THE OLIVER WYMAN
AUTOMOTIVE MANAGER

SEEKING DIGITAL OPPORTUNITIES

Dear Readers,

Now that "digital" and "big data" start to be established in business reality, automakers need to figure out how to use them to create value. This task is not straightforward. But there are some rules of thumb, and this edition of Automotive Manager outlines a number of ways in which new technology can be turned into new business.

First, the digital car will not be completely different from a regular car, at least not initially. Instead, it will be a car with digital features that augment its safety, drivability, and economy. So, automakers need to focus on specific ways in which digital improvements can bring about concrete, incremental increases in value.

Second, the impact of digital will go beyond features added to the car itself. Business relationships – whether with customers or suppliers – have traditionally been considered a purely human affair. But digital technology can help both sides of these relationships get to know each other better. It can make their interactions smoother, and it can be a source of new types of service.

Normally when digital technology transforms an industry, we talk about it being disrupted. Automakers, however, are not remaining passive: They are determined to carry out some of the disruption themselves, by investing heavily in new technology such as self-driving systems. They are also competing hard with each other in a parallel disruption – electric vehicles – which will change the way cars are manufactured, and have knock-on effects for businesses such as gas stations.

However, some of the technology will come from outside the industry. Digital giants have been piling into the automotive sector, developing autonomous driving software and mobility services, for example. Investment is flooding into digital startups. Automakers, as mentioned in the Cover Story, need to figure out what to develop in-house, and when to work with outsiders.

This is one of the most exciting times in the auto industry for decades, perhaps for a century. Success – and possibly survival – depends on being nimble, flexible, and imaginative. My hope is that the Automotive Manager will provide you with insights towards meeting the challenges of the future.

Best regards,

AUGUST JOAS
Partner, Head of Automotive Sector

CONTENTS

FINDING THE FISH IN AN OCEAN OF DATA

The automotive industry needs strategies for managing and monetizing big data

As everything in the auto industry – from customer needs specification to vehicle maintenance – develops a big data angle, it has become obvious that digital capabilities are the key to future value creation. But there is less certainty about how to succeed in the digital future.

AUGUST JOAS
MATTHIAS BENTENRIEDER
JUERGEN REINER
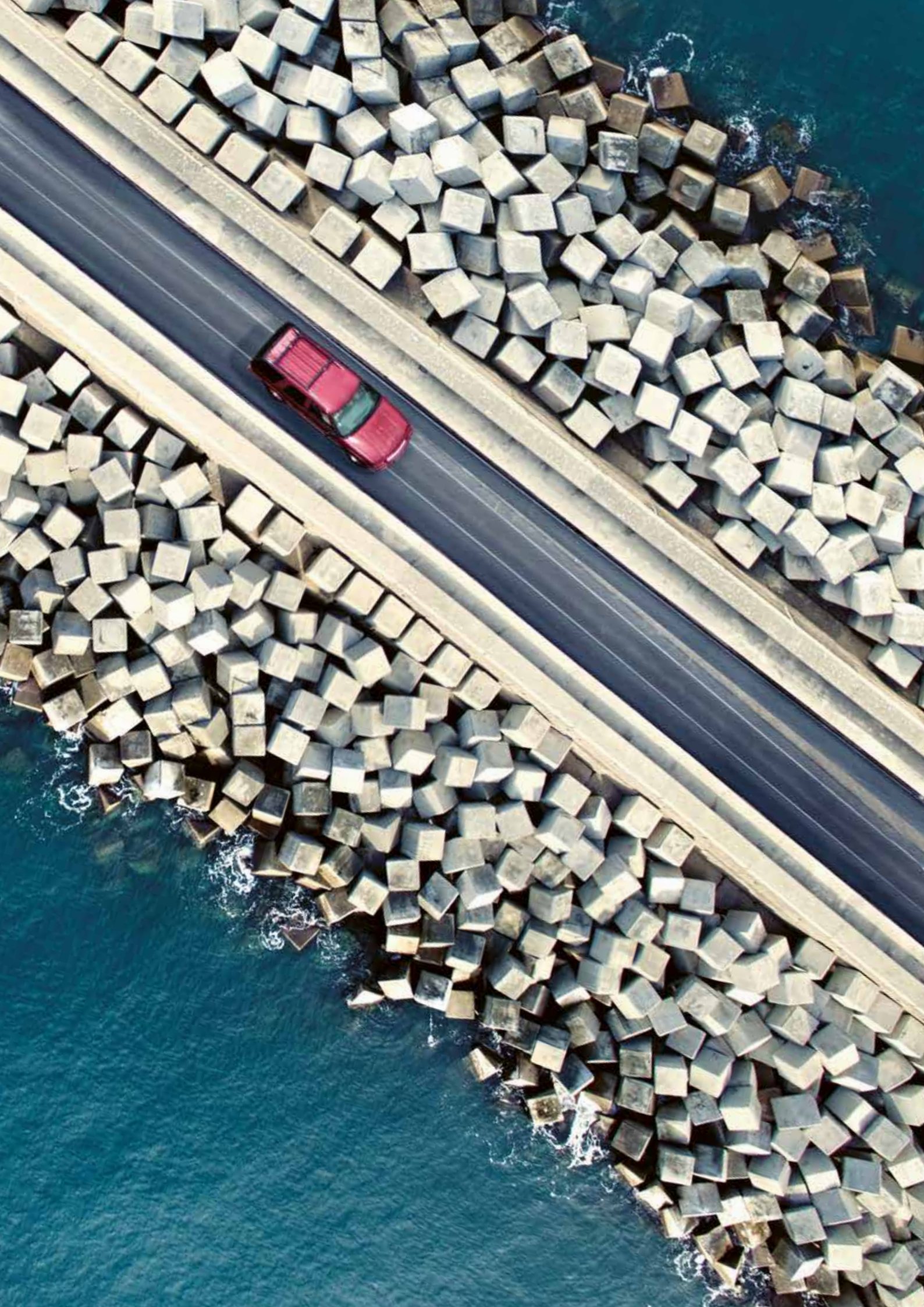
Material for the next stage in the industry's evolution is arriving in the terabytes of data generated by cars, drivers, manufacturing plants, and the entire automotive ecosystem. Players have started to consolidate oceans of data – the next step will be to go fishing. For that, they will need nets: practical, big data applications for their daily businesses. The revenue of big data and business analytics will grow from $130.1 billion in 2016 to more than $203 billion in 2020. That will mean quickly developing the capabilities and infrastructure to process and use the wealth of available data. As of now, however, the creation of value from big data is often not fast enough.

So, the automotive industry's biggest challenge is how to turn big data into valuable data – and make money out of it. The "fish" that are caught in these big data nets may include insights that result in higher revenues, lower costs, or contributions to higher profit margins. However, there is no magic wand. Smart data solutions call for hard work – and they will depend on the specific opportunities in different parts of the automotive value chain.

Most importantly, automakers need to focus on areas where they can start to generate incremental value. Then, once they have developed the capabilities to process data and extract value effectively, they can target large, disruptive value pools. The next stage is to figure out how best to do this. In some cases, the fastest way may be to recruit digital specialists – whether from within the firm or from the outside – but mostly they will have to train personnel in-house. The digitization of the auto industry is going to happen fast, and not having the right staff could result in lost time, as rivals rush out new innovations.

Fundamentally, there are three work streams to create value from big data:

- Use cases: Where to find and exploit the value for the business
- Data management and IT: How to analyze and process data with smart IT solutions
- People and organization: How to develop and organize the required resources

START WITH USE CASES

The first step is to identify the really significant use cases where big data and digital technology could create value for the end customer. Consider, for example, an interaction of the sales and used-car businesses: A driver might be ready to sell their existing car and buy a new one. This could mean both a new-car sale for an automaker and business for its used-car unit, including financing and maintenance services. To come up with the best offer for the driver at the best time requires a range of data on the condition of the existing vehicle, the used car market, and the driver's preferences and buying habits.
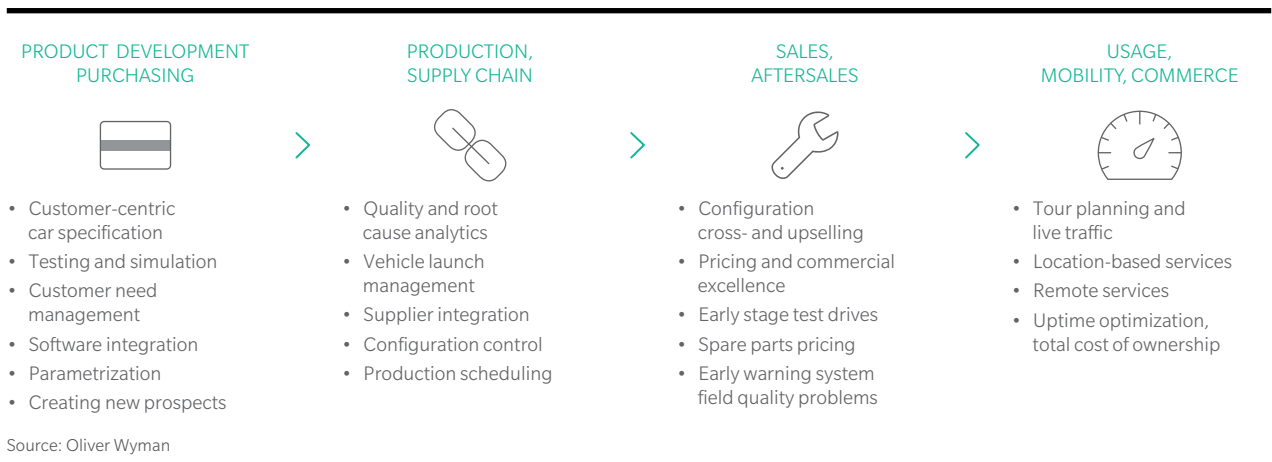
In sales and distribution cost, dealer margins account for about 30 percent of a car's list price. This is an obvious area where data can generate value. There are vast quantities of unexploited data points on price points and elasticities, promotion incentives, dealer margins per channel, and customer discounts. Analyzing and optimizing commercial patterns with big data algorithms could generate additional value of €500 to €1,000 per car, significantly improving the profits of both the automaker and the dealer.
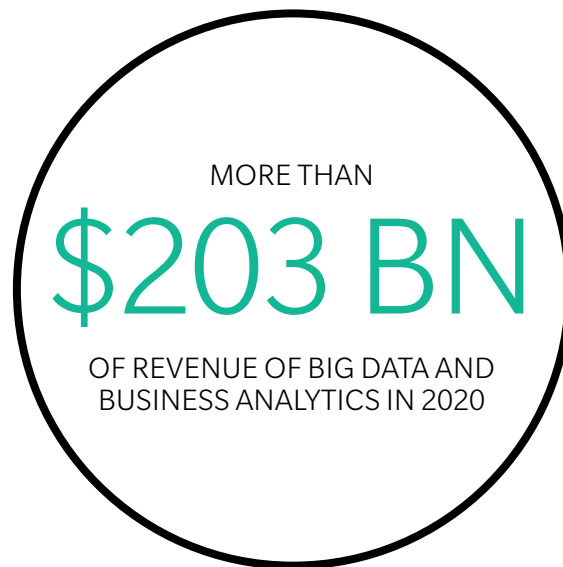
In production, success has long come from ad-hoc problem solving and firefighting, and from managing complexity through experience and good intuition. Plants have had to respond to late engineering changes, the growing number of vehicle launches, issues with supplied parts, or other unforeseen challenges. Mastering big data will revolutionize production, transforming hands-on management into highly industrialized clockwork, which is complex but controlled. Manufacturing data will be integrated from one end of the value chain to the other, immediately making issues and priorities transparent to all those affected.

Product development, engineering, and research have always depended heavily on data, parameters, and digital mock-ups of components. Yet these digital representations have only recently been enriched with information on their functionality, material characteristics, and related software. These data will enable amazing efficiency boosts in engineering: Quality issues in

EXHIBIT 1: BIG DATA USE CASES FOR THE AUTOMOTIVE INDUSTRY
There are a number of substantial big data opportunities along the value chain

PRODUCT DEVELOPMENT PURCHASING	PRODUCTION, SUPPLY CHAIN	SALES, AFTERSALES	USAGE, MOBILITY, COMMERCE
• Customer-centric car specification • Testing and simulation • Customer need management • Software integration • Parametrization • Creating new prospects	• Quality and root cause analytics • Vehicle launch management • Supplier integration • Configuration control • Production scheduling	• Configuration cross- and upselling • Pricing and commercial excellence • Early stage test drives • Spare parts pricing • Early warning system field quality problems	• Tour planning and live traffic • Location-based services • Remote services • Uptime optimization, total cost of ownership

Source: Oliver Wyman

a component will be detected before they result in a defect; and parts assembly will be simulated in advance. Most important, these will contain only the necessary functionalities.

Mobility services, a relatively new business, are entirely based on data. Whether a service hails a taxi, organizes ride-sharing, or finds a parking space, its essence is the matching of customer needs with the availability of transport and driver services. Managing vehicle capacity and understanding customer riding patterns is complex, and early field studies indicate that mobility services will only be profitable at a scale that provides full coverage for, say, a city. So the business case for mobility services will depend in large part on the ability to maximize car utilization by getting the most out of large quantities of data. (See Exhibit 1.)

SCRUM TEAMS AND DATA INSIGHTS

The opportunities are straightforward enough in theory, but implementation is highly complex. The basis for much of new value creation in the digital age will be customer information, plus vehicle data gathered from sensors and other measurement devices. This data will likely be gathered by different sources: the ownership history from a dealer, maintenance records from repair shops, and details of preferences from rental companies. Even if all the data are accessible, they likely come in different forms and formats, meaning the automaker will not be able to simply pour them into a spreadsheet to get the answers needed.

This means that the first, and key, enabler for a digital automaker is big data management. A manufacturer needs to build capabilities to link unstructured external data with its own data. If it is not meticulous when implementing quality standards, it will drown in data it cannot process.

Automakers should start to develop big data skills by setting up special scrum teams with responsibility for specific use cases. The teams can develop a vision and business case – and, eventually,

oversee customer adoption and satisfaction. The scrum teams will also need to figure out IT requirements to make sure the new applications will work as intended.
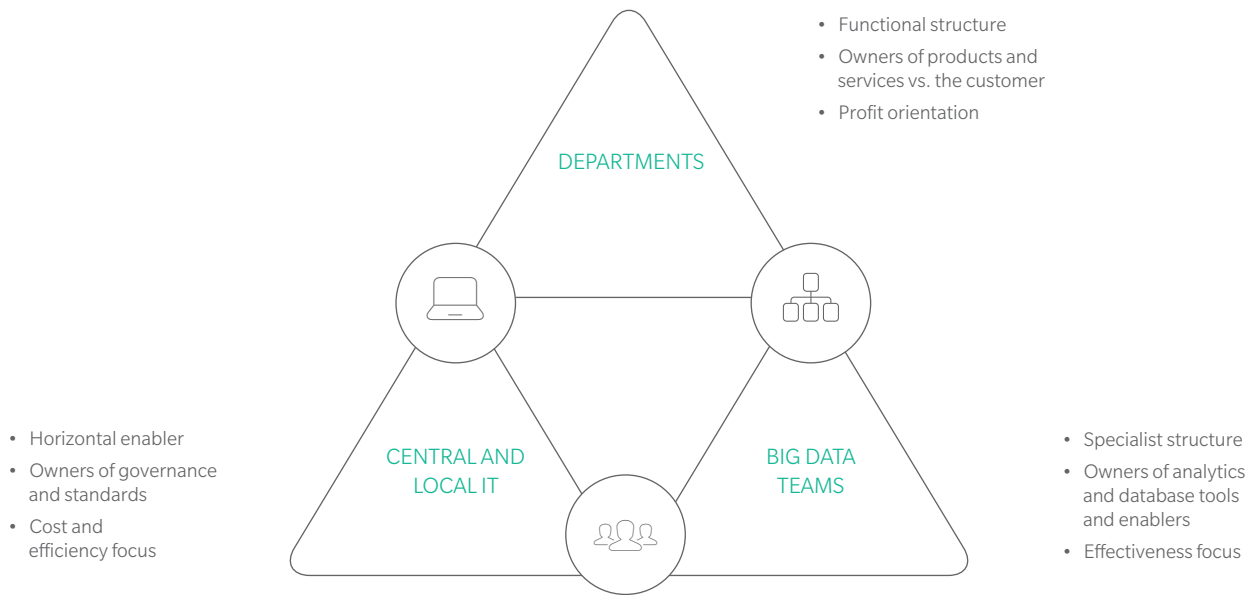
SMART PARTNERSHIPS

Digital innovations will dominate the automotive sector in the future, as the automotive ecosystem links to other areas of the connected life, ranging from alternative mobility services to in-car information and entertainment. This trend is already a living reality: Young people, especially, are using their smartphones as mobility planners, to reserve cars in sharing schemes, and to check the times of connecting trains. Even if fully autonomous vehicles do not become ubiquitous in our streets for many more years, driver support technology is already widespread in the form of parking assistance systems and speed-and-distance monitors that remind drivers to brake.

The convergence of the digital and automotive industries has brought new players into the auto industry, transforming it into a new, hyper-competitive playing field. Traditional vehicle manufacturers would have been stunned years ago to see companies like Apple, Google, and Microsoft competing for a share of the customer's mobility wallet. Now, these digital giants are investing heavily, especially in areas such as big data analytics and applications along the automotive value chain.

The new big data applications will be a valuable source of business for automakers, which will want to place their cars in managed fleets, whether these be for corporations or car-share schemes. These new business models and market players will gather valuable data on drivers' habits and tastes. As many of the players come from the digital world, they have experience in how to use the data effectively. They also have deep pockets and are willing to invest in new expertise. (See Exhibit 2.)

- Functional structure
- Owners of products and services vs. the customer
- Profit orientation

DEPARTMENTS

- Horizontal enabler
- Owners of governance and standards
- Cost and efficiency focus

CENTRAL AND LOCAL IT

BIG DATA TEAMS

- Specialist structure
- Owners of analytics and database tools and enablers
- Effectiveness focus

Source: Oliver Wyman

In some new fields, traditional automakers will not be able to compete effectively. So far, patent filings indicate that they are focusing on areas such as electric vehicles – the means to power the physical car – and leaving autonomous and mobility solutions to digital companies. Some automakers, rather than trying to develop digital applications at their own headquarters, have digital joint ventures in Silicon Valley and are investing in startups related to broader mobility or data analytics startups, as well as the processing of data.

Some of automakers' most crucial decisions in the future will be over how best to acquire essential new digital capabilities and technologies – the choice between in-house development, outside investments, and partnerships. As they try to forge win-win business relationships with new partners, they can leverage their knowledge of end-customers, which will help them ask the questions that will turn big data into smart data.

DATA PRIVACY

The customer will be an essential partner. In Europe, consumers' digital rights are being formalized in the General Data Protection Regulation (GDPR), which aims to give people control over their personal data and to unify regulation within the EU. Consumers will "own" their personal data: They will have the right to know the reasons for data collection, how it is used, and how long it is retained. They will also be able to request that companies erase and stop processing their data and to choose to carry their data to another service provider.

Surveys show that 57 percent of people have a high level of worry about online privacy, with just 13 percent reporting a low level or none. But many people appear to overcome such concerns if the result is greater convenience: Some 90 percent of Internet users currently use online banking, and 80 percent do some kind of online shopping. It is, therefore, a good bet that most people will be willing to share their personal data – so long as they believe they are getting something useful in return. Persuading them that this is the case means building trust into the customer's experience and relationship with the brand.

TIME TO GET STARTED

So, despite the importance of analytics to catch fish in the digital ocean, the first steps in many use cases will relate to getting the data lined up. An aftersales manager might want to know how to set prices optimally for spare parts and repair services; how to optimize uptime for customers by keeping parts available; or how to improve vehicles' reliability. But answering these questions poses numerous challenges – on the availability, structure, and complexity of data; on how far the data is (or is not) networked; and on the consequent ability to interpret data.

