer of inner-city traffic in New York, London, or Paris will note the relative lack of private vehicles; during the daytime, most vehicles in city centers will be from logistics or from shared mobility enterprises, including buses, ridesharing, and ridehailing. Certainly in cities, mobility operators may be responsible for the majority of vehicles on streets in the near future.

These operators have become very familiar to us: Uber, Ola, Lyft, Grab, and Didi have come to dominate the last mile of passenger transport - and they are now also adding last-mile goods delivery to their repertoire. While their offerings today are somewhat interchangeable, clearly there is potential for greater differentiation. Mark Thomas speculates, "Getting back to the airline analogy, there are only two main aircraft manufacturers. Any differentiation that exists in the customer experience comes from the airlines themselves" - in other words, the mobility operators of the sky.



During the Covid-19 crisis, the various strengths of logistics and delivery companies came to the fore. While Uber's ridehailing operations nosedived as the world went into lockdown, its Uber Eats division stayed stable, providing customers with restaurant-quality food and drivers with a sustained income during the crisis. Similarly, Ming Maa, President of Singapore's leading ridehailing and delivery provider Grab, saw growth in alternate areas during the crisis. In a video call in April 2020 he announced, "We are launching GrabMart for on-demand delivery of short-tail items. We will be offering a farm-to-table offering, and we've begun to offer Grab Assistant - a concierge service which allows anyone to get anything delivered from anywhere to their door." Clearly, this should be seen as a wake-up call to the logistics industry, and the impact could also be felt by OEMs. Just as DHL, Amazon, and others already work with suppliers to custom design vehicles for their specific purposes, so too will the larger mobility operators (with fleets) insist on built-to-order vehicles for their ridehailing purposes.

SoftBank which owns or has invested in ridehailing operators representing some 90% of such rides worldwide has relationships with a number of OEMs. This may result in mass orders for ridehail and last-mile delivery vehicles. Didi Chuxing - into which SoftBank, Toyota, Apple, and others have invested - has already agreed with Chinese manufacturer BAIC to build and offer over 100,000 vehicles to drivers via a leasing joint venture.[37]

# What About Logistics?

Mobility operators, including companies that are part of an OEM group, and logistics providers will become important stakeholders in vehicle design and maintenance models. They might become the main customers of current OEMs and, in this way, they may influence the way vehicles are designed and manufactured.

It is too soon to figure out if this will bring more or less complexity to the inbound-to-manufacturing supply chain and the aftermarket supply chain. Will bigger batches of similar vehicles be ordered at once? Will there be exponential growth of variants to satisfy different business needs? Will 500,000 unit production lines remain the norm going forward?

Those are questions logistics professionals around the world must answer quickly. Indeed, the logistics principles that governed the industry over past decades were fit for mass production but won't allow for the extreme levels of customization that some predict.

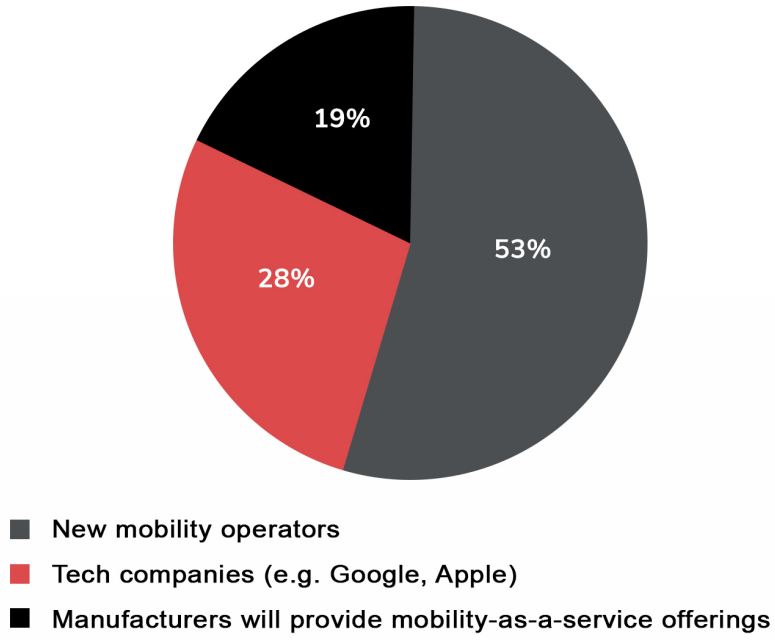
"Direct visibility on demand and a shift towards a pull model might be required for many OEMs to maintain operational efficiency," predicts DHL's Fathi Tlatli who has spent most of his professional life supporting customers' supply chain development across industries.

