Re-inventing the wheel

Scenarios for the transformation of the automotive industry

Global megatrends and disruptions are shaking up nearly every aspect of the automotive industry. This paper addresses possible impacts of two of the industry's key uncertainties.

The future of personal mobility is no longer clear – will individual use or shared mobility shape the future automotive market?

Regulation and politics could have a profound impact on the industry's direction – but which way will it go?

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Introduction

The purpose of this short paper is to inform your strategic decision making. We gathered some of PwC's top specialists on the automotive industry to explore how the sector might evolve over the next 5-10 years. Our team included experts in regulation, industry evolution and competitive behaviour.

We crafted four alternative scenarios which portend billions of dollar shifts in the market depending on how consumer demand will evolve given new technology and habits – including self-driving cars – and how regulators will shape the environment for competition. In developing these scenarios, we took into account how key megatrends such as demographic change, resource scarcity and climate change, urbanisation and a global shift in regional economic power are having a significant impact on everything from talent management and production models to regulation (see *The bigger picture – a transforming world*). We also drew on new research from Strategy&, the global strategy consulting team at PwC, on the almost $40 billion dollar connected car market. Deep understanding of global consumer car buying behaviour and industry production trends was provided by Autofacts, our dedicated team of automotive industry analysts. PwC's industry transformation framework formed the basis for our analysis.

The four scenarios – Self-driving vehicles accelerate; Electric chauffeurs; Connectivity creates new champions; and Local business models prevail – each have very different implications for automotive companies. Your challenge is to think more broadly and really consider whether your strategies are resilient enough to cope with the changes the future may bring. That can help you understand how operational changes and investments could help to make disruptions work to your company's advantage. **You can use these scenarios to think through where you want to be in the future, compare it with where you are today, and consider what that means for making strategy and business design decisions now.**

In addition, you need to ask yourself if your firm understands the implications of new technology and consumer behavior on primary demand for autos, and whether you have the in-depth knowledge needed to anticipate where regulatory innovation or intervention is going to impact the market over the next 5-10 years. Those who do make the right bets will reap significant competitive advantage in this volatile time.

Because understanding the customer is essential to responses to every scenario, we've created a short portrait of the customer for each possible future. And we've given some ideas for where disruption may come from.

Please get in touch if you would like to get additional insights into how coping with the industry's key disruptors could impact aspects of your company's business. We look forward to an on-going dialogue about the industry's – and your company's – future.

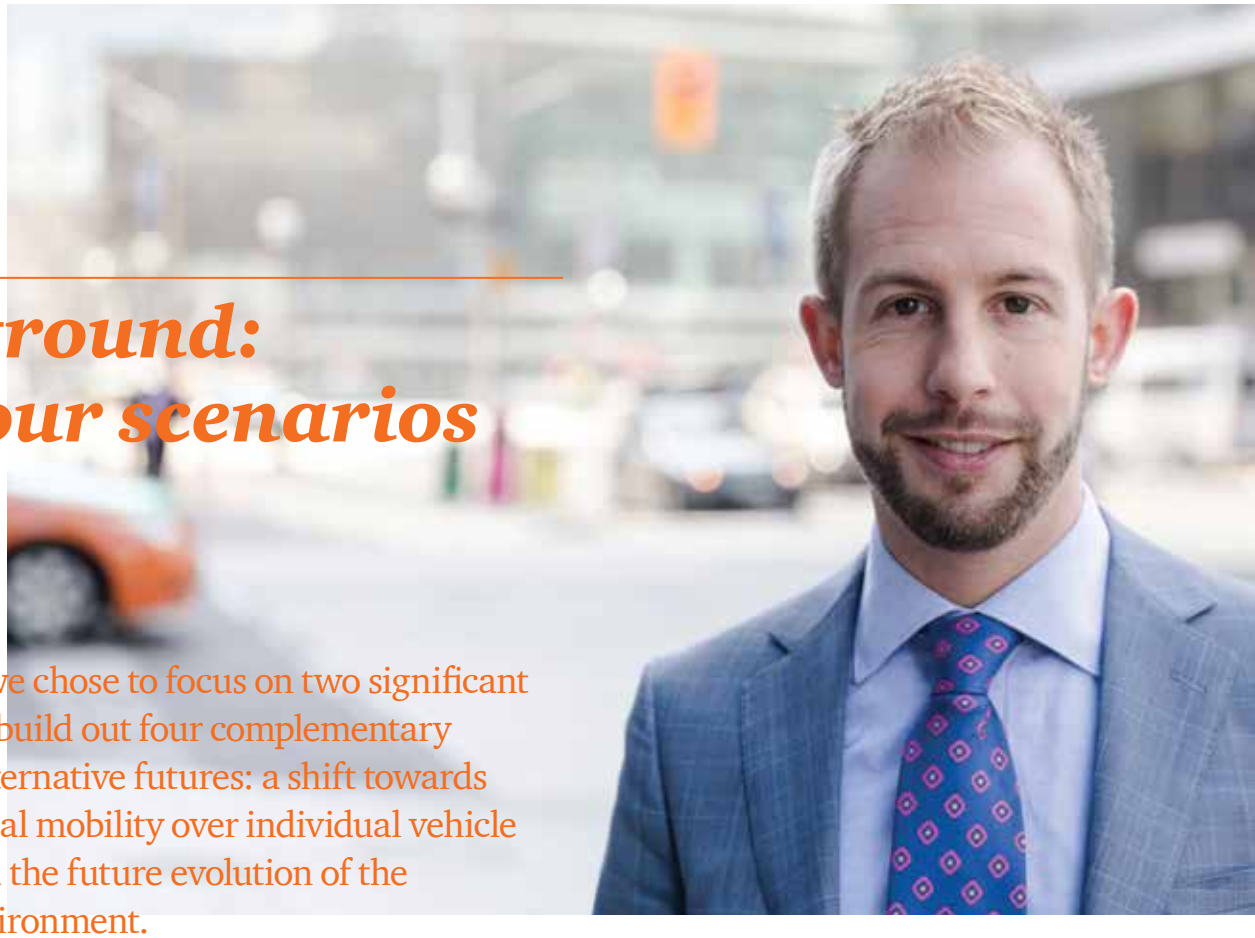
Rick Hanna
Global Automotive Leader
PwC US

Felix Kuhnert
European Automotive Leader
PwC Germany

Hitoshi Kiuchi
Asia-Pacific Automotive Leader
PwC Japan

What's your perspective?

Are you taking action to get your company ready?



Background: why four scenarios

In this paper, we chose to focus on two significant dimensions to build out four complementary scenarios of alternative futures: a shift towards valuing personal mobility over individual vehicle ownership and the future evolution of the regulatory environment.

Why these two? Because both will have a profound impact on how the automotive industry develops in the future – and both are still unfolding.