With the right approach, these challenges can now be surmounted. If an automaker starts work on potential use cases now, it should be possible to roll out new big data applications within six to 12 months. And, instead of drowning in data, the company will start making money out of it. ●

THE AUTOMOTIVE INDUSTRY'S
BIGGEST CHALLENGE IS HOW
TO TURN BIG DATA INTO
VALUABLE DATA – AND MAKE
MONEY OUT OF IT

THE NEW DIGITAL CUSTOMER

How digital tools will change the experience of car ownership

A trip to a repair shop for regular car maintenance has much potential for misery: This begins with the time taken up, and can end with an expensive repair that reminds the driver of the burden of car ownership.
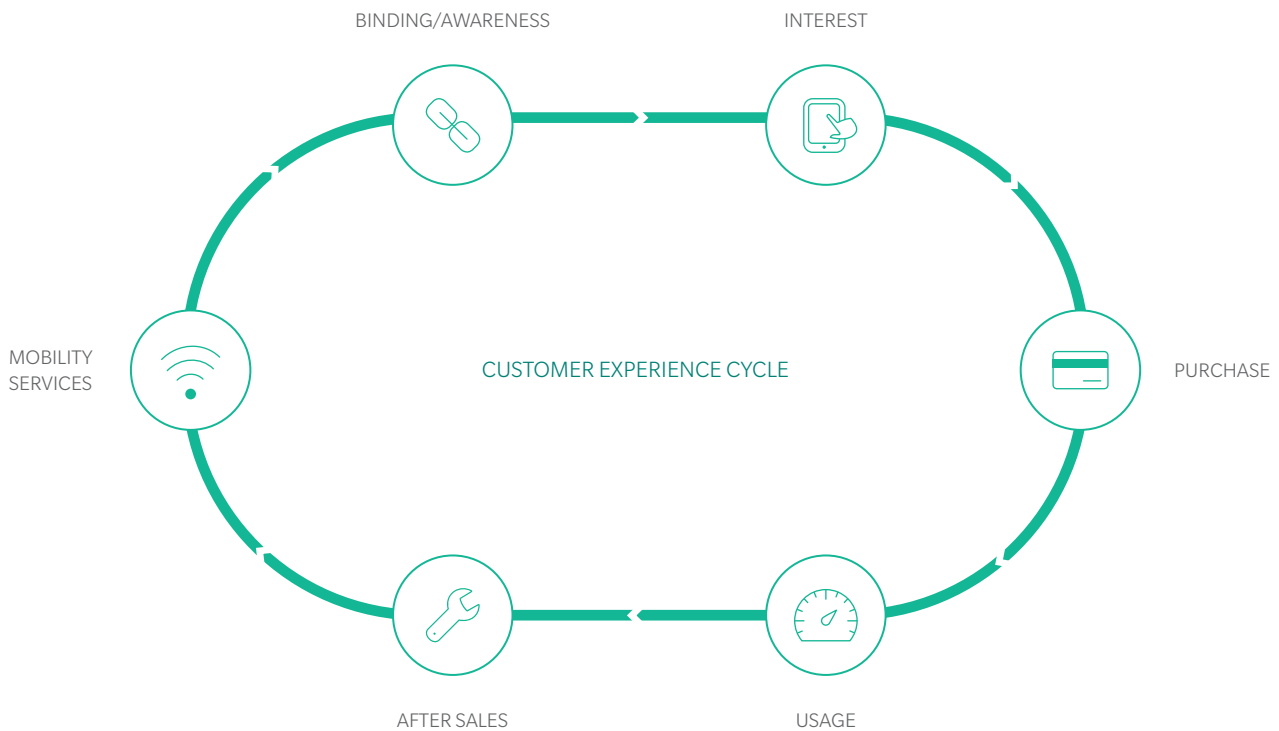
AUGUST JOAS
BO KAUNITZ
ANDREAS NIENHAUS

EXHIBIT 1: CUSTOMER EXPERIENCE CYCLE
Customers are accompanied at all stages of the life cycle with continuous, recurring interaction

Source: Oliver Wyman

So smart automakers are making pit-stops more fun – and more lucrative – by offering additional products and services that fit the driver's needs, such as customized vehicle insurance for an upcoming vacation. They do this by analyzing a mass of data on individual driving style, preferences, and the current state of the vehicle to assemble a detailed profile that will suggest cross-sales. These can potentially add 10 percent to service revenues – and make the customer feel they have gotten more from their visit than just a hefty invoice for damage repair.

Such offers form part of a radical new approach to customer interaction enabled by digital technology and big data. In the past, automakers offered a product with certain features. In future, they will have to sell the brand as a series of experiences: from pre-sales to aftersales, to an eventual upgrade. To do this, car manufacturers need to focus on how these interactions affect a customer and impact their feelings towards the brand and the entire breadth of offerings. These "touchpoints" also present opportunities to know a customer better, by gathering data to build a digital picture of their needs and preferences. Taking control of the entire customer experience can boost annual revenues by between 5 and 10 percent according to a study by Oliver Wyman.

The new thinking is inspired by the digital tech world, where the likes of Apple and Google have become experience innovators: They engage customers in a way that leaves traditional players behind, confronting traditional industries with a paradigm shift. Consumers

in the mobility and connectivity ecosystem now discover brands by new means, have different expectations, and experience products in fresh ways.

Traditional automakers will not be able to copy the digital disruptors in the exact same manner. But both premium manufacturers and volume producers can observe and learn, and offer a comprehensive, digital customer experience that enhances their overall business model.

PRINCIPLES FOR A DIGITAL CUSTOMER EXPERIENCE

Automakers need clear principles to make a success of the new world. First, they should swap an emphasis on product features for a focus on creating a primarily customer-centric experience, which emphasizes usability and the reduction of hassle. Second, they need to form a holistic, 360-degree view of the customer, by gathering all available data on individual customers and wider market trends, and linking and analyzing these to generate new insights. Third, they must engage customers through an omni-channel process, where all content – social media, in-car, dealership – is relevant to the customer and interconnected to ensure continuity. These principles should help guide the customer through a cyclical journey of car ownership and usage. (See Exhibit 1.)

5-10%

ADDITIONAL ANNUAL
REVENUE PER CUSTOMER

The touchpoints on this journey will start when an automaker first creates a spark of interest in a potential customer, so that it can provide early, personalized guidance. They will continue into over 20 on- and offline touchpoints that Oliver Wyman has identified. Data from all touchpoints should be uploaded to an all-encompassing data cloud in order to help form a seamless experience that generates maximum emotional connection.

MOMENTS OF TRUTH

Some touchpoints are classified as "moments of truth" because they have a particularly strong impact on the customer experience and, therefore, the automaker's revenues. A test drive, for example, can lead to a sale and so represents a "cash point", which presents an opportunity to exceed customer expectations and create excitement around the brand. A cash point is also an occasion to make a specific, personalized offer that could boost revenues and margins.

Other moments of truth, such as repair shop visits, imply a high risk of disappointing – or even losing – the customer, with a severe financial downside if not managed correctly. That is why it is smart to combine a potentially negative experience like a pit-stop with an attractive, personalized offer that can convert a potentially unpleasant experience into something more upbeat. Another method is to dispatch a mobile pit-stop team to change a tire, saving the customer an annoying trip and instead boosting the relationship between customer, dealer, and brand.

Digital tools are essential to make the most of many moments of truth. When a customer brings a car in for repair or maintenance, they can be provided with a courtesy replacement vehicle. If this is chosen based on touchpoint data revealing the customer's personal preferences, a customer might think about upgrading to the new model. Even if this stealth test drive does not result in a sale, it will increase positive emotions towards the brand.

Touchpoints such as usage and maintenance records can help persuade a customer to trade in their current car for a new one. Data on the condition of a customer's vehicle is combined with used-car market information to generate an individual price quotation. A customer is notified when the optimal sell-on value for the car is reached or when other data indicate that they are considering buying a new car. The automaker can also feed the customer's current vehicle back into its own used-car business.

NEW ERA, NEW CHALLENGES

A digital customer experience strategy is all the more important now that digital disruptors are entering the car business. Though traditional automakers will likely manage to keep their lead in hardware, Google, Apple and others have been investing heavily in new areas strong on customer interaction, such as self-driving cars and alternative mobility services. That means automakers need to fight to maintain customers' attention and loyalty.

Indeed, these tactics could even convert new-era mobility customers into traditional car owners. By helping deliver car-sharing services, an automaker can track a customer's usage patterns. Then, next time they reserve a ride, the maker can route them towards a model they might consider purchasing, with a setup based on their configuration data – to be followed up by an individualized offer and customized financing plan. The mobility service will thus act as another form of stealth test drive. ●

PATENTING THE FUTURE OF MOBILITY

Google is racking up more patents than most automakers on connected and self-driving cars

Will automakers or technology companies put consumers behind the wheel of autonomous automobiles? Certainly, the car manufacturers have the edge on the hardware, but a small tug of war is brewing when it comes to the intellectual property that will ultimately make connected and self-driving cars a reality on the road.

JUERGEN REINER
ANDREAS NIENHAUS

This article first appeared in Forbes.

>5,000

MOBILITY PATENTS FILED
BETWEEN 2012 AND 2016
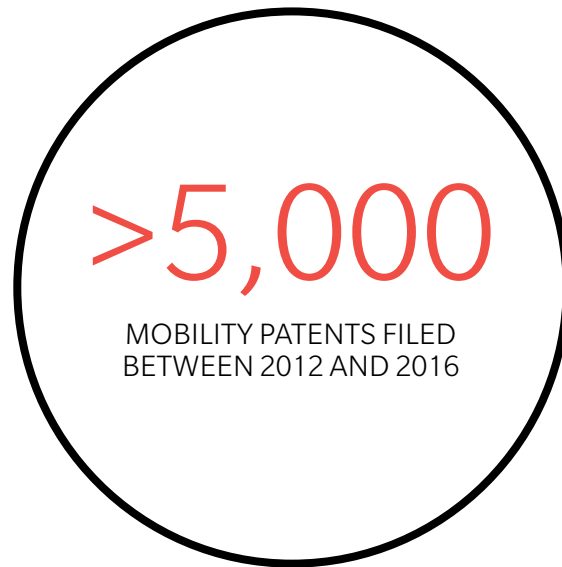
Companies like Google, Facebook, and Apple are pouring enormous resources into a vision of mobility that focuses on the driver experience – so much so that they have the potential to take away some of the limelight – and profits – from the automakers many presumed would dominate car connectivity and driverless technology.

As personal computer manufacturers learned in the 1990s, controlling the hardware alone does not ensure profitability. What makes Apple so smart – and still able to charge over $1,000 for a laptop – has been its focus on the intellectual property. The bottom line for automakers: Keep pushing forward with research and development, and find the right technology companies with which to partner.

PATENT RACE

The biggest tech contender in the mobility space is probably Google, which has been patenting intellectual property as fast as the leading car companies and once even considered building its own fleet. In 2016, Google parent Alphabet Inc. created Waymo, a company dedicated to commercializing Google's self-driving car technology, and began a hunt for partners. Recently, the Alphabet division entered a joint venture with car-sharing company Lyft.

Between 2012 and 2016, there were slightly more than 5,000 mobility patents filed by 12 leading automakers and global tech companies, according to research conducted by Oliver Wyman and World Intellectual Property Organization (WIPO). Of these, almost 3,800 were filed by six car companies – Audi, Daimler, General Motors, Volkswagen, BMW, and Tesla – that related to green car technology, including electric cars, batteries, fuel cells, and alternative fuel. In this category, the tech companies filed just seven patents.

A very different story emerges, however, in an analysis of patents involving connected and self-driving cars. Here, where technology tends to touch the driver more directly than in the green car area, there were almost 1,200 patents, close to one-third of which were filed by tech companies, led by Google. In fact, in the connected car and self-driving category, Google filed almost as many as the leader in the category Audi – 221 versus 223 – and more than BMW (198) and Daimler (159) individually, and more than GM (141) and VW (75) combined. The other five in the non-auto group were Apple, Facebook, Microsoft, Amazon, and Uber.

CAR-SHARING TECH

In the area of mobility services, which includes car-sharing and navigation technologies and app development, the tech companies actually filed more patents than the automakers – 55 versus 44. And, while one might expect Uber to be among the leaders here, it was dead last with only two patents. Google once again dominated with 30 patents, trailed by Apple (14).
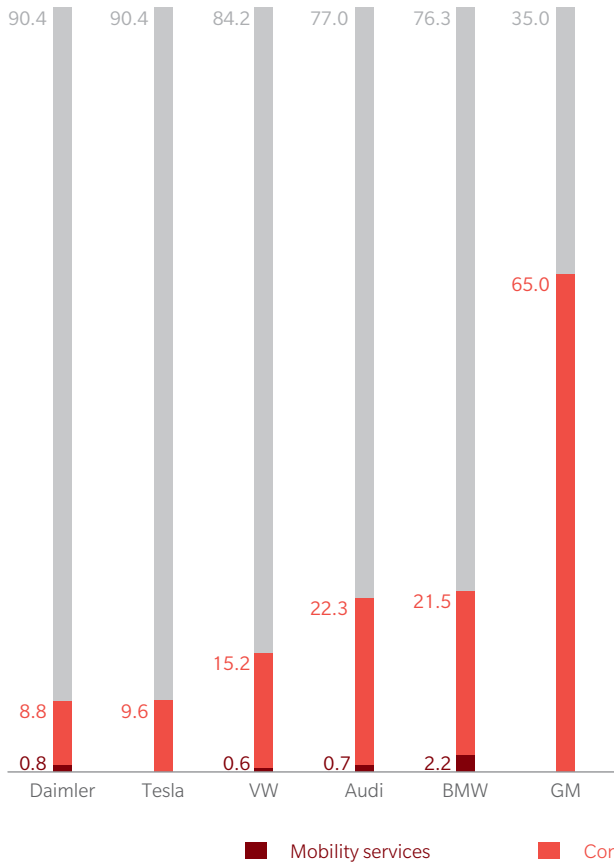
The auto companies' preoccupation with green vehicles makes sense, given the anticipated increase in the regulation of emissions and the pressure to move to a low-carbon or no-carbon economy, particularly in Europe and China. Five of the manufacturers had the vast majority of their mobility-related patent work in the area of green vehicles. The only carmaker that did not have the majority of its patents in this category was the one fossil fuel-based US manufacturer, GM; 65 percent of GM's patents were in the connected car and self-driving category. (See Exhibit 1.)

This analysis leads to two overarching conclusions. First, the research and development activities of digital players like Google show how serious they are about becoming part of the mobility ecosystem. Where the number of mobility patents increased over the five years for tech players by 50 percent, the number actually decreased for the six automakers. The research and development budget rose 20 percent for the tech players and five percent for the car companies.
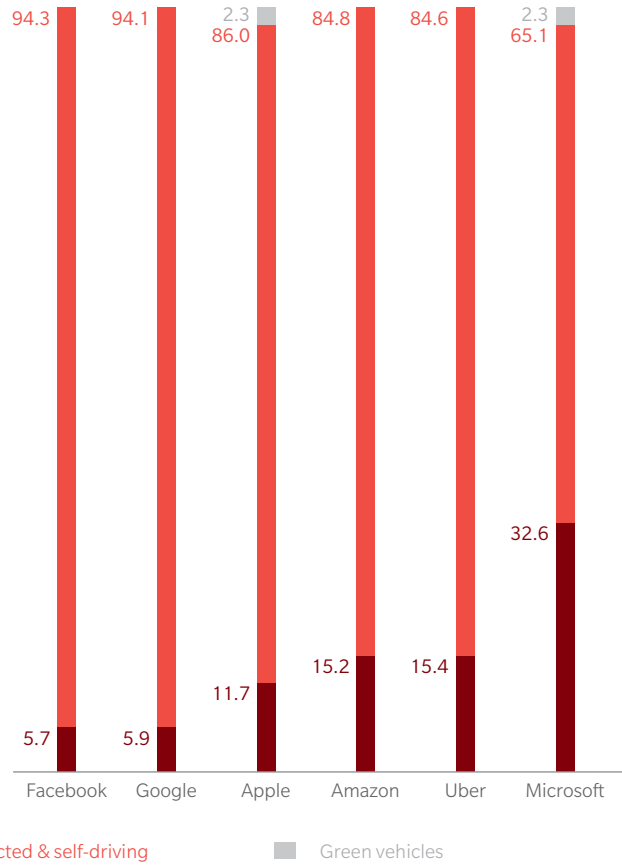
EXHIBIT 1: PATENTING AND R&D STRATEGY OF INCUMBENTS VS. NEW PLAYERS
Carmakers focus on producing hardware for mobility services, while techs focus on software

SEGMENT SHARE OF ALL MOBILITY PATENTS PER OEM,
2012–2016
IN %

	Daimler	Tesla	VW	Audi	BMW	GM
Green vehicles	90.4	90.4	84.2	77.0	76.3	35.0
Connected & self-driving	8.8	9.6	15.2	22.3	21.5	65.0
Mobility services	0.8		0.6	0.7	2.2	

SEGMENT SHARE OF ALL MOBILITY PATENTS PER TECH COMPANY,
2012–2016
IN %

	Facebook	Google	Apple	Amazon	Uber	Microsoft
Green vehicles			2.3			2.3
Connected & self-driving	94.3	94.1	86.0	84.8	84.6	65.1
Mobility services	5.7	5.9	11.7	15.2	15.4	32.6

■ Mobility services   ■ Connected & self-driving   ■ Green vehicles

Source: World Intellectual Property Organization (WIPO), Oliver Wyman

LOOKING TO ENGAGE THE CUSTOMER

Second, by targeting only service-oriented and software-based mobility segments, the digital players picked areas with high levels of customer interaction and engagement. This allows them to pursue a strategy of establishing a new customer interface through mobility services with drivers, opening up the possibility in the future for the software and connectivity capabilities to become the point of differentiation rather than the hardware.

For auto manufacturers, this should be a wake-up call to develop a more focused mobility strategy. Rather than trying to compete head-to-head with players like Google in software-driven mobility segments, carmakers may need to limit investment to mobility services where they can dominate and partner with tech companies. Recently, carmakers also have been teaming up with each other to push into areas like traffic monitoring and navigation services.

Securing customer access through partnerships and by integrating mobility service providers into their own platforms

will help automakers to compete better with current and future digital disrupters in their ecosystem. Here, Tesla has an advantage, because its innovation model is based in part on an open-source system – a reason its patent numbers are low. That allows the electric car company to focus its research and development clearly. More than 70 percent of Tesla's patent filings over the past five years have been concentrated in the area of developing batteries, charging, and electrification.