What's for sure is that logistics will have to enable more operational flexibility and visibility to minimize the total cost of ownership of mobility operator assets from purchase to lifelong maintenance.

## DHL Customers' Views on: Mobility Operators

There is increasing competition to directly connect with the end user. Survey results indicate that new mobility operators may be best positioned to accept the responsibility of dealing directly with passengers. As noted by one respondent, "To avoid jeopardizing the core business of the OEMs, the front end will be kept through new mobility operators (although likely owned by big OEMs)."

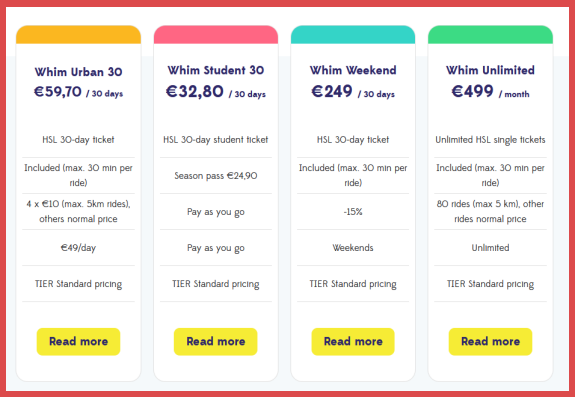
**Assuming there is a successful transition to mobility-as-a-service in passenger transport (this will allow the user to select any operator via their smartphone app), which party is likely to secure the front end (customer-facing position)?**




Results collected September 28, 2020

## Deep Dive: Mobility Aggregators

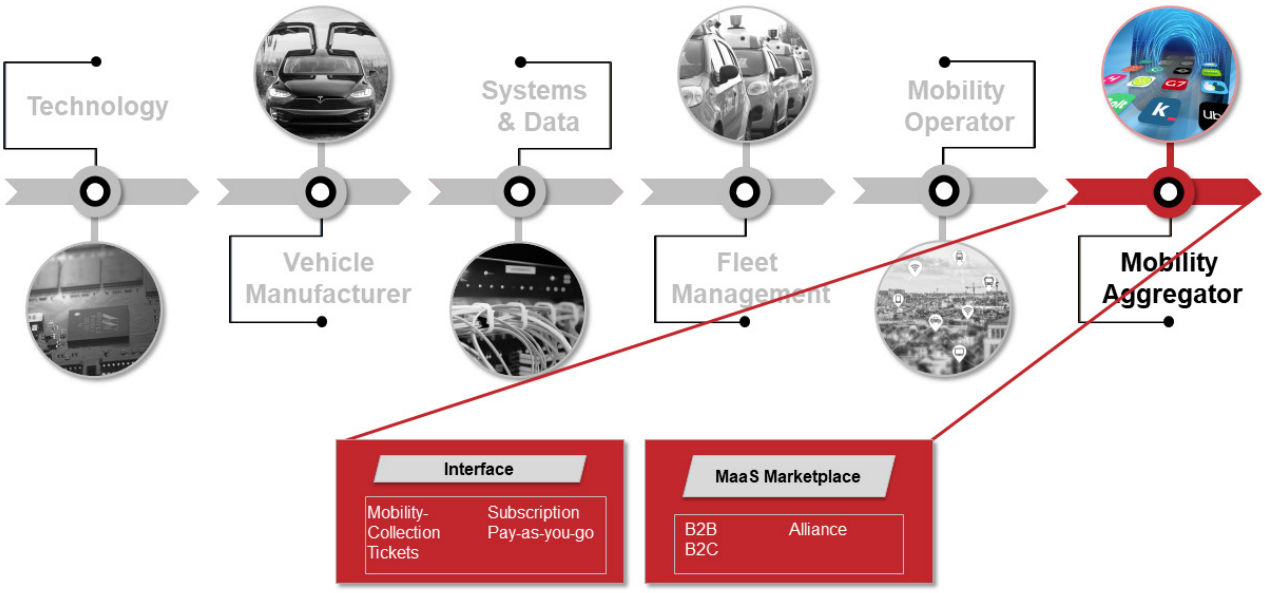
The mobility aggregator's mission is to give end users direct access to the best mobility services matching their needs at a specific location and time. The market size is expected to rise from $5 billion to $18 billion between 2020 and 2025. Well-known examples are Citymapper, MaaS Global, Trafi, and Transit, although these all address distinct use cases and user groups.