Changing attitudes towards car ownership

Customer behavior is at the heart of automotive sales, so how consumers view cars and mobility more generally will shape the future of automotive demand. But whether or not they will abandon individual ownership in favour of what some observers call mobility on demand remains to be seen.

For baby boomers in many mature markets, owning a car was an important milestone in reaching adulthood. Cars have also been important status symbols. But for the generation born after 1980, sometimes called 'millennials' or "digital natives", that's changing. The average age of acquiring a driver's license has gone up in the US[1] while in Germany the percentage of 18-35 year olds with a license has gone down.[2] Instead of cruising main street in cars, today's teens are texting each other or interacting on social media. Older consumers are using digital extensively too. With owning a car less likely to be seen as a functional necessity, the emotional appeal becomes ever more important.

Many consumers are accustomed to using phone and tablets to meet their needs – so calling up a ride or looking for an available vehicle on an app may feel like the logical next step. That's especially true in urban environments where the next shared car or ride may be only steps or minutes away.

The impact is already starting to be felt. There were nearly 5 million people using car-sharing models by the end of 2014.[3] And in addition to traditional fleet-based car-sharing models such as ZipCar or Car2Go, where you pick up a car at a lot or find a parked car with an app, ride-sharing services like Uber and Lyft are taking off in some markets. What we call ride-sharing services differ in that cars are still owned by individuals, who offer a service similar to taxis when they have time.

1 Copeland, Larry. "Many teens taking a pass on a driver's license," USA Today, December 4, 2013, http://www.usatoday.com/story/news/nation/2013/10/13/teen-drivers-license/2891701/

2 Deutsches Mobilitätspanel, http://mobilitaetspanel.ifv.kit.edu/64.php

3 Dr Scott Le Vine, Dr Alireza Zolfaghari, Professor John Polak. "Carsharing: Evolution, Challenges and Opportunities. September 2014. Accessed 27/08/2015, http://www.acea.be/uploads/publications/SAG_Report_-_Car_Sharing.pdf

Car-sharing and ride-sharing – not necessarily demand killers

Let's say both car-sharing and ride-sharing expand significantly– a possible future we explore in two of our scenarios. Most conventional discussion of these trends suggest that growth in car-sharing will have a significant negative impact on new car sales. In 2012, for example, the Economist argued that every shared car could replace 15 individually owned cars.[4] More recently Gunnar Nehrke, of the Bundesverband CarSharing e.V. (bcs), Germany's national carsharing association, estimated that one car-sharing car could replace up to ten private vehicles.[5]

But what if, rather than blunting primary demand, car-sharing and ride-sharing might actually **increase** it? Forecasting the possible impact on primary demand of increased use of personal mobility platforms is complicated, since how drivers use their cars may change too, as John Sviokla, Global Head of Thought Leadership, points out. But Autofacts Lead Analyst, Christoph Stürmer, sees room for optimism (see *Debating the impact – PwC views on car-sharing*). While individuals using the service may choose not to buy cars, Uber drivers or fleet operators still need to replace cars that wear out. Expansion of ride-sharing schemes reflects continuing demand for individual mobility – and that could mean a much more positive outlook for the industry.

Regulation has had a profound impact on the industry

Governments around the world have long had a significant influence on the automotive industry. Regulation around safety, as well as end-of-life disposal and emissions requirements have shaped product development, while labour regulation impacts production standards. Trade and financial regulations affect the flow of cars from factories to markets, and the decisions on where factories of car makers and suppliers are located. During the financial crisis, some governments even passed regulation to support the industry by offering taxpayers a credit for turning in older vehicles and buying a new car.

Another big impact has come from regulation around average fleet fuel efficiency, like the corporate average fuel economy (CAFE) requirements that the US government is phasing in, which are matched by the CO2 regulations in Europe and top-runner requirements in Japan, as well as similar restrictions in numerous other markets.

Open markets are critical to the future outlook

Local regulation on foreign participation, joint venture structures and market access has a profound influence on how global automotive companies participate in growing markets like China, Brazil and Mexico.

While strong growth is just the "good side" of high volatility, the automotive industry has relied on increasing demand in those markets for over ten years now. Automotive sales growth in some of these markets has slowed in 2015, but the long-term prospects remain strong. For example, Autofacts still forecasts 4.4% CAGR for China from 2016-2021.[6]

And China's importance for the automotive industry goes well beyond domestic sales. Many automakers are looking to gain economies of scale/ proximity by fulfilling the intense local demand from local factories, but also by using China as an assembly hub for Asia. More cars are now assembled in China than in any other single country in the world. We expect that to continue in the near term. In 2014, around a third of the automotive brands produced within China were foreign / non-domestic. However, they accounted for almost 57% of light vehicle assembly.[7] And automakers are locating R&D facilities there too. If China changes its current rules for foreign companies, the impact on automotive companies will be profound – whether the changes are in the direction of more liberalisation or more restrictions.

In 2012, Brazil introduced a 30% increase in industrial taxes (IPI) on vehicles. At the same time, Brazil also announced "INOVAR-AUTO", regulation intended to increase fuel efficiency, regional content, local manufacturing and investment in local R&D and engineering by offering reductions in the IPI to manufacturers who met certain percentage targets in at least three of the four areas. Following this change, the Brazilian automotive industry took a nosedive and has been unable to attract new investment. That may in part have been due to timing – Brazil's new rules came into effect right before a massive economic slowdown in the country. Still, the sudden conversion of Brazil from a fairly open market into a fully-protected and closed economy has throttled off a significant part of the growth prospects. The degrading of the country's rating may lead to higher interest rates, further weighing on economic recovery and growth.

China's slowing but still growing

4.4% CAGR

2015 – 2021 (forecast)

Source: PwC Autofacts

4 "Seeing the back of the car," The Economist, September 22, 2012, accessed Oct. 22, 2014, http://www.economist.com/node/21563280/print, © The Economist Newspaper Limited, London (2012).
5 Geiger, Thomas. "Neue Ideen zum Teilen von Autos," Hamburger Abendblatt, August 15, 2015.
6 Autofacts, Analyst Note September 2015.
7 Autofacts Forecast Release 2015 Q3

Governments will shape technological uptake

Technological advances around autonomous driving features/vehicles, electric vehicles, vehicle connectivity and in-vehicle information and entertainment have the potential to transform the driving experience. But how all of these factors develop will be profoundly influenced by the extent to which governments regulate these technologies – or choose to encourage them through subsidies or other incentives.

While self-driving cars get most of the media coverage, there are a whole range of technologies around driver assistance which are already available or close to ready, including cars which can automatically speed up or slow down during traffic congestion or parallel park automatically. OEMs have also significantly ramped up development of safety technologies, including collision avoidance and emergency call systems.

