COMMISSIONED BY:

BOVAG

KPMG

Potential of dynamic in-vehicle data

Strategic study on the impact of (open/limited) access to dynamic in-vehicle data for (non) automotive players

14 March 2022

Table of contents

Dynamic in-vehicle data is the key focus of this report

Type	Examples
Customer data	▪ Name ▪ Billing address ▪ Contact details ▪ Age ▪ Health ▪ Etc.
Sales transaction data	▪ Purchase history ▪ Customer preferences ▪ Etc.
Context data	▪ Weather information ▪ General information on infrastructure ▪ Etc.
Static in-vehicle data	▪ Repair and maintenance data (RMI)
Dynamic in-vehicle data	▪ Error Codes ▪ Status / Operating information Driver data ▪ Direct communication between and from the (de)vehicle(s).

FOCUS

Non exhaustive

Overview of data layers and applicable regulation

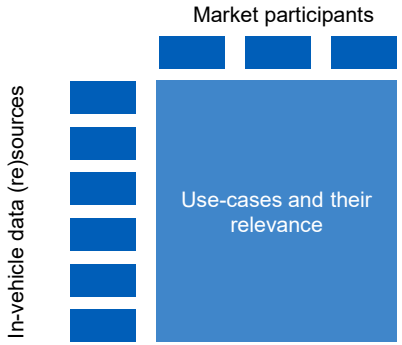
	Static in-vehicle data	Dynamic in-vehicle data
MV-BER	RMI via OBD port/platform	
MV-TAR	RMI via OBD port/platform	Very limited, only emission data is obliged
SERMI	The SERMI Accreditation Standard is aimed to help independent operators servicing and repairing vehicles in a secure manner even if this involves the security features of the vehicle	The access to in-vehicle generated dynamic data is currently not covered by SERMI and upcoming/planned rules are still unknown.
GDPR	Personal data (sensitive and non-sensitive)	In theory, dynamic data sources can be classified as personal data because they can be linked (in part) to individuals. This classification is complex.
In development		*Data Act and industry specific regulation currently in development (February 2022)*

We have analysed four regulatory scenario's regarding dynamic in-vehicle data accessibility and the respective impact on various automotive players

Simplified visualisation of report outline and content

Assessment of in-vehicle data relevance

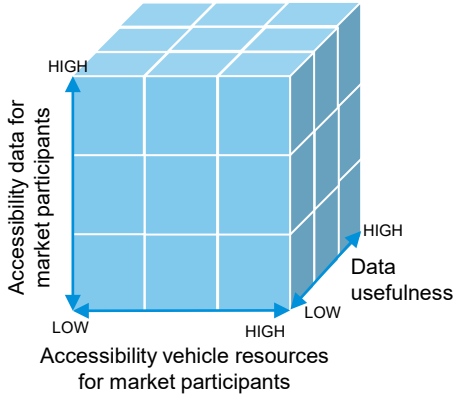
- Assessment of current and future uses-cases of in-vehicle data in the automotive industry by players (OEMs[a], insurance companies, lease companies, public organisations, dealers, independent workshops, aftersales specialists and tech players) and data sources
- Identify the key in-vehicle data sources and resources for (future) business models based on connected use-cases



Regulatory scenario analysis

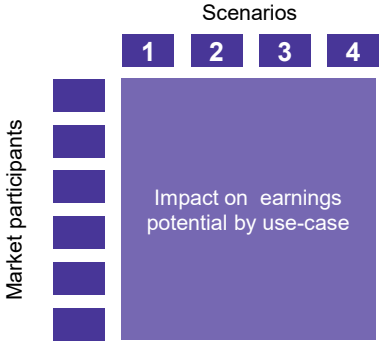
- Outline current regulatory framework with respect to in-vehicle data (access) and role of the respective players, primarily focused on dynamic in-vehicle data
- Develop four potential scenarios with respect to regulatory developments based on three dimensional framework

Current regulations



Impact estimation earnings potential

- Estimate impact on current and future business models and applications of automotive players and public organisations under the four regulatory scenarios based on framework parameters



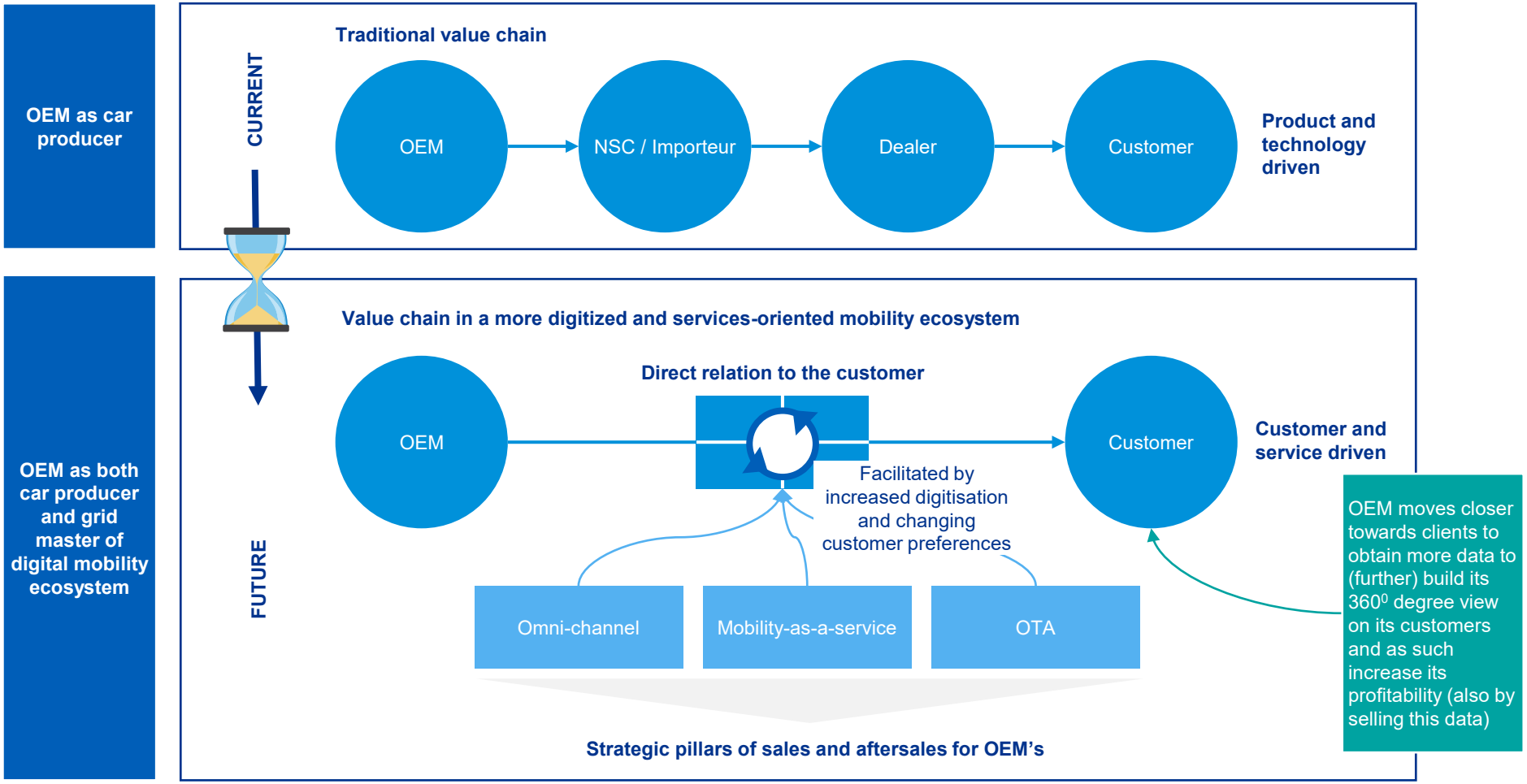
Conclusions of impact of (potential) regulatory developments concerning in-vehicle data accessibility in the automotive industry on the earnings potential of various type of players

Note: (a) OEMs concern the vehicle manufacturers.

Executive summary

1.1

The automotive supply chain is changing as a result of new business an distribution models. New ecosystems are concentrating around consumers and their in-vehicle data, consequently increasing the overall importance of this dynamic data and its use-cases. In this ecosystem, the OEM currently serves as gatekeeper of all in-vehicle data in a dual role as both platform and service provider. The still limited data access of other participants therefore appears to provide OEMs a competitive advantage.



Source: Interview feedback, KPMG analysis.

1.2

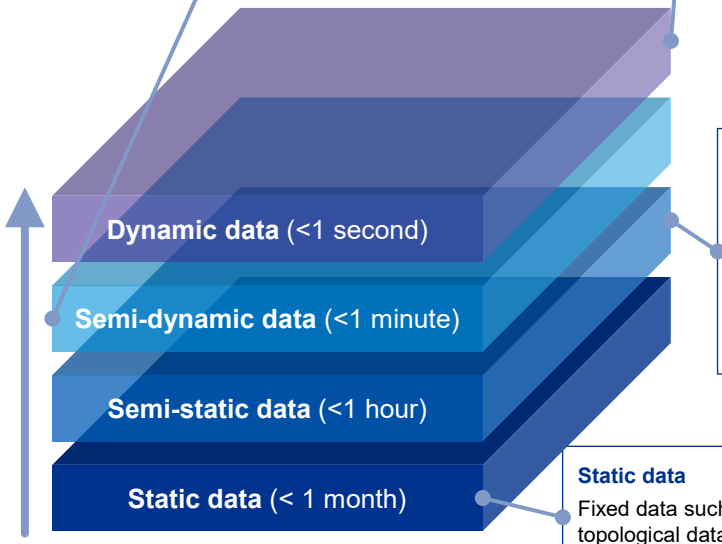
In-vehicle data can be divided into four connected layers based on degree of timing. Dynamic in-vehicle data provides (most) potential for many new use-cases and is projected to grow exponentially driven by the rapid increase in global connected car sales. This data generation is enabled by the combination of various communication technologies which allow connected cars to exchange data with their environment. Of all dynamic in-vehicle data (that can be generated) only a small share is currently available; new use-cases are expected to emerge based on unexplored data.

Building blocks of automotive data

(Near) real time data – focus of this report

Semi-dynamic data
Semi-dynamic data consists of temporary events that have a short time line such as accidents, traffic jams, detailed weather etc.

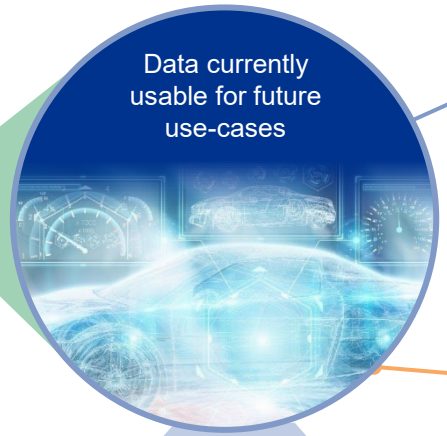
Dynamic data
Data that is either changed or updated on a high frequency, examples are traffic signals, pedestrians, surrounding vehicles, vehicle error codes, battery status, etc.



Semi-static data
Data that changes infrequently, such as seasonal weather, traffic regulations, constructions etc.

Static data
Fixed data such as topological data, road facilities etc.

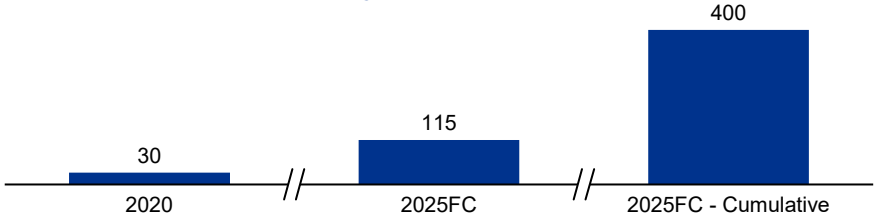
Illustrative overview of current and future use of (dynamic) in-vehicle data



Data currently available
Concerns data that is already in place for use-cases as part of current customer services (provided by third-parties). In order for third-parties to access this data the customer needs to give its consent and a B2B contract with OEM must be in place.

Data potentially usable
On top of data currently used by customers, there are many additional data points which are generated but not yet commercialised. These data points could provide opportunities for new uses-cases by OEMs and third-parties. Refer to the appendix for more detail on the various use-cases.

Global connected car sales annually, 2020-2025, millions



Source: ABI Research, Automotive Edge Computing Consortium, RAC Foundation, Statista, SIP, Interview feedback, KPMG analysis.

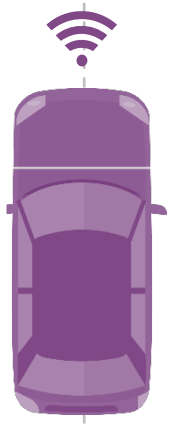
1.3

The increasing amount of generated in-vehicle data provides market participants the opportunity to develop new use-cases to (further) optimise their current or future business models (monetise data). These use-case are linked to (access to) different in-vehicle data sources and resources.

Overview of use-cases by market participants

OEMs

- Over-the-air software add-ons
- Customer value optimisation
- Subscriptions
- Mobility services
- Predictive maintenance (OTA)
- Remote diagnostics (OTA)
- Remote maintenance (OTA)
- Early recall detection and software updates (OTA)
- Sell vehicle data
- Pay as you drive insurance
- Inventory optimisation
- Warranty packages



Expected big data market annual growth with ~17% up to ~USD 8.9 billion in 2026

Market players

Car companies

(After) sales[a]

- Customer journey improvement
- Customer value optimisation
- Predictive maintenance
- Remote diagnostics
- Residual value determination

Insurance-companies

- Pay as you drive insurance
- First notification of loss and claim

Lease-companies

- Residual value optimisation
- Monitoring fleet status

Government

Policy makers

- Taxation based usage
- Car emissions performance
- Road accident prevention
- Improved road and infrastructure maintenance

First responders

- Accident detection and information for immediate assistance
- Theft detection

Others

Tech companies

- Optimise/ proactive navigation
- Target advertisement
- Infotainment systems
- Opening/ closing car

OTA refers to the ability to activate or update individual electronic control units (ECU) and/or the central software management systems over-the-air (remote). Simplest OTA applications concern activation for reading or data downloads while more complex applications entail (re)programming of firmware.

Note: (a) Relevance is based on the importance of in-vehicle data access and on the potential of use cases

Source: KPMG analysis, McKinsey, Interview feedback.

1.4

Both automotive firms and non-automotive firms have an interest in dynamic in-vehicle data as well as public parties. Especially for OEMs and automotive firms, in-vehicle data use-cases could strongly alter their current operations and activities.

The role and interest in data of market participants in the data value chain

	Automotive firms					Other	Public parties		Consumers
	OEMs	OEM (after)sales partner	Universal (trade and repair) firms	Aftersales specialists	Insurance companies	Lease companies	Technology providers	Policy makers	First responders	
Position in value chain	— Producer of vehicles — Vehicle software development — Service provider	— Point of sale of new and used cars — Aftersales (new) cars — Incident damages	— Point of sale of used cars — Aftersales (new) cars — Incident damages	— Suppliers of specific aftersales software and hardware for consumer facing automotive firms	— Aftersales services involving vehicle insurance products	— Financing vehicles — Fleet maintenance management	— Core consumer platform provider — Provider of cloud solutions	— Regulator and supervisor — Infrastructure management	— Ensuring safety and security	— Consumers are the end customer of the automotive firms, technology providers and public parties
Role with respect to in-vehicle data	— Gatekeeper of in-vehicle data — Responsible for controlling data, i.e., licencing, cyber-security — Providing new services and products based on in-vehicle data	— Require reading and writing ability with respect to dynamic repair and maintenance data for aftersales — Providing new services and products based on in-vehicle data			— Providing (pay-as-you-drive) insurance policies — Incident and damage assessment	— Providing lease propositions — Fleet management activities	— Platform role through recommenda-tion/ advertisement algorithms — Selling of tools and platforms	— Responsible for road safety — Car emissions performance — Data usage for traffic management purposes — Governing automotive market	— Using accident data for emergency services	— Consumers profit from new and better products and services based on in-vehicle data as well as from improved infrastructure, policy and emergency services
Actors	— Original equipment manufacturers	— Licensed dealers — Licensed mechanics (branded)	— Independent dealers/ mechanics — Garage formulas/	— Part producers — Software applications providers	— OEM owned and independent insurance companies	— OEM owned and independent lease companies	— In-vehicle technology enablers	— Supervisory authorities/re gulators — Public road authorities	— Road assistance operators — Emergency services	N/A

OEMs currently operate in a dual role as both platform and service provider. The limited in-vehicle data access of other participants provides OEMs therefore a competitive advantage.

In-vehicle data is paramount for market players in implementing use-cases and optimising current value pockets. Refer to the appendix for details on use-cases by market participants.

Source: Interview feedback, KPMG analysis.

1.5

The ability to monetise in-vehicle data by third-parties is driven by access to in-vehicle data and resources (functions). Subsequent required level of access can be realised through various technical solutions. Smartphones can substitute direct access in-vehicle data and resources (albeit partly) via data generated by its applications.

Third-party access for in-vehicle data and resources (functions) via technology

Access can be substituted by smartphones (to a very limited extent) OR via in-build third-party hard- and software e.g. telematics solutions (see page 42)

Ability to monetise in-vehicle data by third-parties

Depending on level of access there is a corresponding technology

Further details of concepts on page 40

Low

Level of access

High

- Data sharing platform
- In-vehicle Interface
- On-board Telematics Platform

Access to in-vehicle data sources: there are five primary in-vehicle data sources linked to a large number of use-cases

- **External conditions** (Optimised navigation, road accident prevention)
- **Vehicle status** (Preventive maintenance, warranty packages)
- **Usage information** (Pay as you drive insurance, optimise customer life time value)
- **Driver data** (Targeted advertisement, infotainment systems)
- **Direct communications from the vehicle** (Proactive navigation, trunk delivery, target advertisement)

Access to in-vehicle resources (functions): the ability to interact with the driver and read/write access and triggering of functions is required for many use-cases

Level		Description
1	Read	Smart device display shown on vehicle display
2	Read	Trigger a data refresh to the OEM back-end for latest vehicle data
3	Read	Read selected parametric dynamic data based on existing routines
4	Remote diagnostics	Active self routine (diagnostics) according to ISO 20080
5	Remote diagnostics	Activate existing self routine (actuator)
6	Write	Re-configure vehicle parameters (e.g. service interval, clear fault memory)
7-8	Write	Re-programming (never accessible)

Increasing risk (less control OEM) by deeper resource access

Key: *Main use-cases between brackets*
Source: KPMG analysis

1.6

Access to in-vehicle data sources and resources is most relevant for automotive firms. Vehicle status and vehicle usage information are the most relevant data sources for development of new use-cases, especially specific vehicle usage information is of high relevance for all market participants. Deep vehicle resource access is mainly required by dealers and universal firms.

Overview of relevance of in-vehicle data for market participants

	Market participants					
	Automotive firms			Government		Other
	(After) sales[a]	Insurance companies	Lease companies	Policy makers	First responders	Technology providers
In need of access ↓						
Usage information	●	●	●	●	●	●
Vehicle status	●	◕	◑	◔	◑	○
External conditions	◑	◑	◑	●	◑	◕
Driver data	◑	●	◑	◑	◑	◕
Direct communications	◔	◔	◔	○	◔	◑
Substitution by smartphone	🟡	🔴	🟡	🟡	🔴	🟢
Level of vehicle resource access required	1-6	1-3	1-4	1-3	1,2 & 5	1-3
Primary use-cases[b]	— Customer value optimisation — Residual value determination — Predictive maintenance and repair	— Pay as you drive insurance — First notification of loss and claim	— Residual value determination — Health of fleet monitoring	— Taxation based usage — Car emission performance — Road accident prevention — Improved road and infrastructure maintenance	— Accident detection and information for immediate assistance — Theft tracking	— Optimise/ proactive navigation — Target advertisement — Infotainment systems

Key: Level of in-vehicle data access importance based on potential use cases: ● High ○ Low.
🟢 Access possible/needed, 🟡 Medium access possible/needed, 🔴 No access possible/needed.

Note: (a) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists
(b) Use-cases are non exhaustive.
(c) OEMs always have access to these resources.

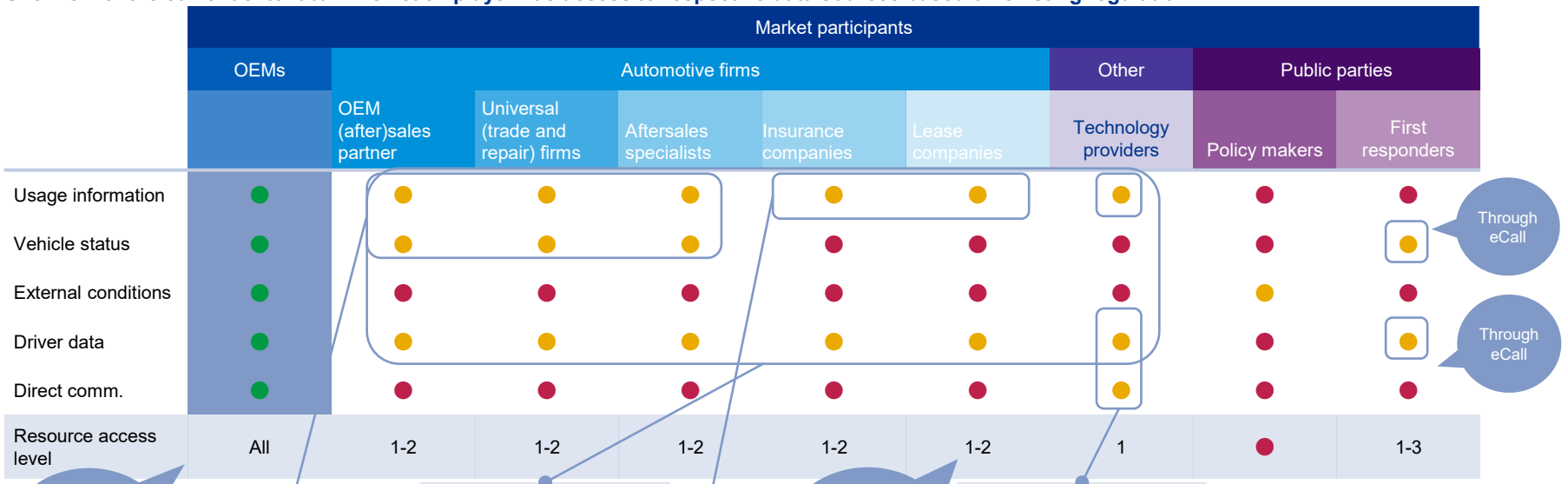
Source: KPMG analysis, Interview feedback.

Based on underlying use-cases, an assessment is made on the importance of data sources per relevant market player. Refer to the appendix for further detail.

2.1

EU regulators have implemented various regulations and standards on a piecemeal basis over the last decade in line with the increasing importance of in-vehicle data, however overarching regulation with respect to dynamic in-vehicle data is missing. Some players do have limited access to parts of (dynamic) data sources under specific regulations. However, in practice this data cannot be mandatory obtained from the OEM. Market participants have limited open access to their relevant data sources and resources (functions), implying an uneven playing field.

Overview of the current extent to which each player has access to respective data sources based on existing regulation



The OEM is gatekeeper and has therefore the most access

Currently, access is only provided to (very) limited RMI information (e.g. ICE emission data) for automotive firms. Regarding access to vehicle resources, only simple resets of maintenance parameters are possible.

Consists of limited access to personal data regulated under the GDPR, as VIN is considered as personal data

Only granted access to limited information for fleet management purposes such as mileage, which is almost always not-real time. Access to vehicle resources is limited

Access to specific vehicle resources is not regulated, occurs through B2B contracts with OEM

Depending on app integration, such as Apple CarPlay, Android Auto. Access to vehicle resources is possible, but depending on terms and conditions of third-party contract between software developer and OEM

Due to a lack of clear stipulations on the rights and duties of market participants regarding dynamic vehicle data they are currently (to large extent) unable to get access without approval and (commercial) B2B contracts with OEMs. Moreover, legal procedures so far have been limited due to long lead times for court decisions (can take 5+ years) and since the data technology and sources and the required access is rapidly changing (in flux).

Key: Full access Limited access No access.

Source: Interview feedback, KPMG analysis.

2.2

OEMs appear to have a competitive advantage towards third-parties since they are positioned as the gatekeeper of in-vehicle data and resources, to which they have full access.

In-vehicle access

OEM acts as gatekeeper

Current situation

~ Access via an application developed for the operating system of the OEM or compatible with third-party platforms such as Apple CarPlay or Android Auto

✗ Direct access to dynamic in-vehicle data without interference of the OEM

✗ Direct access to in-vehicle resources without interference of the OEM

The OEM is the only market participant having access to all in-vehicle data and in real-time due to the position of data gatekeeper (after GDPR consent by consumer)

Connected car (OEM)

Third-parties (such as application developers)

Third-party solution: data retrieved with third-party hard- and software

Telematics data is retrieved from vehicles CAN-bus network

The data is stored and processed in telematics service platform

End-users retrieve valuable insights into the state of the vehicle and/or fleet

Telematics data would allow all market participants to develop and provide (embedded) applications at a level playing field, however the available data that can be retrieved via third-party solutions is often limited.

