

Digital disruption and the future of the automotive industry

Mapping new routes for customer-centric connected journeys



Digital services centred on increasingly empowered consumers will bring disruption to the automotive industry. Economic value within this industry and across adjacent markets will be forever altered. In a world where the future is far from certain, automotive companies will need to develop new core capabilities to survive.

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The IBM Center for Applied Insights introduces new ways of thinking, working and leading. Through evidence-based research, the Center arms leaders with pragmatic guidance and the case for change.



Imagine that you are a middle manager in an automotive manufacturer. Your career has progressed steadily as you gained experience in the various aspects of this complex business. You understand how the development cycle works, how to work with suppliers and dealers and how to drive sales.

Everything you have done has built on each experience and you were looking forward to continued progression. But something seems to have changed. Your career foundations are not feeling as solid as they used to and you no longer feel as confident about the future. The sudden emergence of companies like Uber and many others has changed the rules of the game. What is going to happen next and how can you respond?

“The auto industry is poised for more change in the next five to ten years than it’s seen in the past 50.”

– Mary Barra, CEO, General Motors ¹

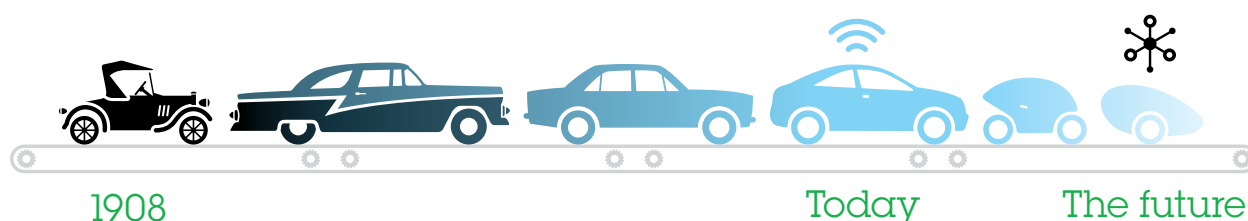
About the research

This paper is based on in-depth interviews with 20 IBM connected car subject matter experts (SMEs) who regularly consult and advise clients across the automotive industry in the United States of America, Japan, China, India and across various European countries. Many have worked previously in roles within auto OEMs and tier-one suppliers. Their collective experience totals 300 years in the auto industry.

Automotive manufacturers need to quickly decide how they are going to respond strategically to digital disruption

Ever since the first Ford Model T rolled off the production line, mankind has obsessed about what the “car of the future” might look like. That question has been asked even more in the last few years as the connected car and what it may eventually spawn – the prospect of driverless or fully autonomous vehicles – has increasingly looked within reach. The car of the future will be smarter. It will be increasingly intelligent, inter-connected and instrumented. Cars will ultimately communicate, socialise and collaborate with other things, including other vehicles, traffic lights, parking bays and retailers, thereby becoming a participant in a wider “system of systems”.

Connected cars will also bring forth an array of digital services created out of the vast amounts of data this connectivity will unleash. These digital services (conceptualised in Figure 1, see following page), many of which are yet to be imagined, are likely to be highly disruptive to the auto industry. They will reinvent existing business models, create new models, change the auto ecosystem and redesign customer engagement and expectations. Along this journey, control points and profit pools will change, and economic value within the auto industry and across adjacent markets will be forever altered.



While there is no room for complacency, we don’t anticipate an immediate “big bang” disruptive event for auto manufacturers (or OEMs) brought about by increased vehicle connectivity and digital services. Disruption is a journey, not a one-time event. However, OEMs face strategic choices regarding their response to digital disruption, and they cannot afford to simply wait and see. With markets and adjacent spaces changing rapidly, there is a real need to keep revisiting strategic responses in a very fluid, agile way. The days of the annual plan are gone.

Not all digitally disruptive services are created equally: our findings reveal some digital services will be significantly more disruptive and have the potential to be more lucrative than others. However, it is by no means guaranteed that OEMs will take all the prizes that digital disruption will bring. All participants across the auto industry value chain need to be mindful of the speed and dramatic transformation experienced in other industries.