This is a turning point in automotive history. The automobile is undergoing a transformation, moving from a means of conveyance to becoming a data center on wheels. For car manufacturers to maintain their leverage in the direction the auto will go next, they have to build alliances and concentrate research and development resources today. ●
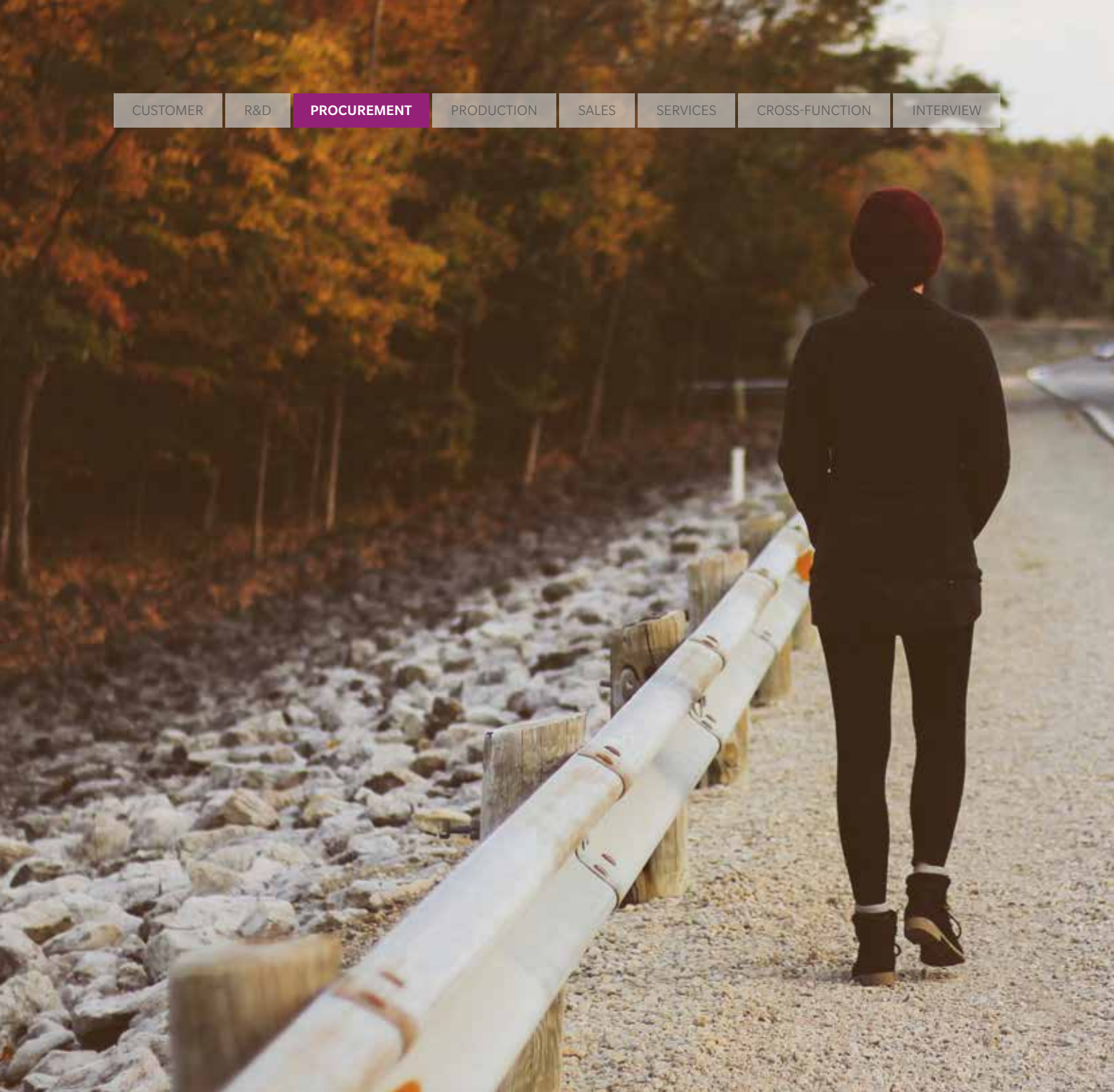
DOOMED TO GROW?

Suppliers at a crossroads

Automotive suppliers are experiencing strong growth and good profitability throughout the world; however, small and medium-sized enterprises find themselves in a dilemma.

LUTZ JAEDE
LARS STOLZ
SIMON OERTEL

The financial performance of the worldwide automotive supplier industry is excellent. On average, the reviewed companies earn an average EBIT margin of seven percent and have an average equity ratio of 40 percent. (See Exhibit 1.) Companies from the United States are especially profitable, while automotive suppliers from Germany and China are experiencing the highest rates of growth in the world. So it is not surprising that three German companies can be found in the top ranks of the Top-10 list of the world's biggest automotive suppliers. (See Exhibit 2.)

But if one takes a closer look at German suppliers, it can be seen that the size of the company plays a significant role in its financial performance. German suppliers with revenues of more than €5 billion generate average growth of almost 16 percent per year and an EBIT margin of seven percent. Suppliers with annual revenues of less than €1 billion exhibit solid growth of almost 10 percent on average and an average EBIT margin of slightly less than seven percent. On the other hand, medium-sized enterprises with revenues of between one and €5 billion generate average growth of only about five percent per year and an average EBIT margin of about five percent. (See Exhibit 3.) Therefore, medium-sized enterprises must answer a very fundamental question: Should I remain in my segment or should I compete with the industry giants?

STRATEGIC CHALLENGES FOR MEDIUM-SIZED ENTERPRISES

German companies in particular have arrived at this crossroads over and over again. Suppliers in Germany are often so successful with their products that they are forced by their OEM customers to build new factories worldwide and broaden their product portfolios. However, if they surpass the "magic" revenue figure of roughly €1 billion, they also need to implement new organizational structures and processes to manage a global supply chain and a portfolio consisting of different segments. In such situations, loss-makers are often not identified in time, investments are misallocated and the company's liquidity is not assured. And yet, companies that successfully manage the transformation to a global player are often able to establish themselves as preferred supplier to the major platforms of the auto manufacturers and realize valuable synergies within their factory networks. In this respect, the study clearly shows that stronger growth is often accompanied by greater profitability once annual revenues reach the level of approximately €5 billion. Therefore, fast-growing companies in particular must always ask themselves if they are ready for the next stage of development. Otherwise, their success story could come to an abrupt end.

This is even more important considering the fact that the market environment for automotive suppliers offers numerous opportunities, despite considerable global uncertainty. Thanks to their financial strength, large suppliers in particular can seize the opportunity of growing through acquisitions and investing into new technology fields. The main drivers of this trend are the continued positive development of the global automotive market, a shifting of the value chain in the direction of suppliers, the growing importance of software in cars, and stricter regulation leading to new drive technologies and new materials. Smartly positioned automotive suppliers – and most especially German automotive suppliers – can only benefit from such a stable and promising environment. ●

EXHIBIT 1: THE GLOBAL SUPPLIER INDUSTRY SHOWS AN AVERAGE GOOD FINANCIAL PERFORMANCE – BUT THE VARIATION RANGE IS VERY BIG

Financial ratios in comparison to 2015

SUPPLIERS GLOBALLY

1. Changing Net Cash (cash and equivalents minus financial debts) in relation to Capital Employed at the end of the period
Explanatory note: Suppliers with a difference in financial ratios of more than three standard deviations from the average are not shown
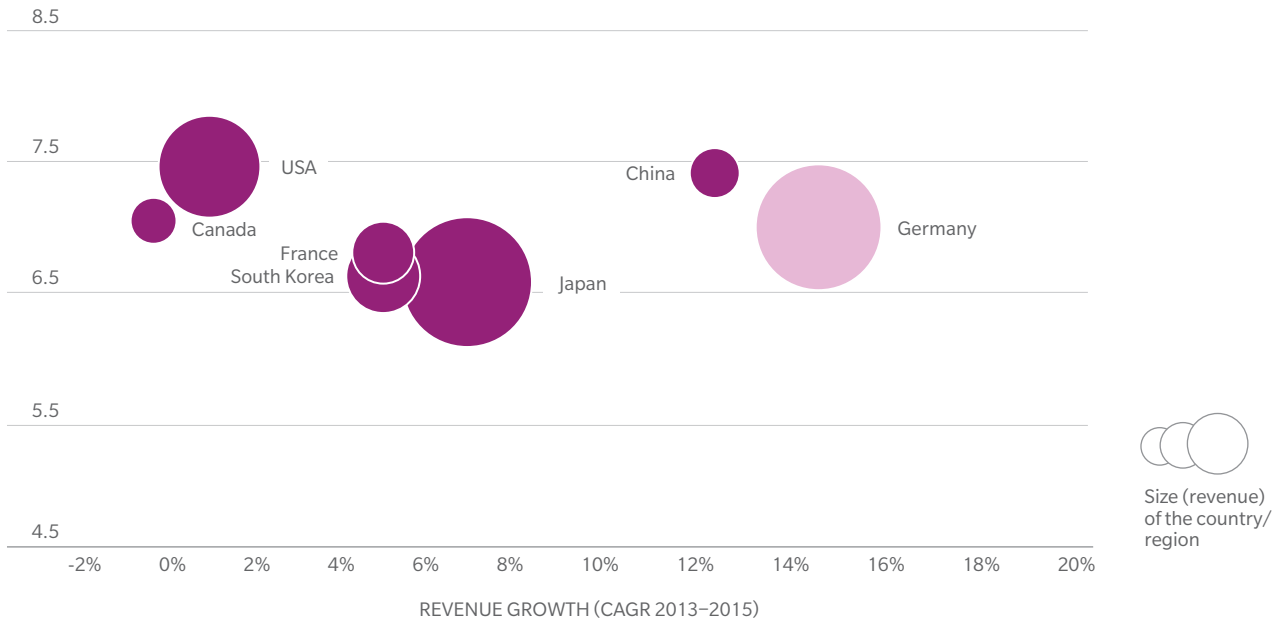Source: Oliver Wyman Supplier Financial Benchmarking 2016

EXHIBIT 2: GERMAN SUPPLIERS SHOW THE BIGGEST GROWTH DYNAMIC GLOBALLY – BUT ARE ONLY AVERAGE WITH REGARDS TO PROFITABILITY

Revenue growth and EBIT-Margin[1] for relevant countries

EBIT MARGIN (AVERAGE 2013–2015)
IN % OF REVENUE

REVENUE GROWTH (CAGR 2013–2015)

Size (revenue) of the country/region

Explanatory note: Adjusted to currency effects

1. EBIT in % of revenue

Source: Oliver Wyman Supplier Financial Benchmarking 2016

EXHIBIT 3: MEDIUM-SIZED SUPPLIERS ON AVERAGE LOSE GROWTH DYNAMIC AND PROFITABILITY

Revenue growth and EBIT-Margin[1] of German suppliers in comparison to the company size

EBIT MARGIN (2013–2015)
IN % OF REVENUE

REVENUE GROWTH (CAGR 2013–2015)

Size = share of revenue of German suppliers in % of the total revenue
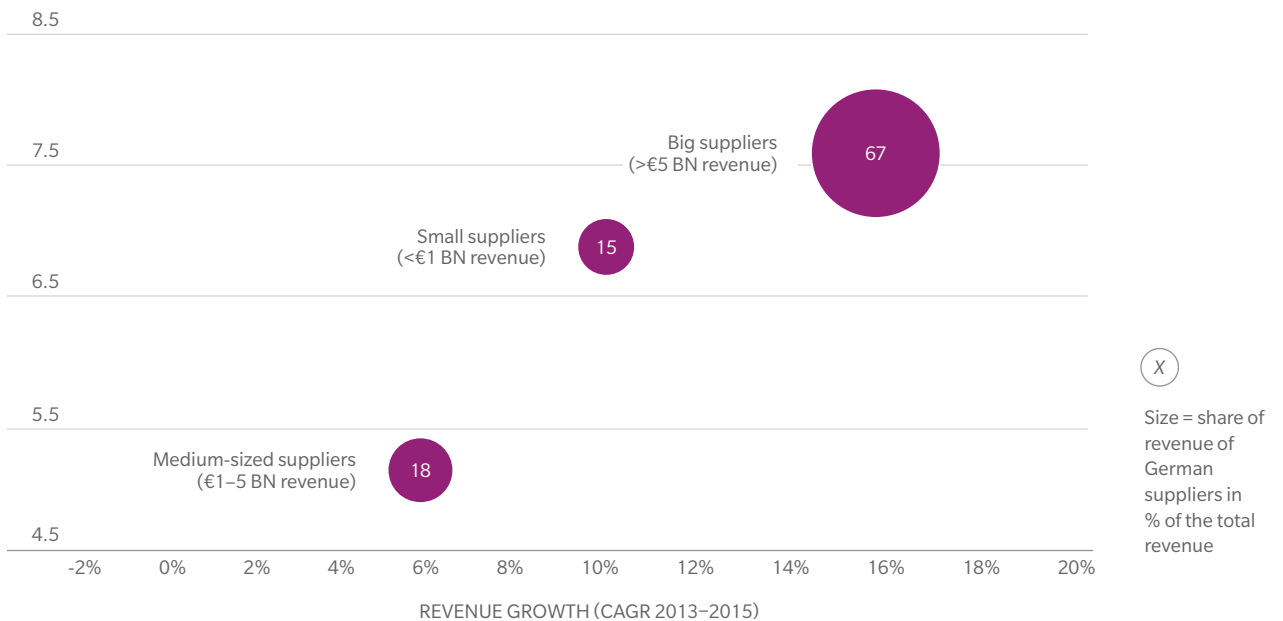
1. EBIT in % of revenue

Source: Oliver Wyman Supplier Financial Benchmarking 2016

RETHINKING QUALITY IN THE DIGITAL AGE

Quality-to-market: Test driving a new quality management paradigm

Can automotive players cope with autonomous driving's quality implications? The autonomous driving phenomenon has introduced sophisticated new electronic components and systems into the automotive mix that could add to the burden of platforms that are already struggling under a heavy load of distributed embedded software and electronics. Without proper safeguards, these highly vulnerable systems could become the Achilles' heel of next-generation car design.

RICHARD HELL
DANIEL PARTSCH

This article first appeared in Automotive News.

WANTED: A MORE ROBUST APPROACH FOR A NEW AGE

While the automobile industry has proven itself to be adept at managing traditional quality-related risk in the past, this time may be different. Autonomous vehicles (AVs) and other innovations that rely on advanced electronics and software require new robust quality management systems and advanced tools and methods capable of preventive monitoring and control. The new functional capabilities of autonomous vehicles will force automotive quality departments to assume a leading quality assurance role. This comprehensive new quality responsibility will include: taking steps to reduce extensive late-stage design changes; stabilizing the supply chain, architecture, and functionality performance; and reducing warranty problems and associated liability damages.

The launch of the precursors to autonomous vehicles and other advanced technologies has already tripled product recalls over the past five years, a clear indication of the increasing complexity of new products and complete systems. What is more, traditional problem-solving activities and methods do not support the identification of root causes in these cases due to the intermittent nature of failure events that these complicated integrated systems exhibit. Take the growing complexity of parking assistance systems, for example. Initially little more than simple ultrasonic sensor-based object detection units, they have evolved into highly complex systems that offer automated parallel parking, right-angle parking, and forward parking with automatic braking, and rely on more than 12 ultrasonic sensors and increasingly complex algorithms.

Automakers need to manage this overall complexity tightly, and monitor it during the product development and production stages, adapting analytics, tools, and methods to achieve standardized and consistent results. Given the shift from a mechanical footing to an approach based on electronics and software, the future automotive quality-management paradigm must in the future encompass preventive digital quality controls. Today's conventional continuous improvement and visual quality management methods cannot cope with these new challenges, as illustrated by the fact that more than 30 percent of warranty cases today result from electrical and electronic components. (See Exhibit 1.)
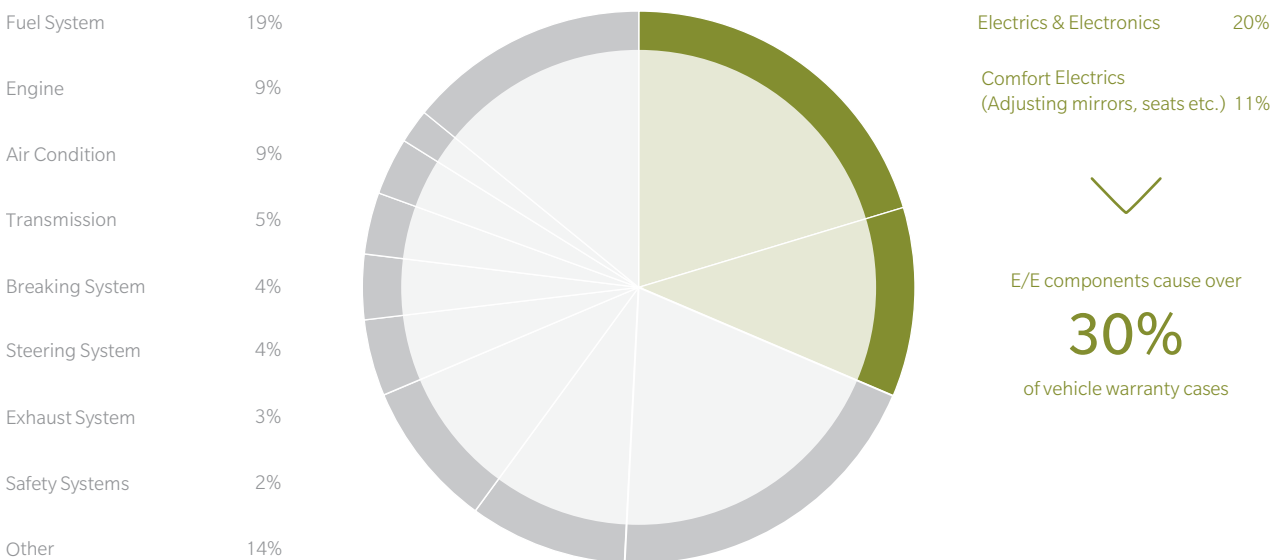
INTRODUCING QUALITY-TO-MARKET

Quality-to-market is an innovative approach for assuring the soundness and reliability of highly complex electronics- and software-driven technologies. Its core philosophy is that quality ultimately drives time and cost considerations. It focuses on areas such as start-of-production (SOP) delays and overspending on deliveries, engineering, and manufacturing, as well as reliability issues and warranty claims.

Automobile manufacturers and tier-1 suppliers have always focused on the quality of products and systems, but time and cost issues have dominated their processes and the decisions

---

EXHIBIT 1: E/E COMPONENTS ARE STILL THE MOST VULNERABLE PARTS OF A VEHICLE
Over 30% of warranty cases are caused by E/E components

COMPONENTS CAUSING WARRANTY CASES
2014, IN % OF ALL ANALYZED WARRANTY CASES

Fuel System	19%
Engine	9%
Air Condition	9%
Transmission	5%
Breaking System	4%
Steering System	4%
Exhaust System	3%
Safety Systems	2%
Other	14%

Electrics & Electronics — 20%

Comfort Electrics
(Adjusting mirrors, seats etc.) — 11%

E/E components cause over

30%

of vehicle warranty cases

Source: CG Car Garantie AG Statistics based on ~1 Mio. warranty cases in 2014

>12

DIFFERENT ULTRASONIC
SENSORS WORK IN PARKING
ASSISTANCE SYSTEMS
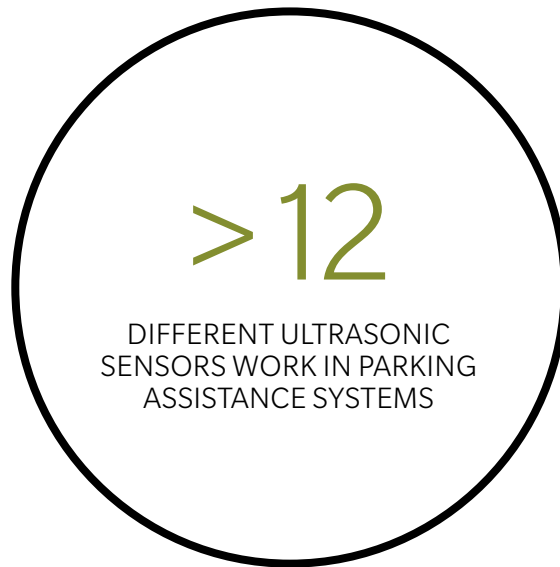
made in executive boardrooms. Quality organizations, on the other hand, have concentrated on single problems or the provision of methodical support. Liability damages, which could hurt the company's overall brand image and ultimately shareholder value, were events where the quality department played the role of independent auditor, taking neither responsibility nor accountability. To establish a balanced link between quality, time, and cost (QTC), companies need to make a shift to the mindset of quality-to-market as a guiding management paradigm, which covers the entire extended supply chain.

Research reveals that the number and proportion of software-related recalls in the US has increased steadily – unmistakable evidence that the automotive industry is not ready for this rapid influx of technology embedded in vehicle structures. The complexity involved in embedding new technologies in existing vehicle real estate has raised new challenges for automotive manufacturers and their tier-1 suppliers. Consequently, companies need to adjust the new processes involving digital quality controls, technical risk management, and quality predictive systems so that they mesh with newly designed product development processes.

ADOPTING A ROBUST QUALITY MANAGEMENT SYSTEM

Transitioning to this new paradigm will require a fundamental change in mindset that enables the company's central quality function to perform as a neutral authority, delivering a transparent and traceable quality control "dashboard." Because the robustness of these processes will have an impact on product quality, companies need to align their quality management systems to future assumptions and requirements. One example would involve the collection of field failure data into a common structure in a "data ocean" to classify failure patterns or other

algorithms in real time, enabling companies to solve technical problems faster.

A collaborative and fully transparent supplier management approach will help companies to diagnose and resolve bottlenecks and identified problems more rapidly. Organizations will be able to map product field and production data directly to new product development cycles, enabling engineering to make better, smarter, and more cost-efficient decisions. And by adopting a structured risk mitigation method that focuses on key at-risk variables, organizations can identify high-risk areas and monitor them tightly throughout the entire development process.

