McKinsey&Company

# Car data: paving the way to value-creating mobility

## Perspectives on a new automotive business model

**Advanced Industries** March 2016

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# Introduction

The expected growth of the value pool from car data and shared mobility could add up to more than USD 1.5 trillion by 2030, and the foreseeable proliferation of new features and services will turn “car data” into a key theme on the agenda of the auto industry. New players (e.g., “high-tech giants,” start-ups, service providers) are entering this competitive arena, as these companies are familiar with collecting enormous amounts of data, processing them, combining them with different sources, and deploying features and services that customers are willing to pay for.

Nonetheless, multiple concerns are raised on the issues of “data ownership” and, more broadly, customers’ willingness to share data, which is a critical requirement for new data-enabled services and features to be offered. In this context, both traditional automotive players and new entrants are eager to understand what the impact on their businesses might be and how to anticipate this going forward. To provide answers to these looming questions, McKinsey launched a large-scale knowledge initiative to study car data and its possible value creation models for the different industry players involved.

### Methodology and definitions

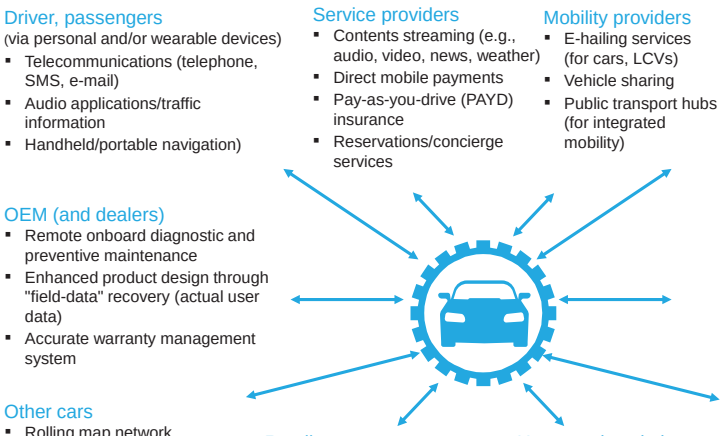
For the present research, McKinsey conducted several surveys and interviews with internal and external experts across Europe, the US, and Asia and combined them with proprietary insights from our Automotive & Assembly as well as our High Tech Practices.

In the scope of this paper, we define car data as: “Data generated by a vehicle and its occupants either when the car is moving or stationary, by itself or in communication with other vehicles (V2V) or infrastructure (V2I), in the ‘use’[1] phase of its lifecycle.” Also, in this document we refer to car data monetization as: “The process of gathering, converting, or leveraging car data for features and/or services that can be charged for, or a set of insights that can be monetized by external third parties.”

Exhibit 1

**The car will communicate with many entities for many purposes**

Car data users/contributors and selected use case examples




SOURCE: McKinsey

1 A vehicle generates data during all phases of its lifecycle. This article focuses on data generated during the use phase.

# Key findings and perspectives on car data and new automotive business models

In this section, we present the initial, high-level findings of our research, which we will integrate and build upon in the first half of 2016.[2]

1

**Data privacy is deemed critical in order to enable new features and services from car data. Today, despite the stated privacy concerns, 71% of surveyed drivers consciously share their data in exchange for tangible benefits.**

Customers today are aware of the fact that relevant data generated while they use mobile devices is openly accessible to applications and shared with third parties, and they consciously decide to grant access to those data in exchange for benefits, such as free apps usage or free content.

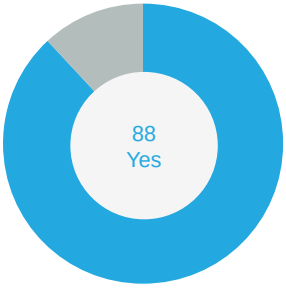
2 For further details, see the overview of our forthcoming publication on car data monetization on page 21. Importantly, in our forthcoming research we will leverage our findings gained through a combination of proprietary end-customer surveys, expert roundtables, quantitative modeling, and targeted "clinics" conducted with design and human-machine interface experts to test the most forward-looking "use cases."

Exhibit 2

**Consumers are well-informed on topics of data privacy and willing to share their personal data with certain applications**

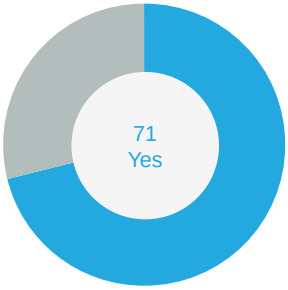
Are you aware that certain data (e.g., current location, address book details, browser history) is openly accessible to applications and shared with third parties?

Percent of respondents




Do you consciously decide to grant certain applications access to your personal data (e.g., current location, address book details, browser history), even if you may have generally disabled this access for other applications?

Percent of respondents




Methodological note: consumer survey based on 70+ questions, addressing 3,000+ respondents in 3 key markets (US, Germany, China)

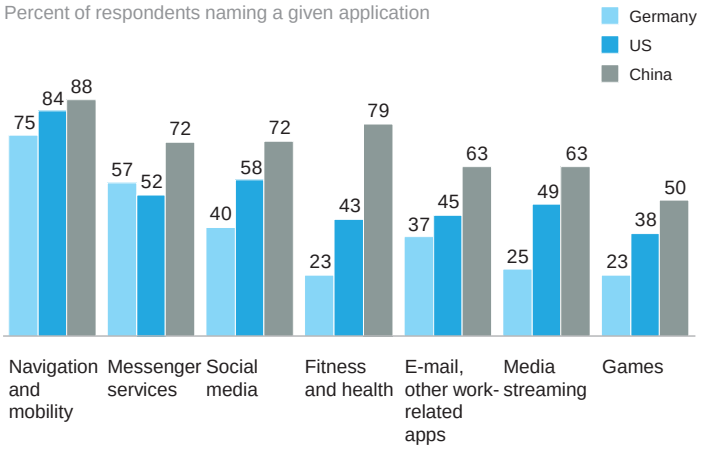
SOURCE: McKinsey Connectivity and Autonomous Driving Consumer Survey, 2015

Exhibit 3

**Customers across investigated geographies are willing to share navigation data, with visible regional differences in willingness to share other data**

If you were to receive an application for free instead of paying for it, would you agree that the application could use your personal data in return? If so, which application would you grant access?