Figure 1. Consumer-centric digital services are disrupting the automotive industry

For more than 100 years the automotive industry has created competitive advantage mainly through engineering excellence. Going forward, this will no longer be sufficient

The automotive industry will not be immune to digital disruption

Over the last two decades we have witnessed how some industries have been dramatically transformed by a wave of technological forces. Brands like Uber and Airbnb have rewritten the rules of the markets they have entered. In fact, they've spawned a new term for the whole notion of disruptive forces transforming industries and incumbents: "Uberfication".

Since its inception, the automotive industry has been a vast playground of continuous innovation as manufacturers have endeavoured to create competitive advantage through advancements in mechanical and electrical engineering. Despite this, the auto market today still remains relatively closed – controlled mainly by the auto manufacturers. Barriers to entry in auto, compared to other industries, remain relatively high and until now the consumer has been largely a passive passenger in this virtuous circle of innovation. The auto industry, like many industries, is now on the brink of significant change, altering these historical market conditions. The changes are due in large part to the digital revolution brought about by a perfect storm of technological influences such as big data and analytics, cloud computing, the socialisation of business through mobile devices, and at the eye of the storm, the Internet of Things (IoT).

The connected car is the poster child for the Internet of Things

While auto OEM marketers have sought to win our hearts and minds for decades – tempting and alluring us to their brands – there is, potentially, a new cold-heartedness emanating from the connected car. From a pure data point of

view, the car itself is another 'thing' in the grand scheme of the IoT – just a node on a network. In the IoT, the car is literally a big data in motion problem.

The connected car is likely to become the poster child of the IoT revolution because it is part of a wider system of systems (encompassing not only cars but also cities, physical infrastructure, retail, insurance and many others) and leverages key IoT enabling technologies, such as sensors, analytics, big data, natural language processing and cloud computing.

The modern connected car – with around one million lines of software code and producing up to 25GB of data every hour² – has the potential to create a dazzling array of new digital service possibilities. And here, entities in the physical world, such as vehicles, start to create new economic value that we are only just beginning to understand.

Data is fast becoming the world's new natural resource. Those in the automotive industry that recognise this and seek ways to tap into the new natural resource will have an edge. Future control points in the auto industry will be defined by who can best leverage data to adapt and improvise business models, identify ways to engage old and new partners and materially enhance the customer experience.

Where there is data and connectivity, of course, there is always risk. Consumers are generally happy to share data as the 'cost' for services, provided they see the benefit and know their data and safety are not compromised. A recent high-profile security incident highlighted the risk to OEMs of keeping everything in-house compared to partnering with experts.

“Security is the foundation to everything in the Internet of Things. This becomes particularly apparent with the connected car, as it is such an active participant in our daily lives. Just like health insurance, you have to be sure that you are adequately covered, otherwise the consequences can be disastrous.”

– Dirk Wollschlaeger, General Manager, IBM Automotive Industry

“OEMs have to cover a huge number of bases... they have to be selective. It’s a strategically expensive time to be an auto OEM.”

– Ben Stanley, Global Automotive Research Lead, IBM Institute for Business Value

Today’s automotive industry is trying to spin many strategic plates

As global entities working in markets that are in a state of considerable flux and where it is difficult to forecast the future, OEMs are facing many strategic options.

In various markets, they need to plan for multiple likely scenarios, while balancing the potential risk of maverick scenarios. Make no mistake – this is a tough strategic challenge: auto manufacturers still see brand penetration into growth markets as a key strategy. But entering new markets with tried and tested models and marketing campaigns is relatively straightforward compared to the strategic shifts needed to be successful in digital services for the connected car. The key DNA requirements are to be fluid and agile, and embrace the idea of “fail fast”.

“As one OEM told me, ‘I am certain that what we are building today is not what we are going to end up with, but we have to start somewhere.’”

Mitigate the chances of being “Ubered”

As cars increasingly become connected, the potential of such digitally disruptive scenarios is not lost on the auto industry. In fact, auto executives not only anticipate the potential disruption ahead, but they are already thinking about what they need to do to take advantage of the opportunities and counter the threats.