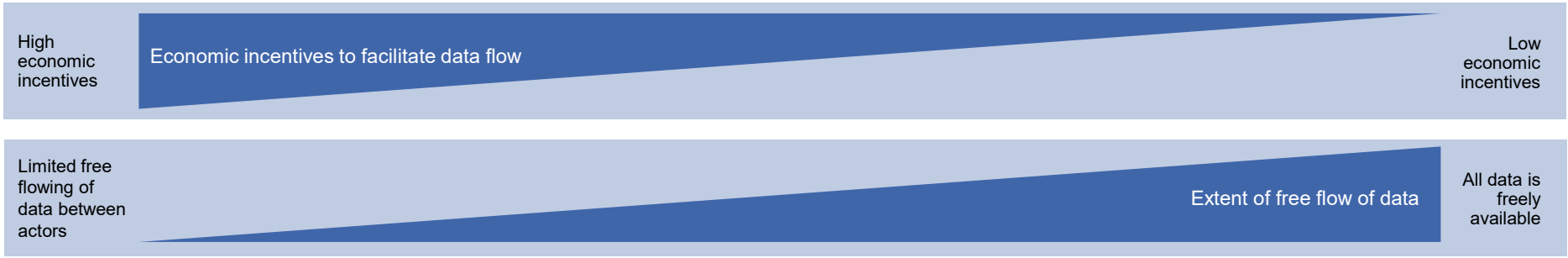
"Manufacturers are keen on processing in-vehicle data, they do not want to give away vehicle data such as data for car sharing. Also, manufacturers increasingly push maintenance messages and guide customers to preferred dealers or workshop for maintenance. Manufacturers have a clear advantage here" – Data expert OEM

Selected interview feedback

Source: KPMG analysis, Interview feedback.

2.3 Expected new regulation on in-vehicle data sharing aims to balance economic incentives and extent of free flow of data to ensure sustainable market dynamics.

The conceptual overview of dynamics between free flow of data and economic incentives



Limited free flow of data – high economic incentives

- Here, data is unable to flow freely between actors
- This is beneficial for OEMs, since they remain in control of their vehicle generated data which is a competitive advantage, but disadvantageous for third-parties since they have restricted access
- Economic incentives are high since vehicle data is only accessible by OEMs, hence they can easily monetize this data
- This frugal approach to data sharing limits innovation and the development of industry wide standards

The goal of the EU is to create a market where data flows freely while competition is promoted, i.e., healthy market dynamics

Full free flow of data – low economic incentives

- In the case where all data is free flowing, all actors have access to vehicle data which fosters innovations and development of applications based on this data by third-parties
- However, in this case, a pitfall is that OEMs as gatekeepers of vehicle data have lower economic incentives since monetization possibilities are consequently limited
- If monetization of data is prevented by free flow of data, then the data might simply not be generated

Source: Interview feedback, KPMG analysis.

2.4

In February 2022, the European Commission has announced the Data Act (DA), that is intended to enable more availability of data for third-parties. Under the DA, the user will have the ability to request data sharing of personal and non-personal (real time) data that is generated in the vehicle. As a result, the DA may help market players to develop new customer services using e.g., real-time vehicle location data. However, specific regulation for access to in-vehicle resources (including vehicle functionality) might not be part of the DA (but will be regulated in other/industry specific regulation).

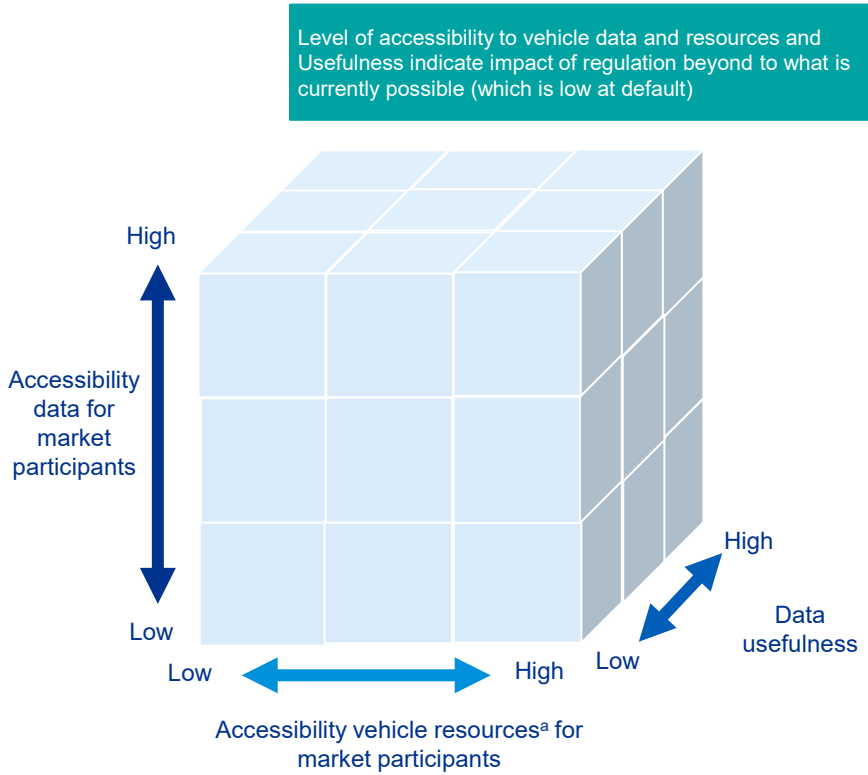
		Advantages	Disadvantages
CURRENT	**OEM is gatekeeper of dynamic data** — The OEM determines who gets access to the dynamic data and the possibility to develop applications for the driver (in the car) based on it. — This means that the OEM can determine (to a large extent) who can develop which services and also where the consumer can be sent for maintenance and repair. — This is a major risk for automotive retailers, because it will make them (even more) financially dependent on the OEMs.	— Competitive advantage for branded car companies (OEM (after)sales partners), but no guarantee that this competitive advantage will remain in the long term. — Liability issue organized centrally.	— Strong dependence on OEM, including accreditation to gain access. — Data sharing solution differs by OEM. — In time, possibly reduced need for OEM to share data (due to reduced dependence on branded car companies). — Limited access to vehicle functions. — Potentially high cost of access.
	Shift		
UPCOMING LEGISLATION	**Consumer is gatekeeper of dynamic data** — The consumer decides who gets access to their data. In addition, the consumer is free to download and use applications on the car other than those of the car manufacturer. — In this scenario, there is room for car companies to develop their own models or applications whereby they can steer on attracting and/or retaining customers for maintenance services on the basis of the data. — In addition, in this scenario, there is room for car companies to develop completely new services based on dynamic in-vehicle data.	— Consumer decides who gets access to his/her data. — OEM can still make money selling data in this scenario and therefore still has an incentive to generate a lot of data, but the OEM's position is less strong than in the OEM as gatekeeper scenario. — Reduced dependency on OEMs. — Access to (after)sales of all brands. — Possible standardization of data exchange and access.	— Less competitive advantage for OEM (after)sales partners, although permission to use data could be obtained from the consumer at the time of delivery of the vehicle (by first time of use). — Clear set-up of governance (and independent party) necessary to ensure consumer rights and need are served. This includes the role of a supervisory authority that is mandated to account OEMs for non-compliance.

Source: KPMG analysis.

25

Scenarios with respect to future regulation are based on different levels of accessibility to (1) in-vehicle data , (2) in-vehicle resources and (3) usefulness of data.

Overview of scenario framework for regulation concerning (dynamic) in-vehicle data



Explanation of variables

Variable	Description	Scoring
Data usefulness	Concerns the richness and level of detail of data and the respective format in which the OEMs are (potentially) obliged to share in-vehicle data with third-parties industry wide	Little usefulness indicates high degree of differentiation in format of data of different OEMs and low level of data detail and richness (and vice versa)
Accessibility data for market participants	Indicates to which extent various market participants are able to access the (dynamic) data freely (passive)	Higher accessibility of data allows more (types of) market participants to have (direct) access to more data sources (and vice versa)
Accessibility vehicle resources for market participants	Indicates to which extent market participants are able to access vehicle resources for communication with customers or performing actions via on-board applications (active) without the OEM as gatekeeper	Higher accessibility of vehicle resources provides more (types of) market participants deeper resource access to the car (and vice versa) without approval or contracts of OEMs (beyond independent cyber security conditions)

Note: (a) Refers to In-Vehicle Resources (IVR) which is all technological functionality that enables interaction with vehicles. This includes, for example, HMI displays, (de-)activation of in-vehicle functions and memory/processing power that allow read and write access to data.

Source: KPMG analysis.

2.6

We have developed 4 potential scenarios driven by their degree of regulation. The scenarios are subject to legal implications which are supported by underlying argumentation and linked legal frameworks. Commercial contracting for third-parties is expected to be required to obtain access in scenario 1 and 3, while full access is granted under scenario 2 and 4. Roll-out of standardised (fully integrated) technical architectures is associated with high costs for the OEMs.

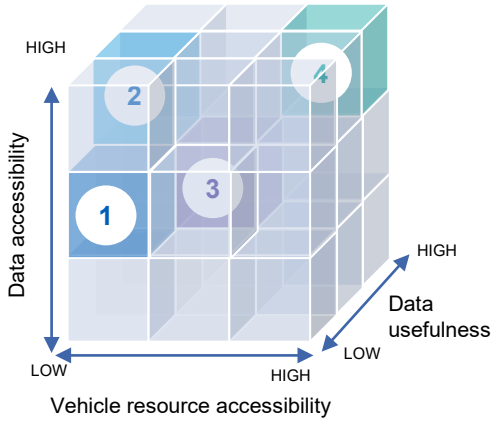
Overview of scenarios

Scenarios	Description
1	In **scenario 1 (OEM as gatekeeper)** with limited additional regulation the following is applicable: — The accessibility of (dynamic) data to market participants is moderate, indicating that in principal parties are allowed access (based on consumer consent). However, with the notion that OEMs make this data available through neutral servers (all data will be pre-processed by OEMs first before located on server) — The accessibility of vehicle resources for market participants is low. With that also the ability to reach the driver (consumer) in-vehicle is limited without compliance to criteria set by OEM (besides apps via smartphone which is also (partly) controlled by OEM). — The level of usefulness is low: OEMs have a high degree of freedom in choosing which data (points) and which format the data is made available as well as with a minimum level of detail
2	In **scenario 2 (Full read-only)** with modest regulation the (dynamic) data is directly made accessible to all (relevant) market participants. This also applies for data (potentially) not used by OEMs themselves on a detailed level. Access to vehicle resources is in line with scenario 1. In-vehicle data with a (substantial) relevance has to provided in a standardised format across the industry
3	In **scenario 3 (Middle-of-the-road)** with modest regulation the in-vehicle data is made accessible to market participants. Data content is likely to be limited. Access to vehicle resources is expanded beyond what is currently possible such that relevant third-parties are able to perform remote diagnostics amongst others (without consent of the OEM beyond cyber security). In-vehicle data with a (substantial) relevance has to be provided in a standardised format across the industry
4	In **scenario 4 (Complete access)** with far-reaching legislative measures all market participants have full access to all in-vehicle data and have a deep level of resource access while at the same time OEMs are obliged to provide a large variety of data in a highly standardised matter. Essentially, all in-vehicle data available and resource access for OEMs is so as well for other market participants

Degree of level playing field

HIGH

Relative positioning of scenarios



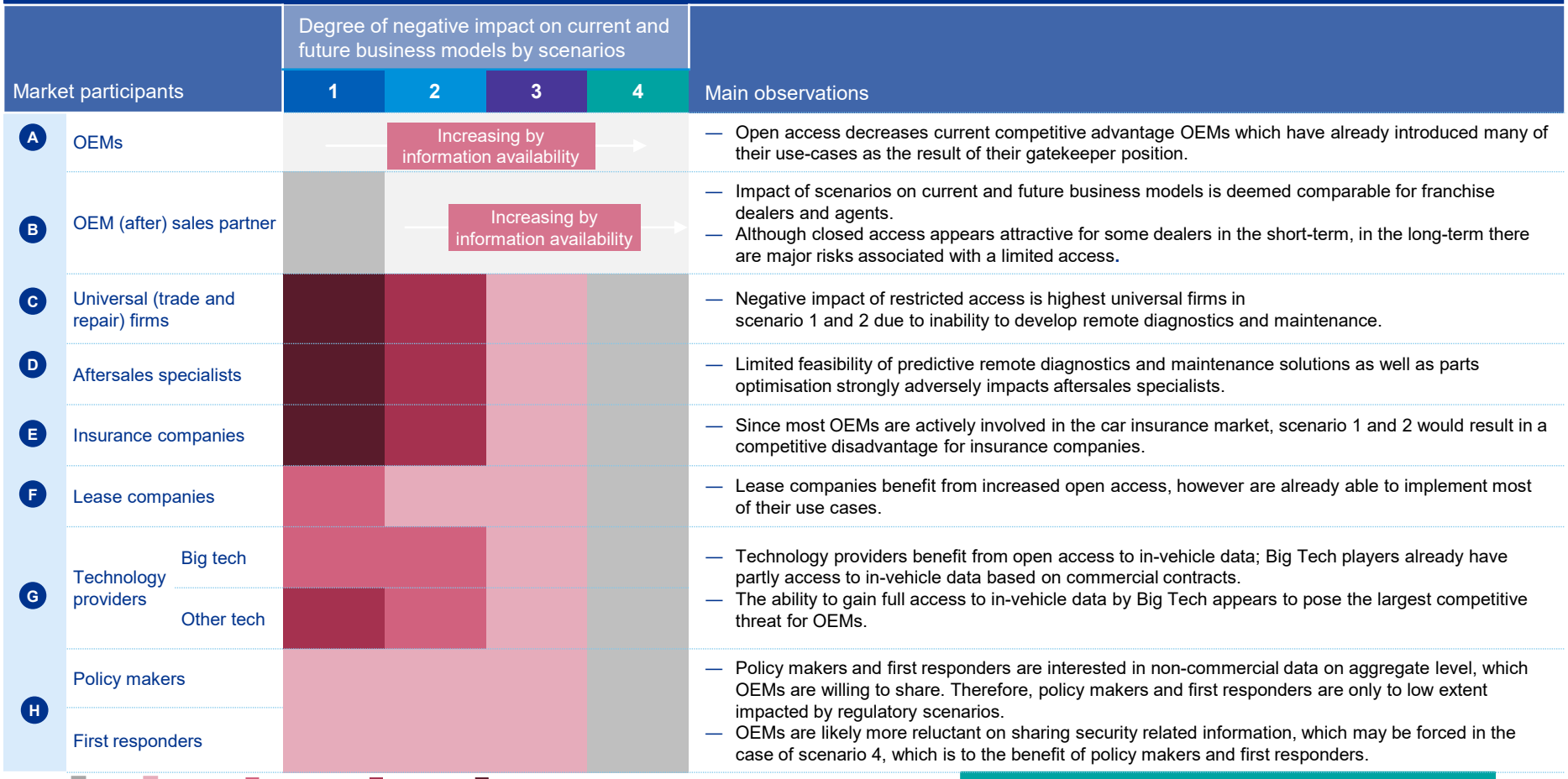
In principal, customers always have to give their consent before OEMs are allowed to share personal data with third-parties (applies to all scenarios). However, there is still much uncertainty how this will be regulated given the constant flow of data (even long after initial purchase) and the concerns surrounding data sharing of consumers which are unaware that they have given their consent. In each scenario it is assumed that consumers are able to alter access to third-parties relatively easily and on a flexible basis

Source: KPMG analysis.

3.1

Increased in-vehicle data usefulness and accessibility lowers negative impact on automotive retailes gradually while higher vehicle resource access considerably decreases adversity. This is primarily driven by the step-up in feasibility of remote and real-time (predictive) maintenance and diagnostics solutions.

Overview of impact to monetise in-vehicle data for market participants



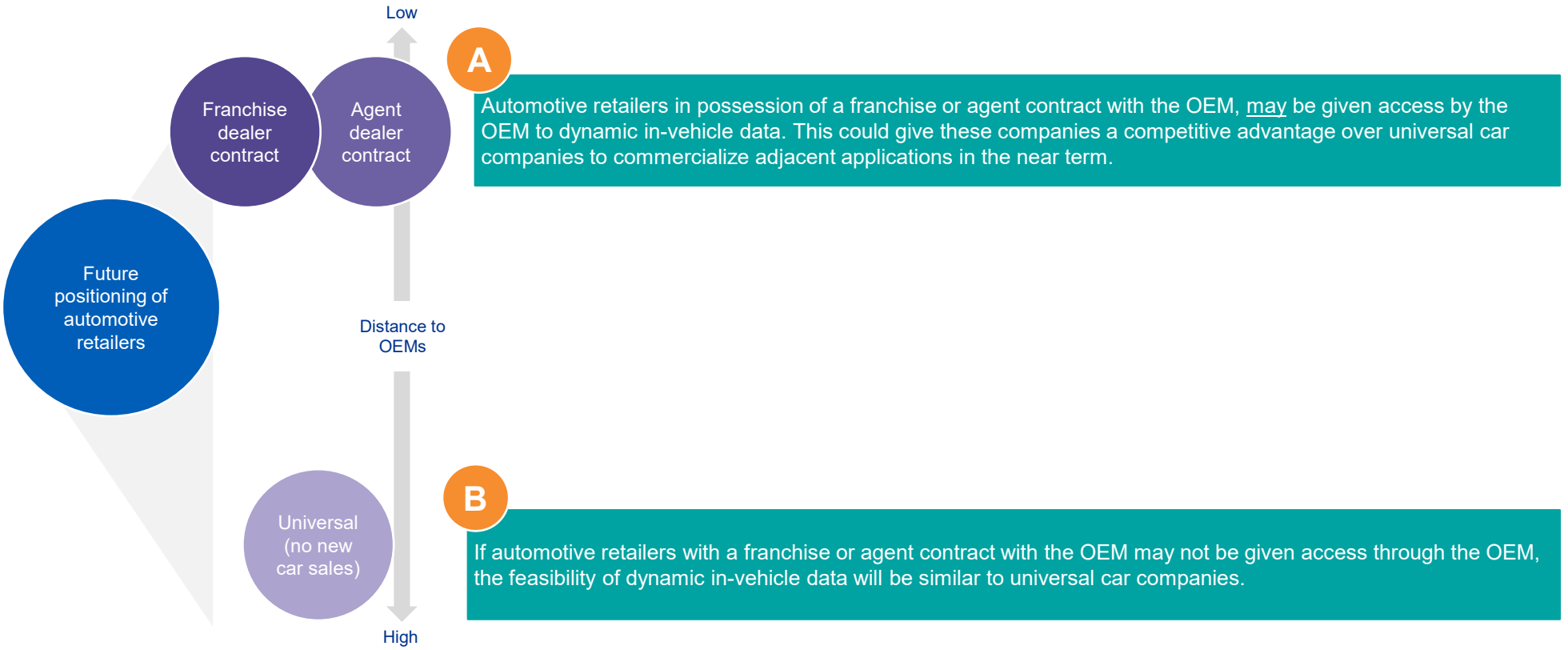
Key: Limited, : Low degree, : Medium degree, : High degree, : Full degree,

Source: KPMG analysis, Interview feedback.

Refer to the impact of regulatory scenarios section for further detail on underlying analysis per market participant

3.2

Future positioning of dealers is expected to be non-homogenous which leads to different levels of impact on their current and future business models. Impact of scenarios on current and future business models is deemed comparable for franchise dealers and agents, however franchise dealers and agents that are granted in-vehicle data access by the OEM would benefit from restricted access of universal firms in the short-term. Also, not all franchise dealers and agents are expected to obtain (full) access.



Source: KPMG analysis, Interview feedback.

3.3

If franchise dealers and agents will be given access to dynamic in-vehicle data, they will have a competitive advantage over other automotive retailers without data from the OEM.

Overview of feasibility primary applications for automotive businesses

Main use cases [a]	Relevance	Position in the value chain	Feasibility of applications for market participants by scenario 1	2	3	4
Predictive maintenance	●	Repair and maintenance				
Remote Diagnosis	●	Repair and maintenance				
Optimization of customer value	●	Various				
Optimization of residual value	●	Sale Occasion				
Damage repair	◑	Repair and maintenance				
Remote maintenance	◑	Repair and maintenance				
Optimization of inventory and workload	◑	Repair and maintenance				
Degree of negative impact on current and future business models of franchise dealers and agents			○	◔	◕	●

The franchise dealers and agents, which are closely positioned to OEMs (and therefore granted access), would profit from limited ability of universal firms to monetise adjacent use-cases

Not every franchise dealer or agent can rely on in-vehicle data and resource access via their OEM. Negotiating with the OEM is especially difficult for smaller dealerships whereas large dealers will have the market power to leverage access to data and resources. This will impact ability to monetise in-vehicle data. In case of no direct access via the OEM, feasibility is in line with universals.

Legend Low Medium High
○:Limited, ◔: Low, ◑: Medium, ◕: High, ●: Full,
✓Access possible/required, ~ Medium access possible/required, ✗ No access possible/required

Note: (a) Applications are non-limited.

Source: KPMG analysis, Interview feedback.

3.4

If franchise dealers and agents may not be given access through the OEM, the feasibility of dynamic in-vehicle data will be similar to other automotive retailers. The feasibility of use cases in scenario 3 and 4 increases significantly. Alternatively, access to dynamic in-vehicle data may be obtained via external hard- and software. However, this has significant downsides and will provide access to a limited dataset (see page 42).

Overview of feasibility primary applications for automotive businesses

B Main use cases [a]	Relevance	Position in the value chain	Feasibility of applications for market participants by scenario 1	2	3	4	Substitutes: Access via smartphone	Substitutes: Third-party hard- and software
Predictive maintenance	●	Repair and maintenance					✗	~
Remote Diagnosis	●	Repair and maintenance					✗	~
Optimization of customer value	●	Various		Increasing due to availability →			✗	✗
Optimization of residual value	●	Sale Occasion		Increasing due to availability →			✗	✗
Mobility Services	◕	MaaS					~	~
Damage repair	◑	Repair and maintenance					✗	✗
Remote maintenance	◑	Repair and maintenance					✗	✗
Optimization of inventory and workload	◑	Repair and maintenance					✗	✗
Degree of negative impact on current and future business on automotive retailers			●	◕	◔	○		

Legend: Low, Medium, High

○:Limited, ◔: Low, ◑: Medium, ◕: High, ●: Full,

✓Access possible/required, ~ Medium access possible/required, ✗ No access possible/required

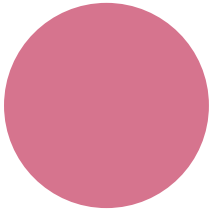
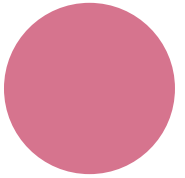
Note: (a) Applications are non-limited.

Source: KPMG analysis, Interview feedback.

3.5

Although closed access in the short-term appears attractive (to some extent) for some OEM (after)sales partner, in the long-term there are major risks associated with limited access for all (after)sales partners. Given the long processing and implementation time associated with the new regulations, the short-benefits are likely to remain, while at the same time risks for the (after)sales partners in the long-term are better addressed. As such, in total it appears that also dealers would gain more from 'consumer is gatekeeper 'and more dynamic in-vehicle data is made available (scenario 4).

Impact of closed access for OEM (after) sales partners, in short vs long time

	Short-term		Long-term (~2030)		Total
Impact for (after) sales partner OEMs		+		=	

Observations

Short-term

- Closed access could provide OEM (after) sales partners with a competitive advantage as other market players will not be granted data access by the OEMs.
- However, this advantage differs per OEM (after)sales partner and depends partially on the core business of this partner and partially on the data access to other relevant data sources the partner is able to obtain.
- Besides, the number of completely new use-cases for OEM (after)sales partners seems relatively low, hence the competitive advantage towards other market participants is limited.
- Also, it is expected that OEMs will provide their local (after)sales partners with other advantages such as first (website) reference for used car sales or maintenance.
- The level of access provided will also differ strongly per OEM.

Long-term (~2030)

- In the long-term the importance of online car sales and data-driven services is expected to increase. This will negatively impact relevance of a physical dealer location and therefore, lower the necessity to share data from the OEM's perspective.
- Tendering of service packages by OEMs or framework contracts that consist of outsourcing of repair and maintenance for mobility services or warranties towards other parties (e.g. internationally operating fast-fitters) could strongly impact the position of the OEM (after) sales partner, especially if they are only allowed data access through OEMs.
- Concluding, closed access leaves OEMs (fully) in control, while their new business models and strategic initiatives hamper the current position of the (after)sales partners, making them less able to (independently) fend off these threats.