Percent of respondents naming a given application




**Higher willingness to share data** for navigation and mobility possibly driven by customers' **higher familiarity** and better **understanding of what they get** in ex-change for their data – significantly lower willingness for other applications that are less clear to customers!

[ Challenge for industry players: make benefits tangible and transparent for customers ]

SOURCE: McKinsey Connectivity and Autonomous Driving Consumer Survey, 2015

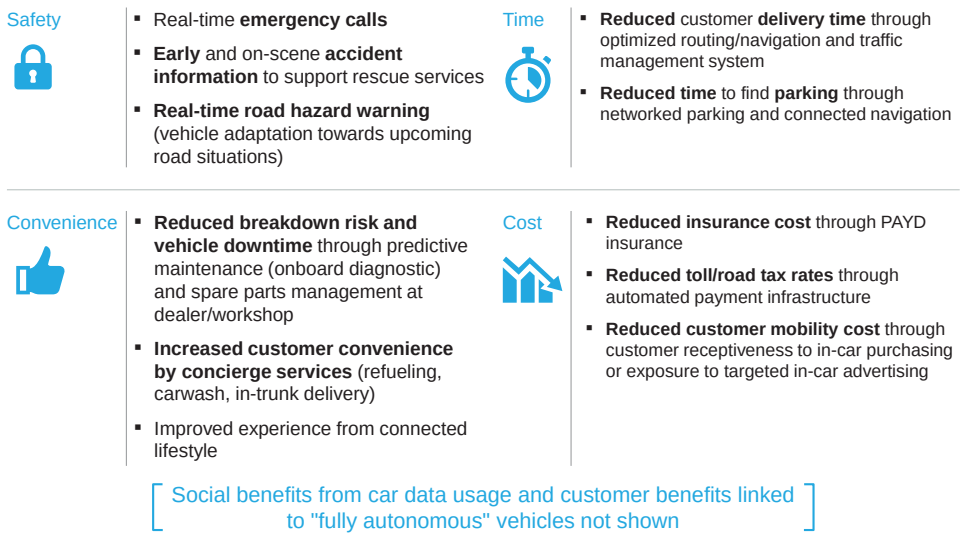
## 2

**Data connectivity will generate a vast set of benefits that customers will likely want to pursue, leveraging their personal data as "currency." The value represented by this "currency" is already significant and expected to grow rapidly over the years to come.**

Connecting car data with data from other domains of life (e.g., from the smartphone or "smart home"), wearable devices will enable new, seamless user experiences and generate significant benefits for the customers.

Exhibit 4

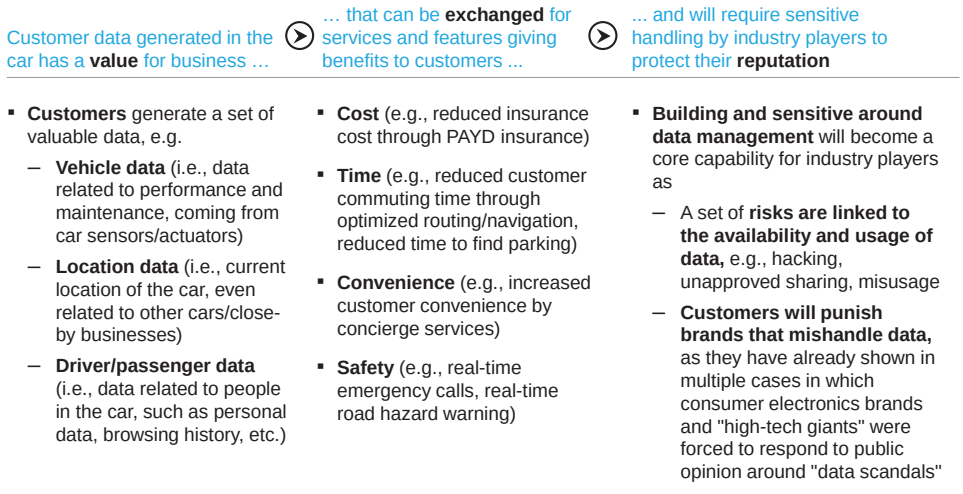
**The increased use of car data will unlock new customer benefits in 4 main areas**




SOURCE: McKinsey

Exhibit 5

**As data becomes a currency, building and sustaining customers' trust will become a critical capability for industry players**

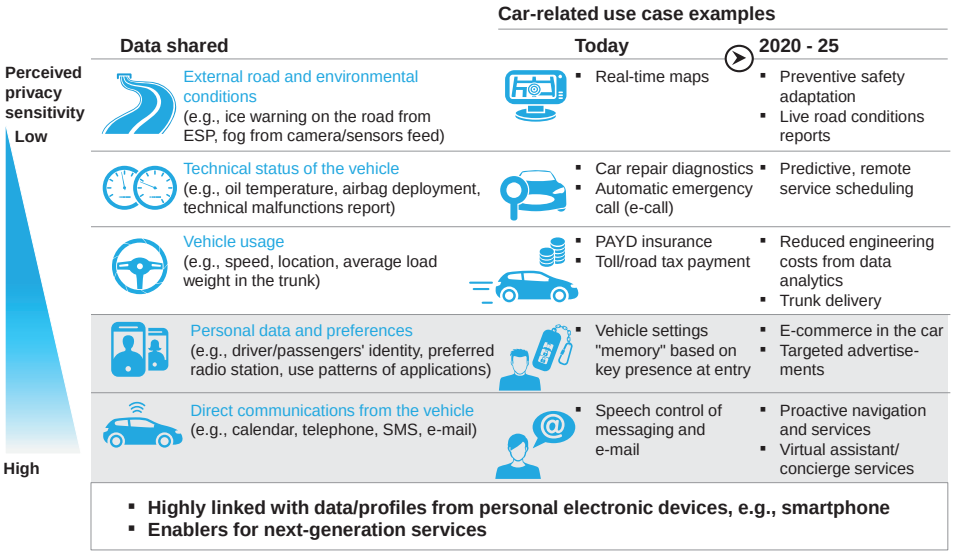



SOURCE: McKinsey

The car generates multiple types of data, each enabling a set of use cases that are bound to be expanded in the future. Among the data types, “personal data and preferences” and “direct communications” are perceived as being the most “privacy critical.” Nonetheless, customers are already choosing to share even “critical” data in exchange for features and services, treating data as a type of currency – why would this be different in the car, when benefits are tangible and transparent to the customer?