Business as usual

Market penetration, product development



Business unusual

Market development and diversification



Figure 2. OEMs are facing many strategic options



3 in 4 auto executives expect greater collaboration with other industries to be a key growth driver⁴



But fewer than **1 in 5** consider their company prepared for the challenges in the decade ahead⁵



And only **1 in 3** say their organisations are adaptable to face the challenges ahead⁶

The IBM Institute for Business Value “Automotive 2025 - Industry without borders” study reveals that over the course of the next decade, around three in four executives expect greater collaboration with other industries to be a key growth driver, and many are already thinking about mobility services as a significant area for co-creation with consumers. However, by its own admission, the auto industry feels ill-prepared: fewer than one in five auto executives describe their organisations as prepared for the challenges on the way to 2025, and only one in three say their organisations are adaptable to face the challenges.³

“OEMs are worried about an Uber or Airbnb moment, but it’s hard to predict it happening in the auto business.”

This growing complexity mandates a fresh approach towards partnering and co-creation and away from conventional approaches

Whatever digital services the auto industry develops, it will likely require collaboration with non-traditional players. New companies entering the ecosystem (such as Trakm8, Automatic.com, Mojio) are seeking to capitalise on opportunities created by this disruption. And we are starting to see the auto market morph in ways that are becoming less predictable. For example, Uber recently acquired Bing’s mapping assets, absorbing around 100 Microsoft employees in the process.⁷

“Determining who they have to work with is a significant challenge for OEMs ... there’s a much expanded group of players, including commercial partners and government.”

“OEMs are not short of ideas or vision, but struggle with how to implement on a practical basis.”

– Stefan Schumacher, WW Director, IBM Global Automotive Solutions

Partnering with non-traditional entities, outside the OEM's usual tier-one supply network, opens up opportunities around potential new business models – 51% of OEMs and 72% of suppliers see new business models as growth opportunities in the next decade.⁸ Creating new business models is very appealing to those OEMs whose profit margins on vehicle sales are typically low. However, it requires something of a mind-shift away from the one-time transactional sales model to a recurring services sales model. In addition, new business models may call for different thinking in terms of agility, taking greater risk and adhering to the notion of fail fast rather than conventional business wisdom around point-project return on investment.

The “new deal” brought about by the whole socialisation of business movement is that the customer has finally become king. The success or failure of any business is invariably conducted under the spotlight of social media.

“Consumers previously went four to five times to a dealer, but many only visit at the final decision point, preferring to use social media instead. OEMs have been relatively slow in picking up this shift.”

OEMs have solicited traditional feedback (e.g. via user groups and focus groups) for a long time, but this has often been limited to design and ergonomics rather than a genuine desire to seek co-creation opportunities with customers from the outset. The auto industry has been relatively conservative and slow to respond, particularly in comparison to other industries. This is increasingly going to be a requirement as customers invariably turn to social media – particularly at the decision point but also throughout their ongoing experience with their brand. The Institute for Business Value study reveals 73% of OEMs expect to use co-creation for mobility services over the next decade.⁹

“OEMs are currently very secure in their old revenue model, with pricing of options traditionally a very high one-time charge. But they are very unsure how to translate this into new models of revenue generation.”

– Ron Dombroski, Vice President, IBM Market Development

IBM subject matter experts provide valuable clues to where future control points and value will be found

In our discussions with SMEs, we explored the extent to which digital services would act as an agent of disruption in the auto industry. We looked at pathways to market evolution through three lenses:

1. The likelihood such digital services would be owned/controlled by the OEMs in the future
2. The extent of the disruption to the OEMs from these digital services
3. The timescale for such services to reach mainstream adoption.

We asked SMEs about eight different services ranging from remote diagnostics to multimodal transportation, and saw three distinct groups appear (see Figure 3). One group centered on the **in-vehicle experience**, which was not very disruptive, delivered on the smartphone or an in-car alternative and likely to reach the mainstream soon. Another group was based around the **vehicle data**, with a degree of control possible for the OEMs as well as some opportunity to monetise the service. The third group had the greatest potential for disruption based on alternative models of **vehicle ownership**. Although when we asked about the likelihood for OEMs to control these services, we did find an interesting distinction between controlling the service and controlling the data that enables the service. A number of our SMEs thought it more likely that the OEMs would simply control and potentially monetise the data.