Companies should adopt a recurring, closed-loop approach to enable the identification and mitigation of technical risks on systems, processes, or supply chains. Experience suggests that recurring weaknesses along the product development process cause most technical problems.

The quality-to-market approach redefines the quality department's traditional role in the digital age, but moving to this paradigm will require significant changes in roles, responsibilities, and behaviors. In the end, one needs the right mindset, established tools, structured methods, and the absolute willingness to live the quality guru mantra of "do-it-right-the-first-time" across the entire value chain, since one does not always get a second chance. ●

THE EVOLUTIONARY CHANGE OF DIGITIZATION

Prepare your workforce for the automation age

The internet has dramatically changed the way companies operate. Massive data storage capacity, super-fast data transmission and mobility devices – along with slick application program interfaces – have left companies scrambling to adapt.

RON HARBOUR
STEVE SCEMAMA

This article first appeared in Harvard Business Review.

Today, innovations in digitization and robotization are quickly laying the foundation for another disruptive corporate transformation.For example, Anheuser-Busch, working with Uber (and Otto), just delivered 2,000 cases of Budweiser in a self-driving truck. Commerzbank has announced plans to digitize 80 percent of its processes within three years. We estimate that robotization, digitization, digital self-services, distributed digital advice and sales, and robo-advisors could result in a 60-70 percent reduction in the workforces of service providers, from financial services to telecom. Manufacturers have already seen reductions, albeit at lower levels. The pace of robot adoption may surprise us, just as the internet spread more quickly than many anticipated.

But companies will only be able to realize productivity gains from these new operating models if they skillfully manage the soft side of their automation transformation – the people in what will be a vastly different organization. As companies introduce software bots and digital self-service, and as they transform assembly lines, they must bring along their key employees, leaders, and customers as they redefine jobs, career paths, workforce management, and social contracts. Executives must think carefully about how to best match people and machines, bearing in mind that many of the decisions they make today will have a long-tail effect on workforce composition, productivity, and profits for years to come.

As workforces hollow out, the remaining employees will be highly specialized and experienced business/technology hybrids – a new breed of professional who can work in highly distributed environments and shift from managing people to managing experiences and technology. In the back-office, the lights will dim, as work is shifted to the customer or other parts of the value chain. In the middle office, risk and compliance management will largely watch bots that are not prone to human error or fraud, supported by sophisticated models to predict quality and

compliance issues. In the front office, automation based on predictive analytics will leave only managers who can control sophisticated robo-advisors trusted by customers. Salespeople will be disrupted as customers link with algorithmic bots to obtain products contextually presented at the (digital) point of need – often dominated by the global platforms that link retail, financial services, entertainment and communications in sticky ways.

Will this happen over night? No. Disruption rarely occurs as soon as expected. Freeways full of driverless cars and beer trucks are still far off, because of technological and regulatory limitations. But the inflection point always happens faster than expected. As always with technology adoption, there is an S-curve, already being scribbled by early adopters; when the inflection point is reached, expect sudden acceleration. So early preparation is needed.

LESSONS FROM AUTOMAKERS

To figure out how to effectively integrate software robots and digitization, executives can take some cues from the automotive industry. After decades of introducing physical robots and automation, some automakers' factories require three to six months to launch an entirely new vehicle, while others need no more than a day. But the most automated carmakers are not necessarily the most efficient.

Instead, the nimblest factories have been pragmatic about integrating automation so that new processes can run smoothly, with continuous improvement – so that only the simplest, most repetitive processes are automated. Over the past two decades, leading automakers have automated their paint and body shops – where they see the greatest gains – but have also retained and retrained the people required to quickly redesign products and processes on more complex tasks.

EXHIBIT 1: LESSONS FROM AUTOMAKERS
Automation is gaining ground but human workforce is still necessary
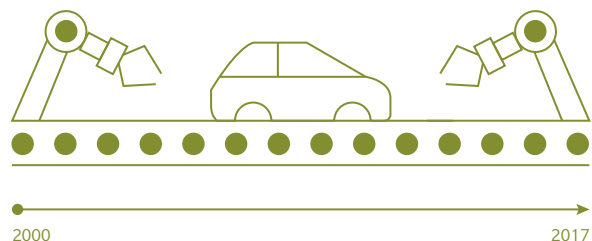
LESSON 1

After decades of introducing physical robots and automation, some automakers' factories require three to six months to launch an entirely new vehicle, while others need no more than a day. But the most automated carmakers are not necessarily the most efficient.

LESSON 2

Automakers have used automation gains to configure and fund increased customization. However, assembly lines are run by humans who build customized vehicles, choosing from as many as 55,000 parts.

3-6 MONTHS

<1 DAY

2000

2017

Source: Oliver Wyman

~70%
REDUCTION IN THE WORKFORCES
OF SERVICE PROVIDER
DUE TO DIGITIZATION

Automakers have used automation gains to configure and fund increased customization; assembly lines are run by humans who build customized vehicles, choosing from as many as 55,000 parts. The lesson: Change needs to be evolutionary, even if the impact of automation is ultimately revolutionary. Do not throw away your core capability, until you are sure automation is better, faster, cheaper. As you prepare for the inflection point, be pragmatic about cost-benefit tradeoffs. Think about the overall organization in an automated world. Be mindful of the critical skills you need to retain, and the skills you need to build up. Take a full end-to-end view. Think both short term and long term. Build strategic advantage through the gains you achieve, beyond cost. (See Exhibit 1.)

PARALLEL WORK STREAMS

The lessons to date on driving digitization and robotics suggest operating on a dual track. Strike the right balance between implementing short-term automation fixes and opportunities, while seeking solutions to problems that will determine success in the long run. It takes time for clients and employees to adapt to monumental change. Thus, it is as important to get long-term organizational change underway as it is to rapidly exploit near-term efficiency.

To that end, managers should develop a list of 10 to 15 processes that bots can quickly improve. Test and learn, both in the application of the right bots to the right problem, and how to redesign processes end-to-end to maximize results. Simultaneously test and learn on the soft side of automation. Blueprint the broader impact on roles, skills, controls, leadership, workforce and talent management, and social contracts.

By doing so, managers can move critical employees and clients closer to their longer term automation ambitions – which can be

funded at least in part with returns from the earlier automation of simpler tasks.

MOLD THE ORGANIZATION

As more processes are digitized in every part of an organization, executives must think at a macro level about the entire enterprise, even as the organization is changing. How do you hire today for a diminished workforce 10 years out? When more and more of your people are replaced by bots, how do you lead, enforce quality control, and audit? The key to navigating through the coming automation age will be identifying and retaining (retraining) the employees who can make one transition after another.

Companies will experience huge changes as physical infrastructure disappears, offshore capabilities are repatriated, more services become self-service and virtual, and customers begin to interact more with robots. Automation will transform not just production, but operating models. Start early to shift the leadership mindset. Actively drive customer adoption by adjusting your pricing and loyalty incentives to encourage early adopters, while simultaneously having your own employees co-service them with the same tools. Initially, customers should be allowed easy and seamless access to people as a fallback to self-service and other digital offerings. Assess the impact on your social contracts to both your employees and the communities you serve. Engage local stakeholders and unions early in discussions of how you can continue to give back to the community with a smaller workforce. Build a picture of the future state and work backwards.

There is time before the inflection point – time to prepare with purpose and pilots. Focus not just on the technology and analytics, the shiny object, but on people and a new form of leadership. •
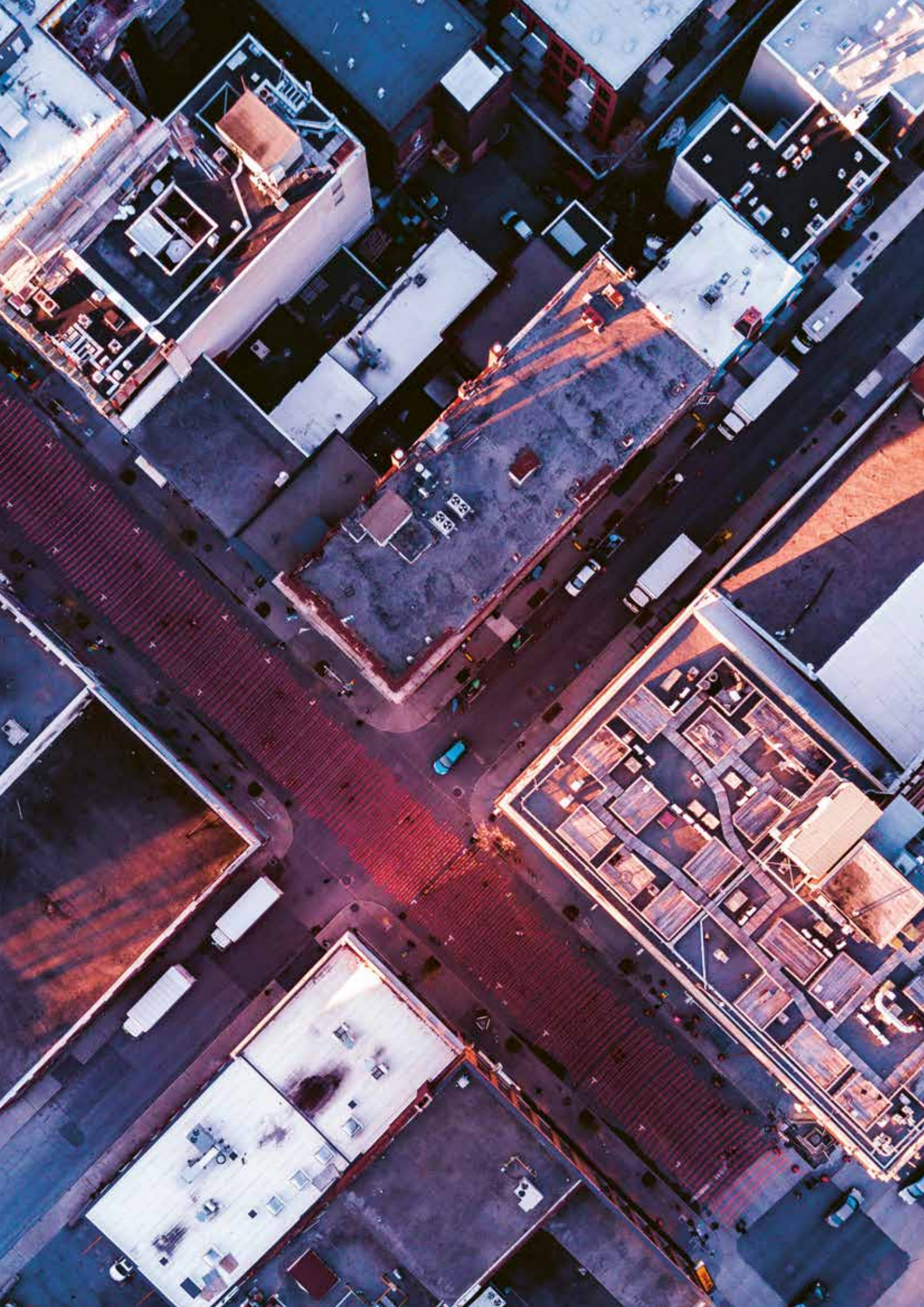
PLUGGED IN

Collaborating to win
with electric vehicles

Are electric vehicles the future of the automotive industry?
Certainly, there are many in the industry who would argue that
is so, even though uncertainties surrounding electric-drive
systems remain – and have increased significantly.

JUERGEN REINER
JOERN BUSS
JOHANNES BERKING
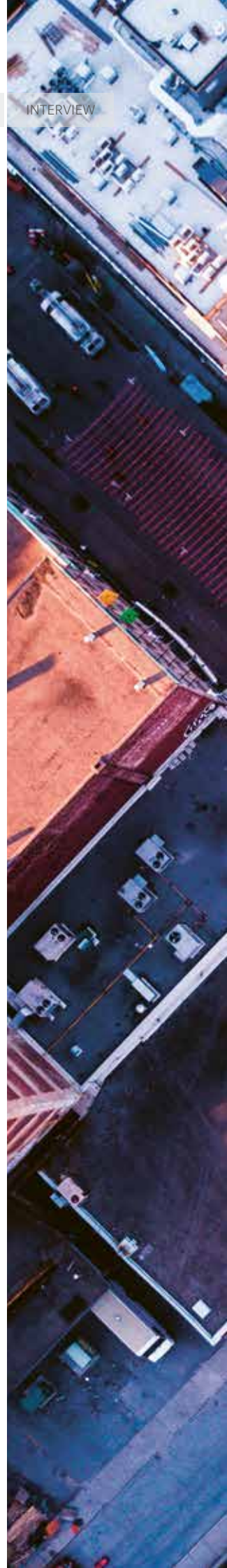
Challenges to electric vehicles include the current low cost of fossil fuels, the recent protectionist and nationalistic leanings of some governments and interest groups, and the limited willingness of automobile manufacturers and suppliers to partner with competitors. At the same time, interest in electric vehicles (EVs) has spiked, fueled by the diesel emissions scandal, the continued regulator focus on reducing fine particulate and nitrogen oxide (NOx) emissions, and government strategies concerning fossil fuel dependencies and global warming.

SEEKING THE KEY TO EV MARKET SUCCESS

Without binding legislation that is consistent across borders or the willingness of players to work with each other beyond standard-setting activities, the rapid adoption of electric vehicles technology remains unlikely. That places the automotive industry in the nebulous position of preparing for a potential disruption without any evidence of when it will happen or how it will play out.

Customer feedback on past sales suggests that electric vehicles will not achieve significant market shares simply as alternatives to conventional drive systems or due to high fuel costs. The higher costs of the vehicles and their limited range, coupled with uncertainties regarding infrastructure development and vehicle residual values, have reinforced a persistent reluctance among customers to buying electric vehicles in the numbers needed to make it profitable for automakers.

Consequently, market success will depend heavily on legislation to drive electric vehicles sales, which in turn may trigger the need to establish the necessary infrastructure and lead to the scale effects that will bring prices down to a level where they can compete with conventional automobiles. The likelihood of short-term legislative changes varies by country, and the outcome is unclear. Nations with strong automotive industries and traditional infrastructure tend to be less aggressive than others; they typically rely on a haphazard network of incentives instead of setting hard quotas. In contrast, smaller markets without substantial automotive industry footprints, such as Norway or the Netherlands, or resource-limited island nations and cities like London, often exhibit significantly more agility. Likewise, emerging markets that lack a strong internal combustion engine (ICE) technology heritage or leadership and are establishing modern energy infrastructure, such as China, are aggressively attempting to leapfrog others to become leaders in the electric vehicles field.

Global vehicle powertrain electrification will probably gain momentum when lead markets change their electric vehicles penetration strategies and when electric vehicles technology costs reach competitive parity with the internal combustion engine. When this will happen remains unclear.

Our research has identified four theoretical electric vehicles penetration archetypes, based on legislation and incentives, with very different ramp-up scenarios through 2035. These are

ELECTRIFICATION WILL HAVE AN INCREASINGLY DRAMATIC IMPACT ON THE AUTOMOTIVE VALUE CHAIN, DEPENDING ON THE DEGREE OF E-MOBILITY CHOSEN

not actual predictions of future electric vehicles penetration, rather they are "what if" estimates of the theoretical rate of new electric vehicles penetration by 2035 given certain legislation or incentives. For example, the first archetype models strong legislation, such as that proposed for Norway in 2025, and indicates the penetration rate would exceed 95 percent. For the archetype that focuses on urban and metropolitan areas in markets with low internal combustion engine heritage, such as China, the rate is about 70 percent. The archetype for markets focused on incentives, such as Germany, is 35 percent, and for those with no additional legislation or incentives, the rate drops to about 10 percent.

UNDERSTANDING THE VEHICLE TECHNOLOGY CHALLENGES

Electrification will have an increasingly dramatic impact on the automotive value chain, depending on the degree of e-mobility chosen such as mild hybrid, plug-in hybrid, or battery electric. Research suggests that one-third of the overall value creation of an average vehicle will fundamentally change when comparing a battery electric vehicle with a conventional one. These changes focus on specific areas, thus affecting specific business models and value chains in significantly different ways.

Consequently, conventional engine and transmission components will face an ongoing decline, while the electronics landscape will likely experience comprehensive change, as power and control systems migrate to higher voltages and vehicle system electrification predominates. (See Exhibit 1.)

CREATING NEW INFRASTRUCTURE

If successful, electric vehicles could make established energy delivery infrastructure and value chains obsolete. Vehicles will move away from centralized fueling points, such as gas stations, to a new, distributed and ideally smart electric-grid-based delivery system. This shift will inevitably open a service

industry to handle customer recharging needs – with a new set of players and rules.

This of course puts into question the future of fuel cell vehicles that is, cars requiring hydrogen-based fueling stations, as they will have to adhere to traditional centralized fueling models and value chains, especially with battery technologies rapidly moving forward and the technical complexity and associated costs of fuel cell vehicles countering its benefits.

WHAT TO DO: COLLABORATE TO COMPETE

Automotive players need to develop a comprehensive strategy that addresses today's industry needs and anticipates a potentially rapid shift towards electrification. Attempts at "parallel positioning", meaning pursuing multiple strategies side-by-side, as some players are currently doing, come at a high cost and can carry extreme risks. For instance, due to the rapid changes in electric drive technology and the uncertainties regarding which systems will mature in the market, investing in particular areas is far from a sure thing. Parallel investment in fuel cells and battery electric powertrains, as well as spending on

traditional internal combustion engines – even when combined with limited partnerships – will stretch the limited research and development budgets of even the largest automakers. Adding to this burden, the extensive investments required for autonomous-vehicle technologies and advanced safety systems could push spending requirements beyond the breaking point.

To address these uncertainties and spend research and development money wisely, we believe automakers and suppliers need to accelerate their participation in bold, cross-competitor initiatives to develop battery-electric vehicles, which could include full vehicle platform sharing beyond batteries, as well as joint work on internal combustion engines and hybrid powertrains as short- and mid-term solutions.

To accelerate the overall electrification trend once it gains critical mass, markets need legislative decisions that align across all forms of transportation, and ideally across borders in ways that reinforce each other. Strong lead markets could form the tipping point of a true electric vehicles disruption. At the same time, the willingness of carmakers and suppliers to work with competitors will limit their risk exposure while driving technology forward and costs down for the benefit of all participants. ●

EXHIBIT 1: IMPACT OF E-MOBILITY ON VALUE SPLIT OF VEHICLE MODULES
Due to the increasing market penetration of alternative power trains, the future value split of electric vehicles modules in a car will strongly increase

2016 TOTAL MARKET VALUE SPLIT OF VEHICLE MODULES AND FUTURE DEVELOPMENT
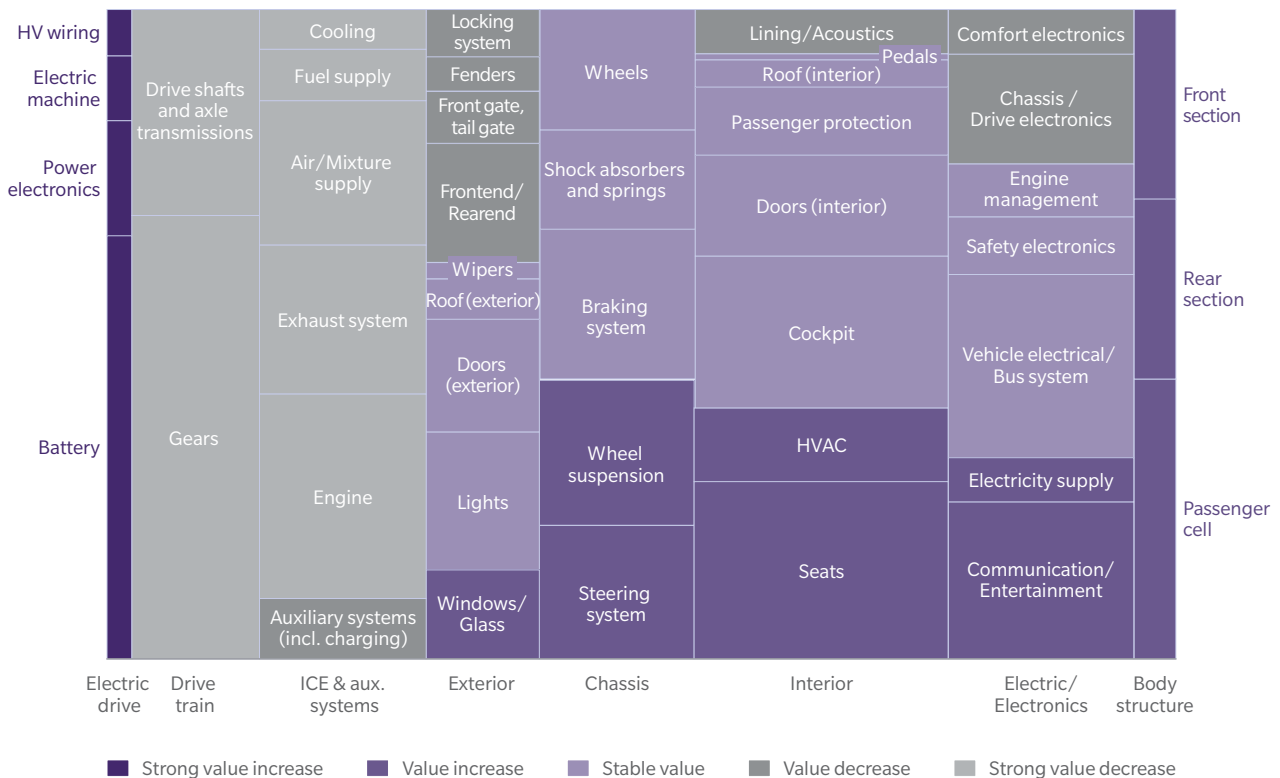
Source: Oliver Wyman automotive cost and value migration model

FINANCIAL RISK MANAGEMENT AS STRATEGIC TOOL

Techniques developed in automakers' finance arms can aid their other businesses

The auto industry faces an ever-expanding range of risks: New mobility services, self-driving systems, and other technological advances are changing the ways cars are used, as well as customer expectations. Digital tools are taking on new roles, such as customer targeting and market-trend identification. At the same time, regulations and compliance standards are constantly being tightened.