- Founded: 2016
- Country: Finland
- Funds raised to date: $50 million
- Main investors: BP, Mitsubishi, NordicNinja

Backed by MaaS Global, Whim aims to be "the first all-inclusive MaaS solution commercially available on the market". The mobile app allows urban mobility users to access transport services surrounding them in just a single place. Pay-as-you-go or subscribe to a temporary plan, different offers are available to meet the specific needs users may have during a specific period and location. The service is available in Helsinki, West Midlands (UK), Antwerp (Belgium), Vienna and soon in Tokyo and Singapore.

Since 2017, the company has registered over six million trips in the EU and recorded 70,000 customers in Helsinki in 2019. While Whim is a pioneer among mobility aggregators in the EU, the competition is diverse. The UK's Citymapper is perhaps the most famous rival. Others include Omio, Moovit, and increasingly public transport operators such as Deutsche Bahn. The mobility aggregator received the support of BP with its investment of €10 million in 2019 and can also count on the backing of investors such as Mitsubishi and the Japanese NordicNinja.




While the industry presents an unprecedented breadth of opportunities for stakeholders, big companies still face barriers in keeping up within a dynamic environment. Inertia, lack of out-of-the-box ideas, and fear about trying new business models are examples of limitations, but these can be integrated into the organization's strategic development. Several options exist to support corporates with their innovation programs, such as implementing an incubator, conducting a start-up contest, or even internal initiatives to stimulate intrapreneurship. But one of the most powerful paths to achieve innovation remains start-up acquisitions that drive change and bring the additional necessary fresh vision and energy.

Established brands have invested in many start-ups in order to get insights - or perhaps an edge – into the new marketplace. Some have been successful, others missed opportunities. In 2016, on stage at a NOAH conference, then-CEO of Daimler Dieter Zetsche speculated in a dialog with Uber founder Travis Kalanick, "Who knows, 50 years from now perhaps we are one company?" Considering that Uber's market cap today is larger than that of most car manufacturers, the question is now who is David, and who is Goliath?

# 4. Quo Vadis, OEMs?

Since the late 19th century, automakers have developed and put together chassis, engines, and other components to produce cars that were shipped to dealerships or sold to fleet companies. This traditional and conservative business model has been shaken by new technologies and end-user needs over the last few years (Neckermann Strategic Advisors anticipated many of these in its book of 2014, "The Mobility Revolution").

Under pressure from new mobility services, OEMs are looking at which strategy to follow to secure not only their current position within the value chain but also their future in a significantly larger and growing mobility industry. This tension also impacts automotive suppliers, equally impacted by new mobility technologies and services. Manufacturers have so far invested modest sums into pivoting from product-oriented companies to 'mobility providers'. In partial recognition of the scale of this undertaking, one French automaker has purchased a magazine business, convinced people will read more in autonomous vehicles. An American OEM started a retail platform in order to skim revenues from the shopping that will be done in the back of their future robotaxis. Yet others are building aggregation platforms for autonomous ridehailing to compete with Waymo and Uber. Even though in the billions, these investments can sometimes feel a bit light in comparison with the money injected by the new competition. What's more, this new value chain comes with a different set of rules.

## The Car Manufacturer's DNA is B2B not B2C

Often forgotten, the typical Original Equipment Manufacturer is a B2B company, producing and selling cars to an intermediary that will directly interact with end users. With billions spent on motorsports, events, and marketing, OEM brands are well known to the public, but this does not mean manufacturers have the knowledge to sell directly to end customers; this knowledge resides with dealers and captive finance companies, as well as with third-party leasing companies. Ridecell's Mark Thomas notes, "OEMs today provide their vehicles to dealerships or fleets who serve the end consumer." The MaaS disruption in the mobility industry is as big as the introduction of the iTunes service in the music world. OEMs and their suppliers need to undertake a significant transformation so they avoid what happened to many stakeholders in the music industry, they continued to produce physical albums when people wanted digital songs. Thomas continues, "The skillset required to be a B2C software company is completely different. The customers are completely different."

