PTOLEMUS
Consulting Group

VEHICLE DATA MARKET
Global Study

**FREE
ABSTRACT**
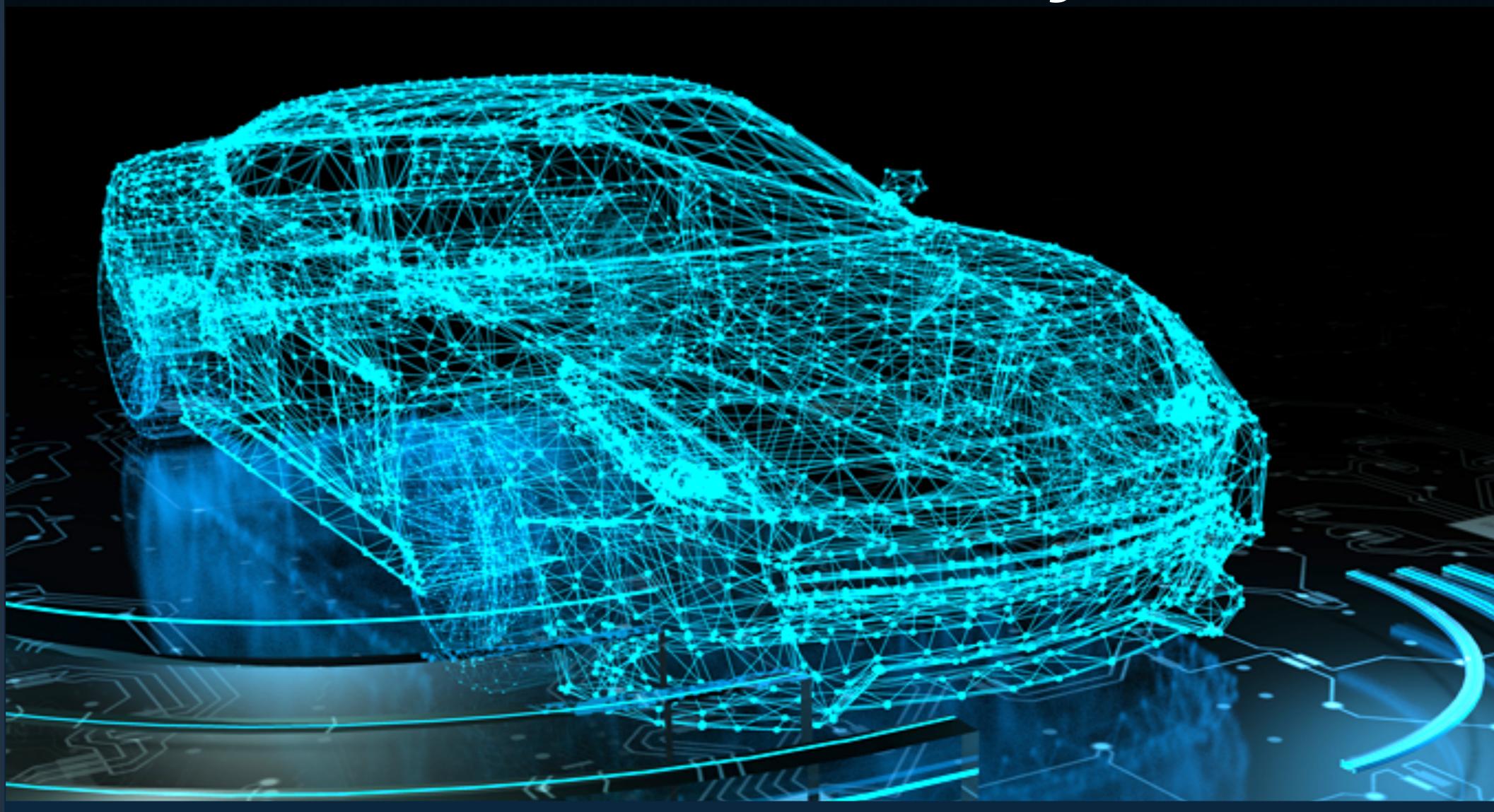
The first investigation
of OEM strategies and
car data hubs

*The future of car data sharing:
from concept to mass adoption*

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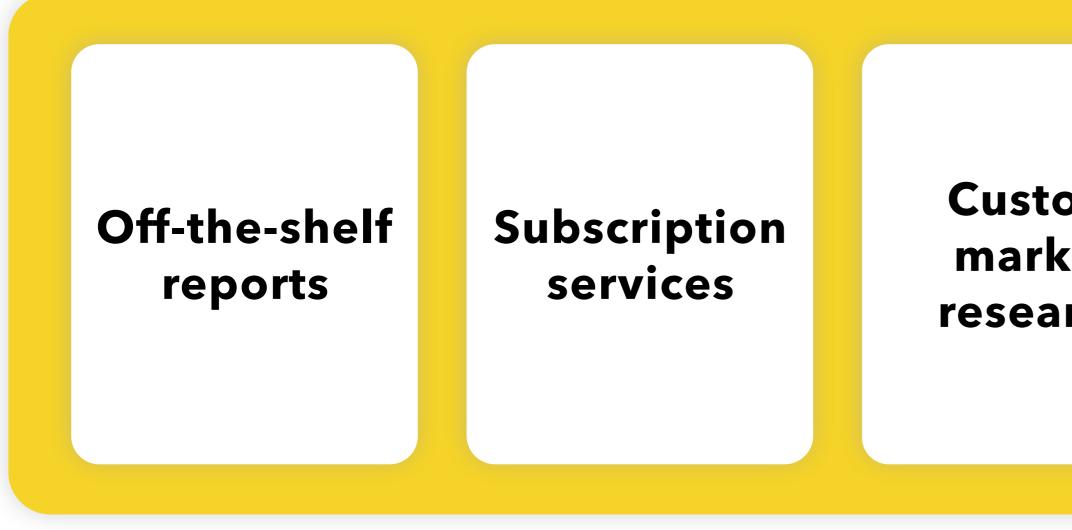PTOLEMUS

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PTOLEMUS

The first strategy consulting & research firm entirely focused on augmented mobility & automation

Strategy consulting services

Strategy definition	Investment assistance	Procurement strategy
Innovation management	Business development	Project management

Market research services

Off-the-shelf reports	Subscription services	Custom market research

Fields of expertise