Exhibit 6

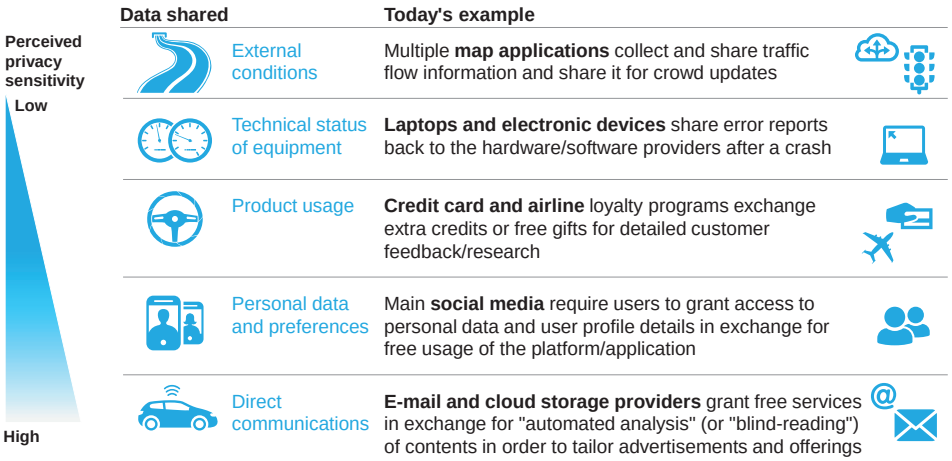
**The car generates different macro-categories of data, with different levels of perceived privacy sensitivity by the customer**




SOURCE: McKinsey

Exhibit 7

**Customers already consciously choose to share data in many ways in exchange for a set of benefits**




SOURCE: McKinsey

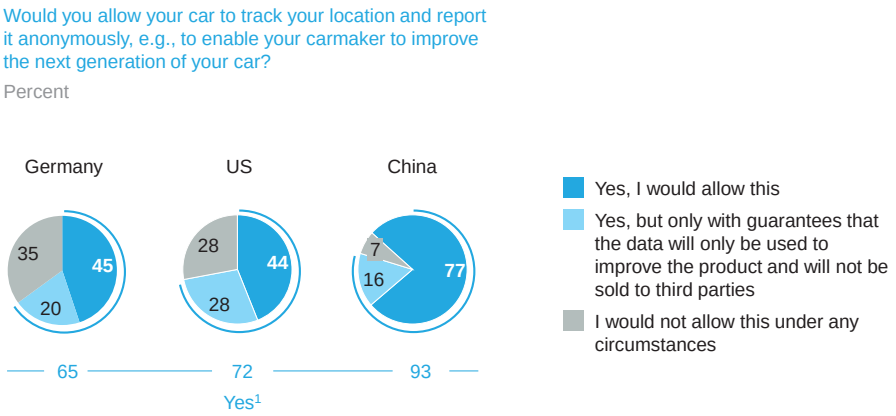
3

**Customer attitude towards privacy and data sharing suggests that the car data "revolution" may be led by China (where > 90% of customers are willing to share their data with auto OEMs) and by younger car buyers globally, as a large share would switch their current OEM for improved connectivity features and > 60% is interested in owning autonomous vehicles.**

China will likely become a hotbed of this revolution because of local customers' higher openness to sharing data with their car manufacturer or smartphone manufacturer compared to the EU and US, and their higher expectations in terms of digital features and services.

Exhibit 8

**93% of Chinese customers are willing to share their location data with the manufacturer of their car, compared to 65% of Germans and 72% of Americans**

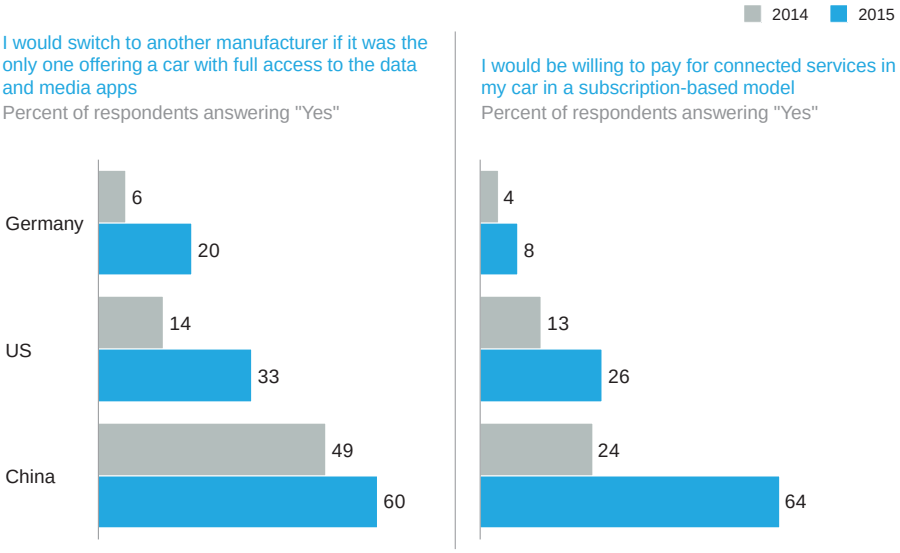



1 Younger people drive customer willingness to share location

SOURCE: McKinsey Connectivity and Autonomous Driving Consumer Survey, 2015

Exhibit 9

**Customers' willingness to switch their car manufacturer and pay a subscription fee for connectivity features is increasing, and China leads the way**