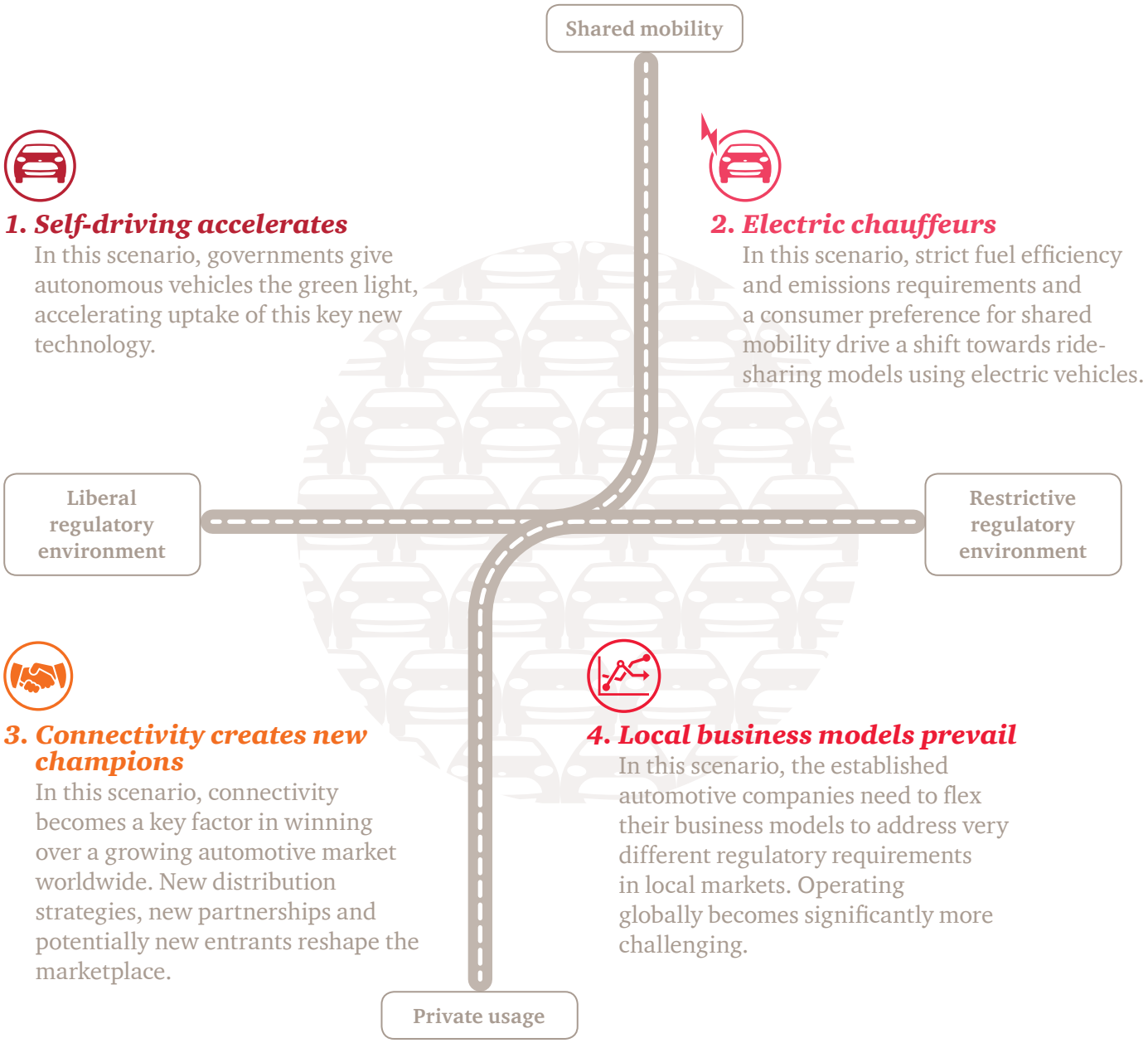
Currently such systems are a potential source of revenue for OEMs, together with a range of other connected technologies such as entertainment, home integration and mobility management. This year's Connected Car Study forecasts a total market of 122 billion Euros for the full range of technologies, with autonomous driving and safety leading the way.[8]

One of the biggest wildcards around these opportunities is the regulatory environment. Some technologies may become required – potentially adding cost to car prices if automakers have to include as standard options. In the US, for example, the National Highway Traffic Safety Administration (NHTSA) is working with the Department of Transportation (DOT) on a proposal to require vehicle to vehicle equipment in new vehicles.[9] These systems are designed to help avoid collisions. And eCall, an emergency call system similar to GM's OnStar technology in the US, will become mandatory for all new models of cars and lightweight commercial vehicles in the EU beginning in April 2018.[10]

Other technologies, like on-board entertainment systems that connect with smart phones or social media, will also be shaped by how specific regulations around driver distraction unfold.

8 Strategy& (a PwC network business) Connected Car Study 2015
9 http://www.nhtsa.gov/About+NHTSA/Speeches,+Press+Events+&+Testimonies/remarks-mr-automated-vehicles-07212015
10 http://ec.europa.eu/digital-agenda/ecall-time-saved-lives-saved

The scenarios:
Four possible visions of how the future may develop over the next five to ten years.



1. Self-driving accelerates

In this scenario, governments give autonomous vehicles the green light, accelerating uptake of this key new technology.

2. Electric chauffeurs

In this scenario, strict fuel efficiency and emissions requirements and a consumer preference for shared mobility drive a shift towards ride-sharing models using electric vehicles.

3. Connectivity creates new champions

In this scenario, connectivity becomes a key factor in winning over a growing automotive market worldwide. New distribution strategies, new partnerships and potentially new entrants reshape the marketplace.

4. Local business models prevail

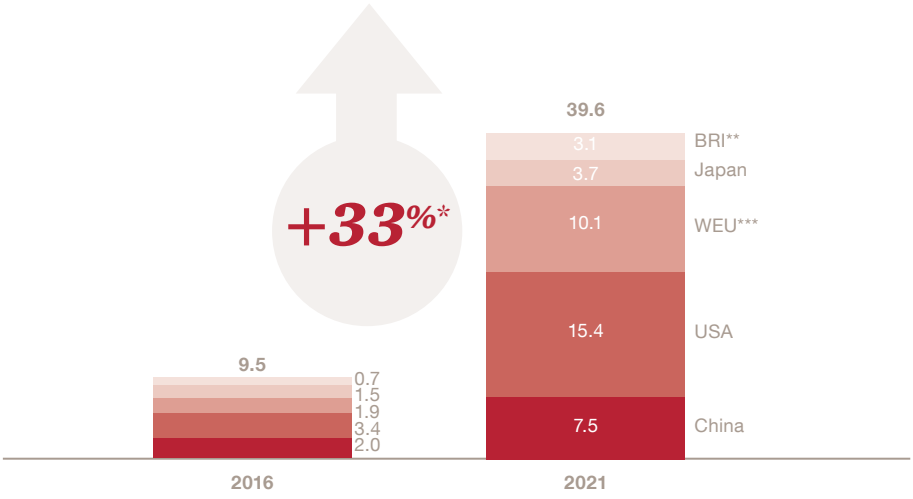
In this scenario, the established automotive companies need to flex their business models to address very different regulatory requirements in local markets. Operating globally becomes significantly more challenging.