Mobility services	Car pooling Car sharing MAAS	Micro-mobility Ride hailing Shared mobility	Smart parking Tax refund
Vehicle services	bCall eCall FMS SVT / SVR	Tracking VRM In-car Wi-Fi Parking	Navigation Speed cameras Traffic information
New energies	BEV EV charging Fuel cards	Fuel cells Hydrogen	PHEV Vehicle-to-grid
Usage-based charging	Car As A Service Electronic Toll Collection	Mobility-as-a-Service Road charging	UBI / PAYD Vehicle rental Vehicle leasing
Vehicle data & analytics	AI CAN-bus Crowd-sourcing Data protection	Driving behaviour OBD Predictive analytics	Remote diagnostics xFCD
Vehicle automation	ADAS Autonomous cars	Autonomous trucks	Robo-taxis Shuttles
Enabling technologies	Positioning (GNSS / WiFi / cellular) M2M / connectivity	Smartphones Sensors	Telematics devices V2X
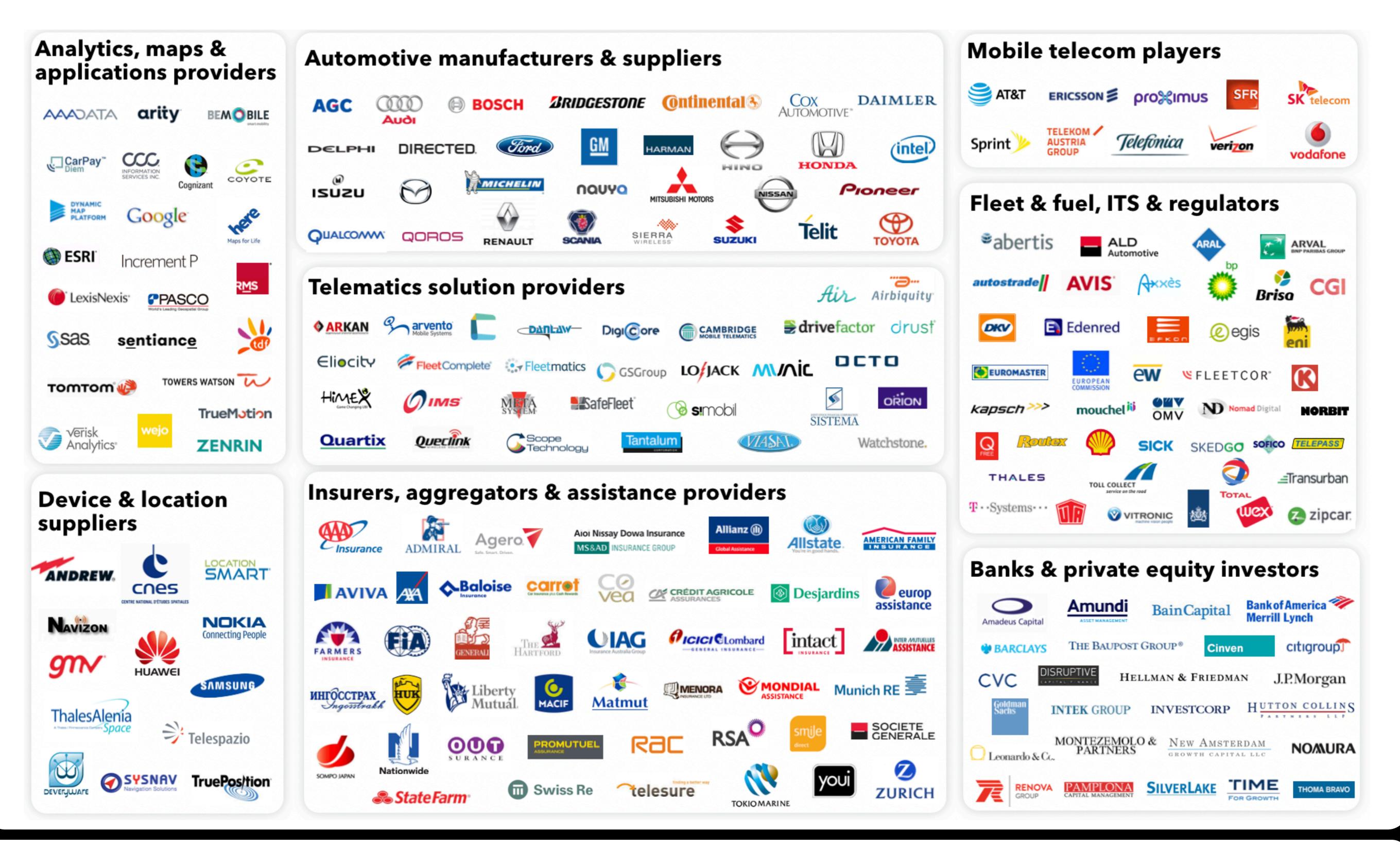
Our clients are across the mobility ecosystem