Total

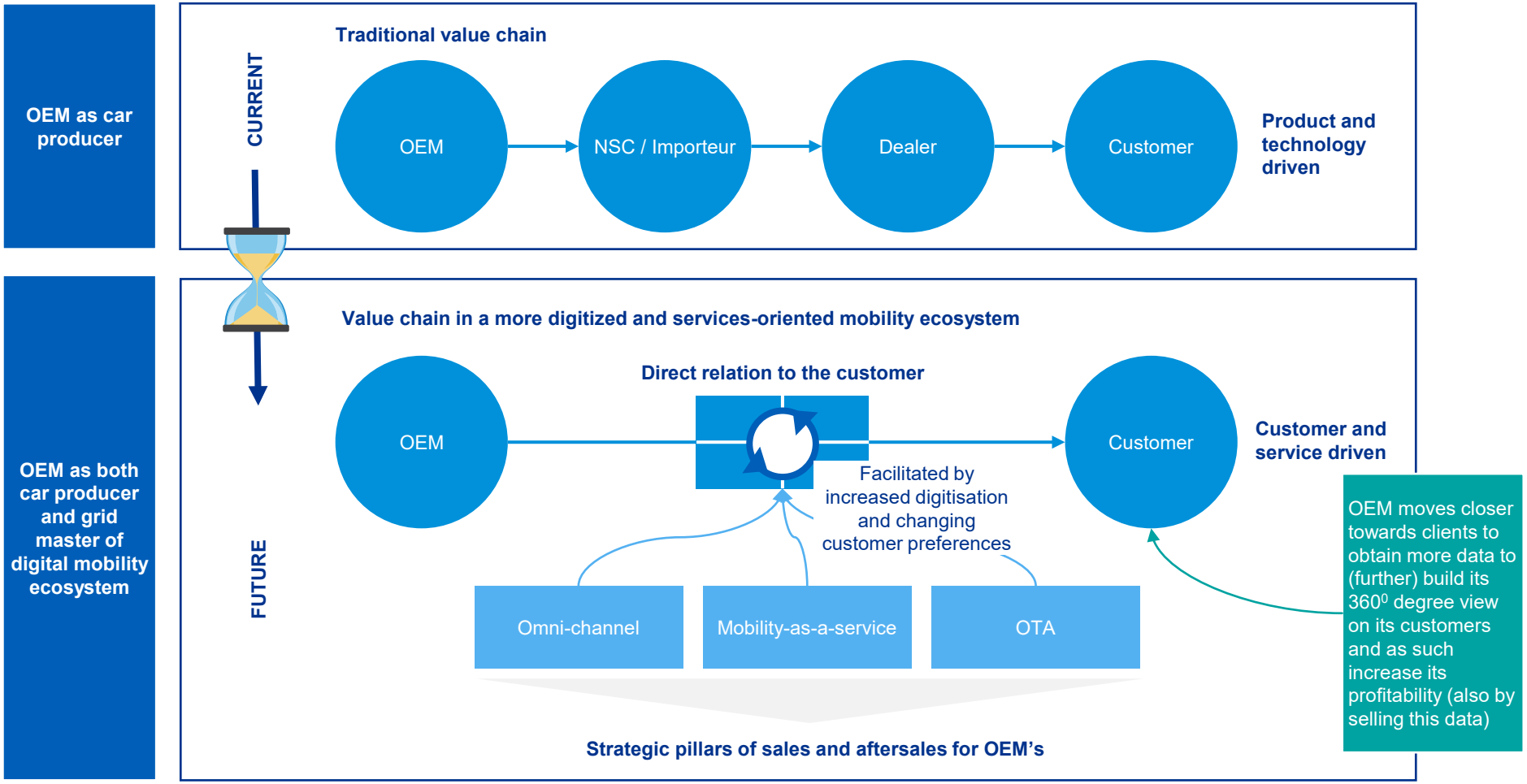
- Although closed access appears attractive in the short-term for partners that are given full access by the OEM, in the long term there are major risks associated with closed access.
- Since OEMs are (mostly) publicly listed companies it is expected that their primary focus will be on their own margins, despite potential negative impacts on other market participants or own (after)sales partners associated with this goal.
- Benefits in the short-term expected to remain to a large extent even when opting for open access due to the long processing and implementation time associated with the expected legislation (for open access). While at the same time risks in the long-term are better addressed.
- Overall, OEM (after)sales partners would therefore benefit more from open access.

Key: Size is amount of impact, Positive impact, Negative impact,

Source: KPMG analysis, Interview feedback.

Supporting analyses

New ecosystems are concentrating around consumers and their in-vehicle data, consequently increasing the overall importance of this data and its use-cases



Source: Interview feedback, KPMG analysis.

In-vehicle dynamic data is becoming increasingly important while access is only regulated to limited extent; future scenarios outline market implications

In-vehicle data and market participants

Degree of access determines to what extent market participants are able to monetise use-cases related to the emergence of large volumes of dynamic in-vehicle data coming decade.

Regulatory framework and scenarios

There is no specific regulation concerning access to dynamic in-vehicle Current regulation only covers dynamic in-vehicle data access for market participants to a limit extent.

New regulations are currently being developed to promote level playing field for dynamic in-vehicle data for which 4 scenarios are considered.

Impact of regulatory scenarios

Increased data usefulness and accessibility lowers negative impact gradually while higher vehicle resource access considerably decreases adversity for other market participants than OEMs. This is primarily driven by the step-up in feasibility of remote and real-time (predictive) maintenance and diagnostics solutions.

Source: KPMG analysis.

In-vehicle data and market participants

Importance of access to dynamic in-vehicle data and in-vehicle resources is paramount to monetise new use-cases

Degree of access determines to what extent market participants are able to monetise use-cases related to the emergence of large volumes of dynamic in-vehicle data coming decade.

Growing volume of in-vehicle data

Dynamic in-vehicle data is growing rapidly driven by roll-out of connected vehicles which are able to share data with their environment on a constant basis through new communication technologies. Both automotive firms and non-automotive firms have a strong interest in dynamic in-vehicle data as well as public parties.

A

Pages 28 - 36

In-vehicle data accessibility

Ability to monetize this in-vehicle data is driven by access to various data sources as well as the level of access to in-vehicle resources. Access can enabled through various technical solutions. Smartphones can serve as a substitute to in-vehicle data, although to a limited extent.

B

Pages 37 - 42

In-vehicle data relevance

Access to in-vehicle data sources, functions and resources is most relevant for (non-) branded dealers and aftersales specialists; vehicle usage information is key for entire market.

C

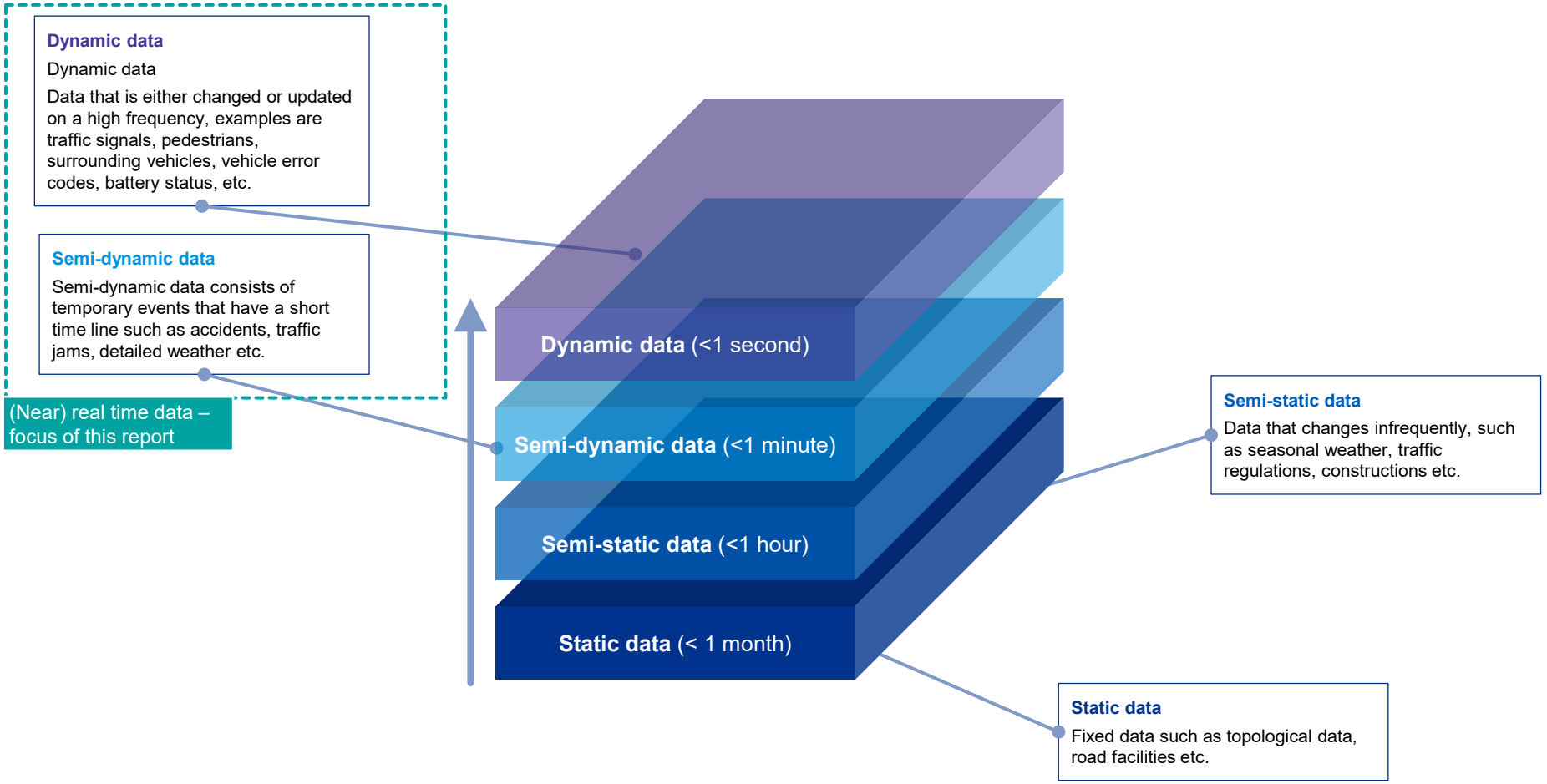
Pages 43 - 47

Source: KPMG analysis.

A Growing volume of in-vehicle data

In-vehicle data can be divided into four connected layers based on degree of timing

Building blocks of automotive data

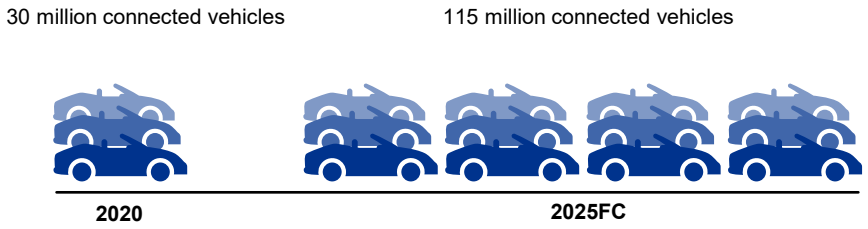


Source: SIP, KPMG analysis, Interview feedback.

In-vehicle dynamic data is projected to grow exponentially driven by the rapid increase in global connected car sales

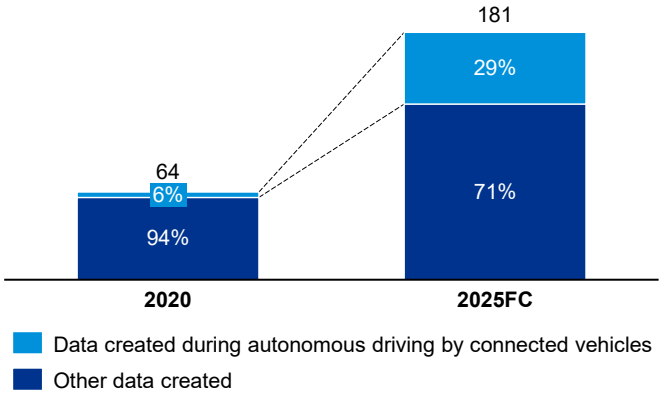
Global connected car sales annually, 2020-2025

Currently, connected vehicles generate only 14 MB/day due to the still limited use-cases implemented, while autonomous driving connected cars may generate up to 1 TB/hour



The rapid increase in global connected car sales is a main driver of the total data generated from connected vehicles which will also drive the share of connected vehicle data with respect to total generated data

Indicative of volume of data created, captured and consumed worldwide by connected vehicles during autonomous driving[a], 2020-2025, zettabytes[b]



Note: (a) Assumes 4% vehicle usage time, 383 GB of data generated per hour, 2020 as inception of the connected vehicle.
(b) 1 zettabyte = 1B terabyte.

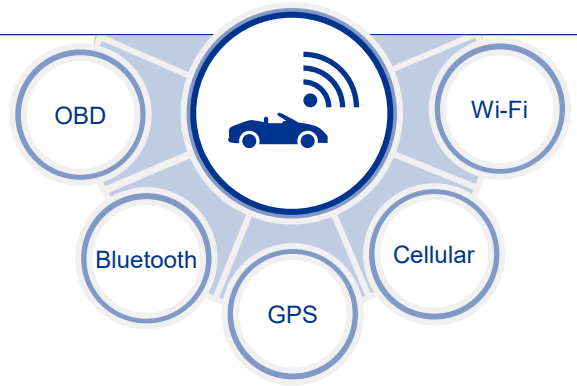
Source: ABI Research, Automotive Edge Computing Consortium, RAC Foundation, Statista, Interview feedback, KPMG analysis.

"The data generated by connected vehicles can easily grow five or ten-fold in the coming five to ten years." – Data expert OEM

Selected interview feedback

The combination of various communication technologies enable connected cars to rapidly exchange dynamic data with its environment

The various communication technologies of connected vehicles



On-board Diagnostics – Static

Main applications: repair and maintenance activities, emission testing, software updates

Resources: diagnostics trouble codes (DTCs), RMI usage information

Wi-Fi wireless communication

Main applications: Infotainment systems, vehicle-to-infrastructure (V2I) communication

Resources: external conditions, vehicle status, usage information, driver data, direct communications

Bluetooth

Main applications: Driver personalisation, smart vehicle access, car sharing, remote parking

Resources: driver data

Global Positioning System

Main applications: navigation platforms, speed camera and obstacle information platforms

Resources: external conditions, user information

4G/5G cellular communication

Main applications: obstacle avoidance, ADAS, V2X, non-line-of-sight systems

Resources: external conditions, vehicle status, usage information, driver data, direct communications

New levels of interchanging connected in-vehicle data

Vehicle-to-infrastructure
Communication with surroundings, such as, road situations, accidents, parking places

Vehicle-to-vehicle
Communication between vehicles concerning location to avoid accidents and traffic jams

Vehicle-to-pedestrians
Protecting pedestrians by locating pedestrians on roads and informing other divers

Vehicle-to-cloud
Interchanging data with cloud analytics platforms. Car sensors collect data and transmits it to the cloud for processing for, e.g., Maas, maintenance

Source: TRL, Ericsson, McKinsey, Flitsmeister, Texas Instruments, Eastern Peak, Interview feedback, KPMG analysis.

Of all dynamic in-vehicle data (that can be generated) only a small share is currently available; new use-cases are expected to emerge based on unexplored data

Illustrative overview of current and future use of (dynamic) in-vehicle data

Data currently available via OEMs (see also next page)

Concerns data that is already in place for use-cases as part of current customer services (provided by third-parties). In order for third-parties to access this data the customer needs to give its consent and a B2B contract with OEM must be in place.

Data potentially usable

On top of data currently used by customers, there are many additional data points which are generated but not yet commercialised. These data points could provide opportunities for new uses-cases by OEMs and third-parties. Refer to the appendix for more detail on the various use-cases.

"Cars are being equipped with more and more sensors, which generate an increasing amount of data. OEMS are struggling with the question whether to sell all this data or to keep it for themselves." – Market expert

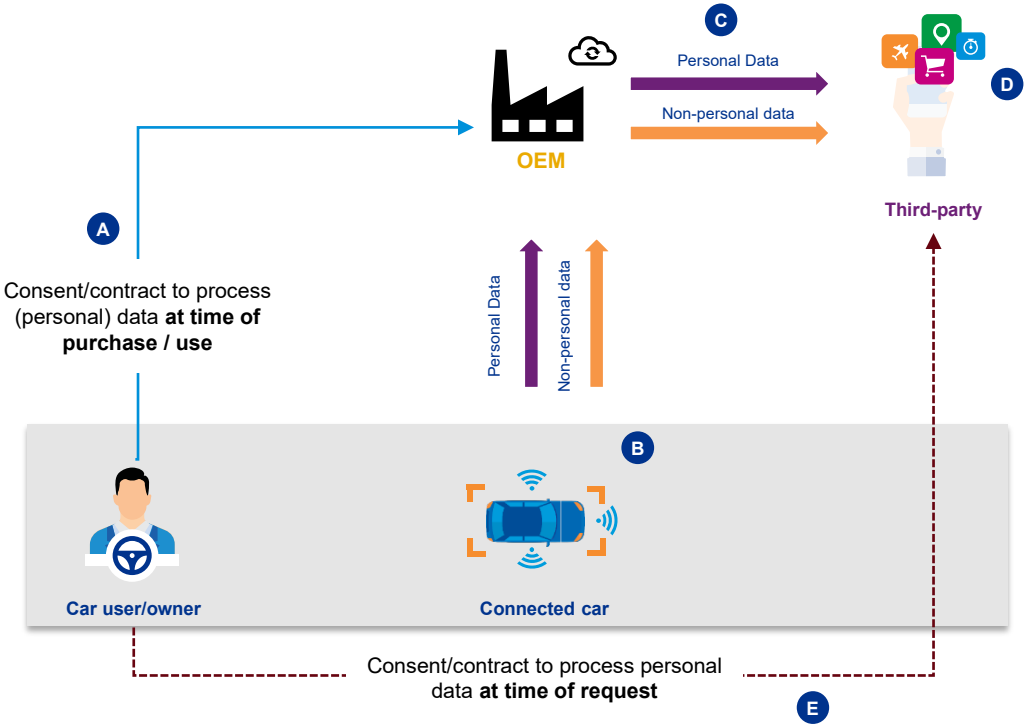
Selected interview feedback

Source: Interview feedback, KPMG analysis.

Ideally, consumers decide how and with whom they want to share their in-vehicle data, however in practice OEMs require B2B contracts with third-parties

Flow of personal data after consent by the consumer

- **A** After the car is sold to the consumer, the OEM asks for consent to collect and process his/her personal data to be compliant with GDPR (refer to page 101 for further details). If applicable, the consumer also has to provide consent for data sharing with third-party applications.
- **B** After consent, the consumer is able to make use of the relevant vehicle features (including third-party applications subject to B2B contracts between third-party and OEM).
- **C** The OEM is able to provide in-vehicle data to third-parties through an OEM-controlled backend server, such as Extended Vehicle, a Neutral Server or an In-vehicle Interface.
- **D** The third-party service provider processes the data provided by the OEM to develop in-vehicle applications.
- **E** Provided consent is given by the consumer, third-party service providers are in rare cases allowed to directly develop applications on third-party developed software such as through the Innovation Portal of Volvo.



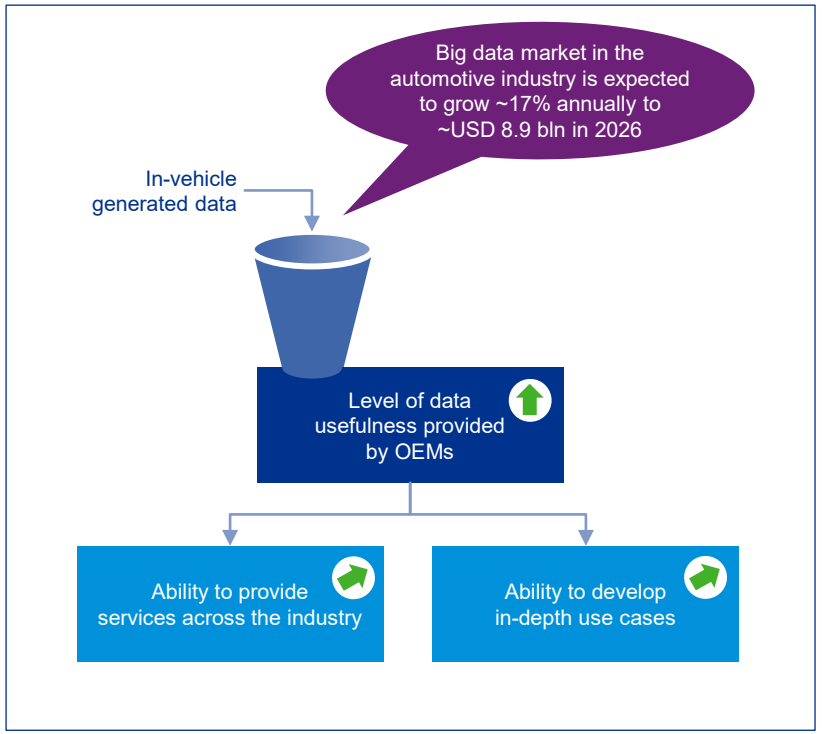
Consumers tend to benefit from the ability to share in-vehicle data easily with third-parties (from OEMs) as this would increase the quality and the number of services available in the market.

Currently (February 2022), only dynamic in-vehicle data that is considered as **personal data** is regulated via the GDPR (based on data portability principle). For **non-personal** data there is no regulation in place.

Source: Interview feedback, KPMG analysis.

The level of data usefulness across the industry is an important driver for the quality and scalability of service offerings

Impact of high[(a)] usefulness level of OEMs on the other market players



When regulation obliges OEMs to share the in-vehicle data with third-parties, the level of data usefulness determines how easily third-parties can analyse, research and use the data

- All-in-vehicle generated data will first arrive at the OEM service location. The OEM will process the data and (depending on future regulation) will or will not process the data available for other market participants.
- When all the OEMs share highly standardised in-vehicle data, third-parties will be able utilize this easily since the level of format differentiation is low and the level of detail is high (and vice versa). This will provide broad opportunities to develop new use cases and offer aggregated services based on real time in-vehicle data.

"I can see the debate ending in OEMs having to share data with third-parties in a uniform and standardized way, with high usefulness for use-cases." – Market expert

"Regulated or not, OEMs will always share the minimum set of data. And when data is shared with third-parties, OEMs always have the advantage of having real-time data versus latency for third-parties." – Data expert OEM

"The obligation of OEMs to share data with third-parties will be regulated, however, there are different data architectures concerning standardisation; each OEM has his own. That will be a significant challenge in communication." – Market expert

Selected interview feedback

Key: Positive impact ■ OEM ■ Third-party.
Note: (a) When the level of usefulness is low the whole figure would be vice versa
Source: Mordor Intelligence 2021, KPMG analysis, Interview feedback.

Both automotive firms and non-automotive firms have an interest in dynamic in-vehicle data as well as public parties…

The role and interest in data of market participants in the data value chain

	Automotive firms					Other	Public parties		Consumers
	OEMs	OEM (after)sales partner	Universal (trade and repair) firms	Aftersales specialists	Insurance companies	Lease companies	Technology providers	Policy makers	First responders	
Position in value chain	— Producer of vehicles — Vehicle software development — Service provider	— Point of sale of new and used cars — Aftersales (new) cars — Incident damages	— Point of sale of used cars — Aftersales (new) cars — Incident damages	— Suppliers of specific aftersales software and hardware for consumer facing automotive firms	— Aftersales services involving vehicle insurance products	— Financing vehicles — Fleet maintenance management	— Core consumer platform provider — Provider of cloud solutions	— Regulator and supervisor — Infrastructure management	— Ensuring safety and security	— Consumers are the end customer of the automotive firms, technology providers and public parties
Role with respect to in-vehicle data	— Gatekeeper of in-vehicle data — Responsible for controlling data, i.e., licencing, cyber-security — Providing new services and products based on in-vehicle data	— Require reading and writing ability with respect to dynamic repair and maintenance data for aftersales — Providing new services and products based on in-vehicle data			— Providing (pay-as-you-drive) insurance policies — Incident and damage assessment	— Providing lease propositions — Fleet management activities	— Platform role through recommenda-tion/ advertisement algorithms — Selling of tools and platforms	— Responsible for road safety — Car emissions performance — Data usage for traffic management purposes — Governing automotive market	— Using accident data for emergency services	— Consumers profit from new and better products and services based on in-vehicle data as well as from improved infrastructure, policy and emergency services
Actors	— Original equipment manufacturers	— Licensed dealers — Licensed mechanics (branded)	— Independent dealers/ mechanics — Garage formulas/ wholesalers	— Part producers — Software applications providers	— OEM owned and independent insurance companies	— OEM owned and independent lease companies	— In-vehicle technology enablers	— Supervisory authorities/re gulators — Public road authorities	— Road assistance operators — Emergency services	N/A

OEMs currently operate in a dual role as both platform and service provider. The limited in-vehicle data access of other participants provides OEMs therefore a competitive advantage.

In-vehicle data is paramount for market players in implementing use-cases and optimising current value pockets. Refer to the appendix for details on use-cases by market participants.

Note: (a) Automotive firms have a direct relation to the automotive value chain, whereas non-automotive firms provide adjacent services/products within this value chain.

Source: Interview feedback, KPMG analysis.

…In order to develop new use-cases to (further) optimise their current or future business models

Overview of use-cases by market participants

Primary use-cases	OEMs	Automotive firms					Other	Public parties	
		OEM (after)sales partner	Universal (trade and repair) firms	Aftersales specialists	Insurance companies	Lease companies	Technology providers	Policy makers	First responders
High Level of relevance[a] Low	— Over-the-air software add-ons — Customer value optimisation — Subscriptions — Mobility services — Predictive maintenance (OTA)[b] — Remote diagnostics (OTA)[b] — Remote maintenance (OTA)[b] — Early recall detection and software updates (OTA)[b] — Sell vehicle data — Pay as you drive insurance — Inventory optimisation — Warranty packages	— Predictive maintenance — Remote diagnostics — Customer value optimisation — Residual value determination — Mobility services — Remote maintenance — Damage repair — Workload optimisation — Inventory optimisation	— Predictive maintenance — Remote diagnostics — Customer value optimisation — Residual value determination — Mobility services — Remote maintenance — Damage repair — Workload optimisation — Inventory optimisation	— Predictive maintenance — Remote diagnostics — Optimise parts and quality portfolio — Workload optimisation — Inventory optimisation — Tyres as a service — Customer value optimisation — Trouble code monitoring — Remote maintenance	— Pay as you drive insurance — First notification of loss and claim — Accident reconstruction — Driving style analysis and feedback	— Customer value optimisation — Residual value optimisation — Health of fleet monitoring — Vehicle usage monitoring — Use vehicle as a wallet	— Optimise/proactive navigation — Target advertisement — Infotainment systems	— Taxation based usage — Road accident prevention — Improved road and infrastructure maintenance — Improved road and infrastructure development — Dynamic systems for traffic rules — Onboard fuel monitoring — Park planning optimisation	— Accident detection and information for immediate assistance — Theft tracking — Distanced activation of actuator

…These use-cases are linked to (access to) different in-vehicle data sources and resources.