1.

Self-driving accelerates

In this scenario, the regulatory environment is favourable to automotive companies. In addition, many potential car buyers opt instead to use either a fleet-based car-sharing service or a ride-sharing service. What ***might*** happen in this environment?

Figure 1: Autonomous driving revenues in major markets are projected to increase
Market potential in Bn.€



Source: Strategy& (a PwC network business) Connected Car Study 2015
*CAGR
**Brazil, Russia, India
***Western Europe

Autonomous driving advances will accelerate as governments give these services a green light and work together with car-makers and academics to ensure safety. Current estimates of autonomous driving market potential (see Figure 1) will be met or exceeded.

Technology companies will eye the automotive market as they continue their own research and new partnerships may emerge. Securing a clean safety record for autonomous vehicles will be a primary focus.

In markets like Germany or France where fleet-based car-sharing services dominate, sales to fleet operators may become more important, with sub-compact, compact and mid-size vehicles and more standard packages most prevalent. Proliferation of ride-sharing services in other markets like the US leads to driver-owners 'trading up' to luxury categories over the short-term.

Competition between sharing models will be fierce

Consumers will have choices, as rental car companies, greenfield upstarts, and OEM's own sharing start-ups battle it out to win loyalty for their car-sharing offerings. Vehicle brands, freshness of fleet, extra features, and superior technology and coverage will all be factors in winning consumer loyalty. In these markets, shared mobility may decrease the number of vehicles in operation, but would tend to increase demand for new vehicles due to shorter holding times and faster wear.

In markets where ride-sharing predominates, there may be significant competition between two or three ride-sharing services. A new technology entrant could also become a big player, especially once autonomous car technology advances enough to make driverless services a viable alternative to current ride-sharing models.

Portrait of the customer

Urban millennials, who value convenience, immediacy, and connected technology, drive early adoption of the personal mobility model. They get much of their sense of status and freedom from social media, expect their transportation to connect with their personal technology, and welcome autonomous driving solutions that give them time to work, socialise or relax during their trip.

Government/ Regulation
Governments support further testing and introduction of self-driving cars.

Distribution
Sales direct to shared car fleets and operators become more important in some markets

Competition
Brand loyalty shifts to car-sharing or ride-sharing platforms; players in other industries look to enter the market

Production
Solid sub-compact, compact, mid-size and luxury platforms needed to meet diverse demand

Customer
Millenials demand better connectivity; technology becomes key differentiator

How you can get ready

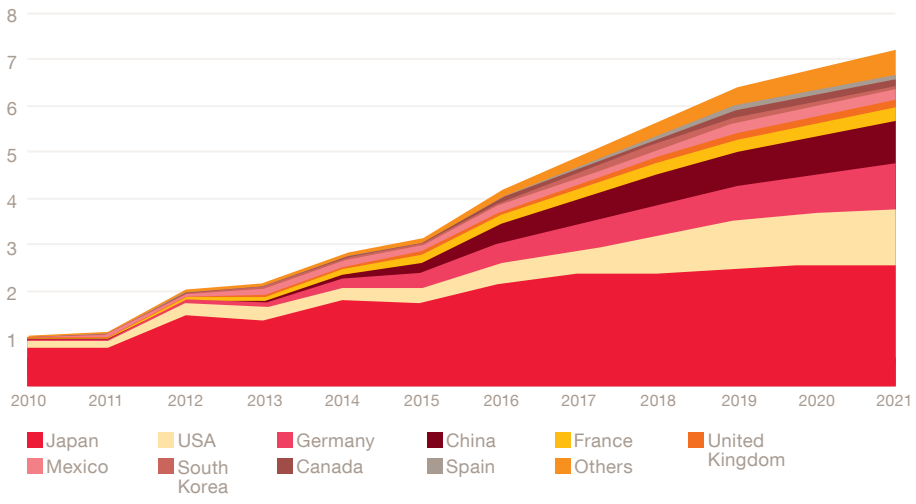
- Evaluate your ability to develop autonomous driving technology and if necessary establish appropriate partnerships
- Consider whether your capabilities support developing your own mobility service offerings or partnering with car-sharing businesses
- Understand car-sharing and ride-sharing regulations and how they impact products and services
- Consider how car-sharing and ride-sharing impacts your supplier relationships and value proposition for customers
- Prepare for developing operations in China, Brazil and other markets across manufacturing, technology, and car-sharing; identify partners that best fit and extend your capabilities

2.

Electric chauffeurs

In this scenario, a restrictive regulatory environment and a stronger preference for shared mobility combine. What ***might*** happen in this environment?

Figure 2: Projected Electric car production by country
2014 – 2021 (Millions)



Source: Autofacts 2015 Q3 Forecast Release
*Includes BEV, Hybrid, Fuel Cell

Strong government regulation around fuel efficiency and emissions leads to an increased focus on electric vehicles. Many potential car buyers use a ride-sharing service instead of buying their own car. Such services are strictly regulated, similar to today's taxis. In these markets, shared mobility would decrease the number of new car sales, as vehicles would be operated like commercial goods, extending their lifespan mileage to maximise investment return. Cars are required to have safety and well-being features, like collision prevention, danger warning signals, emergency call functionality and fatigue protection, increasing the market for these services.

Electric vehicles increase in sales, especially in markets with stricter emissions regulation and in mega-cities. Current electric vehicle consumption increases dramatically in a wide range of important markets (see Figure 2). New financing models for electric vehicles and batteries may emerge. Vehicle management products – functionalities that support the driver to minimise vehicle operating cost and increase comfort of usage – increase in importance. New players with strategies for better using vehicle data are able to capture some of this market.

Somewhat more restrictive policies in China reduce foreign-brand competition in its auto industry, together with similar policies in other major markets like Brazil. Governments are reluctant to allow autonomous vehicles, with the technology restricted to mere auxiliary functions.

Leveraging large platforms gets tougher

In this scenario, global OEMs and suppliers have trouble achieving sufficient market volume; overcapacity leads to price pressures. Fewer markets across which to amortise global platforms requires leaner operations that are also innovative, especially for the burgeoning car-sharing and ride-sharing markets.