Analytics, maps & applications providers

Automotive manufacturers & suppliers

Mobile telecom players

Telematics solution providers

Fleet & fuel, ITS & regulators

Device & location suppliers

Insurers, aggregators & assistance providers

Banks & private equity investors

PTOLEMUS

150 consulting assignments to help our clients define their mobility and data strategies

Defined strategic positioning in insurance telematics value chain	**MICHELIN**
Defined strategy & business plan of its telematics business	Aioi Nissay Dowa Insurance **MS&AD** INSURANCE GROUP
Helped the insurer understand and anticipate the impact of Autonomous Vehicles on its business	European bank-insurance group
Helped evaluate OEMs' interest for its new vehicle market place	Vehicle data hub
Helped the company define its strategy towards OEMs in North America	Vehicle data hub
Helped evaluate European OBD market opportunities in FMS, UBI and roadside assistance	Major telematics device vendor
Defined the company's strategy to leverage mass cellular positioning data	**SFR**
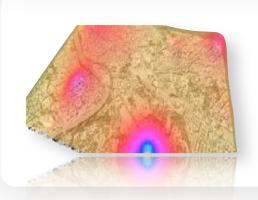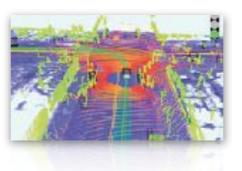
Defined market entry strategy & business case of a new fleet Telematics Service Provider	Vehicle data aggregator
Evaluated the market potential of HD maps for autonomous vehicles	Consortium of OEMs & map makers
Defined its future vehicle connected services global strategy	Global roadside assistance group
Identified & selected potential M&A targets in European connected car services	Vehicle data hub
Defined connected vehicle data strategy for innovative telematics services provision and monetisation	Vehicle data aggregator
Helped define the specifications of its eCall on-board unit	Global automotive OEM
Identify opportunities from connected & autonomous vehicles for the space sector	Space agency

We have helped many OEMs and vehicle data market places

AUTOMOTIVE OEMs

VEHICLE DATA HUBS

Our team of 25 consultants, experts & researchers with 15 nationalities serves our clients worldwide

■ Clients

⦶ Offices / Consultants

PTOLEMUS can help your organisation define and achieve its data strategy in fast moving times