On the other hand, the left side of the mobility value chain looks much closer to the original core business of a vehicle producer. Developing hardware and software is already part of the day-to-day business of an OEM. There are opportunities to leverage a more secured and enhanced position to more confidently face the next evolution of the Mobility Revolution.

Clearly, there is a willingness among OEMs to try different approaches and define what will be the strategy of tomorrow. BMW and Daimler invested €1 billion in a joint venture to together develop new mobility projects. One year later, their common car-sharing program NOW exited from several markets, mainly due to a low utilization rate. Initially, FCA ignored the Mobility Revolution; when it needed to catch up, it partnered with Waymo on the development of autonomous technology and subsequently decided to partner with Foxconn for the core production of vehicles - which used to be FCA's 'core' activity. From these current trials and failures will come prosperous futures for car manufacturers and their direct partners to remain successful. And some may find themselves in a sea in which they are no longer the biggest fish.

## Not the Biggest Players Anymore

OEMs have new customers and have new competitive positions. Before and also after the Covid-19 crisis, some OEMs lost ground. For perspective: BMW and Daimler's investment in new mobility services might have seemed significant in the automotive world but in the mobility world, it is dwarfed by the $25 billion raised just by Uber for its ridehailing service. Similarly, the corporate valuations of BMW and Daimler are dwarfed by the valuations of Waymo, Alphabet's autonomous division. A multitude of companies is now able to adapt their core products and services to mobility features to capture added value in an industry they may not have even considered before. Telecoms, data, software, cybersecurity, and payment providers are jumping into the expanding mobility business to get the biggest possible share of the promising pie. Amidst the upheaval of traditional OEMs, Sony (a company valued higher than Daimler, BMW, and FCA combined)[38] presented its electric and autonomous vehicle at the Consumer Electronics Show - by collaborating with suppliers in the 'Tech & Autonomous Systems' part of the value chain, including Nvidia, Bosch, and Qualcomm. It was certainly not meant to reassure its current car manufacturer clients when Bosch explicitly mentioned its ability to build its own autonomous vehicle. Partners today, possibly competitors tomorrow - OEMs should navigate collaborations with their suppliers carefully in order to be stronger together.