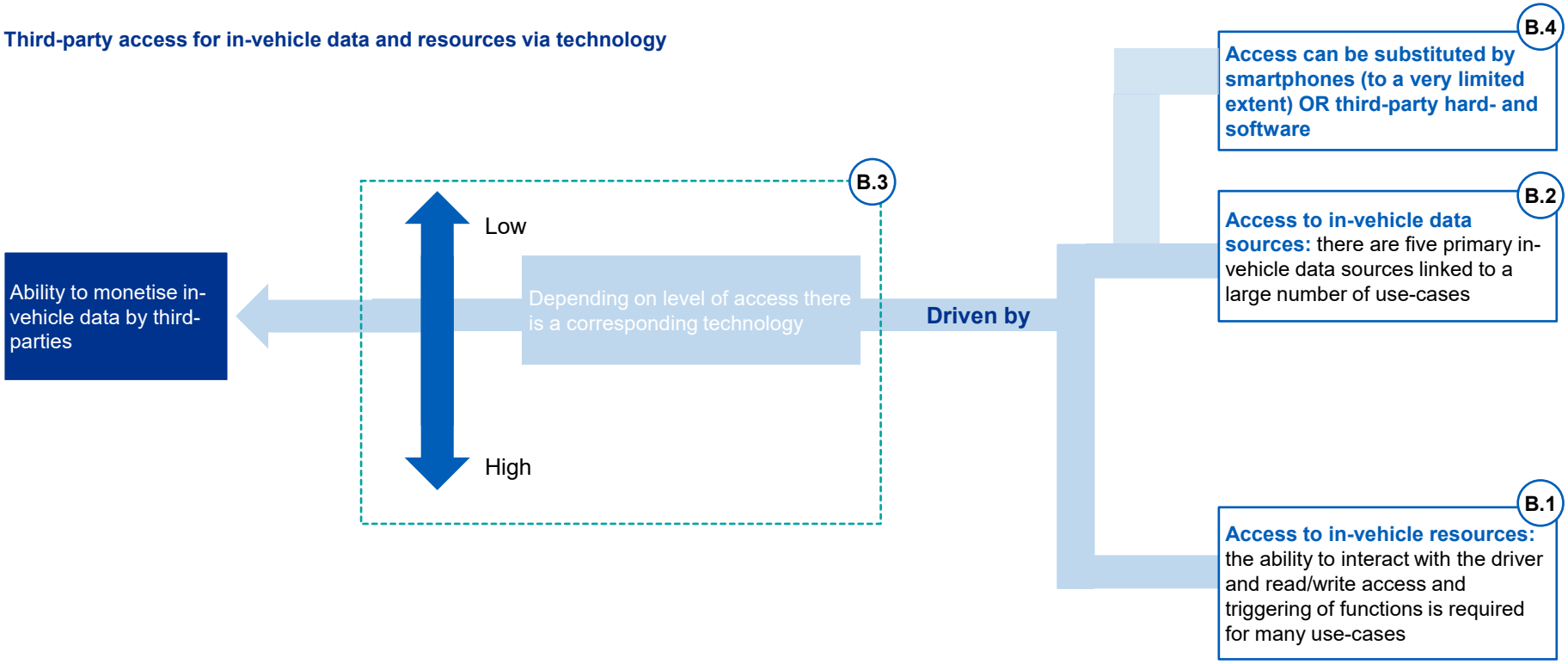
Note: (a) Relevance is based on the importance of data access based on potential use cases.
(b) OTA refers to the ability to activate or update individual electronic control units (ECU) and/or the central software management systems over-the-air (remote). Simplest OTA applications concern activation for reading or data downloads while more complex applications entail (re)programming of firmware.

Source: KPMG analysis, McKinsey, Interview feedback.

B In-vehicle data accessibility

The ability to monetise data is driven by access to in-vehicle data, functions and resources; Level of access can be realised through various technical solutions

Third-party access for in-vehicle data and resources via technology



Source: KPMG analysis.

There are five primary vehicle data sources linked to a large number of use-cases

In-vehicle data sources

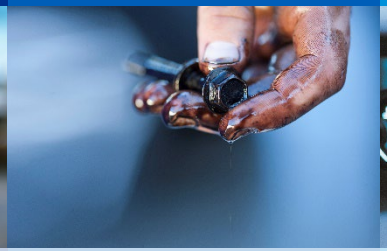
Level of privacy sensitivity →

External conditions (road and environment)

Consists of live information of road and environment conditions that provides relevant information that can benefit traffic safety and management such as:

- Slippery roads
- Positions of emergency vehicles
- Positions of accidents
- Traffic warnings

Vehicle status



Consists of information with regard to the current technical status of the vehicle and its parts examples are:

- Performance/malfunction of engine/vehicle
- Status of battery
- Temperature of oil
- Airbag status

Usage information

Consists of data that provides insights into the usage of a specific vehicle, for example

- Driven kilometres
- Current location
- Average speed
- Fuel consumption

Driver data

Consists of personal data and preferences of the driver of the vehicle, examples are

- Drivers identity
- Driver characteristics (combined with usage information)
- Preferred music/radio
- Patterns of application use

Direct communications from the vehicle

Consists data with regard to direct communications from the vehicle with regard to the frequency, content and the management of applications, such as

- Emails
- Calendar
- Calls
- Contacts

Since these data sources (to a large extent) involve a combination of a human driver and a vehicle the data obtained could be interpreted as personal data. Data traceable to VIN (and therefore to the car owner) is considered personal data by several EU regulations, hence subject to GDPR. See page 101 for further details.

Source: KPMG analysis, McKinsey, Interview feedback.

Next to generated in-vehicle data, the ability to interact with the driver and resource access is required for many use-cases

Simplified visualisation communication flows connected vehicle

Third-parties

Data extraction

Access to vehicle resources

Connected car (OEM)

An important concern with respect to notifications is driver safety since dispersed attention could lead to fatal accidents

Resource and functions access levels

Level		Description	Possible through data sharing platforms	Main use-case applications (non-exhaustive)
1	Read	Smart device display shown on vehicle display	✓	- All use-cases that require direct push notifications to the vehicle
2	Read	Trigger a data refresh to the OEM back-end for latest vehicle data	✓	- Theft protection - Mobility services
3	Read	Read selected parametric dynamic data based on existing routines	✓	- Enriching customer experience based on driving habits
4	Remote diagnostics	Active self routine (diagnostics) according to ISO 20080	✗	- Remote diagnostics - Early recall detection
5	Remote diagnostics	Activate existing self routine (actuator)	✗	- Distanced activation of actuator, pre-heating for instance
6	Write	Re-configure vehicle parameters (e.g. service interval, clear fault memory)	✗	- Distanced maintenance - Software update - Over-the-air software add-ons
7-8	Write	Re-programming (never accessible)	✗	- Autonomous driving - Robotic services

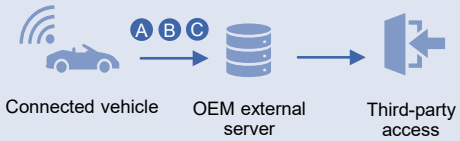
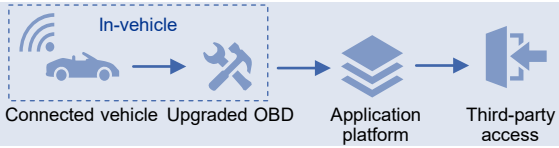
Access to vehicle resources comprise both read/write and remote diagnostics capabilities of third-parties and functions (such as opening the trunk and resetting error codes).

Increasing risk to vehicle integrity/ security/ liability/ customer safety and privacy

Resource access level is an important driver for third-parties in order to apply use-cases. From level 2 onwards (full) access is still very limited to most third-parties given the prudent attitude of OEMs with respect to safety and security of customers. Going forward, it is expected that the type approval (and therefore vehicle security) will remain the responsibility of OEMs

Source: ACEA, KPMG analysis, Interview feedback.

Third-party access to in-vehicle data can be governed by three main solutions; control by OEMs is highest with data sharing platforms, lowest through S-OTP

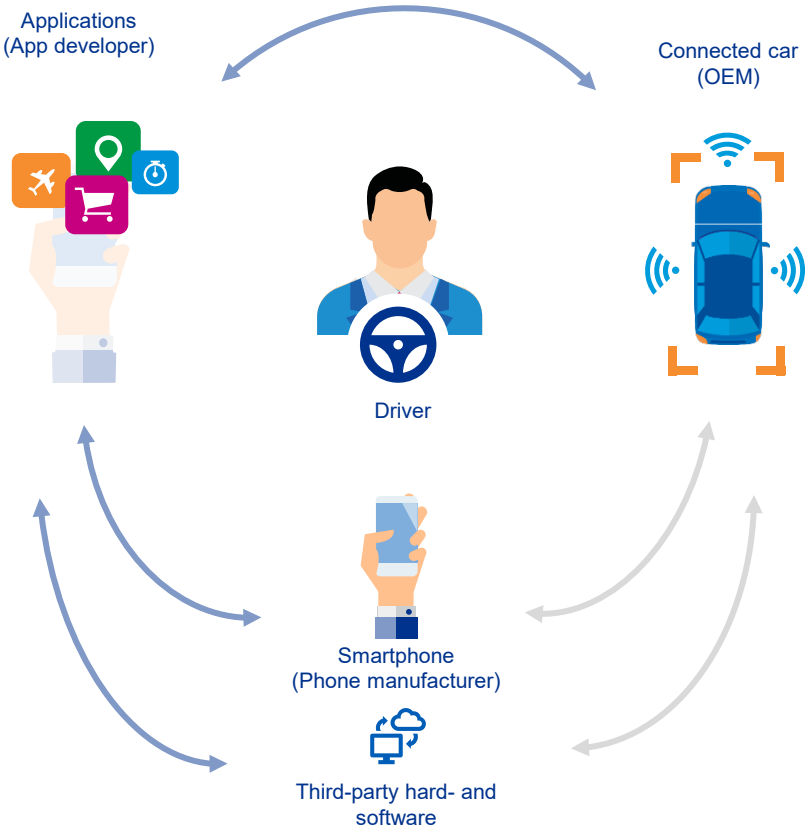
	Data sharing platform (ACEA proposal)	In-vehicle Interface (TRL concept)	Secure on-board Telematics Platform (S-OTP)
Degree of OEM control	LOW		
Platform	— Several EU OEMs have developed a concept where in-vehicle generated data is sent over a secure and encrypted communication channel to a dedicated OEM server (Extended Vehicle) from which it may be transferred to a Neutral Server or directly to the third-party[(a)]. Consumer consent is managed and controlled by the OEM also in case of third-party consent request. — Data access is differentiated in three elements: A. Data already accessible by third-parties, OEMs determine availability and frequency of data and function access; B. Data only usable by third-parties with B2B contracts; C. Data sharing under B2B contracts by third-party apps in the electronic control unit.	— Concept where usage of an upgraded OBD interface can be connected to applications and devices outside the vehicle such as smartphone apps. — The interface allows for real-time access to a standardised dataset. — The platform is only suitable for low-speed connections and the OBD interface has a low level of cybersecurity. — Access to vehicle data is already used through OBD-ports, which is an advantage when the system is upgraded for third-party services. — Consumer consent is managed directly between driver and third-party. — Note: not all vehicles are equipped with OBD	— Platform that allows for unified deployment of applications on the HMI using in-vehicle resources. — The platform essentially functions as an 'app store' where third-parties can develop apps directly displayed on the HMI. — Cybersecurity is increased by a secure gateway layer securing data coming from and to the vehicle. — Allows all market participants to access in-vehicle data and compete equitable and consumers being able to pick from multiple service providers. — Validation of application and accreditation of service supplier is required — Consumer consent is managed directly between driver and third-party.
Example external data platforms: Otonomo, Caruso, High Mobility			
Ability to implement desired third-party use-case	LOW to MEDIUM | OEM controls in-vehicle data access and data quality of accessible data by third-parties. Ability of third-parties to implement desired use-cases is low	MEDIUM | Access to real-time data is possible, but only a minimum dataset is shared through the OBD interface and with low-speed connections. The ability of third-parties to implement their desired use cases is limited.	HIGH | Ability of third-parties to implement their desired use cases is high due to direct possibility to develop apps displayed on HMI. No restrictions on amount of authorised third-party applications
Real-time access	No	Yes	Yes
HMI access	Only through mirroring functions by phone	Depends on whether applications are integrated as layer on the interface or run outside the vehicle	Yes
Ability of substi-tution smartphone	Yes	Partly	Not necessary

Note: (a) The Alliance for Freedom of Car Repair in Europe (AFCAR) has conduced a proof of concept study and concluded that technical abilities of Extended Vehicle are lacking and blocks third-party innovative power

Source: TRL, ACEA, AFCAR, Interview feedback, KPMG analysis.

In-vehicle data use-cases can be substituted by third-party hard- and software and smartphones, although to a very limited extent

In-vehicle data generators and first data flows



Note: First data flow is mentioned between brackets.
Source: KPMG analysis, Statista, Interview feedback.

Access via the OEM is not the only way for other market participants to access in-vehicle data. The use third-party hard- and software and smartphones and their installed apps represent an alternative to track data and deliver services

- Currently almost 81% of the population owns a smartphone. In a car, smartphones are mostly used for communication and navigation purposes. This means that smartphone companies and app creators can always access (when the phone is used) information of the driver such as location, common routes, occurring lunch spots etc. The phone is mainly used as a data device and the app is generating the data.
- Examples of use-cases that would have sufficient information by having this data are:
  - Targeted advertisement;
  - Infotainment systems; and
  - Proactive navigation.
- However, to be able to offer an application that can be used in the operating system of a connected vehicle the app developers need permission from the OEM.

Data retrieved with third-party hard- and software

Telematics data is retrieved from vehicles CAN-bus network

The data is stored and processed in telematics service platform

End-users retrieve valuable insights into the state of the vehicle and/or fleet

Telematics allow for several use-cases:
- Theft detection and vehicle retrieval
- Notifying emergency services after crash detection
- Maintenance and tyre management
- Analysing driving behaviour

In-vehicle data generated by a car is much more extensive than either smartphone or third-party hard- and software. For example, a smartphone is not able to measure in-vehicle observations such as severe breaking, oil temperature, slippery roads etc. In addition, often third-party hard- and software is not able to capture detailed information of the vehicle status, but is limited by the available information via the OBD-port or vehicle CANBUS-network.

C In-vehicle data relevance

Access to in-vehicle data sources and resources is most relevant for automotive firms; usage information is key for entire market

Overview of relevance of in-vehicle data for market participants

	Market participants					
	Automotive firms			Government		Other
	(After) sales[a]	Insurance companies	Lease companies	Policy makers	First responders	Technology providers
In need of access ↓						
Usage information	●	●	●	●	●	●
Vehicle status	●	◕	◑	◔	◑	○
External conditions	◑	◑	◑	●	◑	◕
Driver data	◑	●	◑	◑	◑	◕
Direct communications	◔	◔	◔	○	◔	◑
Substitution by smartphone	●	●	●	●	●	●
Level of vehicle resource access required	1-6	1-3	1-4	1-3	1,2 & 5	1-3
Primary use-cases[b]	— Customer value optimisation — Residual value determination — Predictive maintenance and repair	— Pay as you drive insurance — First notification of loss and claim	— Residual value determination — Health of fleet monitoring	— Taxation based usage — Car emission performance — Road accident prevention — Improved road and infrastructure maintenance	— Accident detection and information for immediate assistance — Theft tracking	— Optimise/ proactive navigation — Target advertisement — Infotainment systems

Key: Level of in-vehicle data access importance based on potential use cases: ● High ○ Low.
● Access possible/needed, ● Medium access possible/needed, ● No access possible/needed.

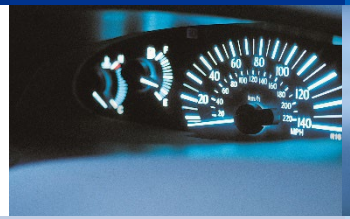
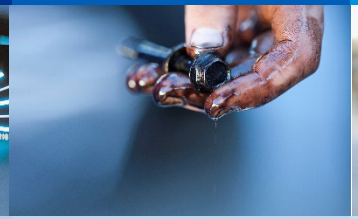
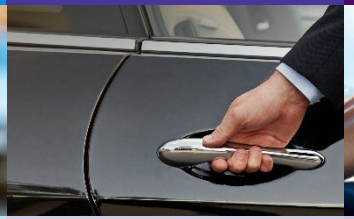
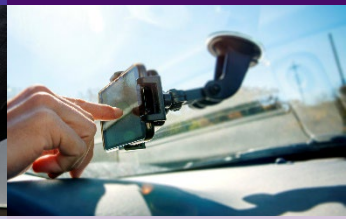
Note: (a) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists
(b) Use-cases are non exhaustive.
(c) OEMs always have access to these resources.

Source: KPMG analysis, Interview feedback.

Based on underlying use-cases, an assessment is made on the importance of data sources per relevant market player. Refer to the appendix for further detail.

Status and vehicle usage information are the most relevant data sources for development of new use-cases

Level of data source relevance[a]

	Usage information	Vehicle status	External conditions (road and environment)	Driver data	Direct communications from the vehicle
Data sources					
Primary use cases	— Pay as you drive insurance — Optimising customer life time value base on driving habits — Mobility services	— Preventive diagnostics and maintenance — Warranty packages — On board fuel monitoring	— Optimized navigation based on live road conditions — Road accident prevention — Improved road and infrastructure maintenance and development	— Targeted advertisement — Driver style analysis and feedback — Infotainment systems	— Proactive navigation — Trunk delivery — Target advertisement
Primary players	— OEMs — Automotive companies — Insurance companies — Lease companies — Policy makers — First responders — Technology providers	— OEMs — Automotive companies — Insurance companies — Lease companies — First responders	— Policy makers — Technology providers	— Insurance companies — Technology providers	— Technology providers

Note: (a) Relevance is based on the importance of data access based on potential use cases

Source: KPMG analysis, McKinsey, Interview feedback.

Specific vehicle usage information is of high relevance for all market participants

Overview vehicle data

	Market participants							
	OEMs	Automotive			Other	Government		Total
		(After) sales[a]	Insurance companies	Lease companies	Technology providers	Policy makers	First responders	
Specific vehicle usage information	●	●	●	●	●	●	●	●
Current status of the vehicle and its parts	●	●	◕	◕	○	◔	◕	◕
External conditions with regard to road and environment	◑	◑	◑	◑	◕	●	◑	◑
Driver data	◑	◑	●	◑	◕	◑	◑	◑
Direct communications from the vehicle	◔	◔	◔	◔	◑	○	◔	◔

Based on underlying use-cases, an assessment is made on the importance of data sources per relevant market player. Refer to the appendix for further detail.

Key: Level of data relevance: ● high level of relevance for data source based on underlying use-cases ○ low level of relevance for data source based on underlying use-cases
● Most important data source.

Note: (a) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists

Source: KPMG analysis, McKinsey, Otonomo, Interview feedback.

Deep vehicle resource access is mainly required by dealers and universal firms

Overview of importance of vehicle resource access for market participants

Next to an assessment per data source, an assessment per use-case is made on the level of vehicle resource access necessary to be able to implement the use-case per relevant player. Refer to the appendix for further detail.

	Resource access level[a]	Market participants						
			Automotive firms			Other	Government	
		OEMs[b]	(After) sales[c]	Insurance companies	Lease companies	Technology providers	Policy makers	First responders
1	Smart device display shown on vehicle display	✓	✓	✓	✓	✓	✓	✓
2	Trigger a data refresh to the OEM back-end for latest vehicle data	✓	✓	✓	✓	✓	✓	✓
3	Read selected parametric dynamic data based on existing routines	✓	✓	✓	✓	✓	✓	×
4	Active self routine (diagnostics) according to ISO 20080	✓	✓	×	✓	×	×	×
5	Activate existing self routine (actuator)	✓	✓	×	×	×	×	✓
6	Re-configure vehicle parameters (e.g. service interval, clear fault memory)	✓	✓	×	×	×	×	×
7-8	Re-programming (never accessible)	✓						

Key: ✓ Access to this level of vehicle resources required for at least one potential use-case
× No access to this level of vehicle resources required for potential use-cases.

Note: (a) Increasing risk to vehicle integrity/ security/ liability/ customer safety and privacy.
(b) OEM already has access to all levels of vehicle resources.
(c) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists

Source: KPMG analysis, Otonomo, Interview feedback.

Resource access level is an important driver for third-parties in order to apply use-cases. From level 2 onwards (full) access is still very limited to most third-parties given the prudent attitude of OEMs with respect to safety and security of customers.

Regulatory framework and scenarios

New regulations are currently being developed to promote level playing field for dynamic in-vehicle data for which 4 scenarios are considered

Current regulation

Dynamic in-vehicle data is only regulated to a limited extent.

A

Pages 50 - 57

Rationale for new regulation

OEMs appear to have a competitive advantage due to their gatekeeping position. EU sees need for new regulations.

B

Pages 58 - 62

Regulatory scenarios

Scenarios are based on open accessibility of data sources and resources an data usefulness as the result of the degree of regulation.

C

Pages 63 - 68

A Current regulation

The current data landscape is regulated by IP law, private law and public law; these overlap due to shared goals and responsibilities

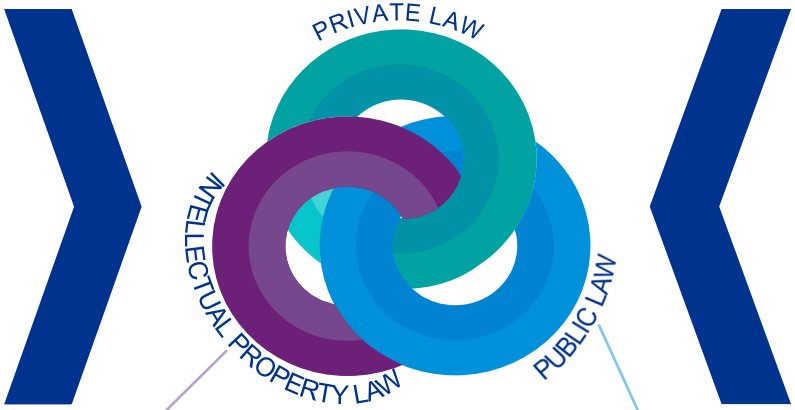
Conceptual overview of the overlap between intellectual property law, private law and public law

Criminal law as part of public law is omitted from the above overview and subsequent analysis as it has limited impact on accessibility and standardisation of data sharing

- Private law is part of civil law legal system and involves relations between legal persons and/or individuals (e.g. contract law)
- Data can be protected through the creation of data rights/arrangements by contracts with third-parties (licensing). The principle of 'freedom of contract' applies

Treaty on the Functioning of the EU (TFEU)

- Treaty forming the detailed base of EU Law defining principles and objectives of the EU
- Article 4 states that the EU has shared competences with member states on several areas, i.e., the EU has regulating power over member states. These areas include the internal market, consumer protection and transport



Charter of Fundamental Rights of the EU (CFREU)

- Legally binding document that brings together the most important personal freedoms and rights for EU citizens
- Article 8 stipulates that everyone has the right to protection of his or her personal data and that this data must be processed fairly for specified purposes on the basis of consent

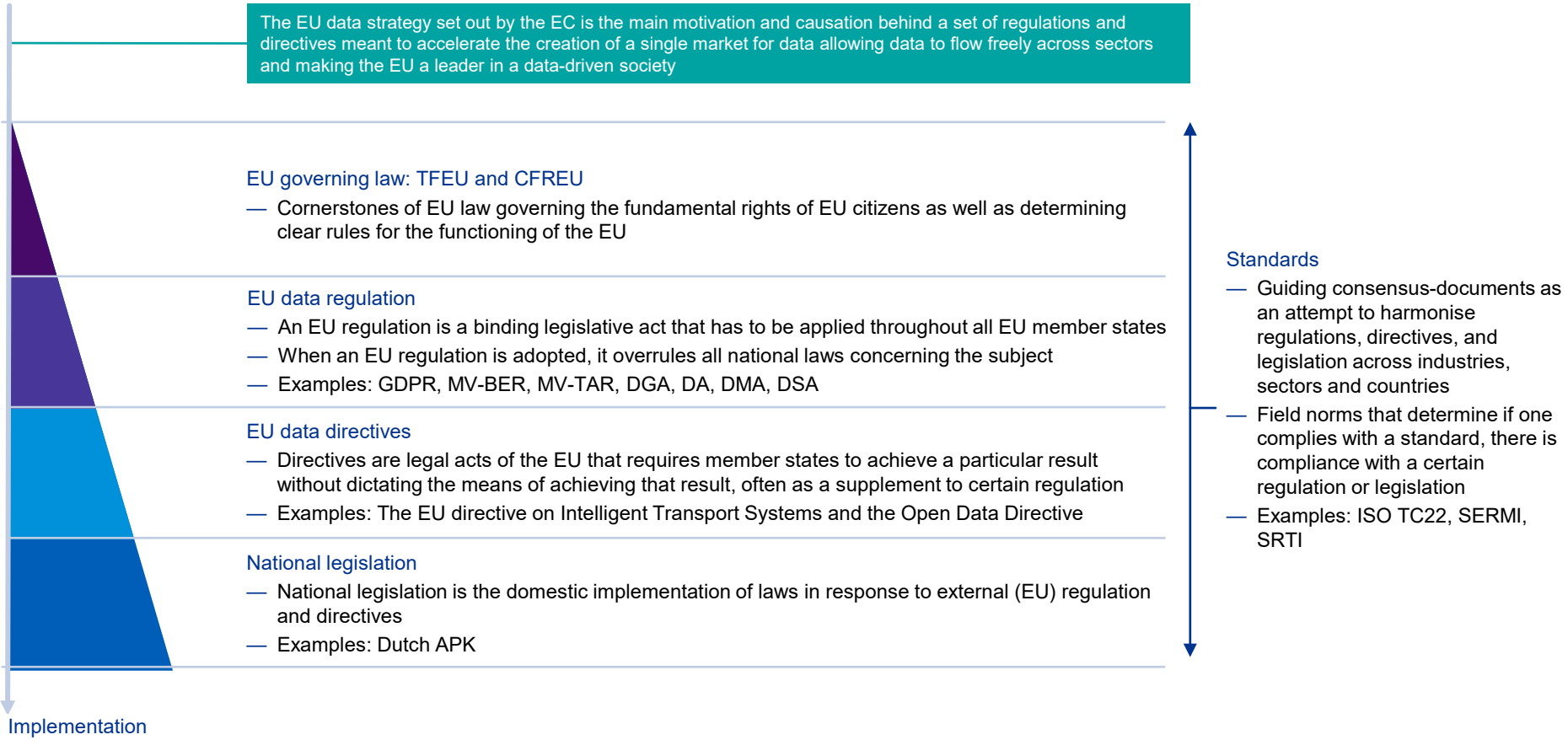
- IP law protects and enforces rights of creators and owners of works known as intellectual property, such as inventions, designs, but also possibly entire data sets when they qualify as databases under copyright law or the EU Database directive. There are several IP rights derived from IP law, e.g.: patents, trade secrets, copyright, and database rights (copyright protected or sui generis databases). A database is legally protected under database right when a significant investment is made in creation or maintenance of the database (not in the data themselves)
- IP rights provide the rights holder with a monopoly (an exclusive right), as an incentive to innovate, and to protect their invention, intellectual creation, brand and logo, design or accumulated data within a database
- IP rights allow the rights holder to IP exclusively use the protected asset in their products or services, or to directly monetize their IP (e.g. license to third-parties)

- Public law governs relationships between legal and natural persons on the one hand and the government on the other
- It is used to realize the goals and safeguards stemming from e.g. TFEU and CFREU
- Relevant legislation with this regard is for instance: the General Data Protection Regulation (GDPR)(CFREU), consumer protection law (TFEU) and competition law (TFEU)
- Public law will play a pivotal role if and when the way IP and private laws are 'used' or deployed by market players leads to undesirable market conditions or (potential) infringements of fundamental rights

Source: Bird&Bird, Norton Rose Fulbirght, Interview feedback, KPMG analysis.