- **Strategy definition**
  - Shaping of future vision in vehicle data
  - Strategic plan
  - Impact of connected car on the business
  - Market entry strategy
  - Board coaching
  - Strategy orientation workshops

- **Innovation strategy**
  - Vertical market assessments
  - Product definition
  - Consent management
  - Data analytics strategy
  - AV tech evaluation

- **Investment assistance**
  - M&A strategy
  - Commercial due diligence
  - Technology due diligence
  - Feasibility studies
  - Vehicle data market sizing
  - Business case development
  - Cost benefit analyses
  - Post-merger integration

- **Innovation delivery**
  - Proof of concept design & launch
  - Architecture definition
  - Project management

- **Procurement**
  - VDH sourcing strategy
  - Data sourcing strategy
  - Specifications
  - Supplier selection
  - Assistance to tenders

- **Business development**
  - Partnership strategy definition
  - Assistance to tender response

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It's not about being data-rich. It's about sharing it with others!

Dear reader,

I would like to start by quoting Sony's CEO Kenichiro Yoshida during the last CES:

"It's not an exaggeration to say that mobile has been the mega-trend of the last decade. I believe the next mega-trend will be mobility."

Well, if we think what made mobile big, we actually mean "smart phones".

What made them smart?

Many would say: a new user interface (including the touch screen), great cameras, unfettered data connectivity, etc.

This is all true but what made them really smart was that they could receive and send data from the Internet, across of a wide set of sensors and applications. And that they were relying on an ecosystem of apps that could tap into the device's treasure of data: from the geographic position to the list of contacts and the photographs. What would WhatsApp be if you could not send your phone's pictures?

In other words, you can't be smart if you are not able to communicate with others! You need to listen to others and talk to them in a way that a dialogue can take place.

By this standard, the car of today is still quite far from being smart.

Most new cars come with broadband connectivity. But you can't send the data you want from it!

The most important dataset you can think of is the fuel level. Well, no single car maker allows you to retrieve this on a third party app. Even the newest 'digital generation' car maker does not permit it!

Then maybe the second most important type of data is diagnostics information. Again most new cars do not allow this to be retrieved by third party apps. You need to install an OBD dongle to capture it and your car maker is telling you this is not safe to do!

We all know why this is like this. For false reasons: safety and security being invoked at all times. **And for a real one**: because most of the industry's profits are made from the repair business!

So for car makers, opening up vehicle data to third parties is like opening the pandora box.

In this context, **the emergence of vehicle data hubs / market places could be the very last chance for the industry to adapt…** before it is too late and a regulation is imposed on OEMs.

What are vehicle data hubs (VDHs)? Both start-ups such as Caruso, Otonomo and wejo. And more established companies such as CCC, LexisNexis and Verisk.

They are not only playing the middlemen between OEMs and third parties. They also clean and standardise raw data. Most of them propose to deliver data-driven insights to third parties. So that the garage understand what part you will need to replace, not only that your oil temperature is too high.

In our view, **they play a natural role in the ecosystem**. Connecting car makers - who have never had more challenging tasks to accomplish - to millions of other stakeholders. From the leasing or insurance company to the street corner's car accessory store.

Will VDHs take off? This 600-page report responds to this question and many more.

A clue? What is the most valuable company today? Apple, the phone OEM that was the first to open mobile data to the ecosystem! And generates more than half of its revenues from the iPhone.

All the best.

Frederic Bruneteau
Managing Director

The debate on third party access to car data is raging...

The safety of drivers and passengers is paramount to us. That is why we need to use this secure off-board model for data sharing.

Giving third-parties direct and uncontrolled access to data in a moving vehicle is an open door for hackers. How well would you sleep at night with your front door wide open?"

Erik Jonnaert
ACEA Secretary General

Data does not belong to the manufacturer. Access to data must be non-discriminatory.

Jean-Marc Zulesi
French MP

Monopolistic behaviour in data markets benefits the OEMs but is likely to diminish welfare for consumers and aftersales service providers.

Bertin Martens
European Commission

Vehicle data access is probably the most significant issue facing our industry

Aaron Lowe
Auto Care Association

… Legislation could come soon

Data can not be the property of only a very few

Tomorrow's mobility will not happen without independent repairers nor mobility start-ups

I am worried that Renault has partnered with Google on the connected car

Jean-Marc Zulesi

French MP

Karima Delli

Chair, Committee on Transport & Tourism, European Parliament

I wrote a letter to Mr. Breton asking that access to car data should be fair, transparent and stable

Dr. Christian Knobloch

Knobloch & Gröhn GbR

In the context of the European Green Deal, the repairability of the car is going to be a key issue

Off-board Extended Vehicle models are small in number and severely limited in functionality and extent of data.

