

THINK ACT

BEYOND MAINSTREAM



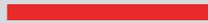
A CEO agenda for the (r)evolution of the automotive ecosystem

New archetypes will emerge in the future to divide the market up among themselves. How to gain access to tomorrow's profit pools

March 2016

THE BIG

3



40%

of automotive total profits will be earned by providers of robocabs in 2030 – fully autonomous, electric vehicles.

The OEM share will be 22%, the OES share 14%.

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archetypes are likely to share profits and revenues in a next-generation automotive ecosystem, with Mobility Service Providers at the "fat end" of the value chain.

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transformation paths guide incumbents to become competitive players in the new framework.

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Everyone agrees that the automotive ecosystem faces a quantum shift. We aim to determine exactly when and how.

In a milestone decision that paves the way toward fully autonomous driving, the National Highway Traffic Safety Administration (NHTSA) recently recognized the computer as a new type of vehicle operator. After more than a century of people behind the wheel, machines could be about to replace them on U.S. roads. Industry players all agree they face a fundamental shift in consumer attitudes toward the automobile. At the moment, though, there are more questions than answers – who will earn money selling what exact products or services?

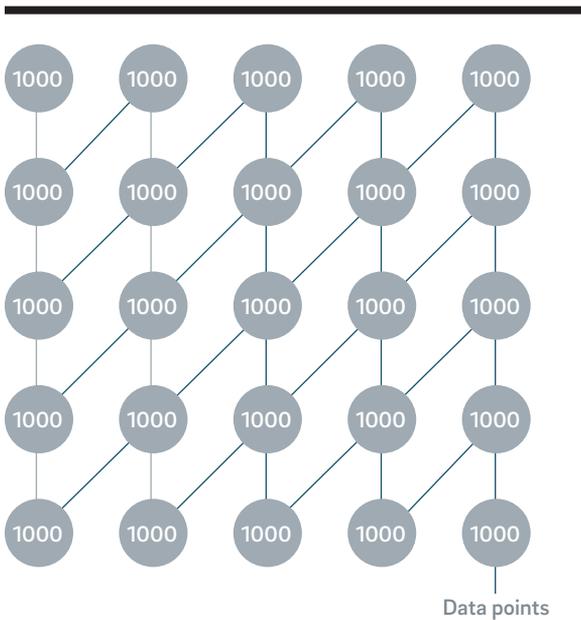
The three overarching trends that will drive the industry are commonly known. Alternative propulsion systems, driverless and connected cars as well as the shared economy are all expected to give birth to new business models complete with their own respective sources of revenue and profits. In January, Ford CEO Mark Fields estimated the size of this transportation services pie at USD 5.4 trillion in annual sales alone – above and beyond the traditional car market.

How exactly to tap into this demand and what the future may bring is something of a hotly debated topic. Industry executives still do not share a common view on whether battery-powered electric vehicles or hydrogen fuel cell cars or both will be the technology powering transportation in the long term. As a result, OEM and suppliers are forced to hedge their bets and continue plowing their limited resources into all three. Just one possible outcome is a world where battery-electric vehicles act as thousands of miniature, decentralized power plants balancing out peak and trough demand for energy in urban areas. During operation they transport consumers point-to-point with zero emissions and when parked are plugged into the power grid, storing excess electricity from renewable sources and releasing it back into the grid as needed.

We aim to quantify the changes facing the automotive ecosystem in order to make this structural shift more tangible. By plugging into our Global Automotive Ecosystem Revenue Stream and Profit Pool Model the

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(R)evolution of the automotive ecosystem



HOW WE CONNECT THE DOTS

Our innovative simulation tool distills the various studies on specific market segments into one comprehensive picture, including scenarios for everything from future car-sharing volumes and consumer acceptance of autonomous driving to the market development of electromobility. Our analysis covers changes across the entire automotive value chain from production to scrappage and accounts for various distinct forms of mobility with over 300 variables and 25,000 data points. Nor are they considered separate from one another – we factor in interdependencies as well. This allows us to model alternative scenarios stemming from economic developments and new technologies, socioeconomic trends and regulatory changes. This scenario simulation provides an estimate of how much the various market segments could shift in terms of kilometers driven, and hence enables us to extrapolate their implications for future revenue and profit pools.

number of kilometers driven globally, as well as customer preferences and availability of technology under certain assumptions, we can anticipate in which direction demand would migrate as well as calculate its extent for different scenarios. Approaching the issue from this particular perspective differs materially from previous attempts to quantify market conditions, which so far have primarily been oriented toward the number of cars sold.