The EU data strategy is supported by EU-wide regulation and implemented by legislation at a national level, and subsequently operationalised by standards

Overview of the European legislative framework and the implementation of the EU Data Strategy



Source: European Commission, Interview feedback, KPMG analysis.

There are over 30 regulations regarding data governance, however only 6 appear directly applicable to dynamic in-vehicle data

Overview of (upcoming) regulations and applicability on in-vehicle data

	Applicability on in-vehicle data	Regulation	Status	Description
Primary focus	●	GDPR	Active	Regulation on ensuring better control of EU citizens on personal data
	●	MV-TAR	Active	Type approval regulation also covering third-party access to RMI
	●	MV-BER	Active	Block-forming exemptions also coving third-party access to RMI
	◕	eCall	Active	Stipulating requirements on having an on-board emergency device
	◕	Data Governance Act	Upcoming	Foster the availability of data by increasing trust in data intermediaries and strengthening data sharing across the EU and between sectors
	●	Data Act	Upcoming	Key measure for making more data available for use in line with EU rules and values
	◑	Regulation on road safety universal traffic information	Active	Stipulates minimum requirements of sharing road safety related traffic information
	◑	ITS Directive	Active	Coordination of implementation of an EU-wide interoperable transport system
	◑	Open Data Directive	Active	Stipulates requirement for EU member states to share public sector data
	◑	ePrivacy Directive	Active	Protecting privacy and personal data in the electronic communication sector
	◑	Regulation on real-time traffic information services	Active	Ensuring accessibility, exchange, update of traffic data by road authorities
	◑	TFEU	Active	General treaty on the functioning of the EU
	◑	Digital Markets Act	Upcoming	To limit unhealthy digital market powers and to promote competition
	◑	Digital Services Act	Upcoming	To create more safety for online platform users
	◔	— Software Directive — InfoSoc — Fuel economy and CO2 emissions directive — Unitary Patent Protection Regulation	— Rijksoctrooiwet — Product Safety Directive — Unfair Terms in Consumer Contracts Directive — Product Liability Directive	— Reducing Pollution from Motor Vehicles — Consumer Rights Directive — Trade Secrets Directive — Databankenwet	— Wet bescherming bedrijfsgeheimen — TT BER — GBER — Protection of Databases Directive

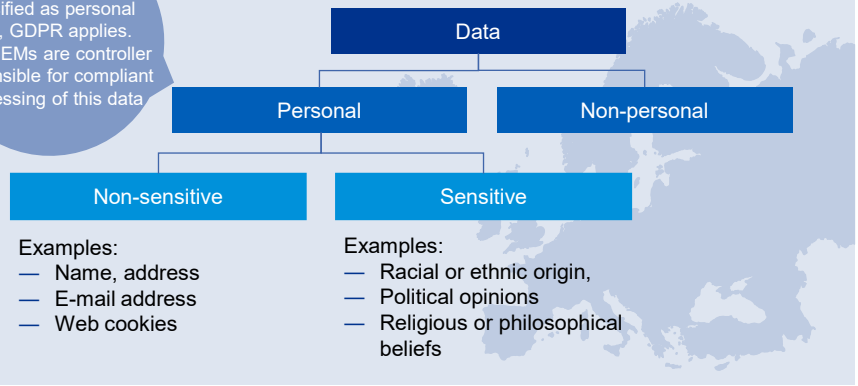
Key: ◔ Level of applicability, Within scope, Relevant however not directly applicable, Limited relevance and applicability

Source: KPMG analysis, Interview feedback.

The OEM as gatekeeper is responsible for ensuring that both non-sensitive and sensitive personal in-vehicle data is stored and processed compliant to GDPR

Data classification as determined by GDPR

When data is classified as personal data, GDPR applies. The OEMs are controller responsible for compliant processing of this data



Roles defined by GDPR concerning data

Data subject

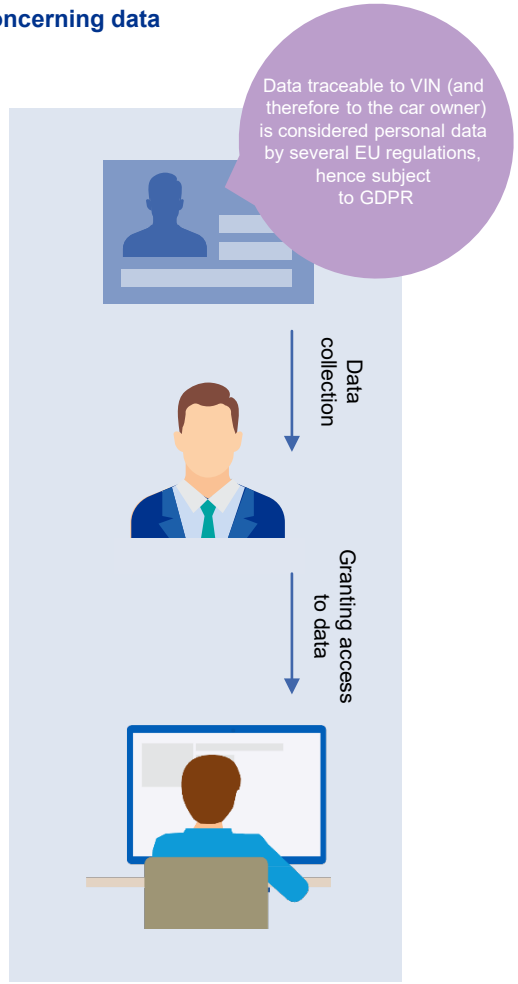
— The subject the stored data relates to
— Any natural person whose personal data is collected, retained or processed

Data controller

— After the subject's consent, the data controller becomes responsible for the data
— Determines the purposes of processing personal data

Data processor

— Requests the data and processes personal data on behalf of the data controller
— Has no decision over the purposes of processing
— Processing activities are governed by binding contracts with the controller ensuring confidentiality



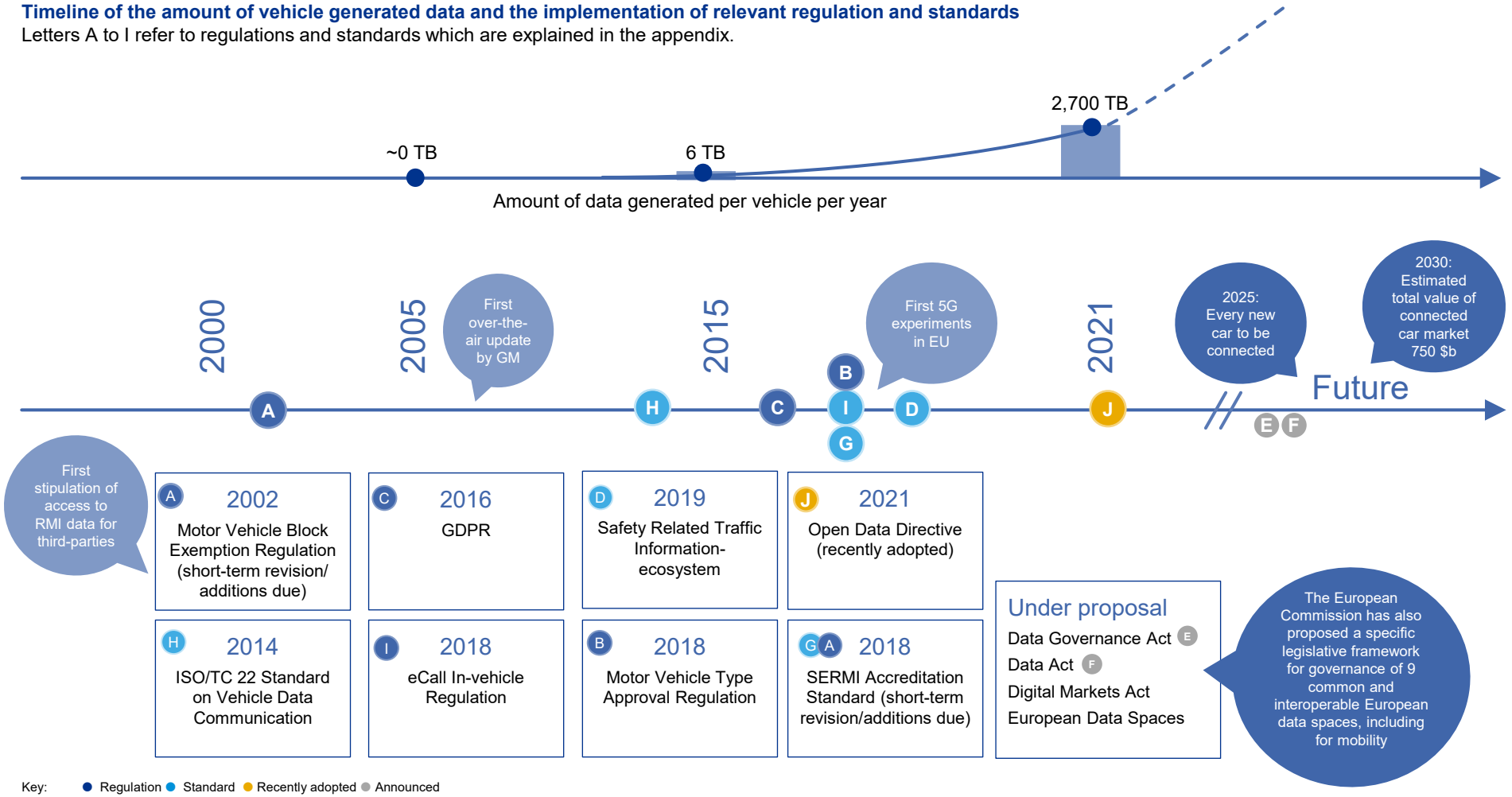
The six data protection principles of GDPR

1. Making sure that data collection is done lawful and transparent to data subjects
2. Only collect personal data for a specific purpose, clearly state that purpose and only collect data as long as necessary
3. Use the minimum set of data necessary for a specific purpose
4. All personal data must always be accurate
5. Limit storage to the period up until the data is no longer necessary
6. Using appropriate technical or organizational measures, loss, destruction or damage of data must be protected

Source: European Commission, Criteo, IT Governance, Interview feedback, KPMG analysis.

EU regulators have implemented various legislations over de last decade in line with increasing importance of in-vehicle data

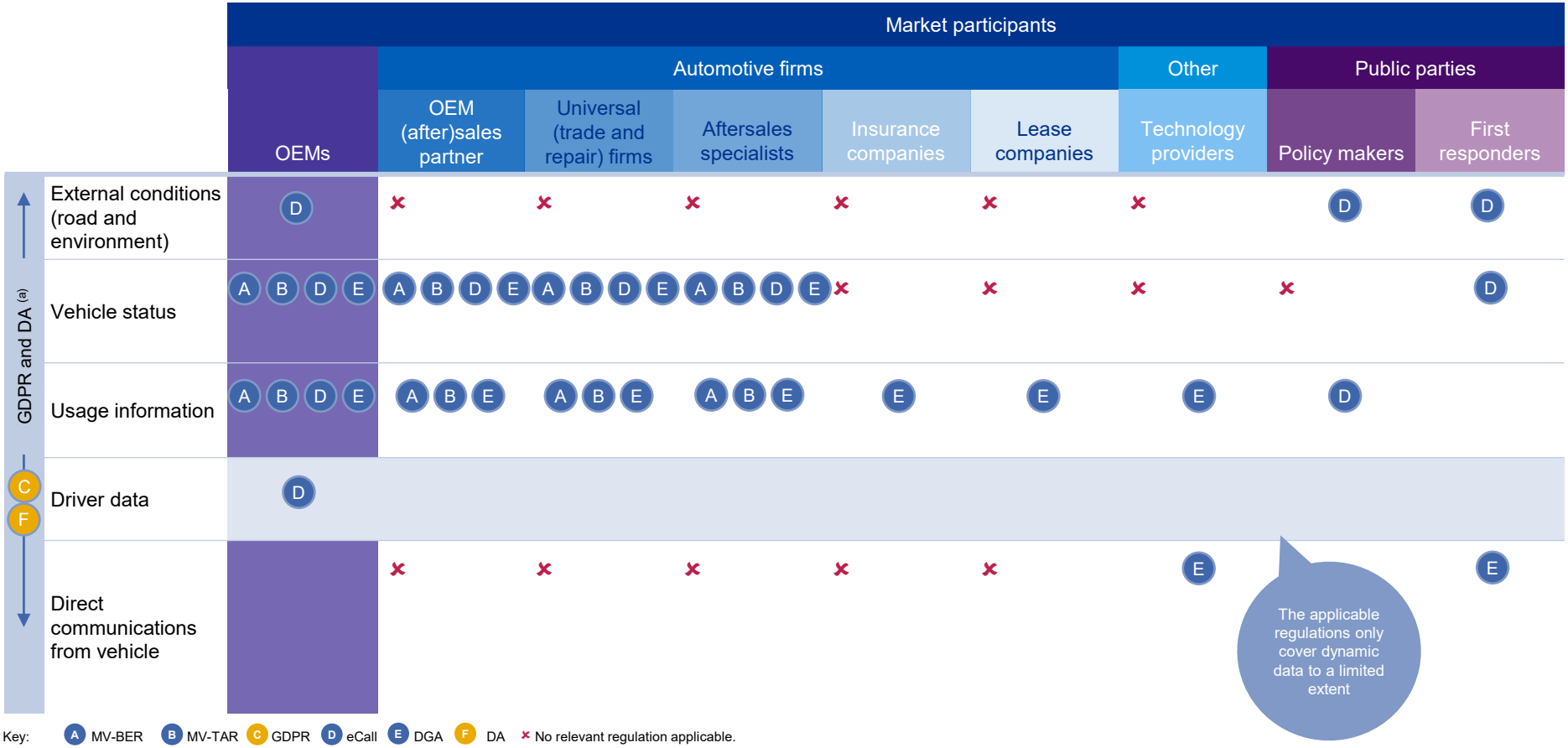
Timeline of the amount of vehicle generated data and the implementation of relevant regulation and standards
Letters A to I refer to regulations and standards which are explained in the appendix.



Key: Regulation Standard Recently adopted Announced
Source: Fortune Business Insights, Forbes, McKinsey, Interview feedback, KPMG analysis.

The different in-vehicle data sources are regulated under specific acts and standards; overarching regulation is missing

Overview of relevant regulations and standards applicable to each market player and data source



Key: A MV-BER B MV-TAR C GDPR D eCall E DGA F DA × No relevant regulation applicable.
Note: (a) GDPR and the DA potentially applies to all players and data sources.
Source: Interview feedback, KPMG analysis.

Especially dynamic in-vehicle data is only covered to a limited extent by current regulations; the rights and duties of market participants are ambiguous

Overview of data layers covered by respective regulations[a]

Regulations	Data layers		
	Static in-vehicle data	Dynamic in-vehicle data	
MV-BER	Repair and maintenance information through OBD port/platform		
MV-TAR	Repair and maintenance information through OBD port/platform		Very limited, only emission data is obliged
SERMI	The SERMI Accreditation Standard is aimed to help independent operators servicing and repairing vehicles in a secure manner even if this involves the security features of the vehicle		The access to in-vehicle generated dynamic data is currently not covered by SERMI and upcoming/planned rules are still unknown.
GDPR	(Sensitive and non-sensitive) personal data		In theory, dynamic data sources such as (real-time) usage data can be classified as personal data since all or parts of this data can be traced back to a human being. Complexities arise in determining what in-vehicle data can be classified as personal
eCall			Limited, only essential information for first responders is shared (e.g. vehicle status, amount of passengers, location) is not really dynamic.

Due to a lack of clear stipulations on the rights and duties of market participants regarding dynamic vehicle data they are currently (to large extent) unable to get access without approval and (commercial) B2B contracts with OEMs. Moreover, legal procedures so far have been limited due to long lead times for court decisions (can take 5+ years) and since the data technology and sources and the required access is rapidly changing (in flux).

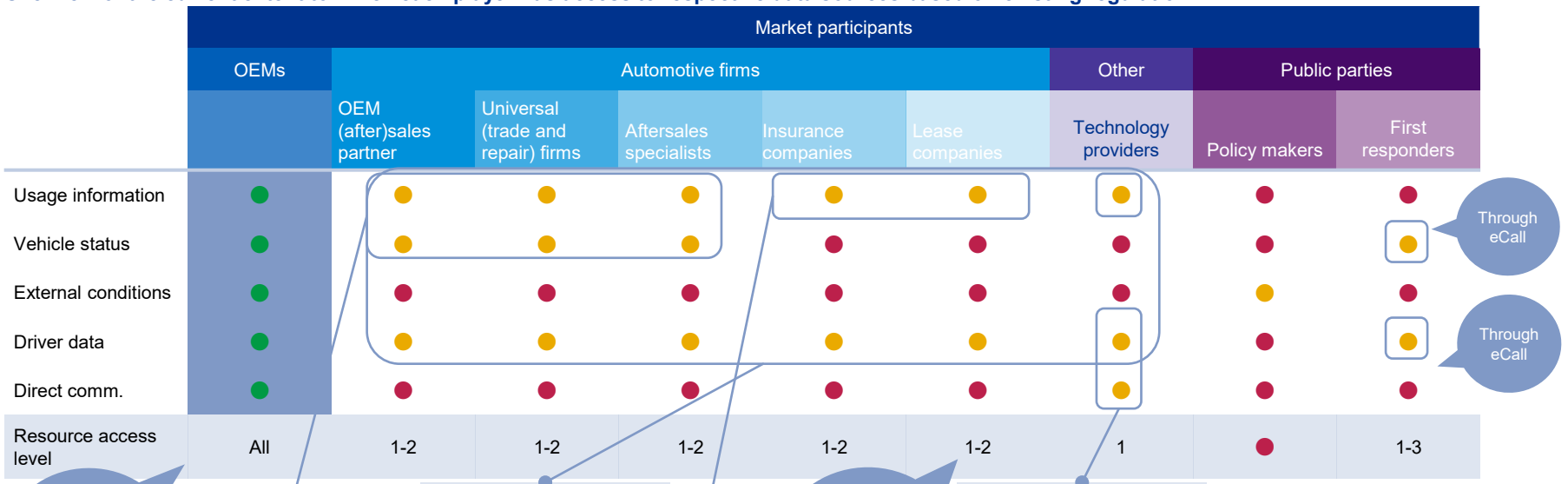
Note: (a) Refer to the appendix for analyses on specific regulations.

Source: Deloitte, Interview feedback, KPMG analysis.

B Rationale for new regulation

Market participants have limited open access to their relevant data sources and resources (functions), implying an uneven playing field

Overview of the current extent to which each player has access to respective data sources based on existing regulation



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Key: Full access Limited access No access.

Source: Interview feedback, KPMG analysis.

OEMs appear to have a competitive advantage towards third-parties since they are positioned as the gatekeeper of in-vehicle data and resources

In-vehicle access

OEM acts as gatekeeper

Current situation

~ Access via an application developed for the operating system of the OEM or compatible with third-party platforms such as Apple CarPlay or Android Auto

✗ Direct access to dynamic in-vehicle data without interference of the OEM

✗ Direct access to in-vehicle resources without interference of the OEM

The OEM is the only market participant having access to all in-vehicle data and in real-time due to the position of data gatekeeper (after GDPR consent by consumer)

Connected car (OEM)

Third-parties (such as application developers)

Third-party solution: data retrieved with third-party hard- and software

Telematics data is retrieved from vehicles CAN-bus network

The data is stored and processed in telematics service platform

End-users retrieve valuable insights into the state of the vehicle and/or fleet

Telematics data would allow all market participants to develop and provide (embedded) applications at a level playing field, however the available data that can be retrieved via third-party solutions is often limited.

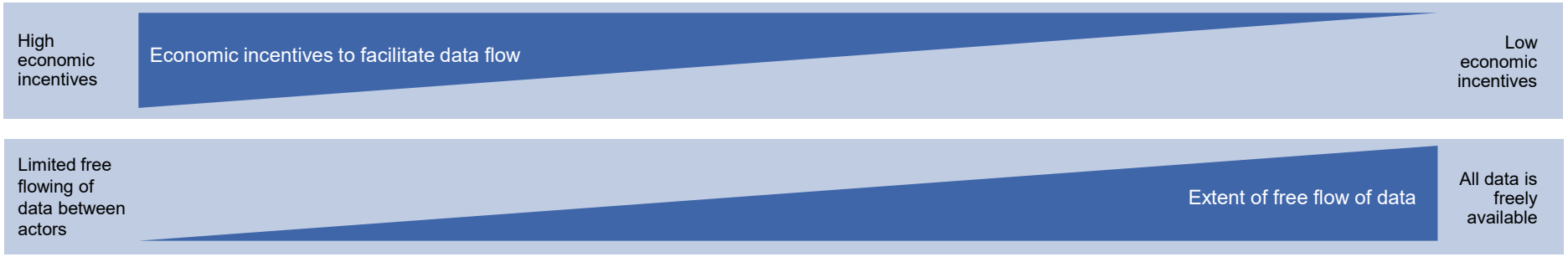
"Manufacturers are keen on processing in-vehicle data, they do not want to give away vehicle data such as data for car sharing. Also, manufacturers increasingly push maintenance messages and guide customers to preferred dealers or workshop for maintenance. Manufacturers have a clear advantage here" – Data expert OEM

Selected interview feedback

Source: KPMG analysis, Interview feedback.

Expected new regulation on in-vehicle data sharing aims to balance economic incentives and extent of free flow of data to ensure sustainable market dynamics

The conceptual overview of dynamics between free flow of data and economic incentives



Limited free flow of data – high economic incentives

- Here, data is unable to flow freely between actors
- This is beneficial for OEMs, since they remain in control of their vehicle generated data which is a competitive advantage, but disadvantageous for third-parties since they have restricted access
- Economic incentives are high since vehicle data is only accessible by OEMs, hence they can easily monetize this data
- This frugal approach to data sharing limits innovation and the development of industry wide standards

The goal of the EU is to create a market where data flows freely while competition is promoted, i.e., healthy market dynamics

Full free flow of data – low economic incentives

- In the case where all data is free flowing, all actors have access to vehicle data which fosters innovations and development of applications based on this data by third-parties
- However, in this case, a pitfall is that OEMs as gatekeepers of vehicle data have lower economic incentives since monetisation possibilities are consequently limited
- If monetisation of data is prevented by free flow of data, then the data might simply not be generated

Source: Interview feedback, KPMG analysis.

The EU will introduce the Data Act and industry specific legislation for dynamic data to ensure more data availability to third-parties based on consumer

		Advantages	Disadvantages
CURRENT	**OEM is gatekeeper of dynamic data** — The OEM determines who gets access to the dynamic data and the possibility to develop applications for the driver (in the car) based on it. — This means that the OEM can determine (to a large extent) who can develop which services and also where the consumer can be sent for maintenance and repair. — This is a major risk for automotive retailers, because it will make them (even more) financially dependent on the OEMs.	— Competitive advantage for branded car companies (OEM (after)sales partners), but no guarantee that this competitive advantage will remain in the long term. — Liability issue organized centrally.	— Strong dependence on OEM, including accreditation to gain access. — Data sharing solution differs by OEM. — In time, possibly reduced need for OEM to share data (due to reduced dependence on branded car companies). — Limited access to vehicle functions. — Potentially high cost of access.
	Shift		
UPCOMING LEGISLATION	**Consumer is gatekeeper of dynamic data** — The consumer decides who gets access to their data. In addition, the consumer is free to download and use applications on the car other than those of the car manufacturer. — In this scenario, there is room for car companies to develop their own models or applications whereby they can steer on attracting and/or retaining customers for maintenance services on the basis of the data. — In addition, in this scenario, there is room for car companies to develop completely new services based on dynamic in-vehicle data.	— Consumer decides who gets access to his/her data. — OEM can still make money selling data in this scenario and therefore still has an incentive to generate a lot of data, but the OEM's position is less strong than in the OEM as gatekeeper scenario. — Reduced dependency on OEMs. — Access to (after)sales of all brands. — Possible standardization of data exchange and access.	— Less competitive advantage for OEM (after)sales partners, although permission to use data could be obtained from the consumer at the time of delivery of the vehicle (by first time of use). — Clear set-up of governance (and independent party) necessary to ensure consumer rights and need are served. This includes the role of a supervisory authority that is mandated to account OEMs for non-compliance.