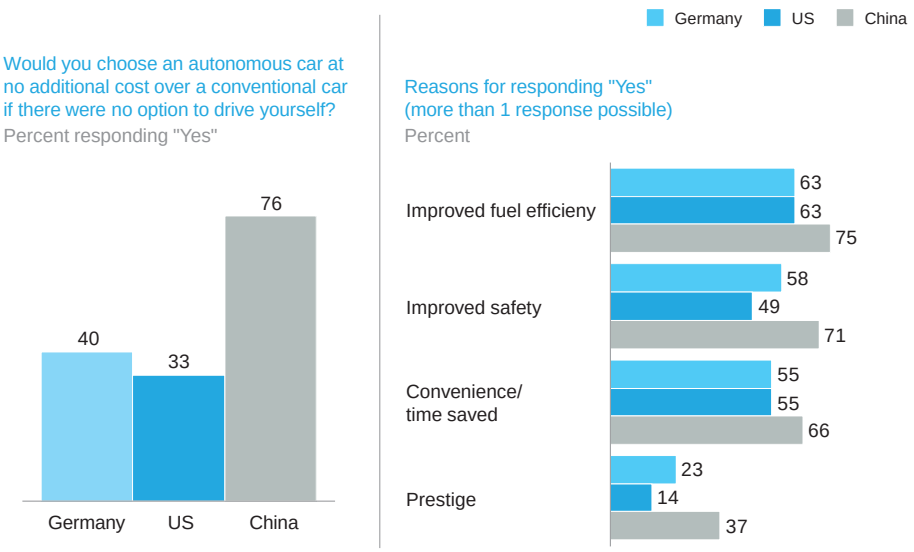



SOURCE: McKinsey Connectivity and Autonomous Driving Consumer Survey, 2015

Chinese consumers also show the highest willingness to pay for data-enabled content and services through subscription models and declare a significant interest in self-driving vehicles.

Exhibit 10

**Chinese customers are most convinced by all reasons for switching to an autonomous vehicle**

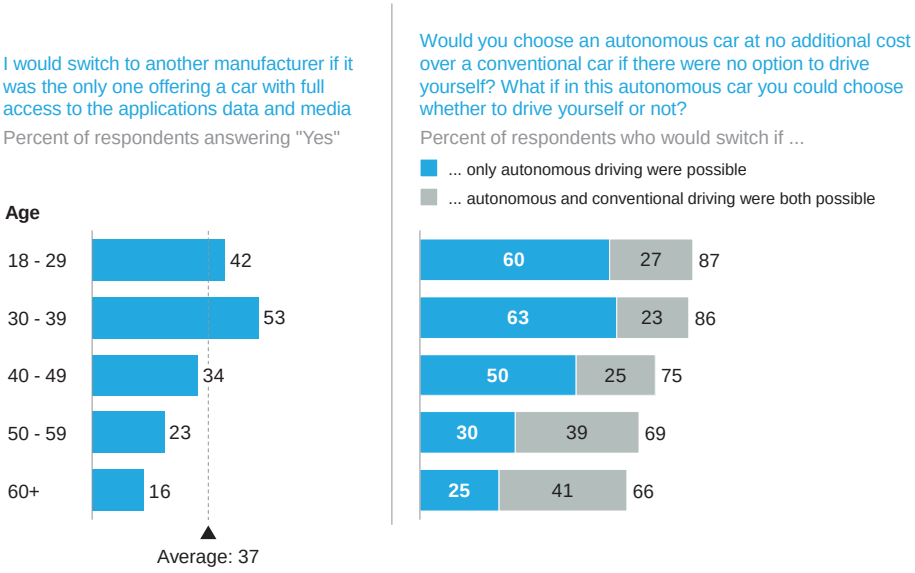



SOURCE: McKinsey Connectivity and Autonomous Driving Consumer Survey, 2015

A similar trend can be found amongst younger buyers, with car owners between 18 and 40 years old indicating the highest willingness to switch from their current OEM in exchange for improved connectivity features. More than 60% of the customers below the age of 40 also declared interest in autonomous vehicles as an alternative to “manual driving.”

Exhibit 11

**Younger customers are most willing to switch their manufacturer for connected features and are most interested in owning autonomous vehicles**




SOURCE: McKinsey Connectivity and Autonomous Driving Consumer Survey, 2015

4

**Car data monetization opportunities will grow incrementally for industry players along the mobility value chain, as car data is likely to generate value through increased revenues, reduced mobility cost, and increased safety and security.**

Already in the next two to three years, industry players will start tapping into car data monetization potential, mainly through three approaches: generating revenues by selling car-related services/features to consumers (and the related consumer insights to third parties); leveraging data to reduce cost and/or risks; and pursuing additional safety and security benefits, e.g., improving safety response to a car crash, increasing road patrolling effectiveness. Today, multiple players are already involved in the car connectivity value chain (as shown in Exhibit 13), and this number is expected to rise as growth opportunities will likely attract new entrants.

Exhibit 12

**Industry players will focus on 3 macro-categories of value-creation models**

NOT EXHAUSTIVE

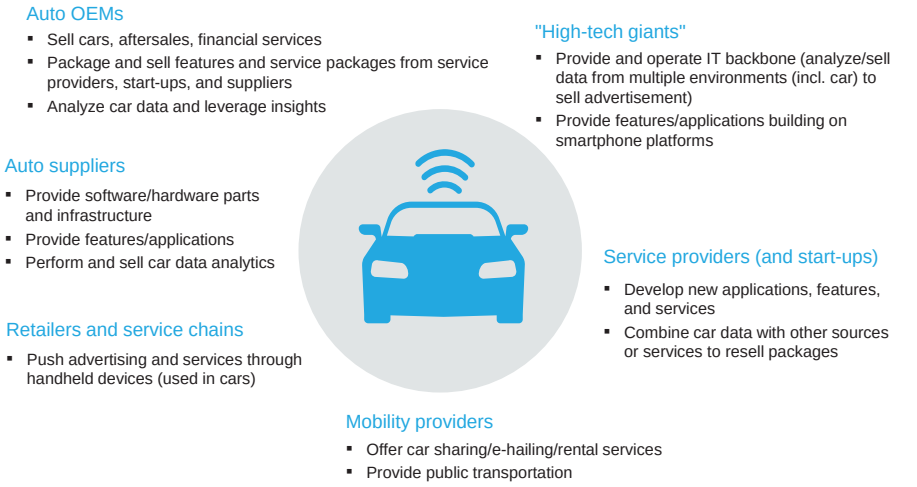
| Value creation models | | Currently relevant examples |
|---|---|---|
| Generating revenues | Direct monetization<br>Selling products, features, or services to the customer | ▪ Map updates, audio streaming<br>▪ "Over-the-air" car features upload<br>▪ Concierge services<br>▪ In-car purchases |
| | Tailored advertising<br>Leveraging car data to push individual offerings to customers | ▪ Nearest dealership for recommended maintenance<br>▪ Location-based promotions |
| | Selling data<br>Collecting, analyzing, and reselling big data to third parties | ▪ Driving behavior for insurance<br>▪ Traffic-flow data to retailers<br>▪ User preferences to advertisers |
| Reducing costs | R&D and material costs reduction<br>Gathering product field data for development | ▪ Car sensor data remote analysis<br>▪ Specifications rightsizing<br>▪ Driving style monitor (fuel consumption) |
| | Customers' costs reduction<br>Analyzing actual usage patterns to reduce repair and downtime costs | ▪ PAYD insurance<br>▪ Remote, predictive maintenance<br>▪ Driving patterns optimization |
| | Improved customer satisfaction<br>Better tailoring product/services to customer needs | ▪ Product redesign vs. actual usage and live feedbacks<br>▪ Remote hardware upgrades |
| Increasing safety and security | Reducing time for intervention<br>Collecting and forwarding warnings in real time, pointing in the right direction | ▪ Emergency call<br>▪ Breakdown call<br>▪ Remote patient data sharing |