A DISRUPTIVE SCENARIO FOR TOMORROW'S AUTOMOTIVE WORLD

While car usage today is primarily individual and focused on ownership, one possible scenario, however, is that providers of electric "robocabs" capable of fully autonomous driving could already seize control of more than one third of the worldwide automotive mobility market by 2030. This sounds like an age but to put it in automotive industry terms, it is less than two product lifecycles away. The message we take here is that customer demands could be highly differentiated as soon as technologies are available and a new market could develop where service providers offer a range of individualized options tailored to meet diverse conceivable mobility needs.

A closer look at the numbers reveals there is a big shift under way. One key result from our simulation is that the demand for individually owned cars, the conventional business for incumbent players including auto manufacturers, might decline by almost 30 percentage points until 2030. Demand for conventional car-sharing and peer-to-peer mobility would increase until around 2025 only to then be replaced by autonomously driving robocabs. → **A** Their cost advantage could entirely eliminate the need, and hence the market, for ride hailing and conventional carsharing. A certain demand for car rentals would remain, however, most likely in the form of larger mobility service packages. As a result it doesn't seem too far-fetched to think robocabs capable of triggering the demise of the two-car household in many areas.

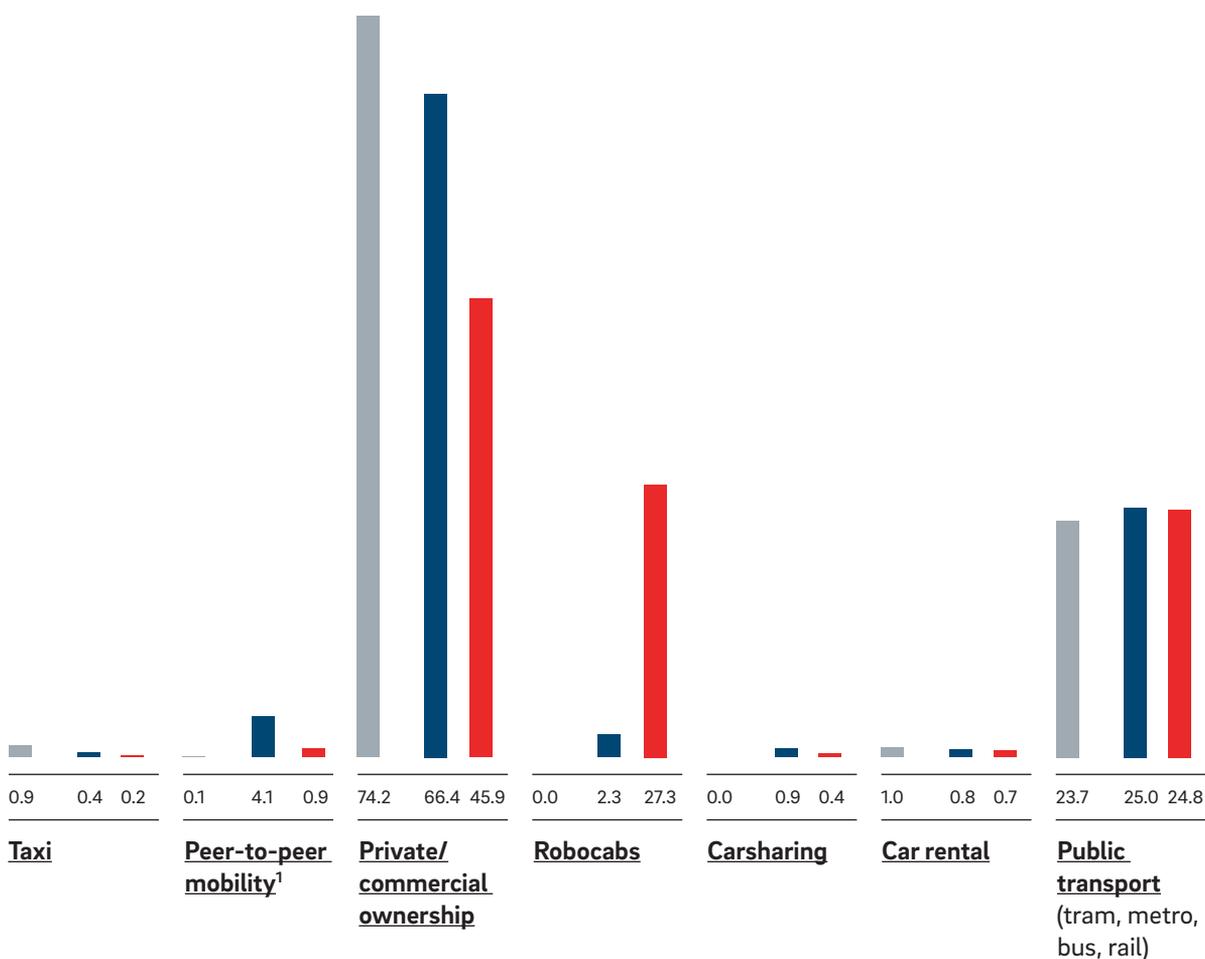
The shift within the ecosystem gains clarity when you look at the revenue and profit streams. The OEM and OES shares of total revenues would decrease. The same is true for independent retail, aftersales and financial services. The prospects for the development of profits in these traditional segments would be even bleaker. In such a scenario, OEM would see their profits drop by