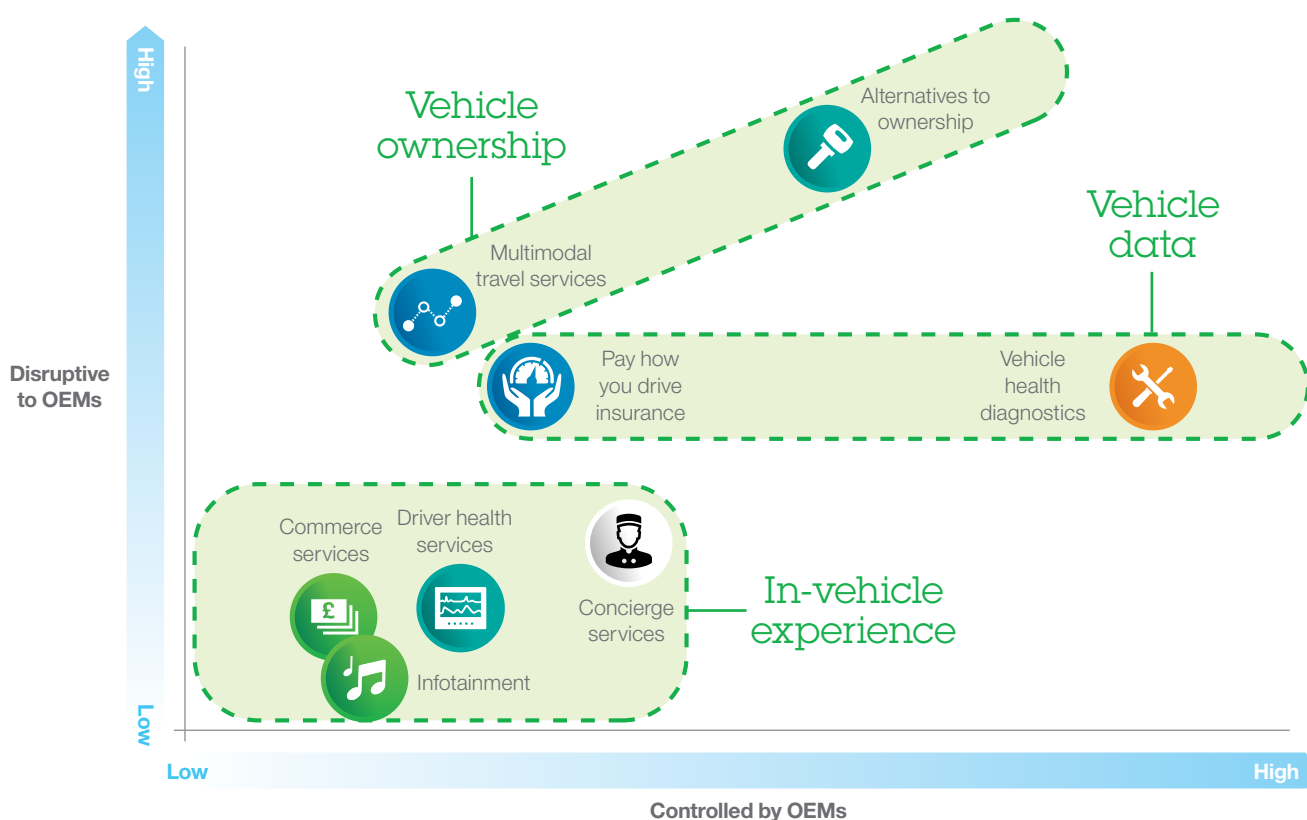


Figure 3. How various digital services will likely impact the auto industry

The in-vehicle experience will be the battle ground between the dumb car and the smartphone

For many years, OEMs have offered built-in options for navigation, usually as a one-time charge at point of vehicle configuration. Over time, the sophistication of systems has increased, to include services beyond navigation, such as automatic crash response. These services may be packaged with monthly pricing based on service levels and may include data roaming plans.