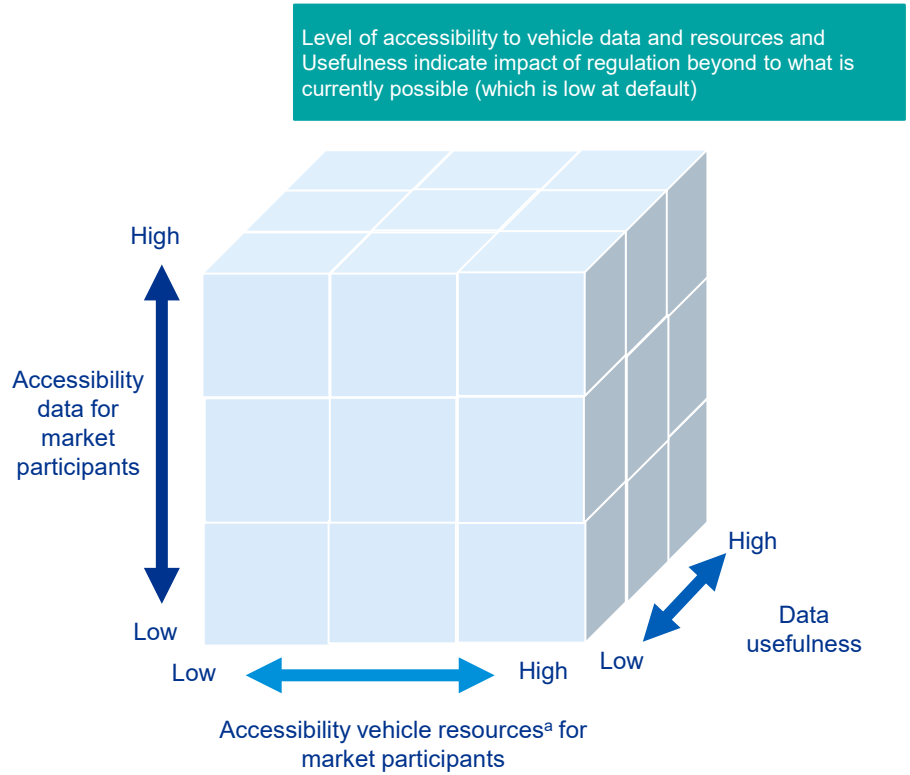
Source: KPMG analysis.

C

Regulatory scenarios

Scenarios with respect to future regulation are based on different levels of accessibility to in-vehicle data and vehicle resources and usefulness

Overview of scenario framework for regulation concerning (dynamic) in-vehicle data



Explanation of variables

Variable	Description	Scoring
Data usefulness	Concerns the richness and level of detail of data and the respective format in which the OEMs are (potentially) obliged to share in-vehicle data with third-parties industry wide	Little usefulness indicates high degree of differentiation in format of data of different OEMs and low level of data detail and richness (and vice versa)
Accessibility data for market participants	Indicates to which extent various market participants are able to access the (dynamic) data freely (passive)	Higher accessibility of data allows more (types of) market participants to have (direct) access to more data sources (and vice versa)
Accessibility vehicle resources for market participants	Indicates to which extent market participants are able to access vehicle resources for communication with customers or performing actions via on-board applications (active) without the OEM as gatekeeper	Higher accessibility of vehicle resources provides more (types of) market participants deeper resource access to the car (and vice versa) without approval or contracts of OEMs (beyond independent cyber security conditions)

Note: (a) Refers to In-Vehicle resources which is all technological functionality that enables interaction with vehicles. This includes, for example, HMI displays, (de-)activation of in-vehicle functions and memory/processing power that allow read and write access to data.

Source: KPMG analysis.

We have developed 4 potential scenarios driven by their degree of regulation

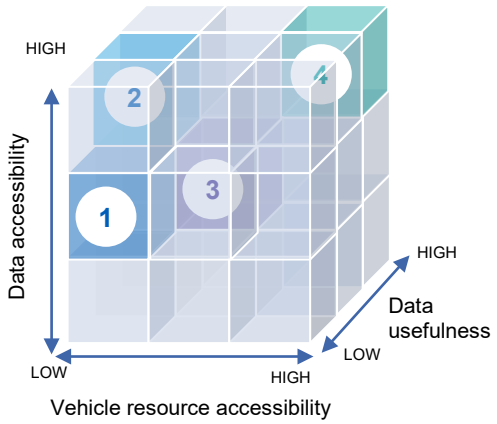
Overview of scenarios

Scenarios	Description
1	In **scenario 1 (OEM as gatekeeper)** with limited additional regulation the following is applicable: — The accessibility of (dynamic) data to market participants is moderate, indicating that in principal parties are allowed access (based on consumer consent). However, with the notion that OEMs make this data available through neutral servers (all data will be pre-processed by OEMs first before located on server) — The accessibility of vehicle resources for market participants is low. With that also the ability to reach the driver (consumer) in-vehicle is limited without compliance to criteria set by OEM (besides apps via smartphone which is also (partly) controlled by OEM). — The level of usefulness is low: OEMs have a high degree of freedom in choosing which data (points) and which format the data is made available as well as with a minimum level of detail
2	In **scenario 2 (Full read-only)** with modest regulation the (dynamic) data is directly made accessible to all (relevant) market participants. This also applies for data (potentially) not used by OEMs themselves on a detailed level. Access to vehicle resources is in line with scenario 1. In-vehicle data with a (substantial) relevance has to provided in a standardised format across the industry
3	In **scenario 3 (Middle-of-the-road)** with modest regulation the in-vehicle data is made accessible to market participants. Data content is likely to be limited. Access to vehicle resources is expanded beyond what is currently possible such that relevant third-parties are able to perform remote diagnostics amongst others (without consent of the OEM beyond cyber security). In-vehicle data with a (substantial) relevance has to be provided in a standardised format across the industry
4	In **scenario 4 (Complete access)** with far-reaching legislative measures all market participants have full access to all in-vehicle data and have a deep level of resource access while at the same time OEMs are obliged to provide a large variety of data in a highly standardised matter. Essentially, all in-vehicle data available and resource access for OEMs is so as well for other market participants

Degree of level playing field

HIGH

Relative positioning of scenarios



In principal, customers always have to give their consent before OEMs are allowed to share personal data with third-parties (applies to all scenarios). However, there is still much uncertainty how this will be regulated given the constant flow of data (even long after initial purchase) and the concerns surrounding data sharing of consumers which are unaware that they have given their consent. In each scenario it is assumed that consumers are able to alter access to third-parties relatively easy and on a flexible basis

Refer to next pages for the legal and market implications of the different scenarios

Source: KPMG analysis.

The scenarios are subject to legal implications which are supported by underlying argumentation and linked legal frameworks

Overview of scenarios and implications

Degree of level playing field: HIGH

Scenarios	Main legal implications for operationalization	Legal frameworks to support this scenario outcome	Main arguments to support this scenario outcome
1	— No adjustments to current regulatory framework — Extended vehicle concept proposed and operated by OEMs is likely to remain in effect — Potential supporting measures to ensure that the neutral server aspect of the technical solution is implemented	— GDPR (personal data) — Databank legislation (IP) — Security (MV-TAR)	— Regulators are usually reluctant to intervene with international private companies (e.g. large Tech companies), however with the introduction of the Digital Services Act (DSA) and Digital Markets Act (DMA), the EC aims to create a safer digital space where the fundamental rights of users are protected and to establish a level playing field for businesses. — All in-vehicle data is considered personal (and private) data and as such sharing of this information should be limited — All in-vehicle data is generated by the car and as such the property of the OEM — OEMs resonate that further access to vehicle resources jeopardises customer safety and security (while OEMs remain liable)
2	— Legal adjustments to outline clarification of which data is made available (catalogue of data) to the market and the timescale in which it is made available; equal quality of data, a harmonised minimum data set, permission to access — Provision of specific safety performance guidelines for in-vehicle resources access	— Competition law (beyond current MV-BER and **MV-TAR)** — **Data Act** — **Data Governance Act**	— There is an increasing trend visible of EU regulators ensuring fundamental rights of users are protected and to establish a level playing field for businesses. A level playing field is considered key for other (automotive) players, mainly with respect to services and products offered in the aftersales channel (branded and non-brand dealers) — Reducing accessibility of data limits the possibility for development of services and products by other parties. Hence, true consumer choice and lower prices is hampered which is undesired. — and lower prices due to competition. — Societal benefits at large are limited by blocking access for (relevant) parties in development of value-adding use cases
3	— Implications from scenario 2, including (remote) access to the OBD port while driving to retrieve relevant vehicle information		
4	— Legislation to achieve the implementation of the on-board application platform — Support the provision of a documented API and a SDK for software developers — Implement automotive cyber security standards		

Source: KPMG analysis.

Commercial contracting for third-parties is expected to be required to obtain access in scenario 1 and 3, while full access is granted under scenario 2 and 4

Overview of scenarios and use-cases

Scenarios	Useful-ness of in-vehicle data	Remote access to vehicle resources			Level of in-vehicle (dynamic) data access			Third-party application HMI access[a]	Applicable technical solution[a]
		Who	What	Score	Who	What	Score		
1	Low	OEM as gatekeeper	Level 1-3 (read)	Low	OEM as gatekeeper	— Vehicle status — External conditions — Usage information	Medium	Via mobile phone (indirectly controlled by OEM) or in-vehicle based on OEM standards	Data sharing platform
2	Low	All	Level 1-3 (read)	Medium	All	— All of the above, including driver data	High	Via mobile phone (indirectly controlled by OEM) or in-vehicle based on OEM standards	Data sharing platform
3	Moderate	OEM as gatekeeper	Level 1-4 (read + limited remote diagnostics)	Medium	OEM as gatekeeper	— Vehicle status — External conditions — Usage information	Medium	Depends on whether applications are integrated as layer on the interface or run outside the vehicle	In-vehicle interface (extended OBD)
4	High	All	Level 1-6 (up to and including write access)	High	All	— All data sources	High	Directly without OEM consent (subject to independent cyber security standards)	On-board application platform

Degree of regulatory changes

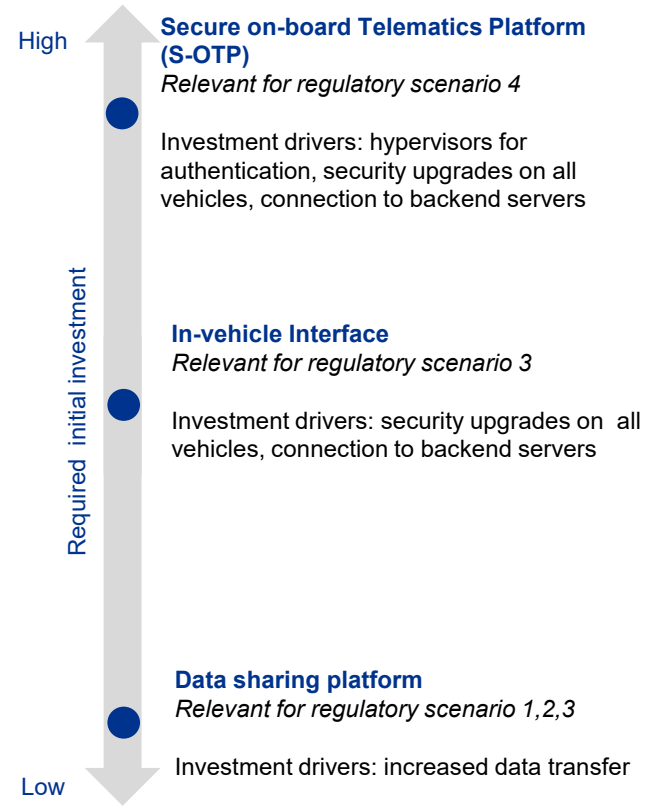
HIGH

In the case OEMs act as gatekeeper, data and resource accessibility for market participants is considered limited without commercial agreements between third-parties and the OEMs. When all participants have full access this is based on the principles of fair, reasonable and non-discriminatory access.

Note: (a) Closed technical design of telematics prevents equal access level.
Source: KPMG analysis.

Roll-out of standardised technical architectures is associated with high costs for OEMs, however market participants appear willing to (partly) cover the expenses

Technical architectures initial investments



Reasons for high standardisation costs [a]

To exploit the technical architectures of S-OTP and in-vehicle interfaces a high level of (hardware) integration and standardisation by the OEM is necessary, which are deemed costly. According to interview feedback, market participants are willing to pay for data access (to cover cost price) upon open access.

Costs associated with data standardisation for the OEM ↗

- Different vehicle Types and models ↗
- Different software systems per OEM ↗
- Regular system updates and changes ↗

Key: ↗ Increasing costs
Note: (a) non exhaustive
Source: Interview feedback, TRL, KPMG analysis.

Impact of regulatory scenarios

Increased data usefulness and accessibility lowers negative impact gradually while higher vehicle resource access considerably decreases adversity for other participants

Overview of impact to monetise in-vehicle data for market participants

	Market participants	Degree of negative impact on current and future business models by scenarios: 1	2	3	4	Main observations
A	OEMs	Increasing by information availability				— Open access decreases current competitive advantage OEMs which have already introduced many of their use-cases as the result of their gatekeeper position.
B	OEM (after) sales partner		Increasing by information availability			— Impact of scenarios on current and future business models is deemed comparable for franchise dealers and agents. — Although closed access appears attractive for some dealers in the short-term, in the long-term there are major risks associated with a limited access.
C	Universal (trade and repair) firms					— Negative impact of restricted access is highest universal firms in scenario 1 and 2 due to inability to develop remote diagnostics and maintenance.
D	Aftersales specialists					— Limited feasibility of predictive remote diagnostics and maintenance solutions as well as parts optimisation strongly adversely impacts aftersales specialists.
E	Insurance companies					— Since most OEMs are actively involved in the car insurance market, scenario 1 and 2 would result in a competitive disadvantage for insurance companies.
F	Lease companies					— Lease companies benefit from increased open access, however are already able to implement most of their use cases.
G	Technology providers – Big tech					— Technology providers benefit from open access to in-vehicle data; Big Tech players already have partly access to in-vehicle data based on commercial contracts. — The ability to gain full access to in-vehicle data by Big Tech appears to pose the largest competitive threat for OEMs.
G	Technology providers – Other tech					
H	Policy makers					— Policy makers and first responders are interested in non-commercial data on aggregate level, which OEMs are willing to share. Therefore, policy makers and first responders are only to low extent impacted by regulatory scenarios. — OEMs are likely more reluctant on sharing security related information, which may be forced in the case of scenario 4, which is to the benefit of policy makers and first responders.
H	First responders					

Key: Limited, : Low degree, : Medium degree, : High degree, : Full degree,

Source: KPMG analysis, Interview feedback.

Open access decreases OEMs' current competitive advantage which have already introduced many of their use-cases as the result of their gatekeeper position

Overview of how in-vehicle data is leveraged for use-cases and examples(a)

Pay as you drive insurance

Insurance based on driving style in-vehicle data, frequency etc. through currently existing financial services of OEMs

Sell vehicle data

Selling in-vehicle data for tailored advertisements through collaborations with Big Tech such as Android Auto and Apple CarPlay

Mobility services

Using driver data and usage information for modality vehicle switching or ICE/EV switching, e.g., Kia Mobility Hubs

Ride-sharing services such as YOUR NOW (Mercedes-Benz/BMW)

Subscriptions

Using driver data and usage information to provide subscription services such as Volvo Care

Over-the-air software add-ons

Using driver data to push over-the-air upgrades such as Tesla Autopilot and BMW Connected Drive

Customer value optimisation

Using traffic data for route optimisation, e.g., Mercedes-Benz Live Traffic

Using usage information for route recognition, e.g., Volkswagen Regular Routes

OEMs have a dual role as platform provider (and gatekeeper of in-vehicle data) and as service provider

— Thanks to this position, OEMs do not have problems with obtaining consent from consumer to collect their in-vehicle data since otherwise consumer are often unable to fully access their vehicles.

— Conversely, third-parties are restricted in rolling out their relevant use-cases due to not having this advantage.

A higher degree of open access positively impacts third-parties (and vice versa for OEMs)

— OEMs benefit directly when other parties are restricted from in-vehicle data access. Hence, if regulation induces more open data, OEMs lose their gatekeeping position.

— In contrast, increased open access provides third-parties more options to develop and implement desired use-cases.

Note: (a) Refer to the appendix for a detailed analyses of the OEM specific use-cases

Source: Mercedes-Benz, Volkswagen, BMW, Volvo, Kia, Tesla, Android, Apple, Interview feedback, KPMG analysis.

Future positioning of dealers is expected to be non-homogenous which leads to different levels of impact on their current and future business models

Overview of drivers causing dealers in future positioning

OEM distribution models

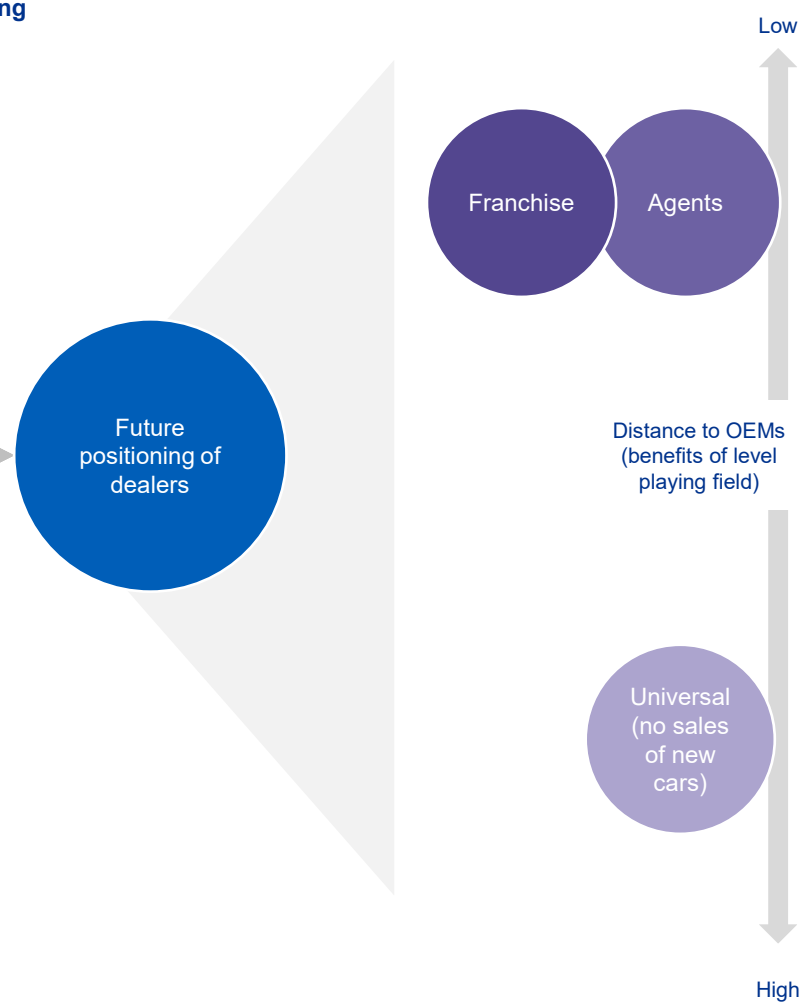
- Depending on new distribution models of OEMs dealers could face new contracting towards agency models or even lose their (after)sales contract
- As such, future positioning of dealers is to a large extent depend on their specific OEM

Dealership size

- Dependency on a single OEM is smaller for larger (professional) dealerships due to multi-brand offering, higher volumes (bargaining power) and the ability to develop additional mobility services
- While smaller (single brand) dealerships are more dependent

Other drivers

- For example, age of dealers and succession plays an important role in the desire to reshape the business (if required due to new OEM distribution models)



- Automotive firms closely linked to OEMs could benefit from limited in-vehicle data access (if access is freely obtained through OEM) since other market participants would not or to a lesser extent be able to provide services (repair and maintenance as well as new mobility serves).
- For market participants without direct access to OEMs level playing field would be preferable.
- Hence, the different positions of current dealers makes that their view on open in-vehicle data sources and resources can contradict.

Interview feedback suggest that not all franchise dealers and agents can rely on in-vehicle data access via their OEMs.

Source: Interview feedback, KPMG analysis.

Impact of scenarios on current and future business models is deemed comparable for franchise dealers and agents

Overview of drivers causing dealers in future positioning

	Description of applicable use-cases (non-exhaustive)
Sale of new cars	— **Customer value optimisation:** Customise future new car offering based on in-vehicle data.
Aftersales market	— **Residual value optimisation:** determination of the residual value of a used car, not by the kilometres or time used, but on the actual car status. — **Predictive maintenance:** Predict future faults or maintenance based on dynamic in-vehicle data. — **Remote diagnostics:** diagnose issues or problems of a vehicle from a distance. — **Remote maintenance:** Solve issues or problems of a vehicle from a distance. — **Tyres as a service:** instead of selling tyres as a single product, sell the services and outcomes a tyre can provide. Furthermore, notify the customer when tyres need to be replaced based on the current status. — **Workload optimisation:** as potential vehicle issues are discovered sooner maintenance can be planned on convenient times so dealer capacity is optimally used. — **Inventory optimisation:** being able to maintain the right amount of inventory to meet future demand based on expected maintenance.

Only limited number of uses-cases are related to sales of new cars (based on in-vehicle data)

Both franchise dealers and agents dealers appear closely positioned to OEMs, but have a different business model with respect to new car sales

— Franchise dealers purchase their own inventory from a specific OEM whereas an agent sells products on behalf of the OEM and earns a commission per car sold.

— Universal firms have no new car sales and as such are positioned further away from OEMs, being predominantly focused on the used car and aftersales market.

However, use-cases are primarily related to aftersales, for which both agents and franchisees have similar point of interests

— Potential new use-cases based on in-vehicle data are mainly related to the aftersales market for agents and franchisees.

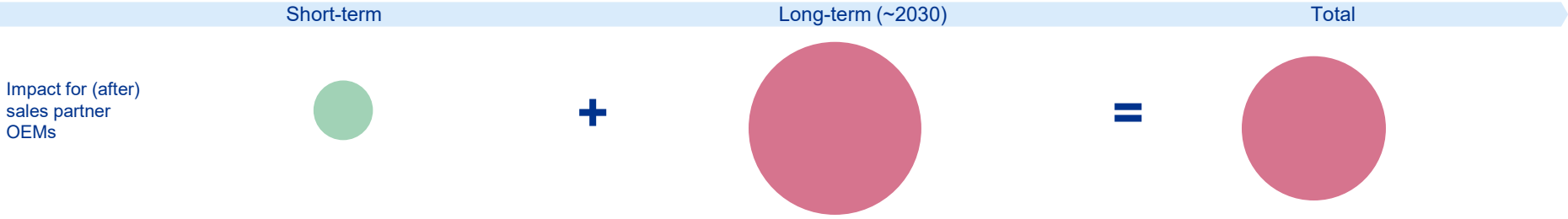
— Therefore, we observe that the impact of new use cases based on in-vehicle data for agents and franchisees is similar as they are both closely positioned to the OEM.

— Refer to the next page for the detailed assessment of the impact of the scenarios.

Source: KPMG analysis, Interview feedback.

In total, it appears that more open access (scenario 2-4) is also more beneficial for dealers

Impact of closed access for OEM (after) sales partners, in short vs long time



Observations

Short-term

- Closed access could provide OEM (after) sales partners with a competitive advantage as other market players will not be granted data access by the OEMs.
- However, this advantage differs per OEM (after)sales partner and depends partially on the core business of this partner and partially on the data access to other relevant data sources the partner is able to obtain.
- Besides, the number of completely new use-cases for OEM (after)sales partners seems relatively low, hence the competitive advantage towards other market participants is limited.
- Also, it is expected that OEMs will provide their local (after)sales partners with other advantages such as first (website) reference for used car sales or maintenance.
- The level of access provided will also differ strongly per OEM.

Long-term (~2030)

- In the long-term the importance of online car sales and data-driven services is expected to increase. This will negatively impact relevance of a physical dealer location and therefore, lower the necessity to share data from the OEM's perspective.
- Tendering of service packages by OEMs or framework contracts that consist of outsourcing of repair and maintenance for mobility services or warranties towards other parties (e.g. internationally operating fast-fitters) could strongly impact the position of the OEM (after) sales partner, especially if they are only allowed data access through OEMs.
- Concluding, closed access leaves OEMs (fully) in control, while their new business models and strategic initiatives hamper the current position of the (after)sales partners, making them less able to (independently) fend off these threats.