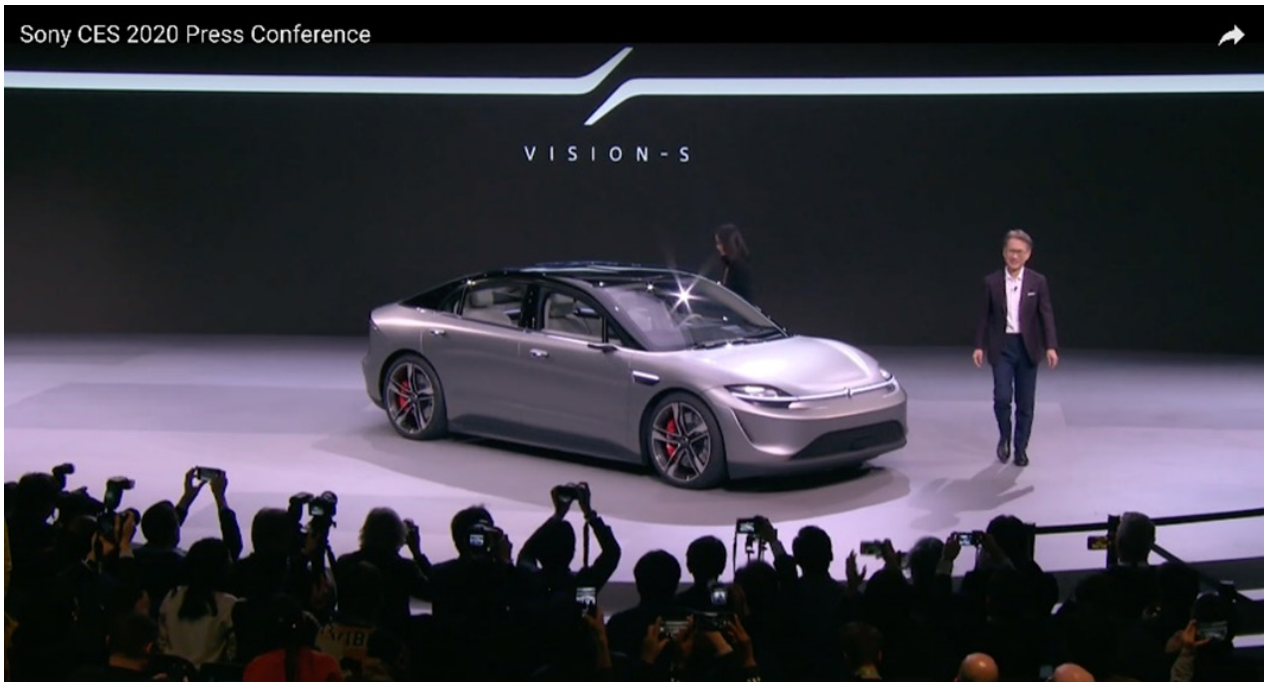



*Figure 19: Sony Vision-S, CES 2020*

To summarise: OEMs have a lot to lose in this Mobility Revolution but, as in any crisis, uncertainty can be turned into opportunity. OEMs must take a strategic decision to focus on the value chain section(s) where they believe they can best leverage expertise. OEMs already possess the manufacturing tradition and capability that all mobility value chain stakeholders consider a strong competitive advantage. But it won't take long for companies from other industries to look at auto-mobility manufacturing as a possible extension of their business.

Futhermore, OEMs must realize they cannot be the full stack developer. It is very hard, if not impossible, for a single company to undertake all activities in the mobility value chain. There's an increasing need for collaboration, partnership, and perhaps acquisition both with start-ups and well-established companies. Autonomous and shared technology is as important now as the engine was for the last 100 years. And just as it was with engines, OEMs have a strategic decision whether to develop in-house or outsource this part of the manufacturing process.



In other words, they must pick their battles and their turf.  OEMs must partner and establish their position in the new mobility value chain, just as they did in the automotive value chain. True partnership brings advantages. “The classic supplier-procurement model is history,” affirms Volkswagen’s Matthias Braun. “In the new model it is all about partnership, which includes all partners at the same table. In this data-driven world, while it may be theoretically possible to change partners more quickly, in reality partnerships last longer because data exchange requires systems integration, and longer-term partnerships yield better data.”

# 5. Conclusion: What it Means to Logistics

With this changed value chain, the challenges for B2B logistics are also altered. Across every element, new stakeholders and customers are redefining the requirements - just as the end consumer has already done.

From a logistics point of view, generating and gathering data across all elements of the value chain - from beginning to end - allows companies to optimize much more than before. Volkswagen's Matthias Braun asserts, "If I know not just where an asset is but where it will be at a given time, I can dynamically steer drivers, goods, even my infrastructure to make a connection. This requires an exchange of data among all partners, however."

## What About Logistics?

Logistics will play a crucial role in the development of the new auto-mobility value chain. Indeed, the success of many of the most promising new business models may depend on the logistics industry setting up bespoke yet cost-efficient supply chains. For example:

- Would a consumer be pleased if no shared vehicle was available nearby when they needed it?
- What if the available vehicle was dirty and the battery run down?
- What if there was no available charging station because too few had been installed or the only ones had been out of service for weeks?
- What if, for example, there was a gap in 5G coverage and this forced the occupant of a self-driving car to put their hands on the steering wheel but this person didn't have a driving license?
- What if, for example, inefficient manufacturing and distribution processes raised the cost of transportation assets, killing the business model of emerging mobility operators and aggregators?

According to DHL's Tlatli and Dedieu, these are the questions automotive and logistics pofessionals will have to answer sooner rather than later. While there is no doubt the balance of power is shifting in the auto-mobility industry, it will be essential for traditional and new players, including logistics companies, to collaborate in defining and powering the auto-mobility revolution!

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