*Customers might get features and services*
- ***For free** (monetization from tailored advertising, selling data, or other source)*
- *Rolled into **vehicle price***
- ***One-off** payments*
- ***Subscription-based** fees*
- ***Rechargeable** credit*

SOURCE: McKinsey

Exhibit 13 **Already today, several players are acting along the car data value chain**

SIMPLIFIED




SOURCE: McKinsey

In the future, car OEMs might try to hold the position of “gatekeepers” in terms of car data access, while still the vast majority of use cases will require allowing access to third parties that will evaluate, combine, and monetize that data. “High-tech giants” are currently involved in developing “auto software platforms” to allow applications and features to be standardized, available, and accessible to the broadest number of users. Today, traditional auto suppliers are mainly pursuing product optimization from “actual usage” data; nonetheless, a set of advanced players is also developing skills around software platforms and big data analytics services. Service providers, mobility providers, and start-ups typically focus on developing specific features or use cases for car application, benefitting from widely diffused platforms to reach a large number of customers with the same application and value proposition.

Nonetheless, the role of each player and the boundaries of business models are evolving rapidly.

Ultimately, regulation will play a decisive role in setting the boundaries of data ownership and transferability, allowing or limiting the proliferation of new use cases. Whatever “industry setup” pans out, customers will be the real winners coming out of this evolution, as they will benefit from a greater number of available features/services and from a richer base of data that will make car transportation easier, safer, cheaper, and more convenient.

5

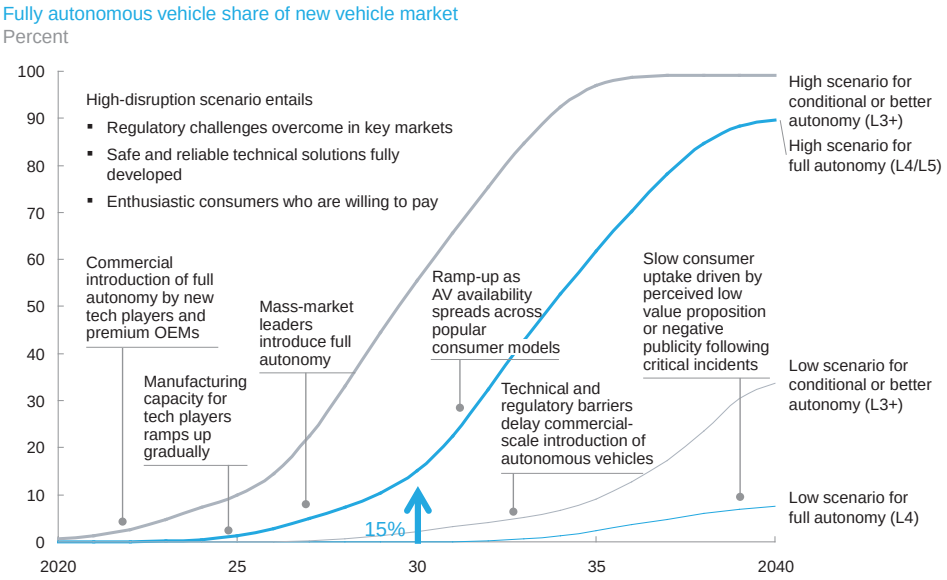
**Autonomous driving has the potential to create a step change in the value of car data, since up to 50 minutes of the user's traveling time per day become available for other activities (e.g., working, sleeping, online shopping).**

The progressive diffusion of "fully autonomous vehicles"[3] (expected to be 15% of global car sales by 2030 in our "high-disruption" scenario) has the potential to transform the car into a "living environment," making "driving time" available for other uses: autonomous vehicles will allow customers to free-up up to 50 minutes per day, and they will be able to sleep, work, or shop online while riding in the car. Critically, the combination of autonomy and connectivity will create a real "third space" beyond home and work, an environment where customers will enjoy their time, browse the Internet, purchase, and live "branded experiences."

The space created by autonomous driving could potentially transform the car into a moving retail store and digital experience center. Industry players might deal with this new so-called "control point,"[4] combining transportation with digital technologies to magnify the ability to shape customers' spending patterns well beyond typical automotive-related purchases. This will significantly increase the value that will be created by gathering, combining, and sharing data generated in the car and change significantly the way in which customers experience mobility.

Exhibit 14

**Up to 15% of all new vehicles sold in 2030 could be fully autonomous, subject to progress on the technical, infrastructure, and regulatory challenges**




SOURCE: McKinsey's "Automotive revolution – perspective towards 2030" study, 2016

3 SAE International On-Road Automated Vehicles Standards Committee defines as full automation "the full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver."

4 "Control point" is referred to as a critical technology or step of the value chain that enables an industry player to capture value from an offering (e.g., controlling the platform that allows consumers to buy apps and music enables "consumer electronics" industry players to capture a portion of the value generated from the transaction).