MATTHIAS BENTENRIEDER
JOCHEN PEPPEL
RAINER GLASER

These challenges are elevating the role of automakers' finance departments. Long relegated to the position of assisting in the financing of customer purchases and managing sales units, the compliance requirements of the role dictated that the finance function develop advanced risk-management systems and methods. These tools and processes included, among other things, early warning frameworks, customer risk assessments, and financial planning. (See Exhibit 1.) And now, given stricter financial regulations, finance departments are upgrading and improving their risk-management techniques.

First movers have already grasped the importance of such expertise in automakers' wider businesses. Digital disruption means the car industry needs to improve its strategic and forward-looking management. That involves new ways to monitor global markets – the impact of political events, economic downturns, and changes in customer demands – and to identify and be able to react to adverse market developments. Such capabilities are also being demanded by authorities as part of increasingly stringent compliance and risk requirements for the overall auto business. These tasks are making finance's methodologies more relevant, as they have already been used to develop related tools.

One example is compliance with IFRS 9, the International Financial Reporting Standard that goes into effect in 2018. The standard requires significant credit-risk modeling capabilities to determine the impairment allowances for financial instruments, such as customer financing and lease receivables. Compliance with IFRS 9 thus requires robust stress-testing and loss-forecasting methodologies, as an inadequate approach could have an impact on profits, making them more volatile. Once fully developed, the models and methods can be leveraged to manage an automaker's wider business and strategy development. In particular, the core methodologies developed for IFRS 9 compliance are applicable to strategic planning and scenario analysis. (See Exhibit 2.)
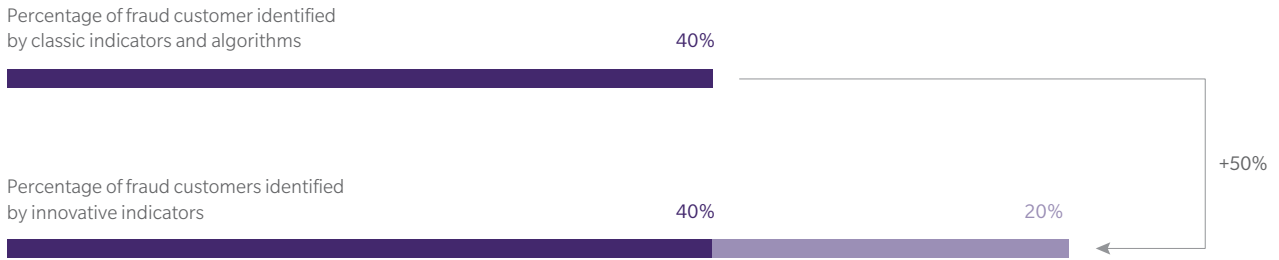
NEW TOOLS FOR NEW DATA

Finance's processing capabilities are becoming increasingly important to automakers, given the ever-growing quantity of data from new sources, social media, and connected cars. The data provides vital information on consumer preferences, enabling automakers to better manage customer relations. To take advantage of the information, however, requires innovative leveraging of input data, sophisticated algorithms, and advanced machine learning – techniques developed for financial and risk management. Combining the new data with traditional indicators can, for example, boost the power to predict potential fraud cases by more than a half.

Consumer demands and market trends can be anticipated, using early-warning and monitoring frameworks developed from finance's methodologies. Other such tools include scenario-based portfolio and residual-value modeling, which are now being used frequently in strategy development and performance management.

As the automobile industry faces disruptive change, manufacturers are struggling with the new ways in which cars are being used, driven, and bought. The good news is that they need not look far for a solution: A peek at their finance and compliance operations will reveal sophisticated techniques that can add value and help automakers manage the new and increasingly complex risks they face in a digitized and connected world. ●

EXHIBIT 1: SUCCESS RATES OF FRAUD IDENTIFICATION ALGORITHMS
Classic vs. innovative indicators

Percentage of fraud customer identified
by classic indicators and algorithms   40%

Percentage of fraud customers identified
by innovative indicators   40%   20%
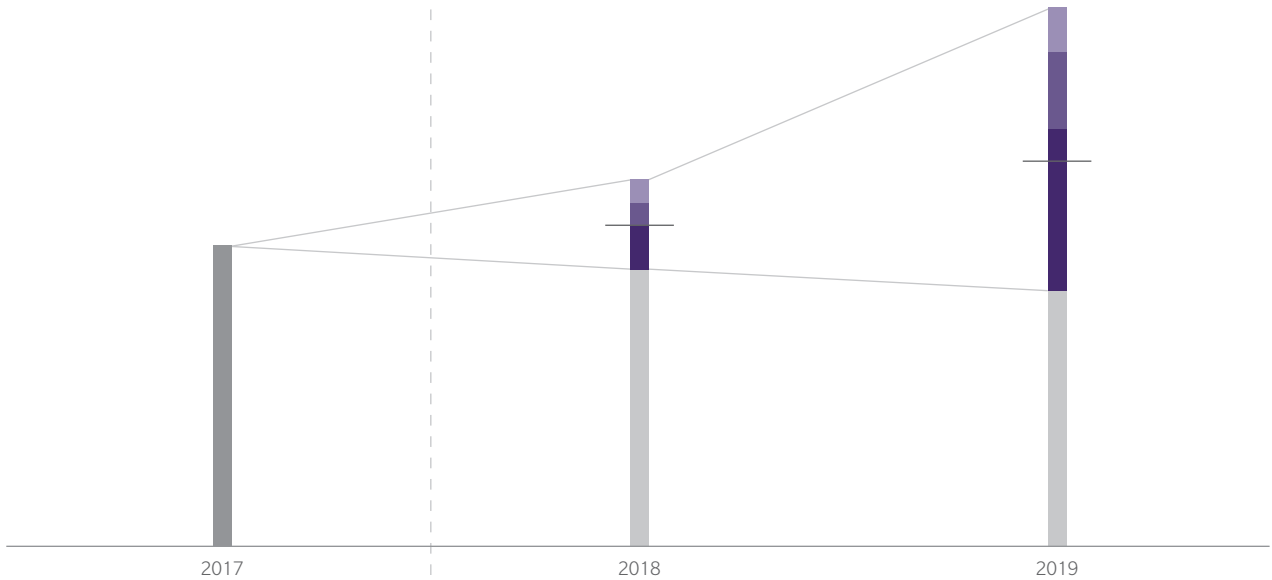
+50%

Source: Oliver Wyman

EXHIBIT 2: DRIVERS OF VOLATILITY OF IFRS 9 ALLOWANCES
Methodology and parameter choices can have significant impact on IFRS 9 provisioning results – thus they need to be sufficiently robust to avoid undue adverse implications

ILLUSTRATIVE, ASSUMING CONSTANT BALANCE SHEET

| | 2017 | 2018 | 2019 |

- ■ IAS 39
- ■ IFRS 9
- ■ Macroeconomic volatility
  - Economic expectations need to be incorporated under IFRS 9 increasing volatility
  - Sensitivity heavily dependent on scenario definition and modelling approach
- ■ Methodology-driven volatility
  - Potentially undue volatility due to methodology choices
- ■ Parameter volatility
  - Additional variation implied by dynamics of input parameters

Explanatory note: illustrative base prognosis for the IFRS 9 allowance balance in 2018 and 2019
Source: Oliver Wyman

ACHIEVING AUTOMOTIVE PRICING EXCELLENCE

More art than science, car pricing needs an overhaul

Automakers agonize over every penny when pricing a vehicle, but give billions of euros away in incentives and margins to sell it. Our data-driven analysis illuminates the status quo of car pricing and how automakers can outperform it.

AUGUST JOAS
FABIAN BRANDT
ROMAN DAFFNER

LEAVING CASH ON THE PRICING TABLE

Approximately 30 percent of a car's list price reflects distribution cost, including dealer margins. Automakers often fail to impose rigorous analytics on these expenses and so overspend. For example, on a typical new car sold in Europe with a list price of €25,000, roughly €17,000 represent the vehicle maker's cost and profit, while the other €8,000 are split in €4,000 sales cost and €4,000 for the dealer's margin. However, after customer negotiations, the actual transaction price usually drops to about €20,000, consuming both dealer and automaker margins. (See Exhibit 1.)

Although automakers wield considerable market experience, they partly lack data driven tools needed to make optimized pricing decisions. What this means is nothing less than a paradigm change in car distribution, from experience driven behavior to fact-based decisions. Several factors contribute to the industry's pricing problems. Automakers usually determine vehicle list prices with a cost-plus approach and comparisons to competitive pricing, but do not fully take into account customers' perspective. Additionally, they tack on significant sales incentives that lead to the typical transaction price levels. These incentives frequently do not follow a differentiated, systematic approach and do not optimally leverage customers' willingness to pay. Improper offer structures and vehicle configurations play a role, too. Cars stand unsold, manufacturers fail to realize vehicles' full profit potential, and dealers resort to additional incentives and discounts to "move the metal."

Inadequately set incentives and discounts undermine profitability. On top of that, strong intra-brand competition drives retail discount levels. Carmaker incentives can come to be misused resources, money spent in the wrong places, because they lack sufficient transparency regarding the total incentives vehicles carry across their sales system. Most promotional activities reflect limited quantified insights on the return-on-investment, and companies often fail to thoroughly analyze individual sales incentives for their effectiveness. Additionally, bonus and margin systems that emphasize volume, rather than profit, place an overwhelming pressure on making the sale while letting profitability deteriorate.

Traditional market allocation processes are also a widespread problem. Allocating car volumes within and across markets is complicated, with many allocation strategies favoring volume over profit considerations or else going with a "business as usual" approach. Finally, opportunistic steering can send pricing strategies into the ditch. In fact, pricing plans typically fail because they lack adequate steering and monitoring across vehicle types – tasks made more difficult by the local, decentralized nature of pricing decisions.

ENSURING PRICING EXCELLENCE

Focused data analytics, smart optimization algorithms, and pragmatic IT solutions are the key enablers to ensure pricing excellence. With innovative insights and tools, automakers,

30%

OF A CAR'S LIST PRICE ARE DISTRIBUTION COSTS, INCLUDING DEALER MARGINS

national sales companies and dealers can improve their commercial distribution performance in several ways.

Create customer-centered list prices. Instead of adopting traditional inside-out, cost-plus pricing, develop differentiated and dynamic list prices, defined by customer expectations. Adopt customer-centered insights, such as willingness to pay and price elasticity. These ought to be the focus of pricing, not product production costs.

Rethink offer optimization. Option packaging, pricing and discounts ought to reflect market insights, with lower discounts and tailored incentives across vehicle lines and special editions. The opportunity for complexity reduction and cost savings is huge, especially across countries and vehicle categories.

Enhance vehicle configuration strategies. Because pre-configured vehicles often fail to reflect customer priorities, harness big data analytic capabilities to develop optimized configuration recommendations. Match these to customer needs and achieve clarity.

Optimize discounts and transaction prices. Stamp out intra-brand competition and optimize transaction prices by creating greater transparency through close steering and retail staff training. Design and execute discount schemes using insights derived from big data, and strive for higher differentiation levels based on customer data. Focus on four key areas: transaction price analyses, discount steering models, easy-to-use retail tools, and comprehensive and frequent training on retail best practices.

Rethink incentives. Stop rewarding consumers for the wrong things. Evidence suggests that carmakers can reduce incentive spending by up to 30 percent without compromising sales volumes. This requires detailed data analyses of incentive

Current pricing practices in the automotive industry result in significant discounts higher than dealer margins, requiring intensified OEM support

VEHICLE EXAMPLE: REVENUE AND COST IN EUR
LIST PRICE = 25,000 EUR
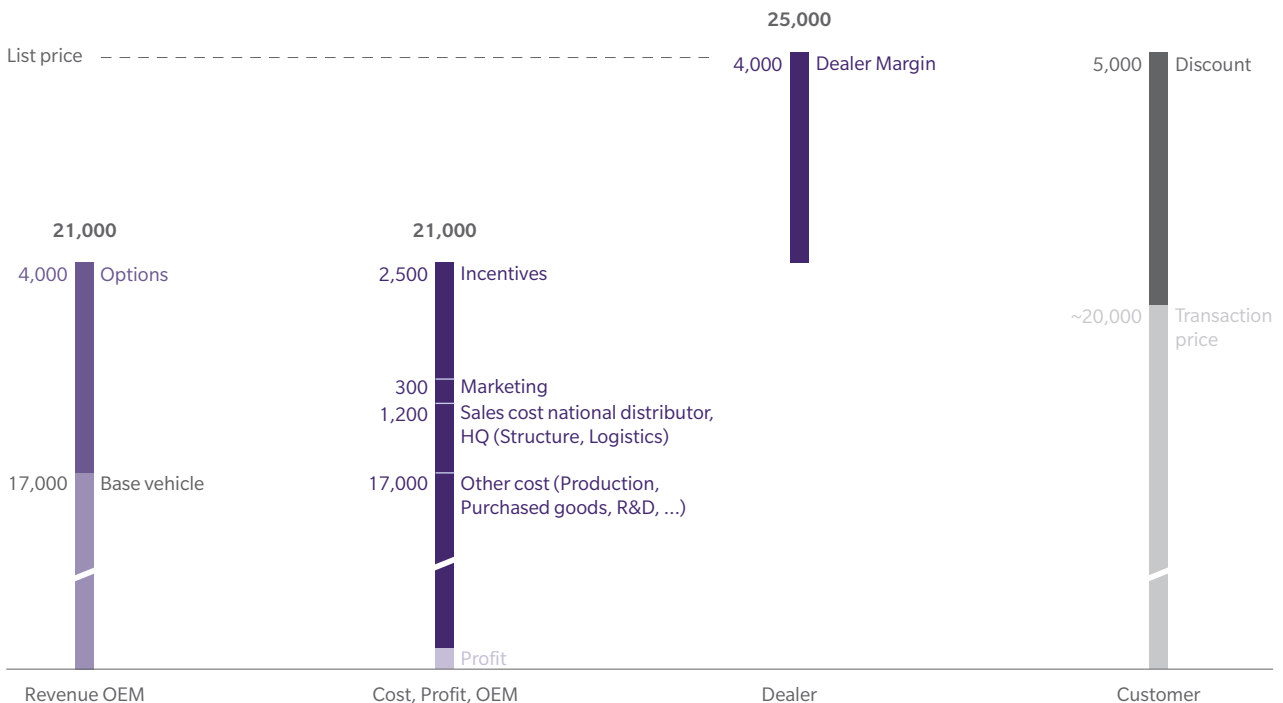
Source: Oliver Wyman distribution cost data base

histories, revised incentive allocation and steering, optimized offers and configuration, as well as pattern analyses regarding types of incentives, channels, markets, and brands.

Redesign channel and margin structure. Focus on profitability and on new sales channels, instead of emphasizing volume via traditional channels. Adding online and direct sales channels will reduce margin spend, while dealers can still play an important fulfillment role in a joint sales model. Margins for channel partners (including platform aggregators) need to reflect the specific role and value-add they play in the sales process.

Improve market allocation practices. Place a greater emphasis on system profit across markets. Create market transparency, employ data analytics, ensure data availability, centralize market intelligence, and identify and understand the triggers, drivers, and indirect effects of commercial decisions across geographies.

Introduce strong steering and monitoring. To avoid pricing "ditches," effectively steer efforts to capture the greatest value. Consistent pricing, rates, and incentives across vehicle categories (build to order, build to stock, test drive vehicles, and used cars) are the starting points. Maintaining the price cascade from automakers to national sales companies to dealers is necessary for safeguarding consistent transaction prices and profit margins.

CAPTURING THE IMPACT OF PRICING EXCELLENCE

Companies often find it helpful to approach pricing excellence in different stages and modules. First, take action to capture quick wins and boost efficiency. This scenario enhances existing structures, creates transparency and therefore reduces incentives and discounts based on big data insights. The next step is to differentiate vehicle and option list prices and to optimize vehicle packaging and configuration decisions, with a specific focus on avoiding unnecessary discounts. Finally, to achieve full optimization firms need to adjust distribution channels and processes. This scenario builds on actions undertaken during the first stages and concentrates on introducing new distribution channels with online and direct sales elements, plus the according margin system adaptions. Capturing from €1,000 to €3,000 per vehicle, full optimization pursues all possible measures and can save up to 30 percent of total cost of distribution.

Facing growing competitive threats, disruptive technological shifts, and the intrusion of innovative new mobility business models, automotive players can no longer rely on the inefficient pricing strategies of the past. Instead, they will need to adopt analytically-based and customer-centered methodologies to make sure their offer, price, and incentive bundles are always on target. ●

AUTOMOBILE-RELATED STARTUPS MATURE

Investment in auto-sector digital technology grows, even as the number of startups peaks

Automobile-related startups have raised $50 billion since 2011, and currently are trending towards bigger, fewer investments that could yield a handful of global champions, according to an Oliver Wyman survey.