A

HOW FOCAL POINTS WILL SHIFT IN THE NEW AUTOMOTIVE ECOSYSTEM

It is apparent that a large amount of business centered around ownership and ownership-like models will be transacted in the future through mobility providers. Rental car businesses, peer-to-peer mobility schemes and car-sharing could be replaced by new service offers.

Distribution of kilometers driven worldwide in %



2015 2025 2030

1) Contains "asset-light" platform services, e.g. ride hailing, ride sharing, etc.

Source: Roland Berger

B

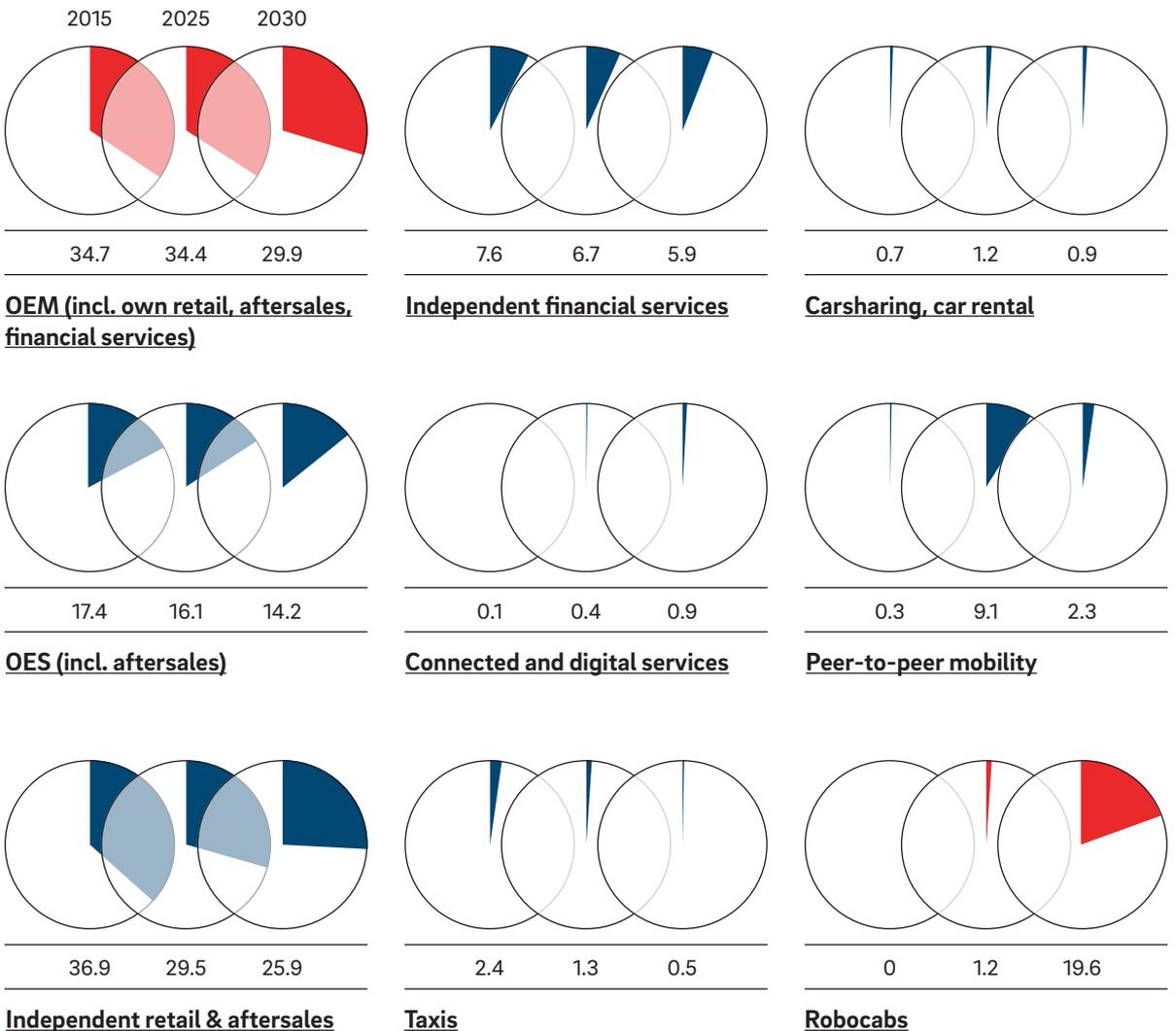
CASTING FOR THE BIG FISH

GLOBAL REVENUE POOL

Development of total revenues in EUR bn



Shares of total revenues worldwide in %



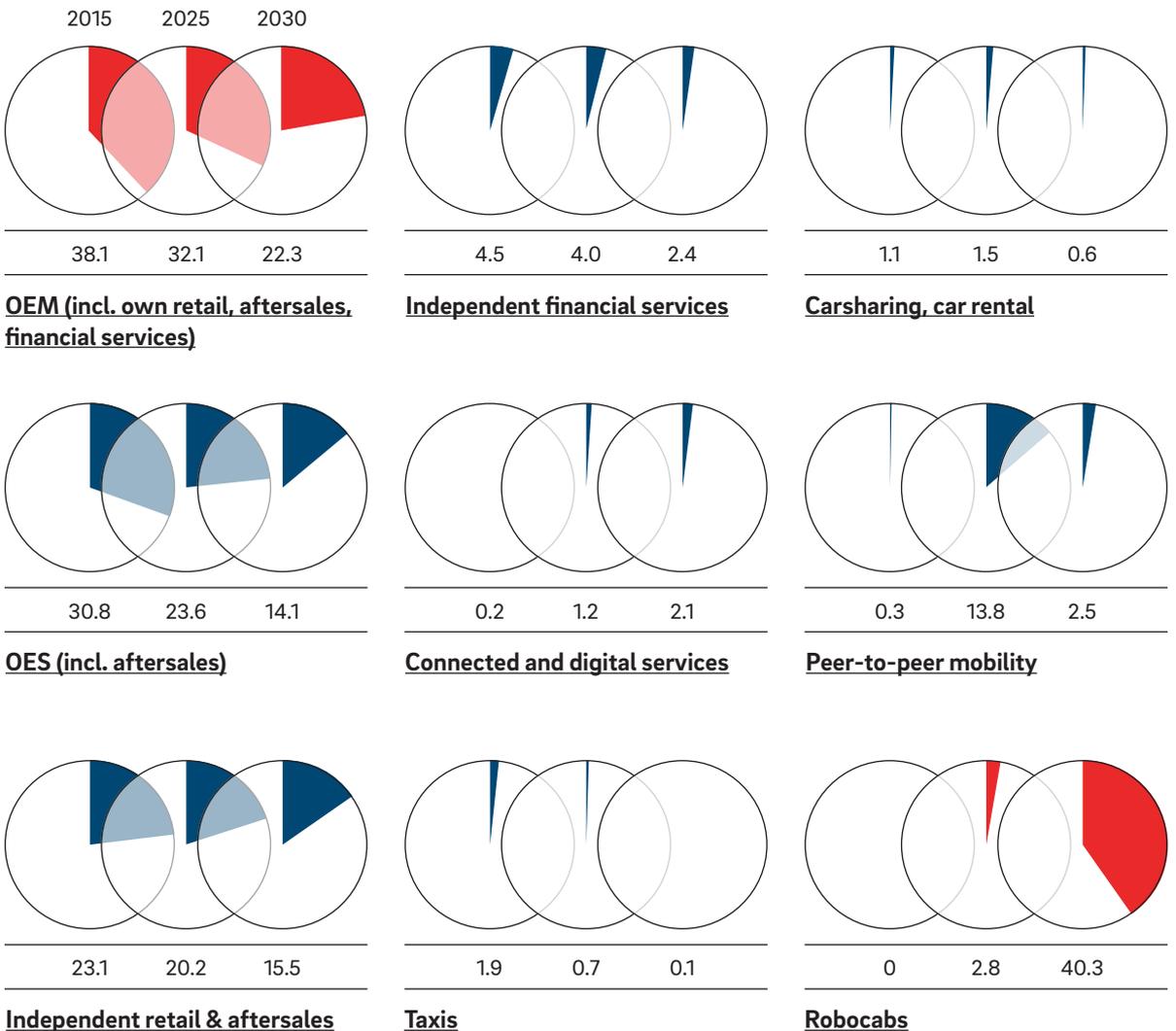
Total profits are expected to increase until 2030. Although cars still will be manufactured and sold by OEM and OES, mobility services (robocabs) are likely to earn the biggest share of the future profit pool.