The idea that the Extended Vehicle is a model whereby OEMs share equally vehicle data and functionalities – is a myth.

PTOLEMUS

Stakeholders even disagree on what is the key purpose of the car!

The car is not a phone. Its primary function is to transport people from A to B.

The OEM remains responsible that the car works for the vehicle's lifetime.

Therefore it must set the rules that must be complied with.

Jocelyn Delattre

ACEA

Designing a vehicle without access to third parties is planned obsolescence

"New connected cars must be designed with 3 data environments in mind: the OEM area, the app store area and the repair area"

Stéphane Derville

Mobivia

Privacy issues should not be underestimated, as some bad uses of mobility data have emerged

BMW CarData

The "data hunger" off our ever-smarter cars is a real concern for drivers.

The auto industry therefore needs to step up and make it much easier for drivers to understand what data is being collected and for what purpose.

Ted Gunning
LeasePlan CEO

The customer will be notified by BMW in case of a third party request access to his car's data. He is able to understand in detail what vehicle data a third party requests.

He can also decide at any time on the third parties data access request - and at any time revoke it.
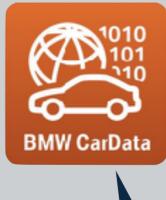
For just a few hundred dollars, shady middlemen could sell your location within a few hundred meters based on your wireless phone data.

It's chilling to consider what a black market could do with this data.

It puts the safety and privacy of every American with a wireless phone at risk.

Jessica Rosenworcel
FCC Commissioner

OEMs agree on the major potential of car data

The raw data does not belong to PSA. We provide it to insurers and through a neutral server.

But we do not intend to make money from the data, just cover our costs (telecoms, cloud, etc.)

PSA Peugeot Citroën

Since 2013 all BMWs have inbuilt SIM cards. We have 10 million connected vehicles on the road globally.

BMW CarData

Internally, the most valuable data category is diagnostics.

We want to grow the quantity and quality of diagnostics data sets.

Today we hear about issues through dealers.

Hyundai Motor America

Robert Welborn

General Motors

GM's fleet represent 89 million vehicles and all new vehicles since 2014 are connected.

We wanted a data hub supplier that had the capacity of tracking use cases, even small ones for small clients.

Will Vehicle Data Hubs save the day?

The neutral server creates a win-win-win situation for OEMs, service providers and drivers alike.

While it opens up new monetization opportunities for car manufacturers, it spurs innovation among service providers to create new digital solutions that drivers will ultimately benefit from.

Giovanni Lanfranchi

CTO, HERE Technologies

We are more than just a pipe. We provide insights to both OEMs and third parties.

We also offer a full consent management engine for OEMs to comply with CCPA and GDPR.

We've created the necessary conditions to ensure that our customers have access to car data.

Caruso simplifies the usage across all OEMs.
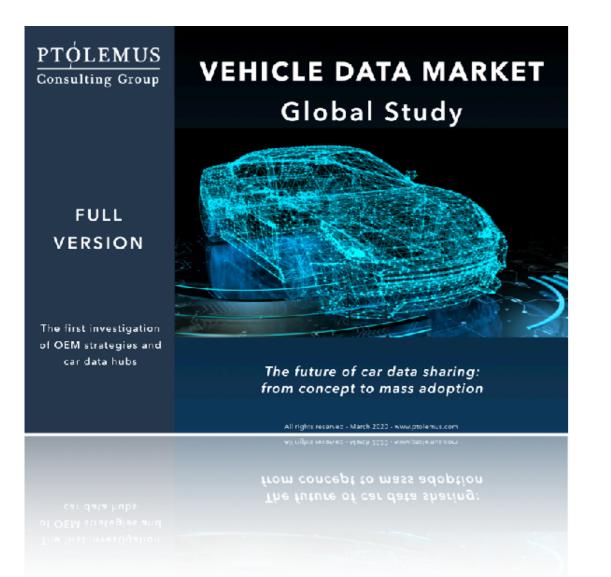
Richard Barlow

CEO, wejo

The OEMs want to have a supply chain to a number of data recipients for them to develop their mobility products.

What we are offering is the seamless supply of data to these third parties. We see ourselves as a tier-1 supplier in the digital asset market.