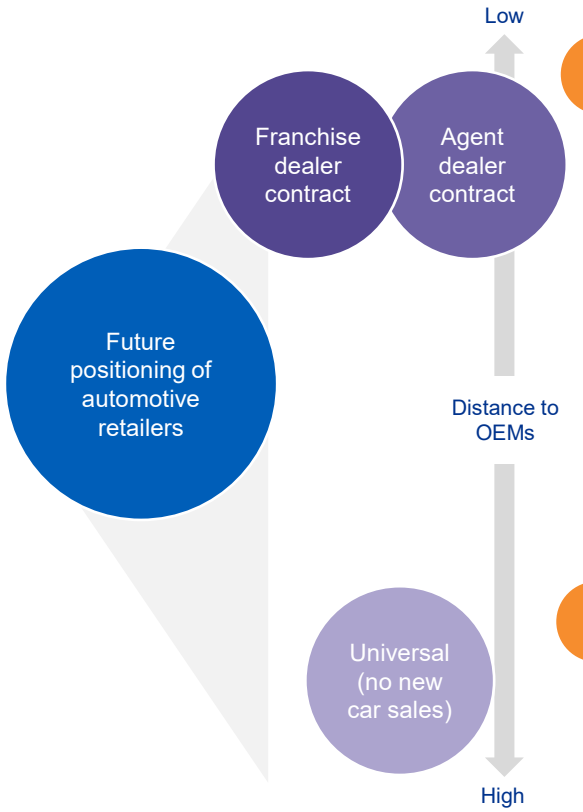
Total

- Although closed access appears attractive in the short-term for partners that are given full access by the OEM, in the long term there are major risks associated with closed access.
- Since OEMs are (mostly) publicly listed companies it is expected that their primary focus will be on their own margins, despite potential negative impacts on other market participants or own (after)sales partners associated with this goal.
- Benefits in the short-term expected to remain to a large extent even when opting for open access due to the long processing and implementation time associated with the expected legislation (for open access). While at the same time risks in the long-term are better addressed.
- Overall, OEM (after)sales partners would therefore benefit more from open access.

Key: Size is amount of impact, Positive impact, Negative impact,

Source: KPMG analysis, Interview feedback.

The 'dealer' is not a definition of a homogeneous group of companies: feasibility of use cases will therefore differ from one to the other



A

Automotive retailers in possession of a franchise or agent contract with the OEM, may be given access by the OEM to dynamic in-vehicle data. This could give these companies a competitive advantage over universal car companies to commercialize adjacent applications in the near term.

B

If automotive retailers with a franchise or agent contract with the OEM may not be given access through the OEM, the feasibility of dynamic in-vehicle data will be similar to universal car companies.

B

Franchise dealers and agents given access to dynamic in-vehicle data have a competitive advantage over other automotive retailers without access

Overview of feasibility primary applications for automotive businesses

A Main use cases [a]	Relevance	Position in the value chain	Feasibility of applications for market participants by scenario 1	2	3	4
Predictive maintenance	●	Repair and maintenance				
Remote Diagnosis	●	Repair and maintenance				
Optimization of customer value	●	Various				
Optimization of residual value	●	Sale Occasion				
Damage repair	◑	Repair and maintenance				
Remote maintenance	◑	Repair and maintenance				
Optimization of inventory and workload	◑	Repair and maintenance				
Degree of negative impact on current and future business models of franchise dealers and agents			○	◔	◕	●

The franchise dealers and agents, which are closely positioned to OEMs (and therefore granted access), would profit from limited ability of universal firms to monetise adjacent use-cases

In the future, not every franchise dealer or agent can rely on in-vehicle data and resource access via their OEM. Negotiating with the OEM is especially difficult for smaller dealerships whereas large dealers will have the market power to leverage access to data and resources. This will impact ability to monetise in-vehicle data. In case of no direct access via the OEM, feasibility is in line with universal car trade and repair companies.

Legend Low Medium High

○:Limited, ◔: Low, ◑: Medium, ◕: High, ●: Full,

✓Access possible/required, ~ Medium access possible/required, ✗ No access possible/required

Note: (a) Applications are non-limited.

Source: KPMG analysis, Interview feedback.

Not every franchise dealer/agent will have access via their OEM, in that case feasibility of use cases is low and in line with other automotive retailers

Overview of feasibility primary applications for automotive businesses

B Main use cases [a]	Relevance	Position in the value chain	Feasibility of applications for market participants by scenario				Substitutes	
			1	2	3	4	Access via smartphone	Third-party hard- and software
Predictive maintenance	●	Repair and maintenance					✗	~
Remote Diagnosis	●	Repair and maintenance					✗	~
Optimization of customer value	●	Various		Increasing due to availability →			✗	✗
Optimization of residual value	●	Sale Occasion		Increasing due to availability →			✗	✗
Mobility Services	◕	MaaS					~	~
Damage repair	◑	Repair and maintenance					✗	✗
Remote maintenance	◑	Repair and maintenance					✗	✗
Optimization of inventory and workload	◑	Repair and maintenance					✗	✗
Degree of negative impact on current and future business on automotive retailers			●	◕	◔	○		

Legend Low Medium High

○:Limited, ◔: Low, ◑: Medium, ◕: High, ●: Full,

✓Access possible/required, ~ Medium access possible/required, ✗ No access possible/required

Note: (a) Applications are non-limited.

Source: KPMG analysis, Interview feedback.

C

Negative impact of restricted access is highest for universal firms in scenario 1 and 2 due to inability to develop remote diagnostics and maintenance

Overview of feasibility primary use-cases for universal firms

Main use-cases[a]	Rele-vance	Value pocket	Feasibility of use-case by scenario				Substitutes	
			1	2	3	4	Access via smartphone	Third-party hard- and software
Predictive maintenance	●	Repair and maintenance					✗	~
Remote diagnostics	●	Repair and maintenance					✗	~
Customer value optimisation	●	Multiple		Increasing by information availability			✗	✗
Residual value optimisation	●	Used car sales		Increasing by information availability			✗	✗
Mobility services	◕	MaaS	Actuator activation through third-party hard- and software			On-board application	~	~
Tyres as a services	◑	MaaS		I			✗	~
Remote maintenance	◑	Repair and maintenance				Only limited general activities	✗	✗
Accident reconstruction	◑	Repair and maintenance					✗	✗
Inventory and workload optimisation	◑	Repair and maintenance		II			✗	~
Degree of negative impact on current and future business models for universal firms			●	◕	◔	○		

Key: Low, Medium, High, ○: Limited, ◔: Low degree, ◑: Medium degree, ◕: High degree, ●: Full degree,
✓ Access possible/needed, ~ Medium access possible/needed, ✗ No access possible/needed,

Note: (a) Use-cases are non exhaustive.

Source: KPMG analysis, Interview feedback.

Limited feasibility of predictive remote diagnostics and maintenance solutions as well as parts optimisation strongly adversely impacts aftersales specialists

Overview of feasibility primary use-cases for aftersales specialists

Main use-cases[a]	Relevance	Value pocket	Feasibility of use-case by scenario				Substitutes	
			1	2	3	4	Access via smartphone	Third-party hard- and software
Predictive maintenance	●	Repair and maintenance					✗	~
Remote diagnostics	●	Repair and maintenance					✗	~
Optimise parts quality and portfolio	●	Parts					✗	✗
Remote maintenance	◕	Repair and maintenance				Only limited general activities	✗	✗
Tyres as a services	◕	MaaS					✗	~
Trouble code monitoring	◕	Repair and maintenance					✗	~
Degree of negative impact on current and future business models for aftersales specialists			●	◕	◔	○		

Key: Low, Medium, High, ○: Limited, ◔: Low degree, ◑: Medium degree, ◕: High degree, ●: Full degree,
✓Access possible/needed, ~Medium access possible/needed, ✗ No access possible/needed,

Note: (a) Use-cases are non exhaustive.

Source: KPMG analysis, Interview feedback.

E

Since most OEMs are actively involved in the car insurance market, scenario 1 and 2 would maintain in a competitive disadvantage for insurance companies

Overview of feasibility primary use-cases for insurance companies

Main use-cases[a]	Rele-vance	Value pocket	Feasibility of use-case by scenario 1	2	3	4	Substitutes: Access via smartphone	Substitutes: Third-party hard- and software
Pay as you drive insurance	●	Car insurance	–	Increasing by information availability →			✗	✓
First notification of loss and claim	◕	Car insurance					✗	✗
Accident reconstruction	◕	Car insurance					✗	✗
Driving style analysis and feedback	◑	Car insurance	–	Increasing by information availability →			✗	✓
Degree of negative impact on current and future business models for insurance companies			●	◕	◔	○		

Since the OEM offers similar services as car insurance companies, limited access to in-vehicle data and resources and low standardisation levels could significantly impact their business models. However, interview feedback suggest that insurance prices are already relatively low in some countries so OEMs and insurance companies have little room for price adjustments there. While in the majority of the countries there is still sufficient potential to optimise insurance prices based on driving habits

Key: Low, Medium, High, ○: Limited, ◔: Low degree, ◑: Medium degree, ◕: High degree, ●: Full degree,
✓ Access possible/needed, ~ Medium access possible/needed, ✗ No access possible/needed,

Note: (a) Use-cases are non exhaustive.

Source: KPMG analysis, Interview feedback.

Lease companies benefit from increased open access, however are already able to implement most of their use cases mainly with third-party hard- and software

Overview of feasibility primary use-cases for lease companies

Main use-cases[a]	Rele-vance	Value pocket	Feasibility of use-case by scenario				Substitutes	
			1	2	3	4	Access via smartphone	Third-party hard- and software
Customer value optimisation	●	Multiple	—	Increasing by information availability			✓	✗
Residual value optimisation	◕	Used car sales	—	Increasing by information availability			✗	~
Health of fleet monitoring	◕	Fleet management	— (A)	Increasing by information availability			✗	✓
Vehicle usage monitoring	◕	Fleet management	—	Increasing by information availability			~	✓
Use vehicle as a wallet	◑	Other	—	Increasing by information availability			~	✗
Degree of negative impact on current and future business models for leasing companies			◑	◔	◔	○		

Key: Low, Medium, High, ○: Limited, ◔: Low degree, ◑: Medium degree, ◕: High degree, ●: Full degree,
✓ Access possible/needed, ~ Medium access possible/needed, ✗ No access possible/needed,

Note: (a) Use-cases are non exhaustive.

Source: KPMG analysis, Interview feedback.

Big Tech players benefit from open access to in-vehicle data; some already have partly access to in-vehicle data based on commercial contracts

In-vehicle data accessibility for technology providers

A — Smartphone integration
- Pushing Big Tech core platforms through customers preferred smartphone integration
- Functioning as a software layer over the central vehicle software
- Only access to infotainment system related in-vehicle data, no access to RMI

B — Full operating system development
- Development of modular software for OEMs which function as full operating system
- OEMs determine how many functionalities the software must have and how much the OEM still develops in-house

C — Open in-vehicle data
- Development of software platforms and services based on open access of in-vehicle data
- Third-parties including tech players are able to freely develop applications as long as cyber security and system integrity is not compromised

Overview of methods of access for different tech players

	Big Tech[(a)]		Other technology providers	
	Current access	Examples	Current access	Examples
A	Access through core platform smartphone integration due to customer preference of having in-vehicle integration of smartphone applications	Partnerships with Volkswagen, Stellantis, BMW, Renault, Mercedes-Benz, Kia Apple CarPlay androidauto	●	n/a
B	Access through full operating system development due to OEM outsourcing of core OEM software platform	Android Automotive partnerships with Volvo, Polestar, Renault, Audi	●	(Very) limited e.g. Spotify, Youtube Music and Tidal and some radio applications
C	Scenario		Scenario	
	1	2	3	4	1	2	3	4
	◑	◑	◔	○	◕	◑	◔	○

Key: Degree of negative impact: ○ None ● High, Current accessibility: ● Limited, ● None.
Note: (a) Amazon, Apple, Alphabet, Meta, Microsoft
Source: Android, Apple, Interview feedback, KPMG analysis.

The ability to gain full access to in-vehicle data by Big Tech appears to pose the largest competitive threat for OEMs

Competitive threat for OEM's under open access

Market participants		Competitive threat: Degree	Competitive threat: Description
OEM (after) sales partner			
Universal (trade and repair) firms			— The risk associated with granting full in-vehicle data access to automotive firms is deemed limited, since these companies are not likely to become competitive in the core segments of the OEM's (e.g. building their own car or provide firmware (software) solutions).
Aftersales specialists		●	
Insurance companies			
Lease companies			
Technology providers	Big Tech	●	— Big Tech companies are considering to enter the automotive/mobility market as a (hyper) aggregation platform. As Big Tech currently already own the customer relationship, they would be able to compete with OEMs with a multi modal mobility solution.
	Other		
Policy makers		●	— No direct risk for OEM's since policy makers and first responders have different data interests (non-commercial).
First responders			

Open access towards in-vehicle data for technology providers would further increase their competitive position towards OEM's, especially for Big Tech. As such, OEM's are hesitant towards granting Big Tech companies full access.

Key: ● No direct threat, ● Limited threat, ● High threat,
Note: (a) Based on survey results of 1,100 executives in the automotive industry.
Source: KPMG international analysis, KPMG analysis, Interview feedback.

For most of the safety critical use-cases OEMs are willing to share in-vehicle data, but not for all; regulatory scenarios may force them to still do so

Overview of public party use-cases and their need for OEM specific in-vehicle data

	Use-cases[a]	Feasible starting at scenario	Safety criticality	Data currently shared	Need for OEM specific in-vehicle data
Policy makers	Taxation based usage	1	●	●	●
	Road accident prevention	1	●	●	●
	Improved road and infrastructure maintenance	1	●	●	●
	Improved road and infrastructure development	1	●	●	●
	Dynamic systems for traffic rules	1	●	●	●
	Onboard fuel and emissions monitoring	1	●	●	●
	Park planning optimisation	2	●	●	●
First responders	Accident detection and information for immediate assistance	1	●	●	●
	Theft tracking	4	●	●	●
	Distanced activation of actuator	4	●	●	●

Through eCall.

Access to fuel consumption information is facilitated by the MV-TAR with increased scrutiny by public (EU) parties since 'Dieselgate'.

Key: Degree of negative impact: ○ None ● High, ● Yes, ● Limited, ● No.
Note: (a) Use-cases are non exhaustive
Source: KPMG analysis, Interview feedback.

- Public parties are mainly interested in safety and traffic management related in-vehicle data (and less focused on commercial automotive applications) which primarily is non-OEM specific.
- Although, much of the critical safety related information is likely to be shared, public parties cannot simply claim OEM and consumer data. First, for some cases consumer consent is expected to be required. Second, OEMs might want compensation for in-vehicle data collection and storage costs. However, these costs are likely to be minor. Third, OEMs are prudent towards sharing security related data such as related to actuator activation.
- Also, increased data usefulness increases efficiency of developing and value add of use-cases (and as such lowers costs).

Overview of scenario impact on public parties

	Scenario 1	2	3	4
Policy makers	◔	◔	◔	○
First repsonders				

Appendix

Deep dive use-cases

OEM use-cases aim to expand control over the full customer life cycle (1)

Overview of primary use-cases of OEMs and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access[b]	Vehicle data				
							EC	VS	UI	DD	DC
Generating income	Over-the-air software add-ons	Additional options to offer to the driver such as activating seat heating on demand, additional power, more range etc.	●	n/a	×	n/a	×	✓	✓	~	×
	Customer value optimisation	Customise mobility offering based on in-vehicle insights. For example: if a customer drives the same route every day and hits a traffic jam, offer another mobility solution or if a customer is driving long distances off road, offer a four-wheel drive option	●	n/a	✓	n/a	×	✓	✓	✓	~
	Subscriptions	Subscription based mobility offering based on the driving habits and routes of a customer	◕	n/a	~	n/a	✓	✓	✓	✓	~
	Mobility services	A service that uses a data channel to offer multiple types of mobility services (bicycles, scooters etc.)	◕	n/a	~	n/a	✓	✓	✓	✓	~
	Sell vehicle data (360 view on customers)	Many players in the market value customer data coming from the vehicle highly. Such as recurring routes, locations to shop etc. the OEM could sell this data for personalized advertisement	◑	n/a	✓	n/a	✓	✓	✓	✓	✓
	Pay as you drive insurance	Use the in-vehicle data such as the amount of driven kilometres and the drivers behaviour to determine the amount of insurances to be paid	◑	n/a	×	n/a	~	✓	✓	✓	×

As the OEM is currently gatekeeper of the data, they have full access to the in-vehicle data and all the vehicles resources. Since OEMs also offer services such as insurances, being the only party with access to this information provides them with a large competitive advantage.

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive; (b) OEM already has access to all levels of vehicle resources.
Source: KPMG analysis, Otonomo, Interview feedback.

OEM use-cases aim to expand control over the full customer life cycle (2)

Overview of primary use-cases of OEMs and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access[b]	Vehicle data				
							EC	VS	UI	DD	DC
Reducing costs	Predictive maintenance (OTA)	Send automatic messages to the car about potential problems or predict future faults or maintenance. Suggest location for maintenance	◕	n/a	×	n/a	✓	✓	✓	×	×
	Remote diagnostics (OTA)	Diagnose an issue or problem of a vehicle from a distance	◕	n/a	×	n/a	×	✓	✓	×	×
	Remote maintenance (OTA)	Solve an issue or problem of a vehicle from a distance	◕	n/a	×	n/a	×	✓	✓	×	×
	Early recall detection and software updates (OTA)	Discover potential software issues earlier and update car software from a distance	◕	n/a	×	n/a	×	✓	✓	×	×
	Inventory optimisation	Being able to optimise inventory levels and order specific parts right on time since the OEM can predict whether certain parts will be needed based on in-vehicle data	◑	n/a	×	n/a	~	✓	✓	×	×
	Warranty packages	Offer warranty packages based on actual driving patterns	◑	n/a	×	n/a	✓	✓	✓	×	~

OTA refers to the ability to activate or update individual electronic control units (ECU) and/or the central software management systems over-the-air (remote). Simplest OTA applications concern activation for reading or data downloads while more complex applications entail (re)programming of firmware.

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.

Note: (a) Use-cases are non exhaustive; (b) OEM already has access to all levels of vehicle resources.

Source: KPMG analysis, Otonomo, Interview feedback.

Most relevant use-cases for automotive players relate to OTA maintenance and repair which requires a high level of vehicle resource access (1)

Overview of primary use-cases of automotive players[b] and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access	Vehicle data				
							EC	VS	UI	DD	DC
Generating income	Customer value optimisation	Customise mobility offering based on in-vehicle data. For example: if a customer drives the same route every day and hits a traffic jam, offer another mobility solution	●	✓	✓	1-3	×	✓	✓	✓	~
	Residual value determination	Determine the residual value of a used car not by the kilometres or time used, but on the actual car status	●	~	×	1-2	×	✓	✓	~	×
	Optimise parts quality and portfolio	Increase the quality of vehicle parts based on in-vehicle observations and immediately notify the customer when parts need to be replaced	●	✓	×	1-2	✓	✓	✓	×	×
	Mobility services	A service that uses a data channel to offer multiple types of mobility services (bicycles, scooters etc.)	◕	✓	~	1-2	✓	✓	✓	✓	~
	Tyres as a service	Instead of selling a tyre as a single product, sell the services and outcomes a tire can provide	◕	~	×	1	~	✓	~	×	×
	Trouble code monitoring	Gain visibility into traditional diagnostic codes generated by vehicle engines	◑	✓	×	n/a	×	✓	✓	×	×

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive, (b) Some larger dealers are also active in the insurance and lease market
Source: KPMG analysis, Otonomo, Interview feedback.

Most relevant use-cases for automotive players relate to OTA maintenance and repair which requires a high level of vehicle resource access (2)

Overview of primary use-cases of automotive players and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access	Vehicle data				
							EC	VS	UI	DD	DC
Reducing costs	Predictive maintenance (OTA)	Send automatic messages to the car about potential problems or predict future faults or maintenance	●	~	×	1-3	✓	✓	✓	×	×
	Remote diagnostics (OTA)	Diagnose an issue or problem of a vehicle from a distance	◕	✓	×	1-4	×	✓	✓	×	×
	Accident reconstruction	Access to valuable information to reconstruct an accident	◑	✓	×	n/a	✓	✓	✓	✓	~
	Workload optimisation	As potential vehicle issues are discovered sooner maintenance can be planned on convenient times so dealer capacity is optimally used	◑	~	×	1	~	✓	✓	~	×
	Inventory optimisation	Being able to maintain the right amount of inventory to meet future demand based on expected maintenance	◑	~	×	n/a	~	✓	✓	×	×
	Remote maintenance (OTA)	Solve an issue or problem of a vehicle from a distance	◑	✓	×	1-6	×	✓	✓	×	×

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive
Source: KPMG analysis, Otonomo, Interview feedback.

Lease companies can use in-vehicle data to operate their fleet more efficiently, increase safety and reduce costs

Overview of primary use-cases of lease companies and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access	Vehicle data				
							EC	VS	UI	DD	DC
Generating income	Customer value optimisation	Customise mobility offering based on in-vehicle data. For example: offer the customer a new car based on its previous preferences and current driving habits	●	✓	✓	1-3	✓	✓	✓	✓	~
	Residual value determination	Determine the residual value of a used car not by the kilometres or time used, but on the actual car status	◕	~	×	1-2	×	✓	✓	~	×
	Use vehicle as a wallet	Offer services where the vehicle can be used as a wallet and pays automatically for parking, toll etc.	◑	✓	~	n/a	~	×	✓	✓	~
Reducing costs	Health of fleet monitoring (OTA)	Monitor the real time health of the complete fleet and predict when a vehicle needs maintenance	◕	~	×	1-4	✓	✓	✓	×	×
	Vehicle usage monitoring	Observe vehicle usage to detect unauthorized use or theft	◑	✓	~	1-3	✓	✓	✓	~	×

Since the lease company is the owner of the car they rather have the car owner as the gate keeper of the in-vehicle data instead of the car driver.

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive
Source: KPMG analysis, Otonomo, Interview feedback.

Usage-based insurance contracts and a reduction in the amount of fraudulent claims based on in-vehicle data are key for automotive insurance companies

Overview of primary use-cases of insurance companies and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access	Vehicle data				
							EC	VS	UI	DD	DC
Generating income	Pay as you drive insurance	Use the in-vehicle data such as the amount of driven kilometres and the drivers behaviour to determine the amount of insurances to be paid	●	~	×	2	~	✓	✓	✓	×
	Driver style analysis and feedback	Monitor the behaviour of a driver such as breaking and speed and provide feedback	◑	✓	×	1-3	×	×	✓	✓	~
Reducing costs	First notification of loss and claim	By the occurrence of an accident, real time data can be used to assist the driver and the insurer with the assessment of the vehicle, repairs and claims. Furthermore, real time data can help to recover a stolen car	●	✓	×	1-2	~	✓	✓	✓	~
	Accident reconstruction	Access to valuable information to reconstruct an accident and eliminate fraudulent claims	◑	✓	×	n/a	✓	✓	✓	✓	~

Since the OEMs also offer car insurances, insurance companies have a large disadvantage in their service offering when not being able to access the in-vehicle data.

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive
Source: KPMG analysis, Otonomo, Interview feedback.

Big-tech companies play a critical role in enabling in-vehicle data services (via smartphones) and aim to use data to further improve targeted advertisement

Overview of primary use-cases of big-tech companies and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access	Vehicle data				
							EC	VS	UI	DD	DC
Generating income	Optimise/ proactive navigation	Use real time data to improve the precision of navigation and optimise routes based on weather, traffic- jams, personal planning and hazards	●	✓	~	1	✓	×	✓	✓	✓
	Target advertisement	Based on customer insights stemming from in-vehicle data such as recurring routes, waiting times, HMI-usage personal advertisement can be further optimised, e.g. discounts for lunches or specialty in-car music applications	●	✓	✓	1-3	✓	×	✓	✓	~
	Infotainment systems	Offer personalised in car infotainment systems based on customer preferences	●	×	✓	1	✓	×	~	×	×

From a mobility perspective, the current number of use-cases for big tech companies seems limited. However, the more data these companies can access, the more knowledge and power they have and the more (non) mobility related use-cases they can build. Especially since these companies are also active in the development of autonomous driving, data and vehicle access could provide large added value.

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive
Source: KPMG analysis, Otonomo, Interview feedback.

Access to real time vehicle data is of paramount importance for emergency services to improve response time and speed of work

Overview of primary use-cases of first responders and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access	Vehicle data				
							EC	VS	UI	DD	DC
Societal benefits	Accident detection and information for immediate assistance	Receive precise real time information of a crash and the impact (such as location and number of passengers) to improve response time and care	●	✓	×	1-2	✓	✓	✓	✓	~
	Theft tracking	Vehicle data (such as opening doors) could be used to observe that someone tries to steal a car. When the police is called, the location of the car can be provided and the theft can be stopped	◕	✓	×	1-2	×	~	✓	×	×
	Distanced activation of actuator	Unlock doors of a car when an accident has taken place to rescue in-car passengers	◕	✓	×	1-5	×	✓	✓	×	×

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive
Source: KPMG analysis, Otonomo, Interview feedback.

Personalised taxation, increasing road safety, better infrastructure (development) and CO2 monitoring provide large societal benefits

Overview of primary use-cases of policy makers and required data sources

Use-cases[a]		Description	Relevance	Real time data access[b]	Substi-tution by smart-phone	Level of vehicle resource access	Vehicle data				
							EC	VS	UI	DD	DC
Societal benefits	Taxation based usage	Drivers pay for their real use of the infrastructure based on their distance travelled, driving style and subsequent CO2 release	●	~	~	1	✓	✓	✓	✓	×
	Road accident prevention	Use connected car data of previous accidents to improve road safety and prevent future accidents	●	×	×	n/a	✓	×	✓	×	×
	Improved road and infrastructure maintenance	Use real time car observations of road quality and road signs that are either broken or missing and perform targeted maintenance.	●	✓	~	1	✓	×	✓	×	×
	Improved road and infrastructure development	Analyse busy roads and optimise public transport services	◕	×	~	1	✓	×	✓	×	×
	Dynamic systems for traffic rules	Improve traffic flow by adjusting traffic signals and speed limits by using information of weather conditions, accidents, amount of traffic etc.	◕	✓	~	1	✓	×	✓	✓	×
	Onboard fuel monitoring	Use live data to measure real-world CO2 emissions based on fuel consumption	◕	~	×	1-2	×	✓	✓	×	×
	Park planning optimisation	Use the data from connected cars to lead people to free spots and predict future parking	◑	✓	~	1	✓	×	✓	×	×

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive
Source: KPMG analysis, Otonomo, Interview feedback.