Much of the debate is around the extent to which smartphones may displace built-in as the most common option in the future. This is all centred on the consumer experience battleground. Over time, smartphones and wearables might provide the default interface to these types of digital services, since the devices already capture a user's preferences, behaviour and loyalty. Some OEMs are already beginning to head down this path.¹⁰

Services via smartphone apps that use location-based data are usually free to download. The ability to monetise such services through built-in options and monthly service fees is likely to have less customer appeal going forward. The mind-set of OEMs has traditionally been how to monetise these services. This contrasts sharply with internet companies who seek mass customer adoption and burn cash to obtain it. In addition, updates to services (apps) are practically continuous and customers update their smartphones every one to two years. Again this contrasts with OEMs, whose development cycles are typically 5 to 7 years.

“OEMs have a default mind-set that they own and design and make the cars and that's what sets the control points.”

New applications that can potentially be seamlessly linked to open dashboards are likely to make built-in options look increasingly clunky and obsolete. There is even an argument that connected car is something of a misnomer: in reality, on our roads today, we have a spectrum of “dumb cars”, “smartish cars” with relatively expensive built-in options and (very) smartphones that users either dock manually or tether.

“Is it the car that's being connected or is it the person that's in the car who is connected?”

The vast majority of consumers, particularly the new upcoming generation of drivers, have already made it clear that their digital DNA will be represented by existing mobile devices, particularly the smartphone.

“Millennials have multiple always-connected devices that represent a signature of their own life and personal brand. OEMs need to help their customers transfer their preferences and services between vehicles like they transfer between phone handsets.”

“Consumers expect to bring their own functionality into the car, whether this is music, email or navigation... if you can bring the elements of your life that make you happy into the car, it makes for a more positive experience.”

Any efforts by OEMs to somehow control the connected car via proprietary systems, as opposed to the smartphone, are unlikely to succeed in the long run.

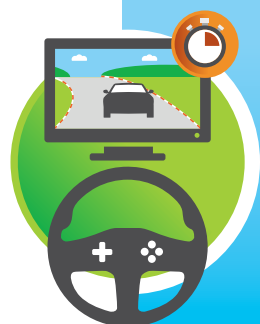
Ultimately, we expect a tipping point where forward-thinking OEMs recognise there is high customer demand for a more open interface, which becomes a differentiator among competing auto brands. At that point, the smartphone wins out, potentially raising questions about OEM brand value in the long term.

Interestingly, a German auto consortium consisting of Daimler, BMW and Audi are in the process of acquiring Nokia's HERE mapping unit.¹¹ This represents a battle being fought over a key connectivity control point, since mapping is fundamental to various digital services such as commerce. The likely intent of this acquisition is to counteract the threat of Apple's CarPlay and Google's Android Auto in the battle to win the in-car experience.

OEMs are the likely winners when it comes to controlling services based on vehicle data

OEMs are in prime position to own the control points (and hence services) generated by data from within the vehicle, such as data associated with diagnostic trouble codes (DTCs). However, there is no guarantee that the OEM will definitively own and control all such services. The alternative school of thought suggests that after-market devices will access some vehicle data elements, with others then aggregating data, applying analytics and building new services. However, there is a double-edged sword here between time-to-market and the need for control.

“Development time for OEMs to bring new technology to market means they are at risk of new entrants picking up a greater share of market, unless the OEMs ‘lock down’ the vehicle systems in terms of security and access.”



“My first car was in a video game”

This quote from one of our younger SMEs highlights the difference between the older generation of car owners/drivers and an emerging cohort of millennials with radically different experiences and expectations. This demonstrates a clash between a long-term, relatively stable environment and the expectations associated with having an always-connected mobile app. The generational difference highlights the challenge for auto OEMs: how do you deal with small but very distinct market segments when you may not enjoy past economies of scale?

“The fear of OEMs is that a car will become a smartphone on wheels, with cars built around their entertainment value rather than their hardware value.”

– Paul Fielden, Global Center of Competence Lead, IBM Automotive

“OEMs are putting predictive analytics in place to try to get ahead of recall situations.”

– Marc Andrews, Vice President, IBM Industry Analytics Solutions

Digital services around vehicle diagnostics and predictive/preventative maintenance have significant untapped potential. If OEMs get this right, it could present not only a lucrative recurring services revenue model, but also increased customer stickiness long after the sale of the vehicle.