With fleet-based car-sharing and driver-owned ride-sharing services developing different levels of market share across geographies, OEMs are forced to develop models which meet very different demand patterns, again making it more difficult to leverage large platforms.

Within China there may be pressure to develop 'national champion' OEMs capable of meeting China's domestic needs. An emerging Chinese OEM might use state-owned investment funds to buy technology-rich foreign automotive suppliers who are hit hard by the decrease in volume globally.

Portrait of the customer

Municipalities become key customers, as the benefits of integrating domestic auto capabilities with urban development include optimising and building-in electric vehicle infrastructures that help achieve emissions targets while accelerating affordability. Shared fleets become core instruments of implementing new traffic management technologies as well.

Government/ Regulation
Regulation on emissions and fuel efficiency pushes adoption of electric vehicles

Distribution
Preferred fleet and/or ride-sharing platform partnerships mandatory for OEMs

Competition
Overcapacity in many markets

Production
Significant price pressure leads to leaner operations, large-scale platforms hard to implement

Customer
Innovative business models needed to address diverse customer needs

How you can get ready:

- Understand car-sharing implications including parking, liability, and insurance, and how they impact products and services
- Focus on services/features likely to increase in importance like safety and vehicle management
- Consider market restriction implications for localisation of business, such as partnering, joint ventures, joint operations, product licensing.
- Pursue design innovations to create vehicles fit for short-journey usage, with extra luggage capacity etc.

Debating the impact – PwC views on car-sharing

Two assumptions are often made about car-sharing: that it will be good news for city governments and bad news for the car manufacturers, but are these really true? We asked John Sviokla, Global Head of Thought Leadership and an expert on industry transformation, and Christoph Stürmer, Global Lead Analyst of Autofacts, to share their thoughts.

How do you think increased uptake of shared mobility will affect vehicle demand?

John: I think shared mobility is going to negatively influence primary demand in the near term as the current inventory of cars is used more. The first thing we have to be clear about is the difference between car-sharing, where a third party owns the vehicle and you get to use it when you need it, and ride-sharing, which is much more like the taxi or Uber model. The implications of those two models on demand is different, because the ownership of the vehicle is different. I would argue that in a ride-sharing model, you will see the people using the service choosing not to buy cars, or at least reducing the number of cars per family. And you are going to see utilisation rates go up significantly. Those two factors together will decrease demand in the near term.

Christoph: I agree that there is a strong potential for better utilisation – but I'd argue that if you use a car twice as much, you also need to replace it twice as fast. So reduced demand from ride-sharing users is going to be made up by greater demand from ride-sharing drivers.

John: Possibly, but the average number of miles cars actually get driven could go up a lot if they were driven 200,000 miles in the first 5 to 7 years, instead of over 14 or 15 years. So increased efficiency would mean you wouldn't need to replace the car twice as fast, because you would get more use out of the car.

Christoph: If that means that cars would actually be driven more than the above 200,000 miles over their lifetime, I agree that it may reduce replacement demand. But let's also look at fleet-based car-sharing. In the Zipcar model, you have increased wear-and-tear from drivers who don't own the vehicle. We can anticipate that pretty accurately from how drivers treat rental cars. In addition, there would be competition between fleet operators on who offers the freshest and most attractive fleet, further reducing use time and increasing replacement speed. There are manufacturers that definitely take an optimistic view on how shared mobility will affect them.

John: I do think there will be some manufacturers who will benefit from car-sharing, but for a slightly different reason. I think that the primary effect in the developed world will be to encourage people to buy a better car – think about Uber drivers, for example. So, I believe there will be a shift towards the luxury end. It'll be mid-level cars that will have a hard time. If I were a premium or luxury carmaker, I would be optimistic.

Do you think governments view car-sharing realistically?

Christoph: Many city governments are looking at car-sharing as a way to reduce traffic congestion. Unfortunately, that's not necessarily accurate as long as people still favour individual mobility over mass transport. There have already been examples which suggest that increased shared mobility actually increases the total number of cars on the road. Car-sharing and ride-sharing does increase utilisation, and that certainly decreases the number of cars that are parked at the side of road at any time. The more speedy replacement of shared cars can also help governments reduce fleet emissions, if they want to promote electric vehicles or certain fuel efficiency standards, for example.

John: I think it will be interesting to see how the regulatory scene and consumer behavior develops. Because ride-sharing increases the primary demand for personal mobility, it may increase demand for cars in the longer term after car inventory is at a new utilisation and productivity rate. Two big questions for me are: will consumer behavior change and we'll see more people pile into the same car for ride-sharing? – if so, demand will decrease. And will we have municipal governments use taxes on shared mobility platforms to finance public transit options, again putting pressure on demand?

Christoph: Government finances may really play an important part in how the modal split between individual mobility and mass transport develops. We may see cash-strapped cities looking to car-sharing and ride-sharing as a way to avoid making investments in infrastructure for large-capacity transit projects, or reduce the necessary investment by making more options available to cover off the "last mile". This may mean a net increase in demand for autos, and a negative effect on congestion.

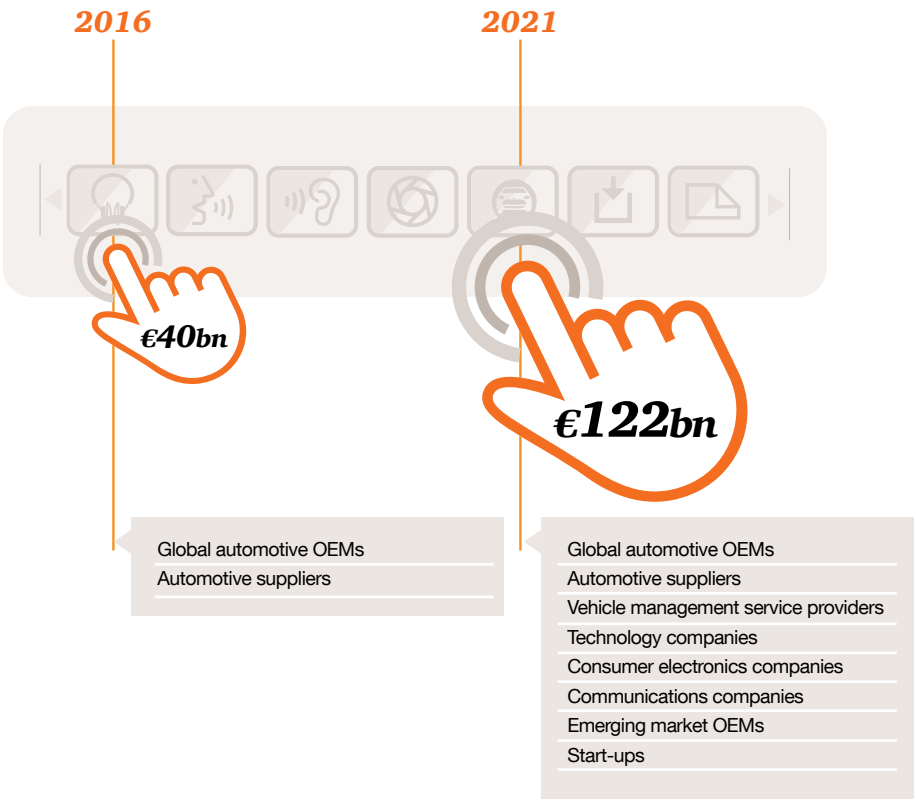
3.