Alexander Haid

Managing Director, Caruso

PTOLEMUS

This study is the first fact-based assessment of the connected car data hub market

VEHICLE DATA MARKET
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FULL VERSION

The first investigation of OEM strategies and car data hubs

The future of car data sharing: from concept to mass adoption

The facts, figures and analysis... behind the hype

Over 600 pages on the connected car data landscape, leveraging:

- **3 years** of market monitoring
- The **Connected Car Services Global Forecast**
- **9 months** of research
- **49 interviews** with key stakeholders including X OEMs
- **Over 10 years** of expertise from 150 consulting assignments in the **mobility & connected car markets**

The report brings:

- **An assessment of OEM strategies**
  - The **9 main challenges for OEMs to share data** analysed, why they cannot defer it any longer
  - **15 OEM data sharing strategies dissected**
  - **7 case studies of real OEM implementations**

- **An up-to-date review of the regulatory landscape**
  - **Standardisation**
  - **Personal data protection**
  - **Open access to in-car data**

- **A bottom-up analysis of the demand for car data**
  - In 18 countries worldwide
  - In 8 vertical markets
    - ✓ Repair & maintenance (remote diagnostics)
    - ✓ Usage-based insurance (UBI)
    - ✓ Fleet management & leasing
    - ✓ Car sharing & car rental
    - ✓ In-car payments (parking, fuel / charging, tolls)
    - ✓ Roadside assistance
    - ✓ Traffic information
    - ✓ Advertising
  - 8 data sharing use cases

- **2018 - 2030 market forecasts including:**
  - Revenues and volumes for each of the 8 vertical markets
  - Revenues and volumes for each of the 3 stakeholders:
    - ✓ OEMs   ✓ VDHs   ✓ VSPs

- **An in-depth analysis of the supply of data sharing solutions**
  - A **5-step technology chain** fit for the connected car data industry including
  - **An assessment of the key mobility and car-data related trends**
  - **A mapping of 9 key vehicle data hubs**
  - **Comparison of their positioning and features**
  - **Detailed supplier profiles**
  - **Appraisal of 8 success factors for VDHs:**
    - ✓ Horizontal coverage
    - ✓ Vertical focus
    - ✓ Geographical footprint
    - ✓ Network effect
    - ✓ Value added to data
    - ✓ Pricing schemes
    - ✓ Transparency and trust
    - ✓ Customer relationship (B2B & B2B2C)

It was written by an international team of consultants

Frederic Bruneteau
Managing Director, Brussels

The **founder** of PTOLEMUS, Frederic has accumulated **25 years of experience of the mobility and transport domains** and 15 years of strategic and financial advisory.

He has become **one of the world's foremost experts of connected car services & automation** and is interviewed on the subject by publications such as the *Financial Times*, *Forbes*, the *Wall Street Journal* and *The Economist*. He has also spoken at over 40 conferences on the subject.

He has led over 140 consulting projects and helped many world leaders define their strategy and implement it.

Clients he has served include AAA Data, Abertis, AGC Automotive, Allianz, AXA, BP, Bridgestone, Cihon, CNH Industrial, Danlaw, DMP, Europ Assistance, the European Commission, HERE, Kapsch, the Netherlands' Ministry of Transport, Mobile Devices, Octo Telematics, Michelin, OMV, Pioneer, Qualcomm, Scania, Société Générale, Telit, TomTom, Toyota and WEX.

Frederic has led the research for over 15 landmark reports including the **Global Mobility Roadbook** and the **OEM Readiness for AV Global Study.**

Frederic directed the research and entirely reviewed this report.

Claire Elnécavé
Senior Consultant, Brussels

Claire has gained 15 years of experience for companies such as Accor, AGC Automotive, Arthur Andersen, Baloise Insurance, Baupost Group, Carrefour, CIC Securities, Coyote, Hachette, Pioneer, Sara Lee and Solvay.

She is expert at defining new business strategies, auditing and developing business models, financial statements, business plans, financial models and market models.

She has completed connected vehicle services projects applied to a large range of industries, e.g. fleet management, insurance, traffic information, repair and maintenance, etc.

For example, she helped a **consumer electronics provider** define its telematics strategy, positioning and business model to enter the insurance market.

She helped a **tier-1 automotive supplier** shape the strategy and go-to-market plan of its new telematics business.

She also built a 10-year forecast of the EU telematics fleet services market for a hedge fund.

Finally she also contributed to our Connected Insurance Analytics report.

Claire led the research, analysis and writing of this report.

Chirag Ramesh-Kalose
Senior Business Analyst, Paris

A dual engineering and business graduate, Chirag has won experience **in the automotive and insurance industries,** helping companies such as CNH Industrial, Faurecia, Octo Telematics, Toyota, Sansera and Sentiance.