GLOBAL PROFIT POOL

Development of total profits in EUR bn



Shares of total profits worldwide in %



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(R)evolution of the automotive ecosystem

16 percentage points by 2030, OES by 17 percentage points. There is plenty of evidence to suggest that a re-positioning of the business will need to be drastic. → **B**

Market participants must consider reallocating their capital to those parts of the business judged most promising. Volume carmakers face the biggest challenge as they need high volumes to compensate for low-margin vehicle sales.

IT WILL NOT BE A FLYING START

Naturally this is easier said than done. The industry has not faced disruptive change over the last 100 years. It is grappling with longstanding structural problems that range from overcapacities and legacy costs, especially on the manufacturing side, to ever-rising CAPEX requirements and research expenditure.

It is no secret that profit margins earned in other industries continue to dwarf those of carmakers. Mainstream players in particular are notorious for not even earning their cost of capital. While the return on invested capital (ROIC) achieved by automotive companies amounted to nearly eight percent in 2014, manufacturers from other heavy industries boast much better figures, such as chemical companies with 13 percent or pharmaceutical makers with 19 percent. Margins from the operating business also trail behind those of other sectors.

This lower profitability translates to fundamentally less attractive valuations on a secular basis compared with other peer groups. Mass market carmakers essentially receive a flunking grade as evidenced by metrics commonly employed by both capital markets and private equity investors. On average their enterprise value is priced only four times their earnings before interest, taxes, depreciation and amortization. To borrow the example of the chemical and pharmaceutical industries once more, these sectors by comparison are valued much higher by the market with multiples of nearly 11 or 13 times EBITDA, respectively. In other words, should OEM seek to raise fresh equity capital for their funding plans, they won't receive anywhere near the same for their "currency" from shareholders as a drug-maker might.

TRANSFORMATION IN STORMY SEAS

Money simply is not present in sufficient abundance for carmakers, so prioritizing investments is absolutely essential to surviving in a market beset by change.

As if earnings prospects were not already slim before, current cyclical waves are exacerbating problems further. Above all the slowdown in China – long a kind of El Dorado for carmakers – has massive implications for automakers, as it is quite common for their profits to be predominantly generated in China. Some estimates for that market's weight range as high as half of net profits once aspects like royalties and the sale of spare parts are included.

So far China's market structure has had the unique trait of being "upside down", with large, high-margin sedans and SUVs actually outselling smaller models – a phenomenon not seen in Europe, where A/B segment vehicles accounted for close to 40 percent of annual vehicle sales compared to only 20 percent in China in 2015. Going forward, however, China is expected to normalize with lower returns on sales as pricing pressure rises and a deteriorating sales mix as more compacts are sold in both inner-city quarters and suburban areas of the country.

Additionally troubling has been the knock-on effect in other emerging markets due to China's slower growth. Commodity-rich countries that helped fuel the construction boom are suffering, if not in outright recession already. Brazil, which supplied much of the high-grade iron ore for China's steel production, has for instance seen its domestic car demand plummet 25 percent in 2015. For carmakers to properly position themselves for the future, they need to have a plan now that reaches well beyond the next product cycle and answers a fundamental question – who will their customers be 15 years from now and what will they need?

Evolution invariably results in the extinction of automotive species incapable of adapting. Make sure you are one of the next-generation players.

The automotive industry has typically been slow to adapt to rapid changes in consumer preferences due to its long product development cycles. Half a decade can pass between the moment a designer first begins sketching a new model and the day it is finally replaced in the market by its successor. Traditionally the auto industry was in the enviable position of being a business where barriers to market entry were high. Manufacturing was capital intensive, came with an enormous fixed cost base and offered in return low margins in the single digits. Delivering the product to the customer required building and maintaining an extensive distribution network. As a result, most carmakers that sprouted up in the past few decades were not founded for financial reasons. More often than not, national governments felt it was a matter of strategic interest to have their own automotive industry, much like operating their own airlines.

The advent of electric cars and autonomous driving is eroding these barriers and new players that had previously sought to profit from the flow of information at

home or in the office now see the car as just another frontier. A superficial glance says carmakers have attempted to gird themselves for the future by rolling out a range of new activities. But who has seriously merged these initiatives with their core business? Who has shifted their resources enough? Most of all, who is prepared to interpret their existing business model anew in the face of the ongoing transition in their industry rather than simply optimize current business models? So far automakers have only begun to experiment with new services built around their core product.

FIRST MOVES IN THE RIGHT DIRECTION?