“One OEM is using connected car diagnostics and seeing a 20 percent increase in consumers visiting the dealership.”

Providing a transparent link between a vehicle’s component health and parts that need replacing or fixing, and then creating seamless pricing and scheduling presents a very appealing customer hook. Such services may cause channel disintermediation as the ownership of the customer could move away from dealership networks to the OEM. With greater centralisation of data, no longer fragmented at a local dealership level, there is potential to create much deeper insights and enhanced business value. For example, there have been many high-profile recall situations faced by a number of OEMs recently. A holistic approach to centralisation and integration of vehicle health data goes way beyond merely fixing cars to preserving OEM brand value.

Telematics-based insurance as a third-party, after-market service has been around for some years. As the level of connectivity in vehicles increases to include sensors and cameras, there arises an opportunity to shift the basis of insurance risk from generic (e.g., males under 25 are high risk) to one where risk is based on actual data – achieved by monitoring how, when and where the vehicle is driven. This could have significant customer appeal, and the majority of our panellists suggest OEMs will act as data facilitators to insurance companies and are likely to play a partnership role.

Today, banks and even grocery retailers act as insurance providers. It seems reasonable that capabilities to capture data that really defines risk could transform the car insurance market away from generic to data-defined risk, even to the point where car insurance control points and value migrate entirely to auto OEMs. There could be significant scope for auto OEMs to materially disrupt this market, particularly if they were to bundle other key services dependent upon data, such as vehicle diagnostics and predictive maintenance. Such services could help foster lifetime customer value and enhance brand equity beyond the physical car.



In an uncertain world, there is no single version of the future

Interestingly, we did not find a uniform set of responses across our interviews. In fact, quite the contrary: we heard a divergence of opinion about the digital services and themes we tested. What does this tell us? It is clear that we have not arrived at a single “group-think” set of answers. Moreover, it underlines the significant levels of uncertainty about how the auto industry will evolve, how difficult it is to envision where the market is heading and that the market scenarios going forward will be many and varied. For OEMs, this means that rigorous and agile strategic planning, monitoring of key leading indicators, and observing both traditional and non-traditional competitor activities, will be more vital than ever.

Services around alternatives to vehicle ownership will be the most disruptive

Although the business model of car sharing (all-in pay-per-hour models popularised by the likes of Zipcar) has been around for a while, it is increasingly coming to wider attention with OEMs entering the market. Examples include Daimler Car2Go, BMW DriveNow and most recently Ford GoDrive.

Car-sharing type services potentially represent a significant game-changer for the auto industry. According to our SME panel, these types of services will take a longer time to reach mainstream adoption and are likely to appeal most in urban settings. So far, this market generally has been limited to start-ups and OEMs responding to this potential threat. Figures vary across the industry, but one estimate suggests car sharing on average leads to 20 vehicle sales being deferred for each car-sharing vehicle.¹² This could represent a major revenue threat to OEMs.

Multimodal, integrated transport solutions (linking intelligent transport elements and networks from door to door) and alternatives to ownership transcend notions about the physical entity of the automobile to focus on the efficacy and inherent inefficiencies in transporting humans and goods. This has potentially massive implications for the future of car ownership.

Cars can appear as expensive and inefficient from a buyer's perspective. Vehicles sit idle for a significant part of their life and represent a major investment that depreciates with every day and every journey. New technologies and social business are starting to remove these inefficiencies – recasting economic value and future profit pools. Furthermore, as consumers, our belief systems are being reshaped fundamentally by the notion that it is better, both from an experience and economic perspective, to eschew ownership.

“Car building is becoming a commodity business. Value-add comes from the customer experience, connectivity and mobility possibilities.”

Everything becomes a service

We expect this fundamental principle to be the most dramatic disruption to the auto industry over the next decade.

Alternatives to ownership, such as ridesharing services like Google RideWith and BlaBlaCar.co.uk are less about the car and more about minimising economic waste and optimising allocation of resource on some or all of the journey from A to B. In this sense, ridesharing services tap into spare capacity, provisioned via an e-marketplace. Some OEMs are experimenting with employee schemes around multimodal and ridesharing services, and these types of business models potentially have vast unexploited opportunities, particularly within the fleet car segment.