He has participated to several connected car / telematics projects, for example:

- For a large engineering group, he **analysed telemetry-related market opportunities**,
- For **Faurecia**, Chirag led **multiple data analytics projects**,

- For an analytics platform provider, **defined its strategy in the connected car markets.**

Chirag has also done extensive research about shifting paradigms towards **electro-mobility**, notably the EU electric charging infrastructure ecosystem. He also led our **2019-2030 global automotive market forecasts**.

Chirag led our forecast of the VDH market across 8 verticals, 3 continents and 3 stakeholder categories.

Filippo Frezet
Business Analyst, Brussels

Filippo has gained experience from organisations such as the European Commission, KPMG or start-ups.

For the **European Commission**, he participated in the **HELP 112 project** to evaluate the cost and benefits of implementing AML geo-location across European emergency services.

For KPMG, he led a research on the most tax efficient way to invest in the Italian real estate market for private investors.

As a Business Analyst for Quibee, an Italian start-up operating in the proximity marketing field, he led the business plan development.

For the Italian startup accelerator Build It Up. He helped 2 early stage start-ups in their business plan structuring and valuation.

Filippo led our analysis of VDH technology and supply environment.

OEMs must move from data monetisation to... mobilisation

- With close to **600 million embedded devices installed in cars worldwide in 2030**, the flow of data triggered by digitalisation will not spare the automotive industry
  - While new cars already embed some 100 sensors today, **AVs will add up to 30 new sensors generating data outside the car**
  - Car data from 130 million embedded devices are already being collecting today

- **As data is becoming the oil of this new economy, 7 key questions are emerging**:
  - What data is being produced by cars?
  - Who can collect this data?
  - What is the quality of this data?
  - Who can the data be shared with?
  - What use cases can be met with this data?
  - What value can this data unlock?
  - And last but not least, will the exchange terms be fair for all parties?

- As seen in both EU and US regulatory debates, data is viewed as a treasure and co-operation is not obvious
  - **The battle for data between OEMs, tier-1 suppliers and the aftermarket** is already a long story: Right to Repair, threats to prevent access to the OBD port, Extended Vehicle initiative, etc.
  - **The ambition of the European Commission to regulate the matter could set the example for the world**, as has been the case of GDPR

- **OEMs,** assembling and connecting all sensors, **control the major asset and wish to keep the largest part of the cake**
  - Only **20% of the 15 OEMs profiled in our report are willing to partner with a variety of data hub suppliers**
  - And **half are opening to partnerships** but only for key use cases
  - **They see most of the value in internal use cases** to improve their products, the consumer ownership and the driving experience
  - **Selling data to third parties is perceived as the least valuable tier for most of the OEMs!**

- The aftermarket has already developed its own solutions, controlling access to sets of car data, removing this revenue stream from OEMs

- **Our analysis shows that the market potential relies on auto makers' maturity and willingness to share valuable connected car data**
  - They have to switch from keeping the data under wraps to sharing it and leveraging its new economy-value
  - But most **OEMs don't know how to monetise their customers' car-data and while regulation still has not been settled, they are not clear on the right direction** and prefer not to move

- **Our analysis of 15 OEMs** shows that
  - **A very small number of OEMs are mature enough to embrace the data opportunity**
  - **Most already have experience with chosen service providers** and start understanding the car data market
  - Some remain very shy towards third parties

Will VDHs allow OEMs to transform from manufacturers into data platforms?

- **OEMs are moving but not fast enough and are running the risk of being submitted to a very constraining regulation** or losing the control of data to tech giants

- In the midst of this unclear landscape, **vehicle data hub suppliers could be the catalysts reconciling all stakeholders:**

  - They propose to aggregate very diverse data from multiple sources and to deliver easy-to-use data sets to a very large number of stakeholders

  - Still experimenting business models, clarifying their positioning and value propositions in an unclear regulatory landscape, **VDHs are building a reliable model for the OEMs, and offering a single access point to a fragmented and complex sourcing environment for service providers**

  - **Despite a strong acceleration since 2018, this industry is new and VDHs still need to reach scale and convince OEMs to open the door wider**

- Of the 15 OEMs we have analysed,

  - **5 have strong connected services capabilities and are actively pursuing a data sharing strategy**

  - Another 5 have some established data sharing capacity for third parties and data hubs to deliver services

- **Based on our analysis of over 10 VDHs, we expect them to become established intermediaries in an open, regulated market**

  - **The EU neutral server set up shows to be attracting most OEMs** to start experimenting, building trustful partnerships and ramping up to multiple market places rapidly