Take Daimler, for example, which launched its carsharing provider Car2Go and consistently expanded its mobility solutions business dubbed "moovel" through small acquisitions as evidenced in GlobeSherpa, FlixBus, RideScout and myTaxi. Customers in Stuttgart today can book a ride on the local metro system for part of a trip and then use a Smart ForTwo for the rest, all paid for

C

THE CAR – JUST ANOTHER DEVICE?

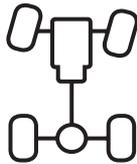
Machines
& tools

Raw
materials

Energy
supply



Device
Component
Manufacturers



Device
Manufacturers



will supply conventional hardware parts built into a vehicle. This could include everything from seating, body structure elements, car interiors, lighting, powertrain systems, electronics and electronic manufacturing to specific software, sensors, semiconductors, etc.

Contract Manufacturers

develop and build cars exactly according to the specifications given. Mobility Service Providers would therefore not require production capacities of their own. They can still differentiate themselves through product and branding in addition to service quality and breadth.

White Label Manufacturers

provide a base version of a vehicle without branding. Much like in the handset industry today, a Mobility Service Provider would purchase a standardized product and use their own brand.

Branded Device Manufacturers

produce vehicles under their own brand. They are the most likely species to provide an integrated offer comprising vehicle and services directly to the customer. But integration in the other direction (from service to manufacturing) is also possible.

Infrastructure
Component
Providers



Infrastructure
Players

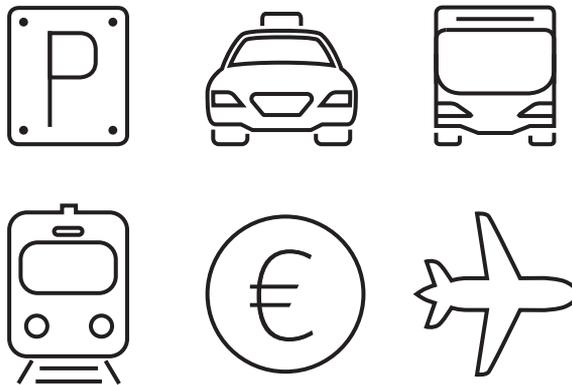


develop technologies for use outside of a vehicle, supporting connectivity and data transfers such as intelligent traffic light installations or technologies that help manage and direct traffic flows.

operate physical and virtual infrastructures (network of roads, toll systems, parking garages, charging stations, public transit, payment systems).

Intelligent transportation system providers offer usage rights as well as data packages. This could include data aggregation, analysis and evaluation (both for a vehicle as well as their operators and authorities, esp. cities).

Value streams in a next-generation automotive ecosystem indicate that for many consumers the car will serve as a means rather than an end in itself.



Mobility Service Providers

The focal point of the new automotive ecosystem. They control the direct relationship with the customer. From financing and leasing all the way to flat rates for public transportation, they offer both standardized and bespoke mobility and service packages. This will include offers for urban dwellers and rural residents alike.

Asset-light version: Platform providers and aggregators

Asset-heavy version: Fleet owners

centrally and digitally via their moovel app. Audi is testing solutions for parcel delivery directly to a customer's vehicle in cooperation with Amazon Prime and DHL.

Inspired by Uber's soaring popularity, GM recently invested half a billion dollars in Lyft, a fast-growing rideshare company in the U.S., to create an integrated network of on-demand vehicles.

Another sign of a paradigm shift was the decision by Germany's trio of fiercely competitive premium car-makers (namely Audi, BMW and Mercedes) to club together to acquire high-definition map provider HERE. While the ostensible reason is to prepare for the day when accurate maps are needed to steer a piloted car, the three aimed to prevent the former Nokia subsidiary from falling into the hands of a company like Uber.

As they look to compete with Silicon Valley, car-makers are also adjusting their management model to allow for flatter hierarchies. In particular the CEO of German car parts supplier Bosch, Volkmar Denner, has been a key proponent of smaller, more agile teams capable of responding to trends by bringing new products or services faster to market.

OTHERS PREPARE TO OVERTAKE

Incumbents initially underestimated new market participants such as Tesla. Despite its very low production volumes, the electric car manufacturer run by Elon Musk has become a serious competitor to German premium brands both in terms of image and innovation. Tesla has shown that it is feasible to build a competitive fully-electric vehicle from scratch within significantly lower development time than traditional players are capable of.