Connectivity creates new champions

In this scenario, regulatory policies continue their current trajectory or liberalise, while car-sharing and ride-sharing remains a niche too small to reshape the auto market. It is the closest to the current status quo. What ***might*** happen in this environment?

Figure 3: Connected Car revenues are forecast to increase – but competition is growing too

Projected revenues from Connected Car products for passenger cars excluding light commercial vehicles



Source: Strategy& (a PwC network business) Connected Car Study 2015

Key markets like China and Brazil stay open or relax their current policies. Growing automotive companies look to compete on the world stage as they look to build global platforms and attract the talent and capital necessary to develop better software and innovate rapidly.

This scenario could provide opportunities for Chinese automakers to build on their existing high-growth business models and role them out globally, competing head to head with global manufacturers of small to midsize vehicles.

The global automotive market further evolves into an innovative cluster that includes technology companies. The full range of connected car products provides significant incremental revenue potential (Figure 3) which will be split across the automotive value chain – including with new technology players able to offer some types of services directly and innovate more quickly.

Potential is greatest in the premium segment, where car buyers are willing to pay for packages featuring connected products and services.[11]

Car buyers expect extensive information to be available online; in the US, more liberal policies allow the expansion of direct sales, creating a challenge to existing dealership models.

Foreign OEMs are careful about the level of access they provide joint venture partners to rapidly advancing technologies. With new innovations needed to compete in their target markets, tighter technology integration and export aspirations make them more protective of advanced intellectual property.

Improving cybersecurity capabilities is also critical to winning in this scenario; here, too, partnerships with innovative new entrants from the technology sector could become the norm.

Portrait of the customer

Millennials in both urban and rural settings have become more receptive to owning cars as they enter the child-raising years. They form the global market core. Most educate themselves and narrow their car-buying decision on the internet before contacting a dealer – and many are open to the idea of ordering a car online.

Government/ Regulation
Governments favour open trade policies; restriction on foreign ownership or sales relax

Distribution
Dealerships become multi-branded "experience centers" to compete with online sales

Competition
Technology companies look to enter the automotive value chain as suppliers or providers of ancillary services

Production
China increases exports of Chinese nameplates to other markets

Customer
Many customers base buying decisions on internet research; customer expects companion capabilities

How you can get ready:

- Look outside traditional car companies for partners that fit and extend your capabilities
- Prepare for joint ventures in China across manufacturing, technology, and car-sharing; identify partners that best fit and extend your capabilities system
- Assess global markets outside China; consider where Chinese OEMs would be most competitive and how that impacts your product and service offerings
- Review opportunities to enhance brand strength in emerging markets; what are the new expectations for capabilities, products and services?

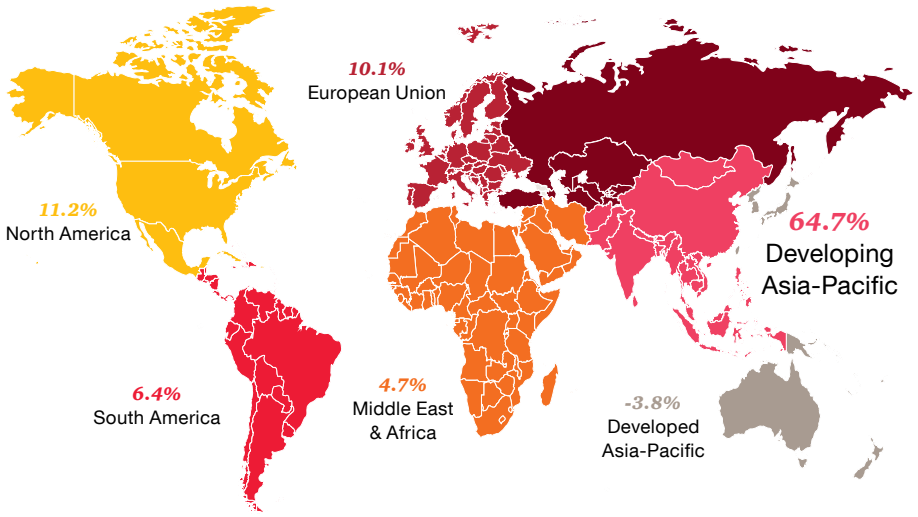
11 Strategy& (a PwC network business) Connected Car Study 2015

4.

Local business models prevail

In this scenario, car-sharing remains a small niche while government policies become more restrictive. That could include reduced access to the market in China and other countries, prohibitions on autonomous vehicles, and more stringent fuel economy and emission requirements. What ***might*** happen in this environment?

Figure 4: Regional Contribution to Growth 2014 – 2021 (Percentage share)



Source: Autofacts 2015 Q3 Forecast Release

In this scenario a restrictive regulatory environment decreases global companies' access to key markets, including China and some other growing emerging markets. Reduced sales growth in key markets like China make it difficult to keep plants running at full capacity in other parts of the world. Those markets which do stay open such as India do so under strict government requirements, for example by mandating infrastructure investments from participating companies. The currently forecast growth in new assembly volume in developing Asia-Pacific (Figure 4) shifts to supplying domestic markets.

Vehicle offerings become strongly regionalised. Automotive companies operate regionally and tailor product development and distribution to the individual needs of local markets. Due to the strong regionalisation, the use of global platforms becomes increasingly unpopular, ultimately increasing the overall cost level of cars and hindering the introduction of conceptually new technologies.

More stringent fuel economy and emission requirements encourage further development of electric vehicles, but these are primarily sold to individuals rather than fleets. Electric car design becomes significantly more creative, with a wide range of designs available. In both electric vehicles and internal combustion engine vehicles alike, the trend towards greater customisation and more features intensifies.

Millenial consumers, born after 1980, take greater interest in car ownership as more start raising families. These digital natives form the core of automotive sales, but their preferences and purchase habits vary widely across regions. Social media increases in importance as the primary way to build and maintain relationships with car buyers. Automakers that are able to enhance their brand and develop strong, locally tailored interactions on social platforms have a competitive advantage.

Portrait of the customer

Millenial consumers, born after 1980, take greater interest in car-buying as more start raising families. These digital natives form the core of automotive sales, but their preferences and purchase habits vary widely across regions.