MATTHIAS BENTENRIEDER
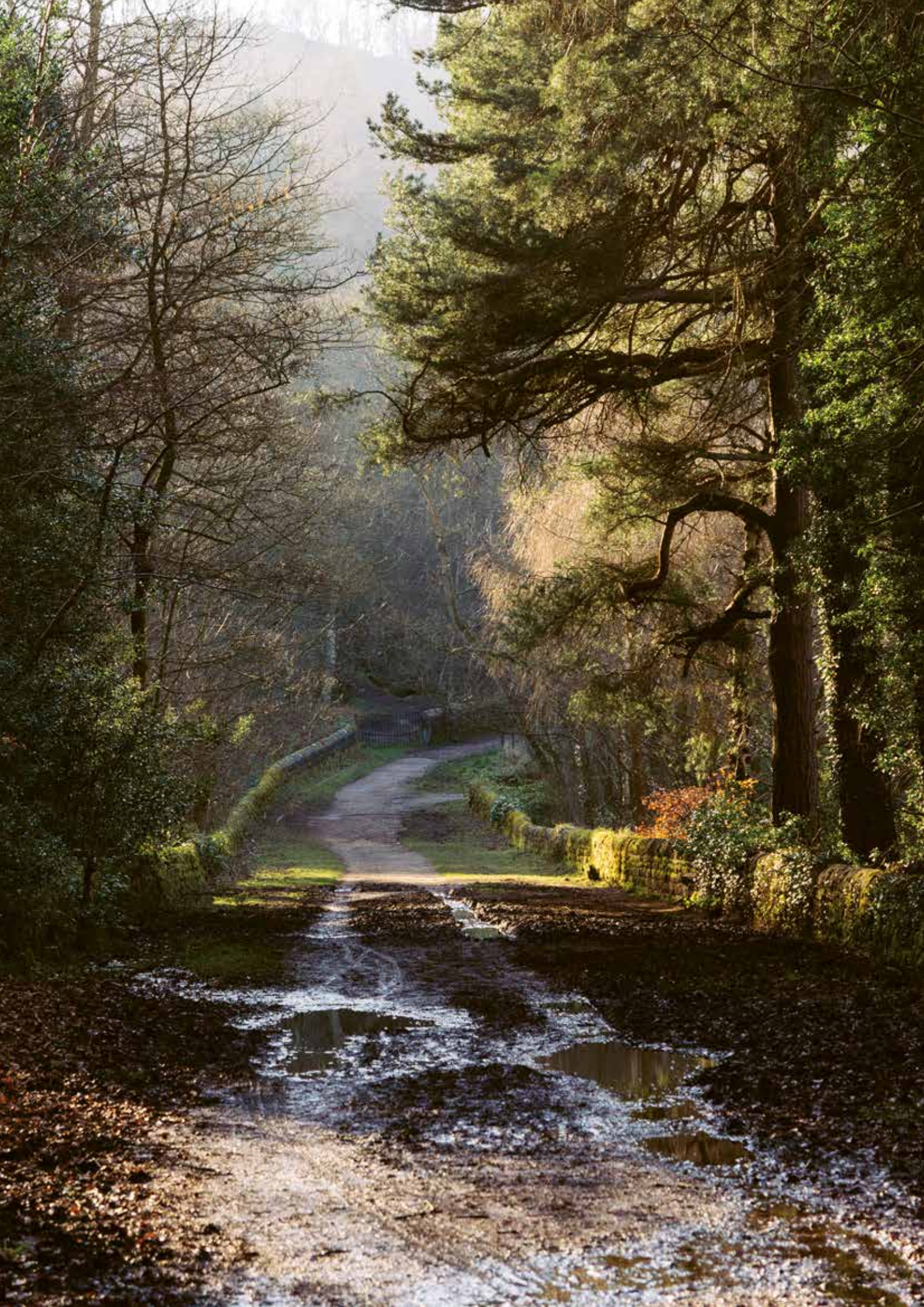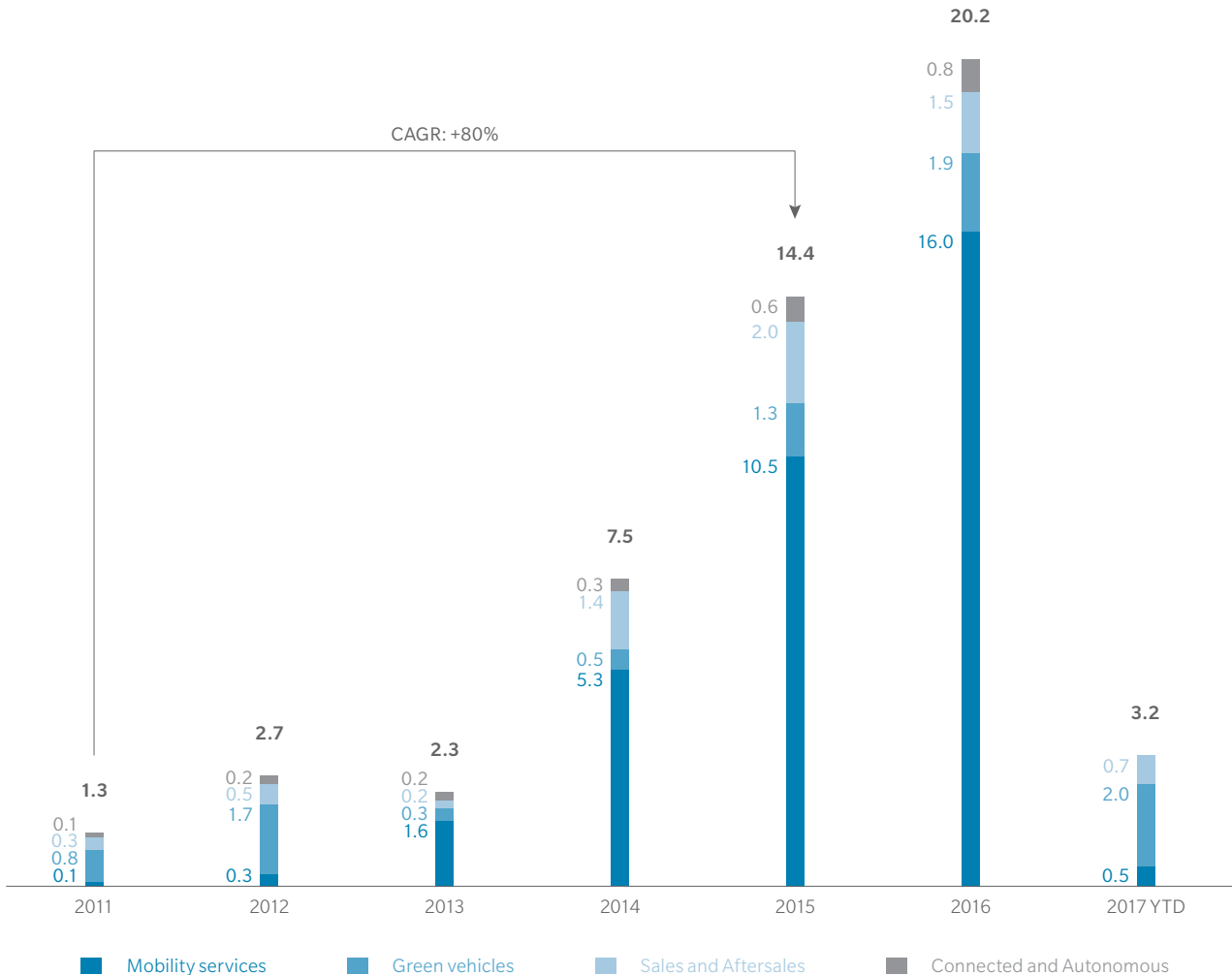MARC BOILARD
ANDREAS NIENHAUS

INVESTMENTS RECEIVED BY STARTUPS, BY SEGMENT
IN $BN, 2011–2017 YTD[1]

CAGR: +80%

20.2
0.8
1.5
1.9
16.0

14.4
0.6
2.0
1.3
10.5

7.5
0.3
1.4
0.5
5.3

2.7
0.2
0.5
1.7
0.3

2.3
0.2
0.2
0.3
1.6

1.3
0.1
0.3
0.8
0.1

3.2
0.7
2.0
0.5

2011   2012   2013   2014   2015   2016   2017 YTD

- Mobility services
- Green vehicles
- Sales and Aftersales
- Connected and Autonomous

1. Data for 2017 includes investments until 05/04/2017
Source: Oliver Wyman

The investments show the increasing importance of outside talent and ideas, as the auto industry undergoes transformation. The car of the past was a stand-alone vehicle, owned and driven by humans, and fueled by gas or diesel. In the future, however, car travel will increasingly happen in self-driving vehicles, be powered by batteries, and form part of a range of intermodal mobility solutions that will include trains, bikes, and walking.

So automakers are looking for startups they can partner with or buy, and the total investment in auto-related startups has strengthened over the past five years. Investment in 2016 totaled $20.2 billion, up from $14.4 billion in 2015. (See Exhibit 1.)

However, the startup world appears to be maturing. While the total amount invested has grown, the funds have been concentrated in a smaller number of new enterprises: only 254

investments were made in 2016, as compared to 379 the year before. Notably, five big players captured 59 percent of the total investment, while 90 percent of the companies are working with less than $100 million. Two world leaders stand out: Uber and Chinese ride-sharing company Didi Chuxing, highlighting the geographical distribution of the investment. Almost half the funds injected into startups since 2011 have gone to the United States, and a quarter to China.

Both automobile manufacturers and startups have much to gain by partnering: The automaker can benefit from exposure to the startup's more entrepreneurial and digital mindset; the startup, on the other hand, may gain greater visibility and status, as well as access to their larger partner's distribution networks and customer bases. These alliances are evolving in four categories: connectivity and autonomy; mobility services, such as rental,

59%

OF THE TOTAL STARTUP
INVESTMENT IS CAPTURED
BY FIVE BIG PLAYERS
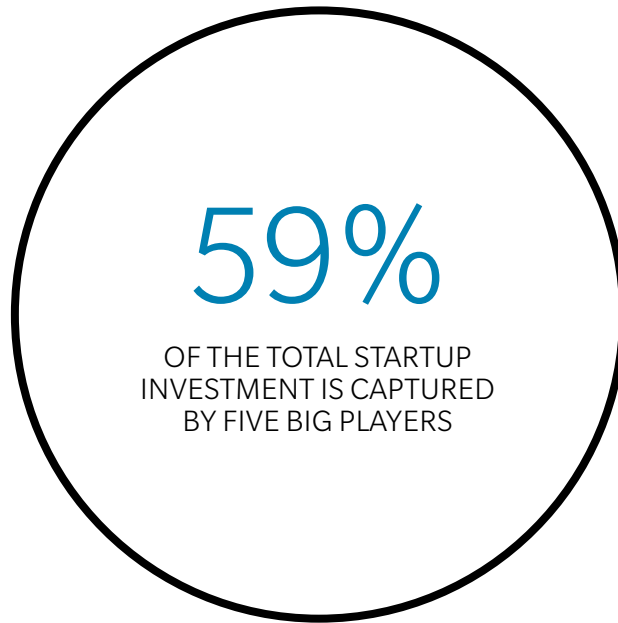
sharing, and ride-hailing, as well as parking and other solutions; sales and aftersales, which increasingly feature an online element; and green vehicles – mostly electrically powered, but also using hydrogen solutions. Investments are becoming more concentrated geographically, too: Within the United States, 83 percent of investments were made in California, indicating a shift in the center of automotive innovation from Detroit to a state known for technology giants and big venture capital funds. Silicon Valley venture capital firm Kleiner Perkins Caufield & Byers (KPCB) has been the most active, with eight deals completed, followed by Google with five. Already, a new Big Four of auto-related digital technology has emerged in the form of Tesla, Uber, Google, and Apple.

But incumbent automakers are fighting back in areas dominated by the digital disruptors, such as ride-hailing and sharing. General Motors has paid $500 million for a stake in Lyft, which

has the best chance of challenging Uber. BMW set up a unit, BMW i Ventures, in 2011, to invest in mobility services and electro-mobility. In November 2016, it announced the unit's headquarters would move from New York to Silicon Valley and invest up to €500 million over 10 years, five times its initial capital. The focus of the unit will be broadened to areas such as customer experience and advanced production technology.

Both BMW i Ventures and Daimler have invested in ChargePoint, the leading provider of charging systems for electric vehicles, which has now raised nearly $300 million in capital. Ford plans to invest $1 billion over five years in a new artificial intelligence software company. Digital applications for mobility are even attracting established companies from outside the auto world: Intel announced in March that it had paid $15 billion for Israeli firm Mobileye, which makes cameras and laser-based sensors for self-driving vehicles.

The deals are taking automakers beyond their familiar partners, such as component manufacturers and dealerships. It is also notoriously hard to forecast the return-on-investment in digital technologies. But automakers need the new digital technologies, and they cannot develop them all themselves – especially given the imperative to integrate them fast. And digital innovation arises from a fast, experimental culture that is not to be found in much of the car industry.

**AUTOMOBILE
MANUFACTURERS AND
STARTUPS HAVE MUCH
TO GAIN BY PARTNERING**

Automakers must learn to work effectively in this new ecosystem, even if it is not what they are accustomed to. The future of their industry will be forged through partnerships with startups. ●

AUTO INSURANCE FACES BIG CHALLENGES

Even before driverless cars hit the road

Autonomous cars offer the promise that 20 years from now we will live in a world where cars take themselves to the gas station while we are sleeping to fill up or charge up for the next morning's drive, where we can enjoy texting on the ride to work without totaling our car, and where getting a learner's permit will no longer be a teenage rite of passage. The day of the autonomous car is approaching, and while not every vehicle on the road will be without a driver once that day arrives, it is expected that by around 2035, up to one-third are likely not to have one.

FADY KHAYATT
MARC BOILARD
ROUGET PLETZIGER

This article first appeared in Forbes.

While it is a scenario that every auto insurer has heard about and dreads, it is not the scenario auto insurers should really be focused on today. Instead, they need to concentrate on the artificial intelligence already making its way onto the roads because it is those advanced driver assistance systems that are about to upend accidents and claims experience in the industry's pricing and underwriting models, long before self-driving cars make a significant impact.

Insurers are starting to get their first glimpse of the dramatically different world of driving they will be confronting for the next 15 to 20 years. It is a landscape populated by the full spectrum of vehicles – from traditional car and driver to those that are partially self-piloted, with even a small set of experimental self-drivers. While the numbers with such innovations as autonomous braking and automatic steering correction functions are still few, that will not be the case for long.

ANTICIPATING CHANGE

Through 2025, the percentage of cars on the road with advanced driver assistance systems (ADAS) is expected to jump from a little more than 10 percent in 2015 to close to 40 percent, according to a report by Oliver Wyman research division Celent. By 2030, half of the cars on the road will have multiple advanced driver assistance systems.

Thanks the exponential growth expected for artificial intelligence systems, our roads will be filled with cars, trucks and buses partially driving themselves. Our skies will see various degrees of self-piloting cargo planes and delivery drones, while our seas will be traversed by versions of self-navigating freighters. By the middle of this century, the world of transportation will no longer resemble what it looked like at the turn of the millennium.

As in other industries grappling with such disruption spawned by artificial intelligence, auto insurers need to get out in front of the change, rethink strategies and tactics before that drip, drip, drip of innovation becomes a torrent. This once staid industry must initiate a reformulation of its pricing, underwriting, claims processes, and most importantly, its culture.

BECOMING DATA-DRIVEN

Insurers will have to begin to think more like technology companies, setting processes in place that not only accommodate new facts and scenarios, but actually have the presumption of change in their DNA. The keys to their success will be flexibility and creativity.

Moving forward, the emphasis will be on expanding data collection and analytical capabilities, forcing insurers to reach across and out of the industry to work with other affected parties to reimagine how things get done. While these changes will prove fundamental to accommodating self-driving cars, the makeover necessary is too extensive to wait for their arrival – and

ADVANCED DRIVER ASSISTANCE COULD CUT UP TO

45%

OF ACCIDENTS BY 2020
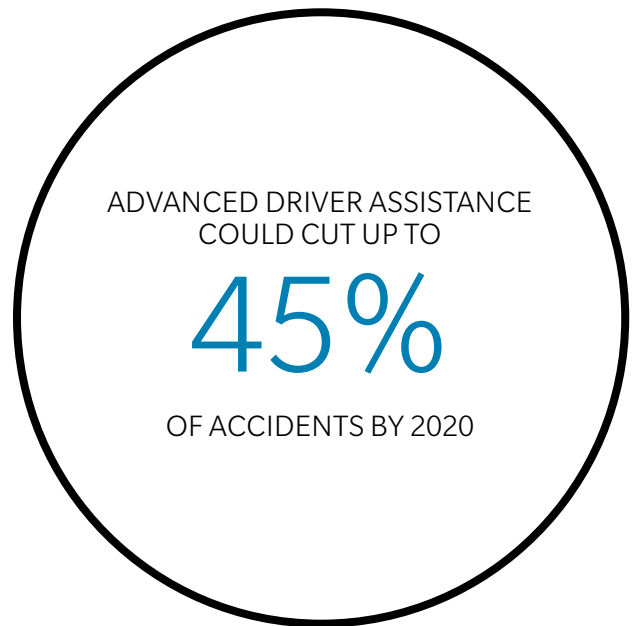
is needed now to accommodate the autonomous capabilities of cars already showing up on the road. (See Exhibit 1.)

While self-driving cars hold out the prospect of eventually eliminating the vast majority of traffic accidents caused by human error – which account for the vast majority of collisions – that improvement will not be seen overnight. Self-driving cars will have to attain a certain threshold presence on the road before the exponential improvement will be realized, but insurance giant Swiss Re projects that advanced driver assistance could cut up to 45 percent of accidents by 2020.

THE CHALLENGE OF ELIMINATING HUMAN ERROR

It just will not be a one-way street to fewer crashes. Studies indicate that these innovations are also apt to create accidents because they respond to situations on the road differently than human drivers. Consider the experience of test vehicles in operation today. Almost all of the various models have been involved in crashes, and almost all of these accidents seemed to occur because the self-driving cars did not anticipate the fact that humans do not always respond logically when driving or follow the rules of the road. Human drivers, on the other hand, do not accurately gauge what to expect from autonomous vehicles.

In a crash involving a test vehicle last year, the self-driving car had a slow-motion collision with a bus because its software was programmed to expect the bus to acknowledge that the self-driving car had the right of way. There have been a few more serious accidents – even one fatality, although in almost every instance, it has not been the self-driving car's action that caused the collision. This insight into autonomy suggests that the gradual introduction of autonomous features will affect pricing, underwriting, and claims processing differently at different

stages of their development and adoption. To adjust to this new reality, insurers need processes and analytical capabilities that are flexible enough to accommodate the various scenarios.

DISRUPTED BUSINESS MODEL

Let us start with premiums. There are predictions for a decline of as much as 60 percent once self-driving cars become plentiful. But that is not until after 2035, and the real question is, what happens in between? Just as with projections for a decline in accidents, we expect it to come gradually over time with the potential for significant volatility even if the overall trend is downward, reflecting the accumulation of experience with self-driving cars and autonomous functions and the changing mix of cars with varying degrees of autonomy. Celent projects a decline of as much as 22 percent in auto losses by 2030. Can premiums be far behind?

The speed and frequency with which pricing models will need to change will require the development of different methodologies that will enable updates over a much shorter cycle. Although the insurance industry has been built on being able to look backwards at the lessons of history about risk, insurers inevitably will have to get used to more agile and experimental processes moving forward, injecting some volatility into pricing.

THE QUICK AND NIMBLE

Another pivotal necessity for insurers as they enter this new world will be developing the ability to analyze and act on real-time data. Since there will be little to no history to inform risk models,

insurers will have to become vacuum cleaners for relevant stats and develop rapid-fire analytics to decipher them. Their goal is to put a value on what it means to have half of the cars on the road with lane departure warnings systems and another third with automatic braking systems and how that information impacts their pricing calculation. This is even further complicated by that fact that systems are being produced by different manufacturers, with some more effective than others.

That is a huge shift. While data has always been a high priority for the industry, it has been almost exclusively backward-looking, until recently. Since the 1990s, insurers have been seeking more granularity in their risk assessments and segmentation of the market, increasingly asking more questions of potential policyholders. In Germany, for instance, insurers had five risk criteria in the mid-1990s about which they inquired. That number today has increased to as high as 50. Because each insurer uses a subset, plus their own algorithms, many pricing models have become true black-box calculations which are no longer easy to back-calculate from the outside.

To collect more detailed data, major car insurance carriers – for example Geico and Progressive in the US – offer customers an option that lets them pay as they drive, monitoring either how well they drive or how much. It involves installation of a telematics device, probably connected to the driver's GPS.