Exhibit 15

## "Full autonomy" might give back 50 minutes per day to drivers

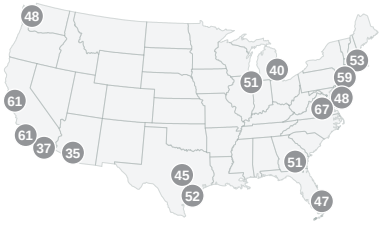
Average time spent in the car

**1.2 billion** people in cars per day

X

**50 minutes** daily time in car

Extra time spent in traffic in 15 biggest US city clusters[1]




xx Yearly delay per auto commuter #hours

All US cities, average: 52 hours per year

- On average 1.2 billion people spend **50 minutes driving** per day
- Commuters around the world waste time in traffic jams, with the average commuter in large urban areas[1] in the US spending **52 hours per year stuck in traffic**
- Autonomous vehicles offer the potential to **free-up time** spent in the car for other activities
- This could potentially **increase productivity** of commuters by 10 -15%[2] or generate global **digital media revenues** of EUR 5 billion p.a. for every additional minute people spend on the mobile Internet while in the car[3]

1 Over 3 million population
2 Assuming a working day of 8 hours
3 Assuming valuation of mobile Internet usage of ~ EUR cent 1 per minute per person

SOURCE: McKinsey's "10 ways in which autonomous vehicles could reshape our lives" report, 2015; 2012 Urban Mobility Report, Texas A&M Transportation Institute; Datamonitor; Global Insight; ComScore; EIU; Strategy Analytics, Veronis Suhler Stevenson; IDC

6

**The new business models have the potential to transform transportation into a service, as mobility might even be offered for free to end-customers in selected environments.**

Once autonomous driving and car connectivity combine, customers might be offered mobility services in exchange for watching targeted advertisements, providing product feedback, or making purchases while in the car. Alternatively, multiple businesses might decide to offer free rides to the store (or venue), as vehicle automation would significantly reduce the "cost per kilometer" of personal mobility, and next-generation connectivity and digital technologies might turn the car into the "first step into the store."

Exhibit 16

**Free mobility could be offered to customers through 3 different models that are not far from today's reality**

Equivalent in customer value

| | 1 | 2 | 3 |
|---|---|---|---|
| | Pushing advertisements | Getting customer data | Selling onboard |
| **Today** | "Watch targeted ads on your phone for a limited period of time and get 2 GB of data free" – Major telecom service provider | "Share your personal data and get free access to our platform" – Global social media giant | "Order a minimum of USD 50 worth of groceries and get free home delivery!" – Major US retailer |
| **2025+ possible propositions** | "Watch 'hyper-targeted' commercials on your phone and get 10 miles of mobility credit for free"[1] | "Sign up to our social media platform and receive 15 miles worth of shared mobility credit"[2] | "Sign up to our loyalty program and purchase USD 50 worth of grocery onboard and get free home delivery + 3 miles of free mobility"[3] |

Mobility as TANGIBLE benefit to be offered to customers

1 Maximum free mobility range equivalent to potential profit on a sale of 2 GB of data
2 Free mobility equivalent to the value of 1 extra customer acquired on social media platforms for leading players
3 Maximum free mobility equivalent to an operating profit on a USD 50 grocery sale

SOURCE: McKinsey

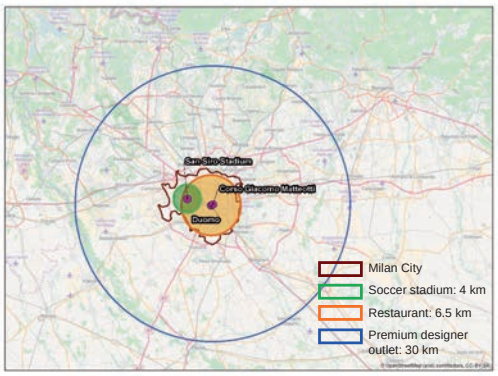
Exhibit 17

**Businesses might increase store visits by providing free customer transportation**

Equivalent in customer value

| Today: free parking and public transport | 2020+: free mobility to the store → What could this mean in a city like Milan? |
|---|---|
| Soccer stadiums in Minneapolis offer **free public transport to the stadium** on game day to ticket holders which typically costs USD 3 - 4 | **Reaching San Siro stadium for free** from a driving distance of 4 km |
| Restaurants in Milan's city center **pay up to EUR 6 - 10 per parked customer** | **Getting for free to a restaurant in Duomo** from Bocconi University – driving distance of 6.5 km |
| Premium designer outlets in the UK **offer shuttle buses for free upon presenting a sales receipt** and reimburse parking worth minimum GBP 20 for a total purchase above GBP 100 | **Reaching a premium designer outlet** in Corso Giacomo Matteotti from the outskirts of Milan for free – driving distance of up to 30 km |

**Potential maximum free mobility radii for soccer stadium, restaurant, and designer outlet in Milan**




A large section of the population could be reached by free mobility

| Location around | Population reached, millions |
|---|---|
| San Siro stadium | 0.2 |
| Duomo | 1.1 |
| Corso Giacomo Matteotti | 4.5 |

SOURCE: OpenStreetMap; LandScan

In this scenario, the car might become what we define as a “control point” for retail; a critical space that leverages tangible benefits (e.g., convenience, safety, time saving) and a tailored user interface (e.g., large touch screens, high-quality audio) to become effectively a new point of interaction with customers.

Exhibit 18

**Car data could enable in-car advertising, allowing for decision making or purchasing online while driving**

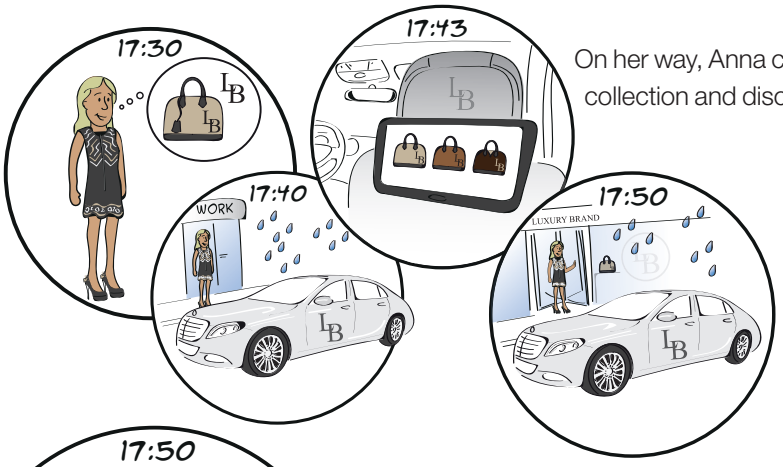
ILLUSTRATIVE


SOURCE: McKinsey

**New mobility offerings in exchange for data and customer loyalty could facilitate a unique brand experience and intensive brand exposure ...**