Government/ Regulation
Governments look to automotive companies to help fund infrastructure

Distribution
Distribution strategies vary greatly in specific countries

Competition
New innovative local players challenge global incumbents

Production
The importance of global platforms decreases as production is regionalised and tailored to local emissions and safety requirements

Customer
Customer preferences are strongly shaped by local cultures and social media becomes more important

How you can get ready:

- Fully understand possible regulatory developments in the markets in which you operate and how these could impact your business
- Consider the impact of a more decentralised operating structure on your business
- Make sure that country and regional operating units are staffed locally and can respond quickly to local preferences

Concluding thoughts: Navigating uncertainty

If the market turns away from private usage in favour of lower-cost, higher convenience alternatives for personal mobility, car manufacturers and their suppliers will need to fundamentally re-think their business models.

Regulatory trends will be equally important to the industry's future. Succeeding in emerging markets, especially China, will be critical for obtaining capital to compete globally and achieving economies of scale. If emerging market policies favor open competition, today's leading manufacturers can reinforce their global positions in the future. More restrictive policies could lead to a localisation of business models. And how technological advances unfold depends a lot on governments around the world too.

Together, these factors will translate into a wide range of further impacts on everything from talent strategies to the innovation focus. Our follow-up articles on automotive industry transformation will address some of these specific issues in more detail.

We believe that most of the automotive industry is currently planning their business around a set of assumptions that vehicle fuel efficiency will improve, driving will become partially (but not fully) automated, new applications and services based on the 'connected car' will expand, and alternative ways of providing individual mobility will grow, but only at a modest rate. They would also agree that most of these changes will be slow in the next ten years, but become increasingly dynamic after 2025. Autofacts' forecasts reflect these premises in detail.

This view of the future, which corresponds most closely to our 'Connectivity creates new champions' scenario, has its own challenges. As our analysis highlights, these conditions will create a favourable environment for new, significant entrants on the global automotive scene. Financially powerful companies will be tempted to venture into traditional automotive markets, squeezing margins and adding to the relentless competition for consumers' cash flows. While competition at the margins of the market – be it in very high-tech, luxury or regional niches – may remain largely unchanged, the battle of the large, scale-driven global manufacturers will both intensify and extend onto new fields of making money, like providing more extensive vehicle management and connectivity services.

Still, it's important to understand that there are some key assumptions about regulation and consumer behaviour underlying this view of the future, which relies on a scenario of mildly liberal regulation, and only hesitant adaption of new mobility models. While making consistent baseline assumptions can help companies focus their planning and use of resources, they run the risk of being blind-sided if the industry environment changes dramatically.

What does this mean for your business?

Become aware of the limitations of the underlying assumptions of your companies' business planning. Put your operations, competitive strength and business model to the acid test of completely different overall scenarios, and check if it will remain robust.

There are also some things you can do now to help cope with whichever scenario the future may bring. We believe every automotive company should:

- Understand and anticipate changes in emerging market customer demands and regulations; how do they change opportunities to create value?
- Check capabilities for competing effectively in China and other growing markets (allowing global competitiveness)
- Take a close look at your distribution strategy. Any of the four scenarios requires a specific sales strategy. Is your strategy flexible enough to handle sudden shifts between the scenario paths?

Given rapid change in the automotive marketplace, agility will also be a key capability. We see a 'need for speed' – companies must be able to change course to react swiftly as the industry is disrupted. That will impact the entire automotive value chain, from supply to distribution.

All four scenarios will provide more deep-rooted transformations than we are currently able to anticipate, as they inspire competition and customer demand to develop in sudden, complex shifts and transformations. Typically, a scenario analysis will underestimate the gravity of changes, but will overestimate their speed. It's also important to remember that the future may include elements of multiple scenarios at once.

So while this exercise can only give a few hints on where the industry might develop, there is ample room to discuss the implications for your specific business and operating model. Please get in touch with our specialists to continue these thoughts, identify the strengths and challenges of your company, and develop strategies to shape any upcoming future in the most favourable way.

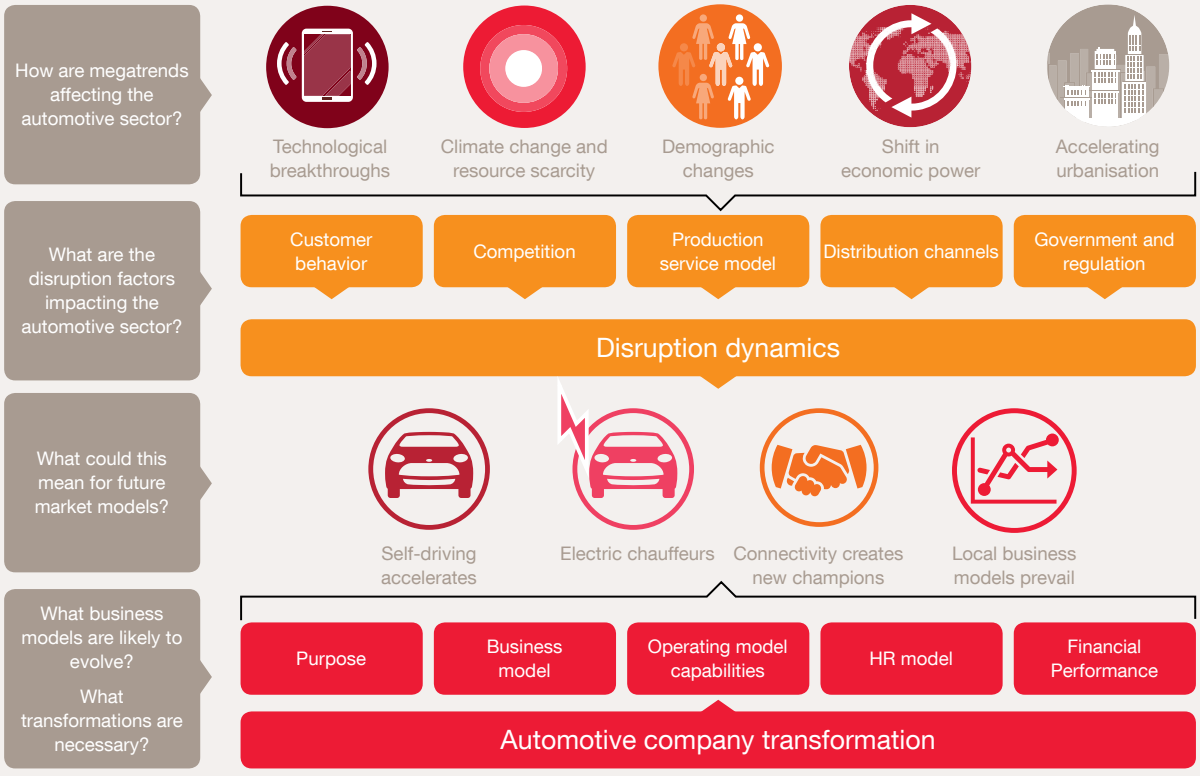
The bigger picture – a transforming world

Five megatrends – technological breakthroughs; climate change and resource scarcity; demographic and social change; a shift in global economic power and rapid urbanisation – provide the backdrop for many of the key uncertainties facing the automotive industry, including those that we've highlighted in our market scenarios. In fact, these megatrends are challenges for all businesses.