Sales of the Tesla Model S in the U.S. outstripped those of the Mercedes S-Class last year, more than doubled the volumes of the BMW 7 Series and easily achieved over four times the equivalent of Audi's A8. Tesla lost over a half a billion dollars in the first nine months of 2015 and the stock plumed two-year lows on the back of the collapse in oil prices. However, equity markets still expect a lot from Tesla – this is reflected in a USD 20 billion valuation. BMW, one of the few pure-play luxury car makers listed on the market, earned easily over USD 5 billion in the same period but weighs in at only about USD 50 billion market cap. Moreover, it needed to sell over 2.2 million cars in 2015 against Tesla's estimated 50,000 in order to achieve that valuation. If Tesla's meteoric rise merely foreshadowed the challenges to come, the entry of major Sili-

con Valley corporations like Google and Uber with their almost inexhaustible financial resources threatens to throw the industry into complete turmoil.

THE FIVE ARCHETYPES OF THE FUTURE AUTOMOTIVE ECOSYSTEM

Both OEM as industry giants and their specialized suppliers could end up playing roles very different from the ones they play today. To make the picture more concise we drew on the numbers from our simulation, took into account talks we had with various automotive customers and referred to developments we have seen in other industries. The result is a vision of five main strategic archetypes that could characterize the future of the automotive industry. → **C** The picture that emerges is not unlike that already witnessed in the telecommunications and consumer electronics industry: Service providers take control of the value chain and push device manufacturers into the background.

1. Mobility Service Providers. For the future automotive ecosystem we see Mobility Service Providers at the "fat end" of the value chain – meaning they are the ones who are in touch with mobility customers of all kinds, the ones to reap the lion's share of revenue and profits. Much has been made of "asset-light" players, who believe the car and the technologies connected to it are only one of many ways to satisfy demand for mobility. They have the means to grow really fast and possibly define new rules in the market, because they are able to draw on network effects from a vast customer base. Their competitive advantage will be grounded in intelligence and algorithms and platforms providing access to customized mobility services for their target groups. It could even be attractive for the Mobility Service Providers to become asset-heavy again if this is the key to delivering a specific service experience. However, we believe growth is easier to achieve in an asset-light setup.

2. Device Manufacturers. Many of the OEM we know today may well become mere Device Manufacturers. These companies' business model would be limited to developing, manufacturing and selling vehicles. But in the future not all of them would be able to sustain the complex automotive retail system we know today. Most of them would sell, or more likely lease, to Mobility Service Providers as they are the ones with the direct access to the customer.

This scenario suggests that only the strong brands of Branded Device Manufacturers will be able to maintain a good positioning in the mobility service business too. White Label and Contract Manufacturers deliver commoditized vehicles for different needs and customer groups. The model range offered by these archetypes is quite narrow compared to the current portfolio, and specifications are defined by the Mobility Service Provider. Innovation would be part of the Branded Device Manufacturers' business, as well as the White Label Manufacturers' to a certain extent, but not the Contract Manufacturers'. The focus of innovation for secondary players would have to shift from product to process and manufacturing technologies.

3. Infrastructure Players. Connectivity is the enabler of the ecosystem of the future. Operators of physical and virtual infrastructures like toll systems, traffic control systems, charging stations for electric cars, utilities, parking garages and the like will therefore be relevant business partners for Mobility Service Providers. Similar to the network operators in telecommunications, intelligent transportation system providers might operate in oligopolistic structures and reap stable and solid revenues in the future automotive ecosystem. They will enable demand to be predicted, vehicle fleet routes optimized in order to minimize pollution and urban traffic managed to prevent congestion. Moreover, the usage of tolling infrastructure according to consumption patterns will become big business. That means infrastructure players will define the framework for other players' activities.

4. Device Component Manufacturers. The fourth archetype represents companies that supply the hardware and software installed in a mobility device. With manufacturers of mechanical and electronic parts facing increasing pressure on their margins as their products become commodities, those firms specializing in software, semiconductors and complex battery technologies will offer the added value in this segment.

5. Infrastructure Component Manufacturers. In addition we expect to find new players delivering technologies enabling data streaming and connectivity on the infrastructure side. This could be a playground for start-ups in the future.

POSSIBLE PATHS TO MASTER THE TRANSFORMATION

At present most of the OEM prefer the option of integrating certain activities that move in the direction of Mobility Service Providers in order to avoid shaking up their existing business model as Branded Device Manufacturers too much. But moving slowly bears the risk of ending up stuck in the middle, never fully embracing either approach. Being a real champion in the service industry is not in most of the car manufacturers' genes. It will be interesting to see what a cultural change in this industry would mean.