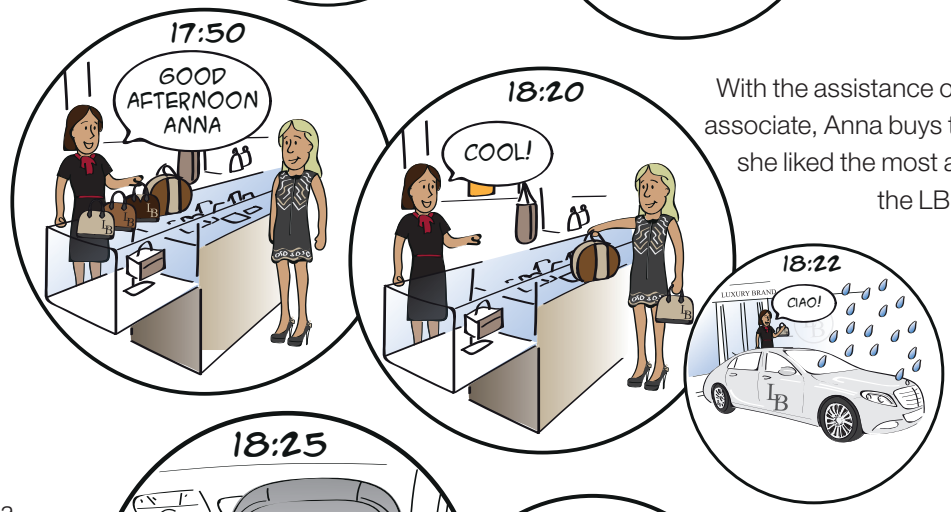
## The "value-creating mobility" experience

Anna wants to buy a Luxury Brand (LB) handbag and orders the LB courtesy mobility service for loyal customers.



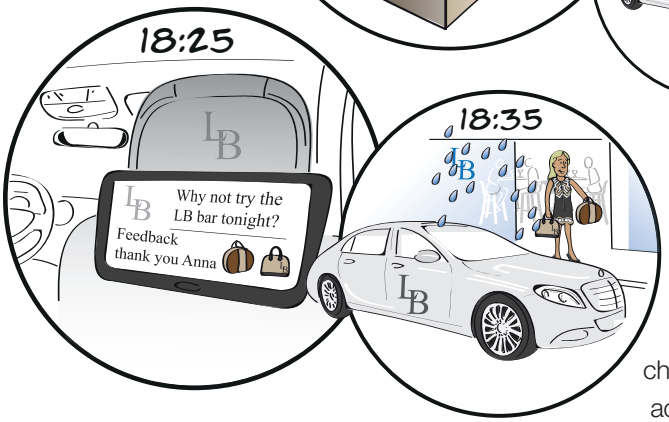

On her way, Anna can already browse the collection and discover the new items on the "in-car" screen.

Anna is welcomed by her LB relationship manager who is expecting her and already made all the preparations.




With the assistance of the sales associate, Anna buys the 2 bags she liked the most and orders the LB car again.

Back in the car, Anna provides customer feedback and prebooks a LB car to take her to the presentation of the new collection.




As the car is synchronized with Anna's calendar and she is still free for this evening, an invitation to visit the newly opened "LB Bar" pops up on the "in-car" display: the purchases of the day grant her a free admission and a welcome drink.

### Customer perspective

- **55 minutes** of fun and VIP treatment
- **No stress** from parking, driving, getting to the store
- **An exclusive invitation** for a free evening

### Business perspective

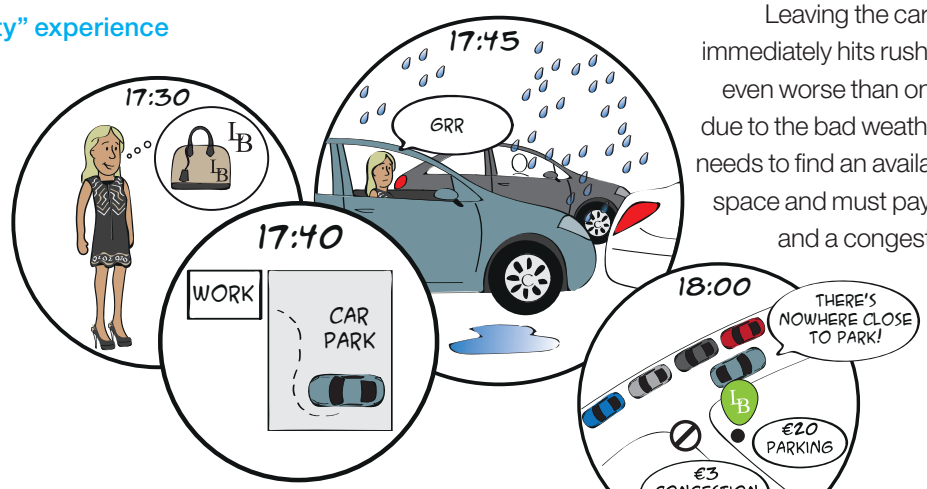
- **55 minutes** of brand exposure in a highly controlled environment
- Efficient, targeted retail processes resulting in **higher sales**
- **Customer feedback**
- Extension of the brand experience as a result of **cross-selling**

**... which were previously not available.**

## The "traditional mobility" experience

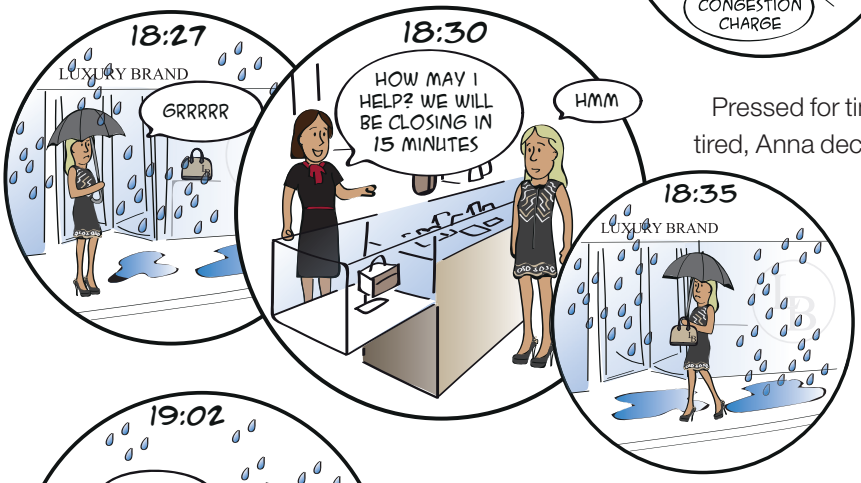
Anna would like to buy a Luxury Brand (LB) handbag and decides to take her car to visit the LB boutique downtown.