Alternative use-cases such as optimisation of parts quality, trunk delivery and robotic taxi services are of high relevance for other players

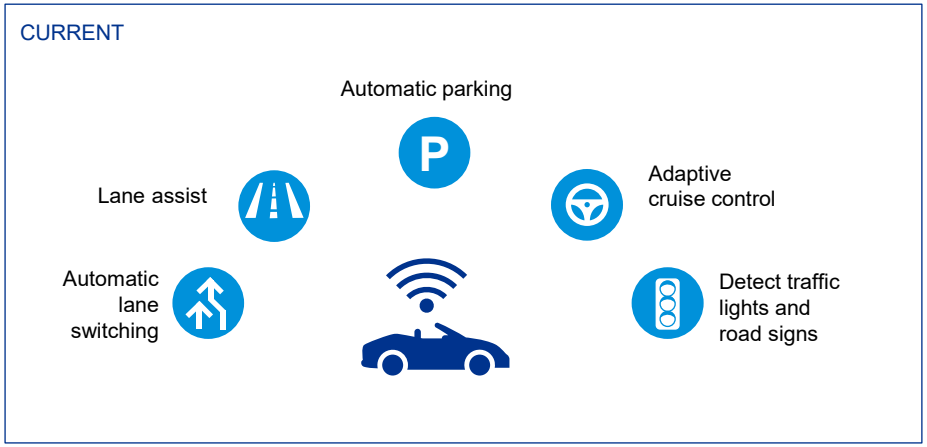
Overview of primary use-cases of alternative companies and required data sources

Use-cases[a]		Alternative player	Description	Relev-ance	Real time data acces	Substi-tution by smart-phone	Vehicle res-ource access	Vehicle data				
								EC	VS	UI	DD	DC
Generating income	Load balancing for EV charging	Energy companies	Using EV battery status and desired charge session end times for load balancing	◕	✓	✓	1-3	✓	✓	×	×	×
Reducing costs	Optimally place EV charging stations	Energy companies	Based on in-vehicle data of all electric vehicles, determine where to supply new charging stations to reduce range anxiety	◕	~	×	1	✓	✓	✓	×	×
	Trunk delivery	Delivery companies	Deliver packages in the trunk of a car	◕	✓	×	5	×	×	✓	✓	✓
	Robotic delivery	Delivery companies	Using autonomous in-vehicle sensor data to deliver packages, groceries etc.	◕	✓	×	7-8	✓	✓	✓	×	×
	Robotic taxi services	Taxi company	Using autonomous in-vehicle data to replace taxi drivers	◕	✓	×	7-8	✓	✓	✓	×	×

Key: ◕ Use-case relevance for specific player ✓ Access possible/needed ~ Medium access possible/needed × No access possible/needed; UI: usage information, VS: vehicle status, EC: external conditions, DD: driver data, : DC direct communications.
Note: (a) Use-cases are non exhaustive;
Source: KPMG analysis, Otonomo, Interview feedback.

High level data access to in-vehicle data could significantly accelerate the development of autonomous driving vehicles

Factors that impact the level of autonomy of a car current and future (non-exhaustive)



When other players than OEMs get full access to in-vehicle data, development of autonomous driving software could significantly increase. The development of autonomous driving could impact previous stated use-cases and provides several options for drivers to for example send an email or watch a movie while driving. This will significantly increase the importance of the data source direct communications.

Big-tech companies that invest in the development of autonomous driving (non-exhaustive)

Zoox + amazon
Google
&
WAYMO
UBER & TOYOTA

OEMs that invest in the development of autonomous driving (non-exhaustive)

HYUNDAI
Ford
Audi
NISSAN
TESLA

Source: KPMG analysis, company websites, Interview feedback.

Outline of relevant regulations and standards

The current MV-BER fosters fair competition in the aftersales market, however from a data perspective it is limited to static (repair and maintenance) data

Overview Motor Vehicle Block Exemption Regulation		
Description and aim	Current	— To safeguard fair competition in the aftermarket for brand-captive and universal automotive firms with respect to RMI – Allows manufacturers to create networks of exclusive dealerships as long as this does not cause any restrictions in competition (for aftersales specialists or independent workshops, e.g.) – Ensures sufficient access to technical information (data) and spare parts for universal automotive firms — The first BER was approved in 2003 which forced manufacturers to grant third-parties access to information necessary to perform their work “in the field of electronic devices and diagnostic equipment” — A revision of the 2003 BER in 2010 stated specific OEM market share thresholds as guidance for allowing block exemption which were adjusted in 2013 and currently in law, stating that states a market share threshold for block exemption is lowered from 100% to 30%, i.e., almost all selective agreements of OEMs with third-parties are no longer block exempted to promote competition
	Future	— The current BER is expiring in 2023 and more details on revision or renewal is expected soon — Evaluation of the current BER cites lack of guidance on information exchange, sharing and pooling data as a result of digitisation which need to be addressed in the new BER — An evaluation report cites that the current BER is suitable with respect to the aftermarket, but may require certain updates due to the increase in importance of data
	Adjacent regulation	— Treaty on the Functioning of the European Union and Competition Law
Market players involved and access	Automotive firms	— The current MV-BER is not forcing OEMs to share data with third-parties and only focusses on the information required to service and repair a vehicle (‘right to repair’). Only for emission data (for ICEs) this data needs to come from the vehicle directly (via OBD).
	OEMs	

Source: European Commission, Clifford Chance, Covington, Competition Law Scholars Forum, Interview feedback, KPMG analysis.

The MV-TAR regulation covers access to static and dynamic repair and maintenance data, although to a limited extent

Overview Motor Vehicle Type Approval Regulation		
Description and aim	Current	— The 2020 EU type-approval framework was introduced in the wake of 'Dieselgate' as replacement of the 2018 version and introduced extensive checks by technical services companies and independent auditors before new vehicles are introduced to market (homologation) — It also ensures unrestricted access to vehicle repair information through a standardised format for independent workshops — Information is related to both static and dynamic On-Board Diagnostics (OBD) and Repair and Maintenance Information (RMI), however only a part of the vehicle data is regulated — The accessible data is increasingly 'processed', meaning that information is increasingly controlled by the gatekeeper, i.e., the OEM — Next to accessing information, repair and maintenance service providers are also allowed to enter information concerning the work that is performed — The MV-TAR also encompasses the approval of automated vehicles w.r.t. data and targets: Installing of data recorders, cyber security, and user awareness of ADAS driving software — The MV-TAR however lacks a solution for remote access to the connected car
	Future	— Currently, the MV-TAR does not encompass new type approvals after software updates to, for example, ADAS software, which would be a welcome addition since software updates may significantly change the behaviour of the vehicle — As interpretation of the MV-TAR OEMs are currently implementing an Extended Vehicle concept (ExVe) by which the manufacturers determine what non-RMI data are accessible by third-parties, which can be classified as competitively unfair — The recently announced Data Act includes a suggestion to include vertical specific regulation with respect to dynamic data in an updated MV-TAR. However, as of February 2022, no specific proposal has been shared yet.
	Adjacent regulation	— Regulation on approval and market surveillance of motor vehicles and their trailers
Market players involved and access	(After) sales firms[(a)]	Although the MV-TAR provides access for automotive firms to vehicle data, both static and dynamic, the regulation does not necessarily imply that these firms have access to high-quality data let alone being able to develop and apply their own diagnostic tools
	Other Automotive Firms [(b)]	Under the MV-TAR, non-automotive firms such as lease and insurance companies also have access to OBD and RMI data, however influence on information is limited since OEMs increasingly process data which often minimal and of low quality
	OEMs	The current MV-TAR forces OEMs to share data with third-parties, however, OEMs are not yet obliged to share valuable dynamic vehicle data which gives OEMs a pivotal position

Note: (a) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists
(b) Includes lease and insurance companies

Source: Ecorys, Bird&Bird, Journal of Intellectual Property, Information Technology and E-Commerce Law, Interview feedback, KPMG analysis.

GDPR entails regulation on safe collection and processing of personal information

Overview General Data Protection Regulation		
Description and aim	Current	— GDPR was adopted in 2018 and aimed to set guidelines for the collection and processing of personal information of individuals within the EU for protective purposes — Processing of personal information can only be conducted based on one of six legitimate grounds, including consent or the fulfilment of contractual obligations — Data must always be processed such that the subject knows what, how, and why data is processed. Additionally, data can only be processed for predefined purposes and is limited to only essential data necessary. The GDPR provides a right to 'data portability' to the Data subject
	Adjacent regulation	— An addition to the general GDPR is the ePrivacy directive which sets a specific standard for all actors that wish to store or access information stored in the terminal equipment of a subscriber or user — As a result, the connected vehicle and every device connected to it shall be considered as a "terminal equipment"
Market players involved and access	(After) sales firms[(a)]	— Since OEMs are the vehicle data gatekeepers, OEMs have to ensure that data processing parties such as independent workshops and lease companies can only access the (non-)personal data needed for conducting work. This makes automotive and non-automotive firms significantly dependent on OEMs since OEMs may provide an interpretation what data is essential for these firms while also having control over the quality of data that is shared
	Other Automotive Firms[(b)]	
	OEMs	— As data controllers, OEMs must ensure that data is handled adequately and are responsible for GDPR compliance. Arguably, all vehicle-generated data is personal data since a natural person is involved and hence GDPR applies
	Public parties	— Public parties are affected by GDPR since infrastructure increasingly contains road-side cameras and sensors which are not only able to register license plates but also velocity, location etc. for which public parties need to have a clear purpose to comply with GDPR

Note: (a) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists
(b) Includes lease and insurance companies

Source: Ecorys, EDPB, BearingPoint, ACEA, Interview feedback, KPMG analysis.

ISO TC22, SRTI and SERMI accreditation are automotive industry standards that operationalise data regulations concerning in-vehicle data

Overview of the standards ISO TC22, SRTI and SERMI Accreditation			
	D. ISO TC22 on Vehicle Data Communication	**E.** Safety Related Traffic Information system	**F.** SERMI Accreditation Standard
Description and aim	— Sub-committee 31 establishes a standard in vehicle data communication covering: data buses and protocols, V2X communication including V2G, diagnostics, test protocols, interfaces and gateways, data formats, standardized data contents — Within the sub-committee, there are several working groups developing standards on specific topics such as: Extended Vehicle and remote diagnostics, network applications, and sensor data interface for autonomous driving interfaces — The standard is part of a larger group of standards (TC22) to progress towards automated driving standards	— To comply with the EU's "Intelligent Transport System (ITS)"-directive, a delegated regulation formed by multiple automotive parties (OEMs, industry associations, ministries of infrastructure) known as the "Data Task Force" has been proposed called the Safety Related Traffic Information system — The ITS-directive is aimed at using data to improve safety, traffic efficiency and driver comfort by helping drivers in decision making and adaptation to traffic situations — Key principle of the directive is that member states provide a national access point for traffic-related data — In The Netherlands, this access point is the "Nationaal Portaal Wegverkeer"	— To elaborate a pan-European harmonised accreditation scheme and process architecture to help independent operators servicing and repairing vehicles in a secure manner even if this involves the security features of the vehicle (e.g. software updates) — The new Type Approval Regulation adopted in 2020 formulates that OEMs should provide access to static RMI-data and both static and dynamic OBD-data as well as independent access to security related information by independent parties for which SERMI accreditation is needed — Current regulation only covers access for independent workshops to static RMI from websites and OBD data. The access to in-vehicle generated dynamic data is however covered by SERMI
Market players involved and access	— (Non-)automotive firms — OEMs — Public parties	— OEMs — Public parties	— Automotive firms — OEMs
Expected updates	— 153 standards have been published, 43 still in development — Release dates are unknown	— SRTI has been tested (in NL) and is currently rolled out over multiple participating EU countries	— SERMI does not cover all RMI in-vehicle data and, hence, the addition of remote diagnosis services to the accreditation is still under development

Source: ISO, ECSEL Joint Undertaking, SRTI, Daimler, European Parliament, SERMI, Autopromotec, Ecorys, Interview feedback, KPMG analysis.

eCall regulation is currently only requiring minimal accident data sharing as OEMs fear brand damage

Overview eCall In-vehicle Regulation		
Description and aim	Current	— Regulation that determines that every EU-vehicle should be equipped with a system that invokes emergency services in the case of accidents — It establishes the general requirements for the EU type-approval of 112-based (Europe-wide emergency number) eCall vehicle systems, components and separate technical units that transfers a minimum set of in-vehicle data to the eCall Public Safety Answering Point ('PSAP'). The obligations involved cover the installation of 112-based eCall in-vehicle systems, and privacy and data protection requirements connected to such systems. — The regulation describes access to such data as requirement for new type approval within the EU
	Future	— There are several initiatives to elaborate the legacy eCall system to a system where a larger minimum set of data is shared such as sensor enabled-emergency service Next Generation eCall
	Adjacent regulation	— This year, the UNECE has adopted regulation which requires every vehicle to be equipped with an Event Data Recorder (EDR) — The EDR records several vehicle parameters (braking moments, velocity etc.) in the case of an accident
Market players involved and access	OEMs	— While being compliant, OEMs will likely share minimum information regarding accident data to protect brand image and are not obliged to do so following the regulation
	Public parties	— First responders have a direct interest in accident data (such as severeness) but are currently only informed about the location and travel direction

Other parties such as repair workshops and insurance companies are also interested in crash severeness data related to eCall to, e.g., coordinate repair work. However, OEMs as gatekeepers are not obliged to share this data.

Source: European Commission, International Conference on Advances in Mobile Computing & Multimedia, Interview feedback, KPMG analysis.

The Data Governance Act sets standards for data sharing with public entities in; currently under proposal

Overview ~~General~~ Data Governance Act		
Description and aim	Proposal	— Announced in 2020 as part of the EU Data Strategy to enhance the EU's competitive position and digital sovereignty, and as such, to encourage data sharing of 'industrial' and non-personal data amongst EU member countries by introducing 'data intermediaries' (separate platforms) to help share and monetize data — Data intermediaries will function as alternative to existing major tech platforms that foster "data altruism", i.e., encouraging automotive players to share their data — The DGA's foundation is based on three pillars: – The introduction of a compulsory notification scheme applying to several data services – The introduction of a voluntary registration regime for data altruism services to ensure trust in data sharing and data intermediaries – The creation of a legal regime for the re-use of public sector data subject to rights of third-parties — The DGA also aims to create sector-specific data spaces, e.g., for the mobility sect
Market players involved and access	(After) sales firms[a]	— The DGA builds further upon the GDPR and aims at 4 pillars: (1) (re)use of government data, (2) data sharing services, (3) data altruism and (4) surveillance mechanisms. The potential of a targeted, governmental intervention through these thematic pillars will, on the one hand, boost the confidence of stakeholders and, on the other hand, decrease transaction costs for data sharing. Both automotive and non-automotive firms benefit from DGA if the regulation indeed encourages OEMs to share data.
	Other Automotive Firms[b]	— Automotive firms benefit both DGA if the regulation indeed induces OEMs to share data and automotive firms subsequently leverage this data to optimise repair and maintenance activities, e.g.. It also helps customers switch more easily between service providers creating an increase in competition
	OEMs	— The DGA is only applicable to the party that has the data, so the DGA is only applicable for OEMs if the ExVe is implemented and they are willing to share the data, i.e. the DGA does not make sharing of data mandatory for market players. — If OEMs claim a gatekeeping position by taking on a role as (sole) accreditor, this would potentially make them a 'data intermediary' according to the DGA.

Note: (a) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists
(b) Includes lease and insurance companies

Source: Norton Rose Fulbright, KU Leuven, Dr2 Consultants, WSJ, Interview feedback, KPMG analysis.

The Data Act help sharing and monetising data for all players; currently under proposal

Overview Data Act		
Description and aim	Proposal	— The Data Act (DA) ensures the access to and sharing 'portability' of user data, i.e., consumers must be able to seamlessly switch and transfer their data between service providers — The DA targets three specific issues: – Unfairness in distribution of usage rights across the value chain and unequal bargaining power compromising competition – The classification of machine-generated data with respect to database rights – Balancing principle 'free flow of data' and 'IP rights' concerning data
Market players involved and access	(After) sales firms[(a)]	— Automotive firms benefit from the DA if the regulation indeed induces OEMs to share data and automotive firms subsequently leverage this data to create new forms of services and optimize (current) repair and maintenance activities, e.g. It also helps customers switch more easily between service providers creating an increase in competition.
	Other Automotive Firms[(b)]	— Under the DA the user may have the ability to request data sharing. This would enable non-automotive firms to monetize data through data intermediaries functioning as platform for the development of new business models and services. (Anonymized) driver usage data can, for example, be of value to insurance companies for optimizing current or developing new business models.
	OEMs	— Due to their current position as 'de facto' gate keepers, IP owners and ultimately accountable for integrity of the vehicle OEMs are reluctant to give access to IVR and/or to DIVD. However, upon approval, the DA could provide access to and help sharing personal and non-personal (real time) data that is generated in the vehicle that can help market players to develop new customer services using e.g., real-time vehicle location data.

Note: (a) Includes OEM (after)sales partner, universal (trade and repair) firms and aftersales specialists
(b) Includes lease and insurance companies

Source: Norton Rose Fulbright, KU Leuven, Dr2 Consultants, WSJ, Interview feedback, KPMG analysis.

The Digital Markets Act, Open Data Directive and Digital Services Act appear not applicable for sharing in-vehicle data between actors in the automotive sector

Overview of Digital Markets Act, Open Data Directive and Digital Services Act

	Digital Markets Act	Open Data Directive	Digital Services Act
Description and aim	— The Digital Markets Act is a regulative act under proposal since 2020 formulated by the European Commission to promote competition in digital markets — The act constructs a list of *gatekeepers* defined as companies with a robust competitive advantage that meet certain criteria which OEMs (currently) do not meet, e.g., over 45 million platform users. And although not explicitly mentioned, it is generally assumed that the EC targets large technology platforms (Big Tech) with this regulation — Gatekeepers will have certain obligations to meet under the DMA such as providing third-parties an equal opportunity with respect to similar services and platforms, and ensuring that users are able to uninstall pre-installed software	— To stipulate a minimum requirement for EU member states to make public sector generated data available for re-use — The directive states multiple 'high-value datasets', e.g., public mobility data — Access to real-time and dynamic data is strongly promoted by the directive, and once the directive will be fully transposed, member states have to publish dynamic open government data through APIs — An example interpretation of such API is the 'Nationaal Portaal Wegverkeer' as platform that provides open data concerning Dutch traffic	— The Digital Services Act is a regulation currently under proposal intending to create more safety of online users — The act is targeted at large platform players that have gained a gatekeeping position in society — The EC cites: "A core concern is the trade and exchange of illegal goods, services and content online. Online services are also being misused by manipulative algorithmic systems to amplify the spread of disinformation, and for other harmful purposes"
Applicability	— Focused on Big Tech — All OEMs do not meet the user criterion (>45M), except for the Volkswagen Group, entailing that if it would develop a core platform service, the DMA would apply	— Mainly focused on public sector generated data	— Not specifically targeted at automotive players, more focused on Big Tech

Source: European Commission, NautaDutilh, Information Technology & Innovation Foundation, Interview feedback, KPMG analysis.

Other

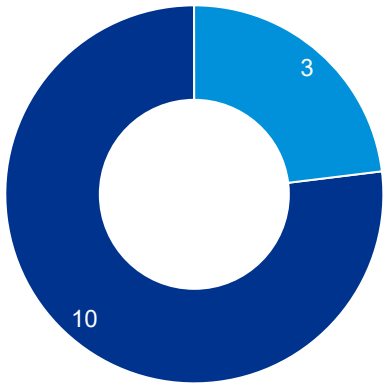
Glossary of terms

$	US dollars
ADAS	Advanced driver-assistance systems
API	Application programming interface
APK	Algemene periodieke keuring
b	Billions
B2B	Business-to-business
CRM	Customer resource management
D2C	Direct-to-consumer
DA	Data Act
DGA	Data Governance Act
DMA	Digital Markets Act
EC	European Commission
EU	European Union
EV	Electric Vehicle
ExVe	Extended Vehicle
GB	Gigabyte
GDPR	General Data Protection Regulation
GPS	Global Positioning System
HMI	Human-machine interface
IP	Intellectual property
LIDAR	Light detection and ranging
m	Millions
MaaS	Mobility-as-a-service
MV-BER	Motor Vehicle Block Exemption Regulation
MV-TAR	Motor Vehicle Type Approval Regulation
n/a	Not applicable
NL	The Netherlands
NSC	National sales company
OBD	On-board diagnostics
OTA	Over-the-air
S-OTP	Secure On-board Telematics Platform
RMI	Repair and maintenance information
SDK	Software development kit
SRTI	Safety Related Traffic Information
TB	Terabyte
V2G	Vehicle-to-grid
V2X	Vehicle-to-everything

Base of preparation

Primary research – Interviews

Interviews completed (Σ: 13)

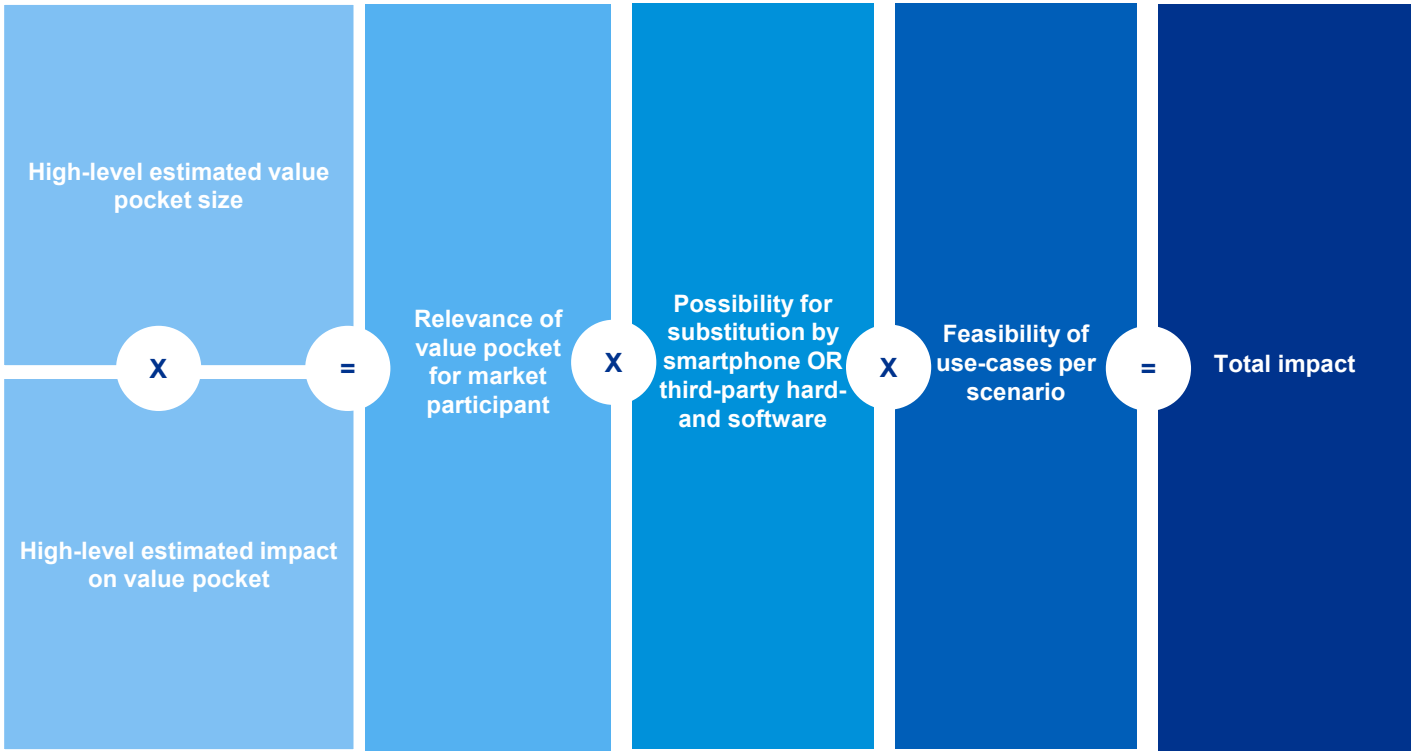


Secondary research

- ABI Research
- ACEA
- Automotive Edge Computing Consortium
- Autopromotec
- Big Tech websites
- BOVAG-reports and articles
- Company websites
- Competition Law Scholars Forum
- Consultancy websites
- Covington
- Criteo
- Eastern Peak
- Ecorys
- ECSEL Joint Undertaking
- EPDB
- Ericsson
- European Commission
- Flitsmeister
- Fortune Business Insights
- Forbes
- ICDP reports
- Industry websites and articles
- Information Technology & Innovation Foundation
- International Conference on Advances in Mobile Computing & Multimedia
- ISO
- Journal of Intellectual Property, Information Technology and E-Commerce Law
- KPMG proprietary information
- KPMG publications
- KU Leuven
- Legal websites and documents
- OEM websites
- Otonomo
- RAC Foundation
- SERMI
- SIP
- SRTI
- Statista
- Texas Instruments
- TRL
- Wall Street Journal

Total impact is determined based on relevance, possibility for substitution by smartphone and feasibility of uses-cases per scenario

Total impact calculation in scenarios



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Source: Interview feedback, KPMG analysis.

KPMG

KPMG on social media

KPMG app