REDEFINING FAULT

Telematics forces insurers to tackle one of the biggest obstacles they confront – developing the IT capability, either internally or through outside service providers, to cope with frequent,

---

EXHIBIT 1: ROADMAP TOWARDS FULLY-AUTONOMOUS DRIVING
Innovative and increasingly intervening assistance systems will pave the way towards fully autonomous vehicles
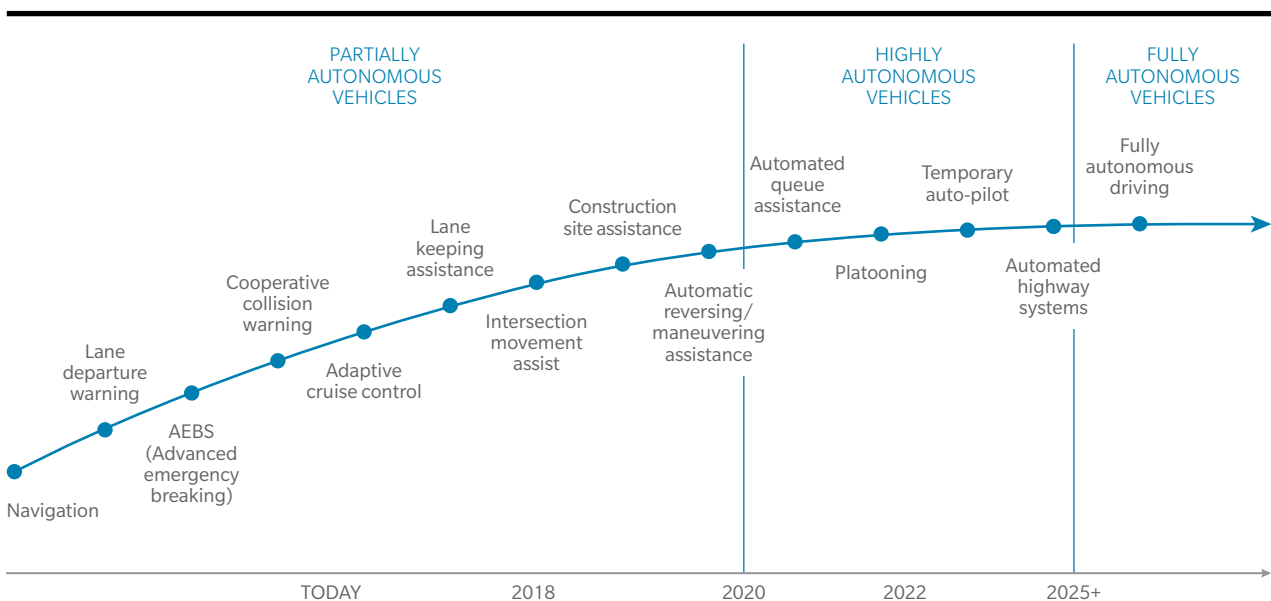
Source: Center for Automotive Research, Oliver Wyman

EXHIBIT 2: CHANGING PARADIGMS

The vision of the autonomous car implies a challenge to many of today's paradigms around cars

HYPER-VERSATILE MOBILITY SOLUTIONS

- Self-navigating cars substantially increase their use as a mobility solution
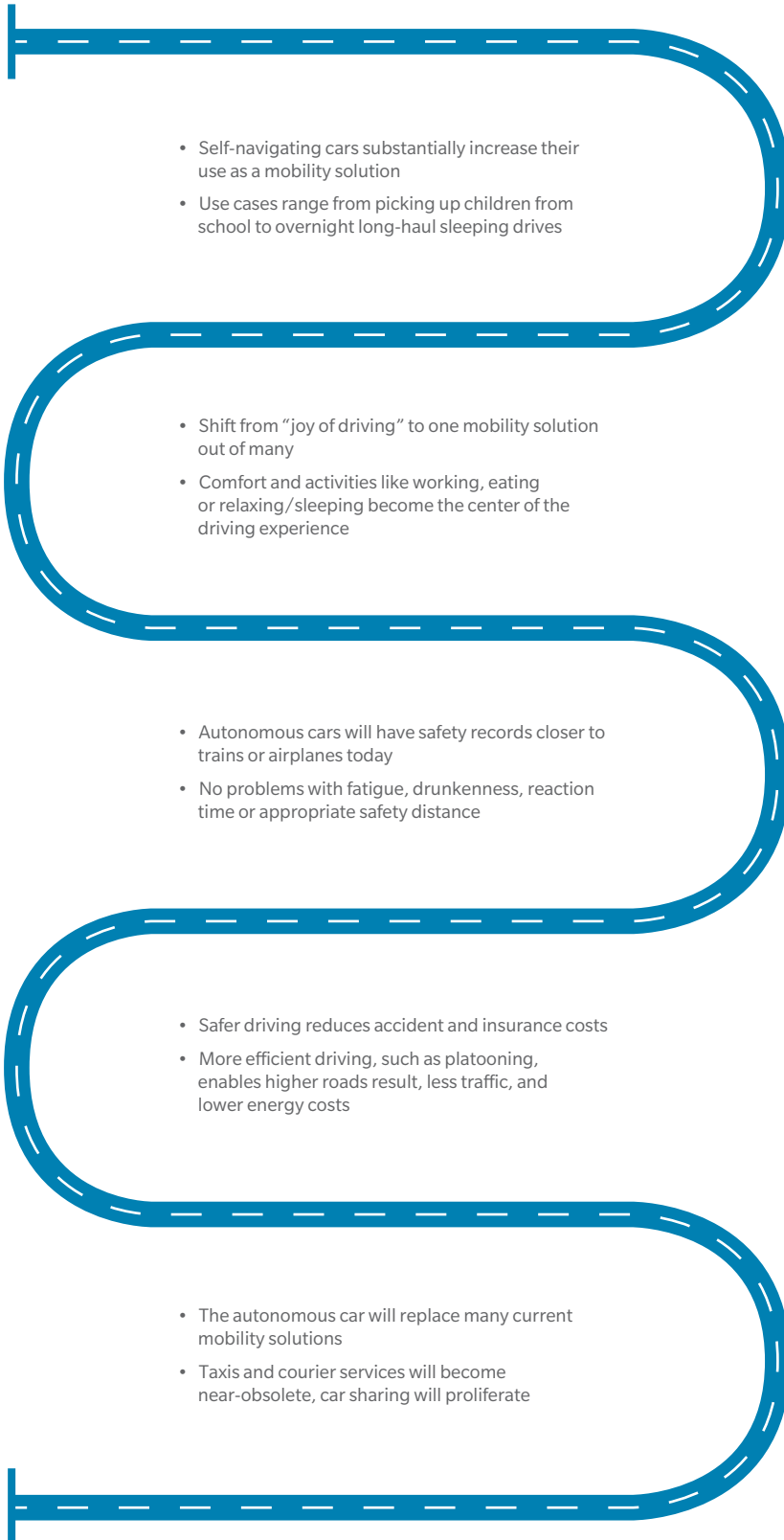- Use cases range from picking up children from school to overnight long-haul sleeping drives

CONSUMER PERCEPTION OF DRIVING

- Shift from "joy of driving" to one mobility solution out of many
- Comfort and activities like working, eating or relaxing/sleeping become the center of the driving experience

NEAR-PERFECT SAFETY

- Autonomous cars will have safety records closer to trains or airplanes today
- No problems with fatigue, drunkenness, reaction time or appropriate safety distance

REDUCING COSTS

- Safer driving reduces accident and insurance costs
- More efficient driving, such as platooning, enables higher roads result, less traffic, and lower energy costs

NEW MOBILITY SERVICES

- The autonomous car will replace many current mobility solutions
- Taxis and courier services will become near-obsolete, car sharing will proliferate

AUTONOMOUS DRIVING

Source: Oliver Wyman

50%

OF THE CARS ON THE ROAD WILL HAVE MULTIPLE ADVANCED DRIVER ASSISTANCE SYSTEMS BY 2030

real-time, and unstructured data. In that scenario, adopting a telematics system becomes the catalyst for IT modernization.

The same may be true for carmakers, when it comes to both data collection and IT upgrades. Like insurers, they will need to constantly refine their products based on feedback from the road. Car manufacturers like Tesla already swear by data collection, which in Tesla's case goes far beyond the typical telematics system. The electric carmaker literally upgrades its models through software downloads and considers itself as much a technology company as a carmaker.

Determining who owns this new real-time data – auto insurer, automaker, or individual – will be critical as determining fault in the age of autonomous control functions and self-driving cars becomes much more complicated. Since the turn of the 20th century when car insurance was first offered, insurers have worked to optimize the claims process for all sorts of accidents, creating an efficient system that attempts to limit the expense of accidents for themselves and consumers. Autonomous cars and autonomous control functions are changing the equation. (See Exhibit 2.)

With the transition to self-driving vehicles, the insurance industry is already envisioning the prospect for gradually moving from individual coverage to insuring car and software manufacturer risk. Even if some of the manufacturers of self-driving features accept responsibility in the front-end for malfunctions of their systems, as Volvo in 2015 committed to doing, that acknowledgement does not necessarily eliminate the risk once plaintiff lawyers get involved. The newness of the situation is likely to lead to an increase in litigation, especially given the complication assigning blame once the technology is a factor. While the autonomous car manufacturer and software maker offer new potential customers for insurance company, it also is an area for which only limited data exists.

THE AVALANCHE OF AUTONOMY

In these early years of autonomy, insurers and carmakers will need to work together. First, establishing ties early in the game will be useful for information sharing. The two industries may also find it useful to cooperate when legislatures begin to reshape the claims process and redefine the concept of fault to reflect the new landscape. Finally, developing a connection to carmakers at a time when the industry expects a shift to fleet coverage and coverage of autonomous car manufacturers also may provide a competitive advantage.

The challenge for the insurance industry is to understand how to go about their business when the environment holds the potential to change quickly. Where in the past there might be a huge safety breakthrough to evaluate every decade or so, today car manufacturers are introducing a variety of autonomous functions on autos almost monthly with no clear timetable for how swiftly any one of them will be adopted on a large-scale basis or generate sufficient data for models.

While autonomy offers an exciting new future for cars, it is one very apt to make the present unpredictable. Even governmental authorities face challenges to develop laws that sufficiently reflect the new reality on the roads and the size of that task may end up slowing down the adoption as officials attempt to balance the need to protect both citizens and industry – particularly if there is an increase in accidents initially that may be more difficult and costly to resolve. Insurers can – and should – play a pivotal role in those early days, especially if they start to grapple with their own challenges now. ●

NEW PRIVACY RULES FORCE FOCUS ON DATA

The EU's GDPR creates new risks and opportunities in the auto business

Information has become the new currency of business – and it is about to get even more valuable and complicated. About 90 percent of today's data did not exist two years ago, and information coming from today's connected cars will soon be adding a lot more of it, generating gigabytes of data every hour. From May 2018, however, consumers will "own" much of that information. The EU's General Data Protection Regulation (GDPR) gives consumers the right to access personal data that companies have collected about them, compel the companies to delete it, and share it with rival businesses. Companies that do not comply could be fined up to 4 percent of global turnover.

MATTHIAS BENTENRIEDER
NICK RAWLINSON

Beyond compliance, a lot of business is at stake, as many of the new opportunities in the auto sector depend on gathering and analyzing consumer data. Automakers are increasingly emphasizing the customer experience of car ownership, for example, which means gathering data on preferences, while data on how people drive will help make roads safer. As a result, customer data will become a major asset as well as a liability, increasing the importance of smart, innovative uses of information and practices that instill trust. That means auto-sector players need to radically rethink their data management, focusing on the new risks and opportunities thrown up by the GDPR.

Some strategic opportunities will come in areas long assumed to be the domain of human interaction, such as sales. An automaker that knows a customer's product preferences can propose the car model and configuration they are most likely to buy. It can also use the information to suggest new products and services when a driver takes a car in for maintenance. Aggregated, this kind of data will help forecast demand in various locations, so an automaker can produce the right models and configurations for the market. (See Exhibit 1.)
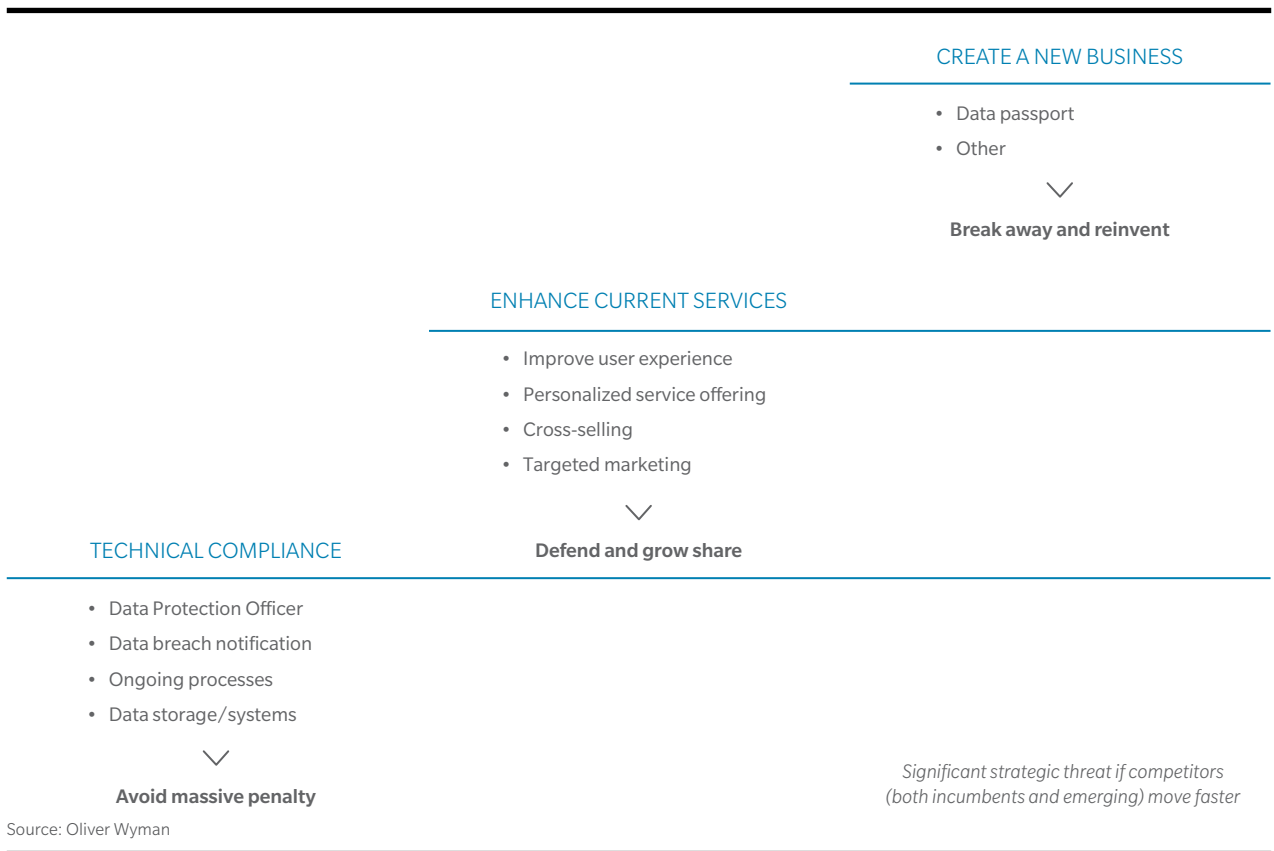
COMPETITION INTENSIFIES

One application already being rolled out is customized insurance. If customers agree to let some insurers use telematics to check whether they are driving safely, they are offered a discount. Information on driving habits is likely to increase in value to insurers, as it enables them to predict the likelihood of an individual being liable for damages incurred in an accident. Inexperienced drivers, in particular, could face sharply different prices for premiums depending on whether or not they share their driving data.

However, by giving customers control over their data, the GDPR will effectively demolish barriers to entry by new market entrants, enabling small, nimble tech-based insurers to proliferate. That could set off a competition among insurers to gather data from different drivers.

The GDPR could also encourage the porting of data between sectors. A car insurance customer might receive a premium reduction for sharing their bank or supermarket data with the insurer; the insurer in turn might be able to use it to develop a

EXHIBIT 1: STRATEGIC PLAYBOOK
Companies need both to ensure short term compliance and also to address the medium term strategic opportunities and threats

CREATE A NEW BUSINESS
- Data passport
- Other

⌄

Break away and reinvent

ENHANCE CURRENT SERVICES
- Improve user experience
- Personalized service offering
- Cross-selling
- Targeted marketing

⌄

Defend and grow share

TECHNICAL COMPLIANCE
- Data Protection Officer
- Data breach notification
- Ongoing processes
- Data storage/systems

⌄

Avoid massive penalty

Significant strategic threat if competitors (both incumbents and emerging) move faster

Source: Oliver Wyman

THE MINIMUM FINE FOR DATA BREACH WILL BE

€20 MM

more robust risk profile of the customer. Plus, that information may be applicable to other kinds of insurance coverage, making it easier for car insurance incumbents to branch out into adjacent fields: They might develop a comprehensive new risk insurance model that covers consumers' cars, homes, pets, travel, electronic gadgets, and perhaps even health. Beyond insurance, the GDPR could lead to the birth of data passport services that aggregate certain types of information, making it easy for consumers to share their data with various businesses.

TIME TO GET ORGANIZED

How auto-related companies approach the GDPR will have a big impact on their prospects. The first imperative is technical compliance to avoid financial penalties. They will need to ensure that customer requests to access, delete, or transfer data are dealt with efficiently – including online identifiers and genetic information, which the GDPR counts as personal information. If asked to delete certain customers' data, the company should consider ways to retain some of the information in anonymized form so that it can contribute to generalized analyses and insights.

Companies must also make themselves an attractive place to store information. If consumers do not trust a firm or it does not provide enough incentive for them to hand over personal information, they will not bother – or they might decide to put their data elsewhere. To improve user experience and personalize offerings, companies should find new data-driven ways to enhance their current services or come up with new business propositions. For example, data gathered from a car's sensors

could inform a driver of the right time to get some maintenance done and suggest value-added services during the pit-stop.

Implementation will require that a group of executives be responsible for the task. Companies handling consumers' personal data will need to appoint a dedicated data protection officer to be in charge of conducting an audit on data processes according to GDPR requirements. The data protection officer will determine what customer data currently exists, how and where it is being stored within the organization, and what data processes are required for compliance. At the same time, firms will need to boost their broad data capabilities by recruiting analytics engineers to develop high-value new services.

Above all, automakers need to recognize that the value and risks related to data are changing rapidly. Their most important task is to identify the strategic opportunities and threats that lie ahead. ●

THE GAS STATION'S DIGITAL FUTURE

Self-driving autos, mobile apps, connected vehicles disrupt oil and gas' retail business

Can you picture a day when you never have to pump gasoline at all at the service station? You will not even have to get out of the car. It is not because they have hired more gas station attendants. It is because the pump and the car can communicate with each other, work together to select your preferred fuel, and fill the tank without the driver being involved. Like gliding through E-ZPass, you would be paying with a cloud-connected app that, by then, may be standard on most autos.