Leaving the car park, Anna immediately hits rush hour that is even worse than on usual days due to the bad weather. She also needs to find an available parking space and must pay for parking and a congestion charge.



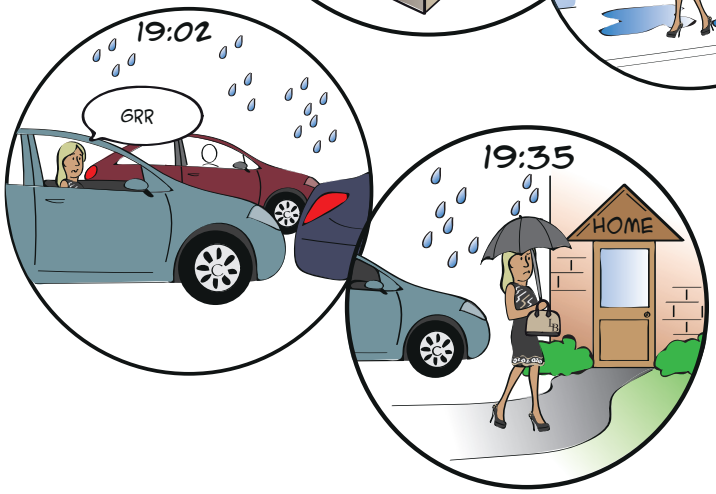

When Anna finally arrives at the store, she first has to wait a few minutes before a sales assistant is available – and then suddenly finds herself in a hurry.

Pressed for time and feeling a bit tired, Anna decides to buy the one bag she came for and leaves the store immediately afterward.




On her way home, traffic is still terrible and the rain hasn't stopped. Not a great start of the weekend at all.

When Anna finally is back home, she's lost the mood to go out and party with her friends. Instead, she prefers to stay at home and will showcase the new purchase another day.




### Customer perspective

- Almost **1 hour** of stressfull driving back and forth
- **Only 8 minutes** in store, and some of these were waiting time
- **Tiring, non-inspirational** shopping experience

### Business perspective

- **Only 5 minutes** of targeted brand exposure
- **Suboptimal** customer experience, ultimately leading to lower sales
- **No customer feedback**
- **No cross-selling** or experiential elements beyond the in-store sale

# Outlook

Car data holds significant value for customers, as shown by their increasing willingness to share data and, at the same time, to pay for connectivity features and services. As a result, data will create significantly more value for customers and industry players, becoming a "currency" enabling them to access benefits in exchange for data sharing.

The trends around connectivity, autonomy, and diverse/shared mobility will optimize customer travelling time and will probably be driven by China and younger car owners. The car will become an environment that allows users to perform and enjoy activities other than driving while traveling. Customers might be offered mobility services in exchange for watching targeted advertisements, providing product feedback, or purchasing while in the car. This might transform the car into a "control point" for many purchasing experiences and greatly expand the potential of customer influencing and spending done in the car.

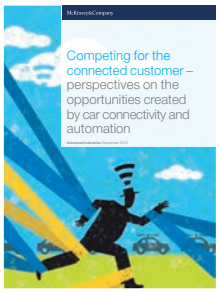
From a business perspective, car data-enabled business models could trigger a new wave of opportunities, increasingly hinging on what happens "during" personal transportation. As these opportunities will be shaped by technological and business-related choices that will be made in the next three to five years, a set of strategic questions need to be addressed by industry players aiming at shaping the scenario going forward, e.g.:

- How can customer value be created and communicated, in order to ensure that data sharing will be perceived as a "fair deal"?
- How should customer trust be built and maintained?
- What technologies and innovations might be needed to deploy the new offerings?
- How could scaling and network effects be leveraged to ensure viable economics for the new business models?
- What organizational model and specific capabilities will be required to succeed in launching and (most importantly) monetizing car data-enabled business models?
- When should investments start to pay off, and when should pilot programs be stopped?

As the aforementioned questions are equally relevant to incumbents and new players in the arena, we see two "reference horizons" in terms of change in industry dynamics. *Between today and 2020,* it will increasingly become imperative for players to compete in this field to build digital capabilities (e.g., big data analytics, human-machine interface design, and services setup) and secure relevant technological and commercial partnerships. *Beyond 2020,* the potential impact of these new value propositions to the customer – combined with the rise of autonomous driving technologies – will be increasingly transformative; industry players will need to be ready to challenge even more fundamentally the way they look at value creation in the personal mobility space.

Our latest insights into automotive industry trends are also available on McKinsey's Automotive & Assembly Extranet and on the McKinsey Insights app, our flagship digital publishing platform.

For further information specifically covering disruptive automotive trends, please refer to the following McKinsey publications:




Fall 2015

**Perspectives on the opportunities created by car connectivity and automation**

As customers' expectations for in-vehicle connectivity features grow – along with their willingness to pay – so will the value pool that's being created. This report addresses which players along the automotive value chain will reap the rewards based on an extensive consumer survey, and provides a map for success.


January 2016

**Automotive revolution – perspective towards 2030**

The automotive industry will change dramatically in the coming years. Four concurrent trends – autonomous driving, connectivity, electrification and shared mobility – will create opportunities for traditional OEMs and new players alike. Our report provides scenarios concerning what kind of changes are coming and how they will affect the industry.


Forthcoming

**Research on car data monetization**

Car data is progressively becoming a "currency of exchange" between consumers and auto industry players while, at the same time, new technologies and offerings are becoming available. This scenario leads to the rise of many new and significant business opportunities. Our full-blown research on car data monetization will focus on identifying and detailing the most relevant opportunities, mapping the monetization models behind them, quantifying the related "value pools," and understanding the possible implications on the future automotive value chain.

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