“Disruption will take time but it is starting. Industry walls are breaking down. In ten years, the value providers, as judged by what customers value the most, may be found in companies like Google, Verizon or Apple as opposed to GM, Kia or Ford.”

This type of disruption has the potential to change where the balance of power is in the industry. We think OEMs have some strategic breathing space in this area, but need to start formulating longer-term strategies. So far, OEM activity has been fairly low key and piecemeal. For example, we see OEMs entering the market in large cities by providing a handful of vehicles on the streets. This is an acceptable strategy if the intention is to learn by experience and fail fast. The potential maverick scenario is that a non-OEM, for example a large media company, sees car sharing as a means of mass brand visibility by putting thousands of vehicles on the streets (see *Maverick scenarios* box).



Maverick scenarios: Is the auto industry on a burning platform?

Inflection points in markets create clear winners and losers with the winners sometimes coming from unexpected places. The inflection point witnessed in the mobile phone market is analogous to the type of disruption that may play out in the auto industry. In mobile, we saw a dramatic shift away from “dumb phones” (only calls and texts) to smartphones – intelligent, personally configurable, small-form networked computers. Along the way and in a short period of time, the value and control points shifted away from the hardware to software and applications. With it, incumbency also shifted quickly and dramatically from the mobile establishment, Nokia and Blackberry, to the “new kids” – Apple iOS and Google Android. This disruption was subsequently referred to by Nokia’s CEO at the time as its “burning platform moment”.¹³

So could some OEMs face their own burning platforms? Here are some maverick yet plausible scenarios:

- A significant shift away from ownership to car sharing
- An amalgam of core tier-one suppliers working with an Internet-based company to enter the auto market on a grand scale
- The regulatory environment on purchasing relaxes, allowing for Internet-based vehicle purchases and dismantling dealership franchises
- A large-scale joint venture between a giant Internet brand such as Google and Tesla
- Fully autonomous vehicles become a reality far quicker than anyone expects

“Imagine UBER but with a driverless vehicle in three to five years ... they could unleash numerous disruptive impacts on the automotive industry.”

“OEMs are scared about the future of their businesses, but they are unsure which future direction the market will go. They are okay for the next three to five years, but beyond that is a big unknown.”

– Dr. Alexander Scheidt, Global Automotive Industry Leader, IBM Global Business Services

How can the auto industry adapt and thrive?

So, how do we sum up for the middle manager we introduced at the start? After all, this person is still looking for guidance.

Clearly a shift is happening in the auto industry, changing where and how value is created. To borrow from Darwin, the key to survival is going to be how well the current players can adapt. Their DNA has been successful for the last 100 years, but new strands will need to be developed in order to thrive in the new environment.

Digital disruption will require OEMs to ask themselves a fundamental strategic question: what business are we really in? Our SME panel suggests that some OEMs (but by no means all) are already wrestling with this question (see *OEMs thinking outside the box*).

There are strong clues in our SME responses. OEMs will need to develop new core capabilities – such as agile operations, partnering, an ability to sense and respond to constantly changing customer needs, collaboration across disparate teams and testing new business models.

We don't know what the future will look like, but organisations with these capabilities are better positioned to grab a larger slice of the value when it becomes clear.

One final thought: our middle manager is not relegated to just being disrupted. There is opportunity to be a disruptor too!



OEMs thinking outside the box

BMW has launched an incubator called i Ventures to recruit start-ups and create mobility services, particularly in urban areas.¹⁴ Specific services in focus include intermodal travel and smart parking. BMW will provide an open workspace in New York. This approach seems similar to how we have seen the FinTech market around digital disruption in banking and financial services develop in London.

Ford has launched “mobility experiments” in 25 locations around the globe.¹⁵ The services include car sharing, data-driven insurance, and on-demand, point-to-point ride services. Ford’s president Mark Fields described this initiative as taking the company “to the next level in connectivity, mobility, autonomous vehicles, the customer experience and big data.”

“If you do not change direction, you end up where you are heading.”

– Lao-Tzu, Philosopher and poet of ancient China



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