IRFAN BIDIWALA
ERIC NELSEN   *This article first appeared in* Forbes.
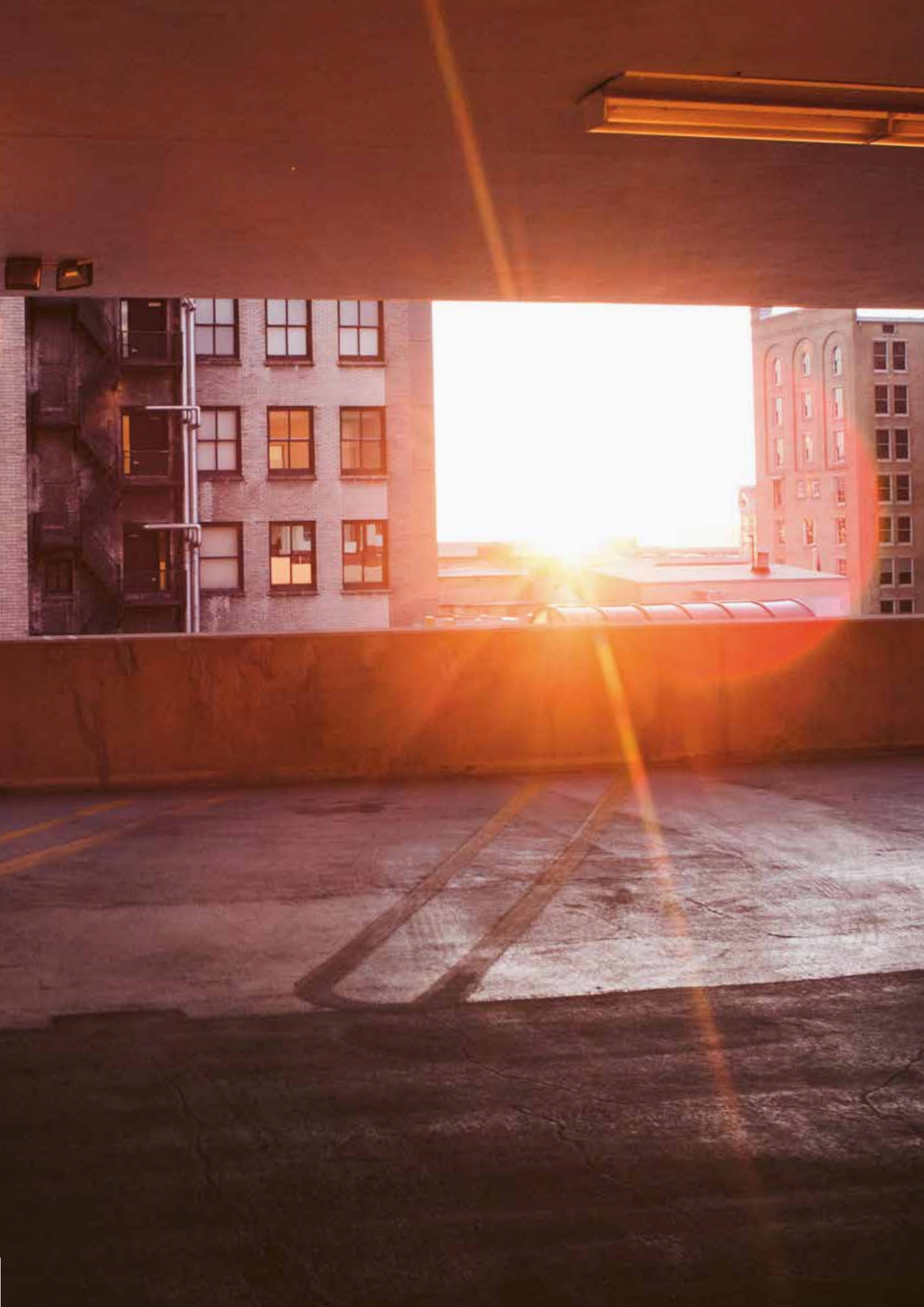
APP-ENABLED ON-DEMAND FUELING
The gas station that comes to you at your house or wherever

DIVERSITY IN THE FUEL OFFERING
The challenge serving conventional cars, electric cars, driverless cars, and people with no cars

EVOLVING CONSUMER SEGMENTS
The digital evolution of the auto influenced by new technology and a sharing economy

PERSONALIZED FUEL MIX
Ability to custom-mix additives to create your own fuel

MODERNIZED STATIONS WITH UNIQUE SERVICES
Making a digitally enabled gas station into your personal concierge

MOBILE AND SMART-CAR APPS
Enhanced selection and seamless interaction between customer and site

CONNECTED CARS
"Smart" next generation autos with constant connection to the cloud

ANALYTICS AND ON-SITE MARKETING
Developing customized promotions for individual customer and site

SELF-DRIVING AUTOS
Cars that take themselves to the gas station and fuel up

AUTOMATED FUELING AND PAYMENT
No need to leave the vehicle with connected, self-driving cars

Source: Oliver Wyman

If your vehicle is self-driving, you should be able to be happily ensconced in your bed or at your computer while your car buys the gas without you even being there.

A NEW RELATIONSHIP WITH THE AUTOMOBILE

This is the future for service stations and gasoline consumers. Today, comparison apps may seem high-tech for your neighborhood favorite, but within the next decade or two, the gas station around the corner will likely be serving everything from hybrids, to autonomous cars, to electric vehicles, to car shares – and selling them a lot more than just regular and premium.

Like so many industries disrupted and transformed by technology, the iconic gas station will soon undergo what will be a pretty substantial digital makeover that connects it not just to the consumer but the car itself. It is not one trend pushing the change; it is a multitude of disruptions that are overhauling our relationship with the auto and the way gasoline is sold. And with all these things in transition, the

business model for the service station must ultimately begin to reflect the new reality.

Gasoline demand has begun to decline in more mature economies and will probably continue to as a growing number of people do not dream of owning a car the way previous generations did. According to the US Census, the number of no-car households increased slightly in 2015, perhaps in part because more people want to live in cities, and of course the well-documented lack of interest in car ownership among millennials.

COOL SERVICES, A VARIETY OF FUELS

The gas station of, say, 2030 will not only have to do things differently; it will have to do different things to be profitable. For instance, one futuristic vision is to have short-distance drones deliver pre-ordered snacks or packages while the driver waits in the car. (See Exhibit 1.)

The gas station of the future is going to have to mirror the diversity of its clientele. Given the rising popularity of hybrids

<30%

OF THE PROFITS OF AN AVERAGE
GAS STATION ARE GENERATED
BY GASOLINE AND DIESEL
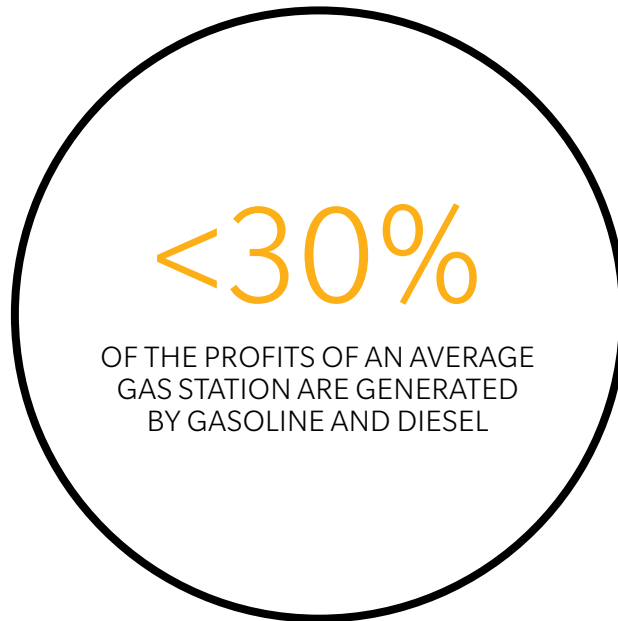
and electric cars like Tesla, perhaps the gas station will have to consider having charging stations, as some now do in Europe. Or perhaps the demand is for compressed natural gas or liquefied petroleum gas. Already, gasoline and diesel generate less than 30 percent of the profits at the average gas station, and that figure may continue to decline, not necessarily from low demand but because the gas station is selling so many other services and products.

Of course, we are used to the convenience store aspect of gas stations, changing them into personal fueling stations – and that service is expected to become more ubiquitous and more sophisticated over time. But the gas station also will likely be a place where you can pick up your order from Amazon after it was delivered to the station by drone. Or maybe you pick up groceries that you ordered or your dry cleaning. In essence, your gas station becomes a giant post office box or a personal concierge – a convenient one-stop shop for the sharing economy as it blossoms.

2 AM GASOLINE CALLS

The change may go beyond the services the station offers; it may involve when it offers them. The busiest time for the gas station of 2035 may be at 2 am when autonomous driving cars are programed to take themselves to the station to fill up for the next morning's drive to the office.

The transactions may not even take place at the service station as on-demand fuel services begin to pop up. With an app, consumers can type in their order and have it delivered to their office parking lot or their driveway.

Stations also will deal with more wholesale purchasers, as car-sharing services like Lyft and Uber grow. Rather than sell to

individual drivers, service-station franchises may only maintain long-term contracts with the companies that employ drivers. Manufacturers of autonomous autos also may decide to develop long-term fuel programs for their buyers.

ANTICIPATING THE FUTURE

While the potentially painful disruption is not entirely welcome news for the legions of independent gas stations and their owners, it represents an opportunity for early adopters, ready to embrace and anticipate change. Already, we are seeing service stations experiment with predictive analytics and other technology-driven innovation like mobile payment. For instance, one US convenience store-gas station chain is cutting gas prices by up to 10 cents per gallon for customers paying via app-enabled direct debit.

By 2022, cars are expected to have enough internet connectivity to allow drivers to simply ask their cars for recommendations on where to go for gas and then rely on the car to seamlessly pay for it. In the United Kingdom, Jaguar and Shell are piloting advanced capabilities for site interaction with such web-enabled vehicles.

The digital revolution has already compressed product cycles and brought disruptive innovation to a range of industries. Like it or not, the traditionally conservative gasoline industry appears to be among its next targets. What is not clear is which enterprises will be early movers and which will go the way of the drive-in movie. ●

IAN BROWN

Ian serves as the Chief Executive Officer for Rentalcars.com, the world's largest car hire booking platform. With customers in over 162 countries and cars in 50,000 global locations, Rentalcars.com's customer base is supported in over 40 languages. Rentalcars.com is in turn part of Priceline Group, the world's leading travel group, alongside Booking.com, Priceline.com, Kayak, Agoda and OpenTable. Ian joined Rentalcars.com in 2014. Previously he spent 16 years at Oliver Wyman where he led the Travel & Leisure and Commercial Effectiveness practices. Ian holds an M.Eng. in Engineering, Economics & Management from The Queen's College, Oxford. He lives near Manchester with his wife Shelley and two young boys.

WHAT KIND OF CARS WILL WE USE IN THE FUTURE, AND HOW WILL WE USE THEM?

As a tech business, we think less about "what kind of cars" we will use in the future and more about what kind of experience customers will expect. Across all forms of travel the clear trends are: frictionless, simple, personalized, mobile, aggregated. That is certainly true for car hire right now. In future, we see that extending to how customers expect to access all forms of ground transport – likely using just one or two apps.

The last few years have seen a proliferation of new business models: ride-hailing, such as Uber; private drivers, as in our Rideways business; peer-to-peer, like Turo; and car clubs, such as Car2Go. And now there are monthly car access schemes like Book by Cadillac. We believe that in just a few years customers will expect to access all of these and more with just a few clicks on their mobile device.

It is easy to imagine a twenty-something urban professional – let us call her Sarah – taking the bus to dinner on a Friday night, and then a taxi or Uber home afterwards. On Saturday morning, she might take a car from an on-street car club for a couple of hours for a trip to Ikea. Then she picks up a fun sports car as a peer-to-peer rental in the afternoon to drive out of town for the rest of the weekend with her boyfriend. Easy to imagine because of course it is already happening in cities like London and Berlin. Throw autonomous cars into that mix at the much

lower price-point per ride they will enable, and maybe two or three of Sarah's trips are taken using autonomous ride hail instead. At least one might be shared with strangers.

Obviously, we all know there is a ton of machine learning required to bring safe autonomous cars to reality at scale and in all locations and weather. We believe the winners in the future will also be applying scale AI to make the whole customer experience frictionless and personalized. For instance, using real-time data signals to anticipate Sarah's needs in getting around and auto-recommending the best options for her at every step, so all she needs to do is say or think yes. By the way, that goes also for targeted in-car marketing.

IS RENTING REALLY THE NEW BUYING?

We are clearly not the experts on this but we do not see car ownership disappearing quite as fast as some have predicted, particularly once you get outside of cities. At the same time, there is a younger, urban adult generation growing up now that has a quite different attitude to mobility as well as to ownership in general, and just does not see the need to own a car. So we do believe that sharing platforms will continue to grow in major cities. Indeed, the data is already pretty clear as you look specific cities in Europe, Asia-Pacific, and for that matter markets like Brazil.

That said, there are some quite different sharing models out there. A lot of fascinating experimentation has been happening in different cities around the world, which we love because there is so much to learn from it. At its simplest we think about two broad sets of sharing platforms which serve different needs: car clubs like Zipcar or Car2Go, where users access the vehicle on an hourly basis, and peer-to-peer clubs like Turo or Drivy.

Car clubs are largely complementary to traditional (charge-by-the-day) car rental. They serve a different customer need: instant access for a few hours. This is why several car rental companies have built or acquired such platforms.

Peer-to-peer clubs, on the other hand, tend to operate in a more similar space to traditional car rental firms. Customers tend to use these for multi-day durations, and often while on leisure trips. They tend to be older vehicles than you would have in a car rental fleet and there can be multiple friction points before you actually get in a car. However, for a customer, they are often cheaper than the equivalent traditional car rental, and you know exactly which vehicle you are hiring.

HOW WILL THE CAR RENTAL BUSINESS CHANGE OVER THE NEXT 20 YEARS?

Mary Barra famously said last year at Davos that she believed the auto industry will change more in the next 5-10 years than it has in the last 50. In some ways we think the same will probably be true for the car rental industry. As well as the types of vehicles changing – more connected, different fuel mix, and so on – we think the customer experience will change markedly too. Today, physically hiring a car takes too many steps and is just plain complicated and full of friction. For example, the customer may have to sign lengthy terms and conditions, often in a language they do not understand. Then they put down a deposit; inspect the vehicle for damage, and likely stand in a long line waiting to be served at a desk.

We just do not think customers are going to stand for this in future. So we are working with some of our most forward-thinking supply partners to simplify the experience for our joint customers and to progressively engineer the friction out – all the way from the first click to getting behind the steering wheel.

As you look further out, there is no doubt that autonomous cars will impact the industry. While this could be a threat to the current rental car operators, I personally think it could represent a real opportunity – certainly for those who are smart about seizing it. It seems likely that we will then see an accelerated convergence between today's different rental, ownership, and mobility models. Once nobody actually needs to drive, then a rental car, an Uber and a car-club car start to look very similar.

HOW DO YOU THINK COOPERATION WILL EVOLVE BETWEEN THE AUTO MANUFACTURERS AND NON-OWNERSHIP SERVICES?

There are actually already some strong relationships between automakers and many car rental businesses. You also see some quite different patterns of participation by automakers in the rental sector as you go around the world. In the United States, Ford sold off Hertz just over a decade ago. But if you go to Japan, you find Nissan and Toyota both operating great car rental businesses at scale.

Many automakers are experimenting with different non-ownership models. Just to pick a few: Book by Cadillac offering customers access to a whole fleet of cars for a monthly subscription fee; General Motors experimenting broadly with its Maven proposition; Daimler behind Car2Go, one of the largest global on-demand car clubs; and Volkswagen recently announcing Moia. As a tech business that has customer experimentation in our DNA, we find it hugely exciting to see so much experimentation happening in parallel across the industry.

Our expectation therefore is that as we see the pace of technological innovation and business model innovation accelerating dramatically, this will also lead to more "relationship innovation" between automakers, car rental operators – and, indeed, businesses like ours. ●

OUR AUTHORS

MATTHIAS BENTENRIEDER
PARTNER

matthias.bentenrieder@oliverwyman.com
+49 89 939 49 553

ROMAN DAFFNER
PARTNER

roman.daffner@oliverwyman.com
+49 89 939 49 592

JOHANNES BERKING
PRINCIPAL

johannes.berking@oliverwyman.com
+49 89 939 49 744

RAINER GLASER
PRINCIPAL

rainer.glaser@oliverwyman.com
+49 89 939 49 887

IRFAN BIDIWALA
PARTNER

irfan.bidiwala@oliverwyman.com
+1 713 276 2237

RON HARBOUR
VICE PRESIDENT

ron.harbour@oliverwyman.com
+1 248 455 7263

MARC BOILARD
PARTNER

marc.boilard@oliverwyman.com
+33 1 45 02 32 19

RICHARD HELL
VICE PRESIDENT

richard.hell@oliverwyman.com
+49 89 939 49 710

FABIAN BRANDT
PARTNER

fabian.brandt@oliverwyman.com
+49 89 939 49 605

LUTZ JAEDE
PARTNER

lutz.jaede@oliverwyman.com
+49 89 939 49 440

JOERN BUSS
PARTNER

joern.buss@oliverwyman.com
+1 248 455 7246

AUGUST JOAS
PARTNER

august.joas@oliverwyman.com
+49 89 939 49 417

BO KAUNITZ
PARTNER

bo.kaunitz@oliverwyman.com
+46 8 546 24 092

JOCHEN PEPPEL
PARTNER

jochen.peppel@oliverwyman.com
+49 69 971 73 579

FADY KHAYATT
PARTNER

fady.khayatt@oliverwyman.com
+33 1 45 02 36 62

ROUGET PLETZIGER
PRINCIPAL

rouget.pletziger@oliverwyman.com
+49 69 971 73 577

ERIC NELSEN
PARTNER

eric.nelsen@oliverwyman.com
+1 312 345 2992

NICK RAWLINSON
PRINCIPAL

nick.rawlinson@oliverwyman.com
+44 20 7852 7789

ANDREAS NIENHAUS
PRINCIPAL

andreas.nienhaus@oliverwyman.com
+49 69 971 73 527

JUERGEN REINER
PARTNER

juergen.reiner@oliverwyman.com
+49 89 939 49 577

SIMON OERTEL
PRINCIPAL

simon.oertel@oliverwyman.com
+49 899 3949533

STEVE SCEMAMA
PARTNER

steve.scemama@oliverwyman.com
+33 1 45 02 33 78

DANIEL PARTSCH
DIRECTOR

daniel.partsch@oliverwyman.com
+49 89 939 49 745

LARS STOLZ
PARTNER

lars.stolz@oliverwyman.com
+49 89 939 49 343

RECENT PUBLICATIONS
FROM OLIVER WYMAN

For these publications and other inquiries, please email info-automotive@oliverwyman.com or visit www.oliverwyman.com.

AIRLINE ECONOMIC ANALYSIS

How carriers should approach 2017.

INCUMBENTS IN THE DIGITAL WORLD

How incumbent organizations can ultimately win in a marketplace transformed by digital disruptors.

THE MARKETPLACE REVOLUTION

Shattering the foundation of the $3 trillion sick-care marketplace.

TEN DIGITAL IDEAS FROM OLIVER WYMAN

In this collection of articles, we showcase ten digital ideas from across our firm for how business leaders can improve and grow their businesses.

MRO SURVEY 2016

Innovation and adoption in the aviation maintenance, repair, and overhaul sector.

PERSPECTIVES ON MANUFACTURING INDUSTRIES

A collection of viewpoints on industrial companies' challenges and trends, as well as their opportunities and potential courses of action.

THE STATE OF FINANCIAL SERVICES 2017

Financial services firms need to adapt to a broadly reordered marketplace.

THE OLIVER WYMAN AUTOMOTIVE MANAGER

Perspectives on the latest trends and issues in the automotive industry.

THE OLIVER WYMAN
CMT JOURNAL, VOL. 3

Our latest thinking on the opportunities and challenges in communications, media, and telecommunications.

THE OLIVER WYMAN
ENERGY JOURNAL, VOL. 3

The latest thinking from across Oliver Wyman's Energy practice on how shifts underway will create new risks and opportunities not just for the energy sector, but also for every company and person that depends on it.

THE OLIVER WYMAN
RETAIL JOURNAL, VOL. 5

Retail is an industry in transition. In this journal, we focus on the future to help us understand where the next upheaval is likely to come from and how retailers can be prepared.

THE OLIVER WYMAN
RISK JOURNAL, VOL. 6

A collection of perspectives on the complex risks that are determining many companies' futures.

THE OLIVER WYMAN
TRANSPORT & LOGISTICS
JOURNAL 2016

Perspectives on the issues facing the global transportation and logistics industries.
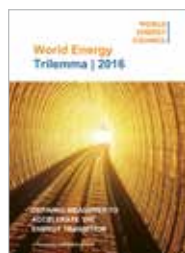
THE SOCIAL
IMPACT IMPERATIVE

The role of private and non-profit sectors in the GCC.

WHOLESALE BANKS AND
ASSET MANAGERS

The world turned upside down.

WORLD ENERGY TRILEMMA

Defining measures to accelerate the energy transition.

ABOUT OLIVER WYMAN

Oliver Wyman is a global leader in management consulting. With offices in 50+ cities across nearly 30 countries, Oliver Wyman combines deep industry knowledge with specialized expertise in strategy, operations, risk management, and organization transformation. The firm has more than 4,500 professionals around the world who help clients optimize their business, improve their operations and risk profile, and accelerate their organizational performance to seize the most attractive opportunities. Oliver Wyman is a wholly owned subsidiary of Marsh & McLennan Companies [NYSE: MMC]. For more information, visit www.oliverwyman.com. Follow Oliver Wyman on Twitter@OliverWyman.

OLIVER WYMAN