REVITALIZE YOUR AGILITY

From the physical assets to knowledge, connectivity software and service

Competition in the Mobility Service Provider segment is expected to be uncomfortable. There will be new players that are better prepared than traditional players for two reasons: The first is that their resources are not encumbered by fixed assets and production facilities. This allows them to react quickly to abrupt changes in consumer behavior, while traditional players still think in product lifecycles. The traditional players' idea of combining their manufacturing business with mobility services might turn into a setback, impairing their agility and potential for growth. Integrated players would not be able to choose the best offer among competing Device Manufacturers, they would first have to ensure they utilized their own production capacities. If traditional players want to become more agile, they need to break up their organizational structures – from functional silos and "not invented here" to open cooperation and a value-adding ecosystem.

The second reason is that traditional players currently lack digital knowledge and structures. Many competitors will be digital natives who are used to selling services in a connected world. Their organizations are dedicated to their service business, having already designed a complex framework of analytical tools that traditional players would have to establish from scratch.

REINVENT YOUR CUSTOMER EXPERIENCE

From "fun to drive" to seamless convenience

In a world of autonomously piloted vehicles there will be less and less regulatory acceptance of individual consumers purchasing cars because they are "fun to

drive". For example the city of Singapore clearly states that it does not want individually owned cars in the city, while Oslo plans to ban them in the city center before the end of the decade. To combat smog, Beijing has often limited traffic on the road to cars with even numbered plates on one day and odd numbered plates the next. Other metropolitan authorities are also considering ways to reduce congestion and improve air quality. Efficiency and convenience of day-to-day mobility will be the new paradigm in the automotive ecosystem.

REFOCUS YOUR INNOVATION

From car features to intelligent services

If the value add for Mobility Service Providers in the future automotive ecosystem comes from services rather than from products, innovation activity patterns should reflect that. Innovative mobility services are needed, along with processes to generate them. What we are talking about here are data sciences. The result would be new apps, intelligent algorithms for big data, or redefined interfaces between various mobility and infrastructure providers.

REFRAME YOUR MANUFACTURING PROCESSES

From product development to manufacturing processes optimization

Here the stretch between device business and service business is most evident. Innovation initiatives in the device business usually aim at process efficiency and optimization of manufacturing. This is a matter of mechanical engineering rather than of developing features for the car itself.

RESHUFFLE YOUR TALENT BASE

From engineering of physical products to more software and analytics expertise

Engineering is the core competency of today's car manufacturers and suppliers, but this might not be the skill that ensures success in the mobility service business in the future. Here customer knowledge will be key, and it does not end with cars and single brands. Experts will be highly sought after for community building in the context of mobility needs, multi-channel experience, and especially mobile and digital marketing. New businesses will require specialists that are familiar with data ownership, big data and analytics. At present

traditional automotive players are not attractive employers for talent in the most sought-after fields.

USE THE FULL EXTENT OF YOUR STRATEGIC LEEWAY

A CEO today needs to find out which archetype offers the most promising prospects for the future. OEM decision makers should ask themselves whether they are willing and able to become Mobility Service Providers. Do they really understand the implications this will have on their resource base? There might be niche strategies that are much more promising than trying to pull off the stretch between product business and mobility services. Is it an option to become a pure device manufacturer for instance – focused on development and manufacturing? OES should find out if they can build up the competencies to be device manufacturers. Or is it more reasonable to act as the "Foxconn" of the automotive industry? Other industry giants have already shown how a completely new strategic direction can work.

The change in the industry's dynamics will call for thorough strategic thinking. Core competencies and their relevance need to be revised to ensure profitable survival in a world of robocabs. Could carmakers one day decide to spin off their heavy, fixed-cost production operations to focus on the higher margin development, design and marketing of their products much as Apple does currently? GM and Ford once before showed a willingness to reconsider their manufacturing depth by floating their components business in the form of Delphi and Visteon.

Whoever wants to still be at the forefront of the industry in 2030 has to sit down and consider today making the decisive changes needed to 2017 investment plans. It's time to fundamentally rethink existing structures and tackle legacy costs before more nimble rivals can outcompete the automotive industry as we know it. ♦

ABOUT US

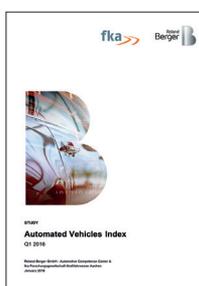
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FURTHER READING



AUTOMOTIVE INSIGHTS Digital drive: The future of automotive

Evolution or revolution? We examine where data-driven change is impacting on the business of automotive OEMs and suppliers – in automated driving and multichannel retail, for example.



Automated Vehicle Index 1/2016

In cooperation with fka Forschungsgesellschaft Kraftfahrwesen mbH Aachen we explore the current status of research and vehicle development alongside the market and legal framework and compare the relative competitive positions of the key markets (Germany, France, Italy, the UK, Sweden, the US, Japan, China and South Korea).

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