The uncertainties we explore in our scenarios are intimately connected with these trends; the shift in global economic power underpins China's growth. Rapid urbanisation makes personal mobility models viable, as population density increases and distances travelled drop. Demographic changes are having major impacts on consumer preferences. And technological breakthroughs are colliding with other megatrends to impact nearly every aspect of the automotive business.

For example, concerns around climate change and resource scarcity have contributed to regulation on fuel efficiency and emissions that is spurring on a whole range of technological breakthroughs, from improvements in materials to advances in electric vehicle technology.

PwC's work on transformation maps how megatrends may impact five key areas, providing an overview of the disruption dimensions shaping the automotive industry's future. In this paper, we've focused our attention on some possible future market scenarios. Future papers will take a closer look at how these will impact companies' business models and the capabilities they need to compete.



A sampling of how megatrends are affecting the automotive industry

Technological Breakthroughs

Technological innovation is at the heart of the shifts that are occurring in the automotive sector. Advances in electric vehicle technology, telematics and autonomous driving and related safety and driver assistance features are the most visible, but technology is transforming the production model as well. Consumers' technology preferences will have a major impact on future developments, but so will government regulations.

Technology companies are starting to participate in the automotive value chain and are likely to gain importance as they look to capture a share of the industry's profits.

Climate change and resource scarcity

Vehicle emissions have been a major target of efforts to reduce emissions. Government regulations around fuel efficiency and emissions are having a major impact on automakers's strategies. NO2 from diesel engines is becoming as important in cities as CO2 emissions. Further innovation will be competitively advantageous and may become mandatory as future regulations to protect people's health develop.Further innovation will be mandatory as future regulations develop.

Demographic change

Within the next minute the global population will rise by 145. By 2025, we'll have added another billion people to reach about eight billion. Explosive population growth in some areas set against declines in others makes for very different automotive market growth potential in different parts of the world.

Automotive companies will need to respond to the needs of different demographic segments, such as ageing populations in markets like Germany. Production will also need to be increasingly flexible, to respond quickly to changes in consumer needs.

Shift in global economic power

China has already become the world's largest automotive market and largest assembly location; the level of growth there and future government policy decisions will have a major impact on automotive companies. Consumer preferences in China will also influence car design globally.

Other emerging markets like India, Brazil, and Indonesia will also become increasingly important car markets in their own rights.

Policy decisions on how open trade markets should be will have a significant influence on the sector.

Accelerating urbanisation

By 2050, the urban population will increase by at least 2.5 billion, reaching two-thirds of the global population.

Fast urban expansion will have a profound impact on automotive markets, as traffic congestion becomes an increasing issue, potentially leading to city-level regulations that add complexity for automakers.

Urban environments make car-sharing and electric vehicles infrastructures more practical and may have a significant impact on how future mobility solutions develop. With space at a premium in highly developed areas, potential car-buyers may also shun ownership due to lack of parking.

Let's continue the conversation

Rick Hanna
Global Leader Automotive
PwC US
T: +1 313 878 8754

Felix Kuhnert
European Automotive Leader
PwC Germany
T: +49 711 25034-3309

Hitoshi Kiuchi
Asia-Pacific Automotive Leader
PwC Japan
T: +81 80 3158 6934

About PwC's Automotive Practice

PwC's global automotive practice leverages its extensive experience in the industry to help companies solve complex business challenges with efficiency and quality. One of PwC's global automotive practice's key competitive advantages is Autofacts®, a team of automotive industry specialists dedicated to ongoing analysis of sector trends.

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About Autofacts®

Autofacts is a key strategic asset of PwC's global automotive practice. Fully integrated with PwC's more than 4,800 global automotive professionals, Autofacts provides ongoing auto industry analysis our clients use to shape business strategy, assess implications and support a variety of operational decisions. The Autofacts team also draws from the strengths of PwC's marketing, sales and financial services groups to support other key areas of automotive companies' functions. Since 1985, our market-tested approach, diverse service offerings and dedication to client service have made Autofacts a trusted advisor throughout the industry.

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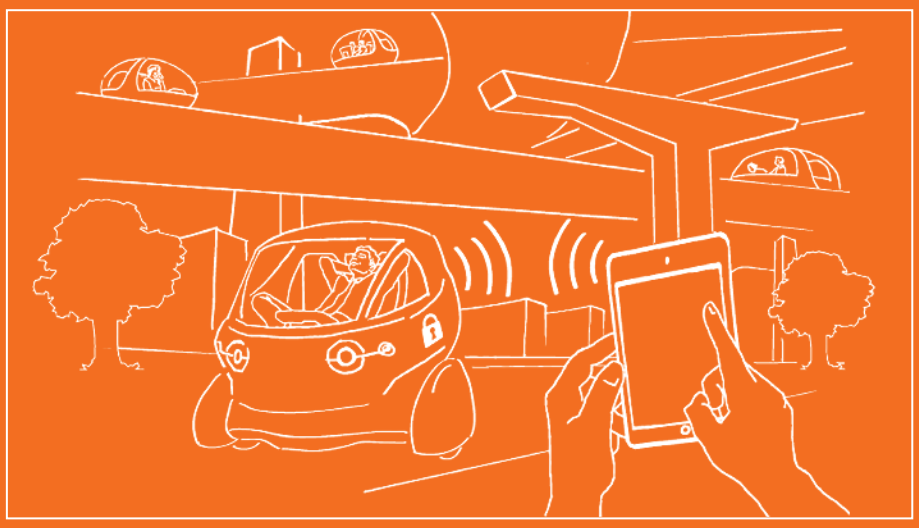
Related reading

The Connected Car Study 2015 - Racing ahead with autonomous cars and digital innovation is our fourth annual study of networked mobility trends. Automotive industry specialists from PwC's Strategy& and Autofacts conducted the study together with the Center of Automotive Management. The study analyses the product portfolios of the world's leading OEMs and suppliers and tracks research and development pipelines and trials to determine the current development status of connected cars. We foresee annual sales of connected car technologies tripling to €122 billion globally by 2021, driven not only by demand for connected car components, but also by the rise of entirely new digital business opportunities.



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