  - **Large US-based TSPs are focusing on the data hub set up** from one-to-one relationships based on aftermarket solutions to a multi-sided platform ingesting OEMs data directly

- **PTOLEMUS forecast shows that the market created by connected car data through a VDH will reach €301 billion in 2030**

  - The bulk of it will be repair and maintenance, fuel payments, insurance and shared mobility

  - These 4 markets will represent **66%** of the global connected services market in 2030

- By 2030, we forecast the revenues generated by market places to be split between all stakeholders:

  - **€12 billion directly for car makers**

  - **€301 billion for all service providers** (including OEMs)

  - **€4 billion remaining for VDHs**

- In our view, **VDHs are probably the last option for OEMs to become data-centric platforms**

  - To succeed, a platform requires scale

  - There will be room for no more than 3-5 suppliers in 5 years

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The report tackles numerous strategic questions

What are the different models of car data hubs?

Will drivers accept to share their data with third parties?

How do different data hubs compare?

Will Europe mandate Neutral Servers?

What is the business model for OEMs?

How to scale data hubs?

Who are the most advanced OEMs?

What is and will be the market size?

Can OEMs do without data hubs?

What are the key vertical markets?

How to make data hubs take off?

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Table of contents

These are the 6 key areas analysed throughout the report

What is the opportunity for car data?

How are OEMs* reacting to car data sharing?

Where does regulation lead to?

What solution do VDHs* offer to OEMs & VSPs*?

What will the impact of VDHs* be?

What is the size of the connected car data market?

We first identify what car datasets are made available today

We first listed what datasets* are available today, both static and dynamic

We then identified which stakeholders control these datasets*

Finally, we investigated which stakeholders control the largest number of critical datasets*

What car datasets are available today?

Static data

Driver data
- Name
- Age
- Gender
- Contact details
- MVR records
- Background check
- Etc.

Vehicle data
- Brand / Make
- Model
- Year
- Body
- VIN
- Registration
- Engine size
- Power
- Fuel type
- Etc.

Fleet data
- Fleet account address
- Fleet manager
- # of vehicles by type
- Vehicle ownership
- Company type
- Etc.

Dynamic data

Contextual data
- Exterior temp
- Ambient pressure
- Weather
- Traffic
- Road category
- Time
- Speed limit
- Idling
- Etc.

Vehicle health data
- DTCs
- Maintenance need
- Battery level
- Coolant temp
- Light status
- Oil temp
- Oil pressure
- Tyre pressure
- Fuel level
- Etc.

Driver data (dynamic)
- Claims history
- Fatigue
- Health record
- HoS
- Distraction
- Etc.

Driving data
- Location
- Speed
- Mileage
- Acceleration
- Braking
- Cornering
- Crash
- Etc.

In-cab data
- Nb passengers
- Navigation
- Seat belts
- Etc.

Transaction data
- Ship from address
- Destination address
- Invoice #
- Order #
- Product code
- Commodity code
- Product description
- Quantity
- Unit measure
- Extended amount
- Freight amount
- Duty amount

Which players control of the data points?

Who controls the fleet cars' key data points?*

Legend:
- Fleet data
- Driver data (dynamic)
- Vehicle data
- Contextual data
- Driver data (static)
- Driving data
- Vehicle health data
- Transaction

Chart categories (x-axis): OEMs, Google, Fleet TSPs*, Fleets, Leasers / FMCs, Fuel card providers, Workshops, Insurers

- **OEMs are generating the largest number of key datasets**

- Fleet TSPs also can generate rich datasets

- Google has a strong position, though it is not providing car data from the vehicle system itself but rather smartphone collected data

Source: PTOLEMUS - Note: (*) Measured as number of key data sets controlled by main actors, TSPs: Telematics service providers, FMCs: Fleet Management Companies

What data generates the most interest?

Demand for connected car data by category

Legend: Leasers / FMCs* | Fleets | Fleet TSPs | Insurers | OEMs | Oil companies | Retailers | Google

Categories:
- Vehicle data
- Vehicle health data
- Driving data
- Contextual data
- Fleet data
- Transaction
- Driver data (dynamic)
- Driver data (static)

Source: PTOLEMUS - Note: * Fleet Management Companies

We secondly evaluated the market potential for car data

We identified key unmet customer needs*

We analysed how many datasets sellers offer and buyers need

We crossed analyses and estimated which data can be beneficial to the buyers

We list some of the use cases and benefits of sharing car data

We identified key use cases improving significantly the user experience

We identified the data requested and available to meet each use case

We assessed the key benefits to data users
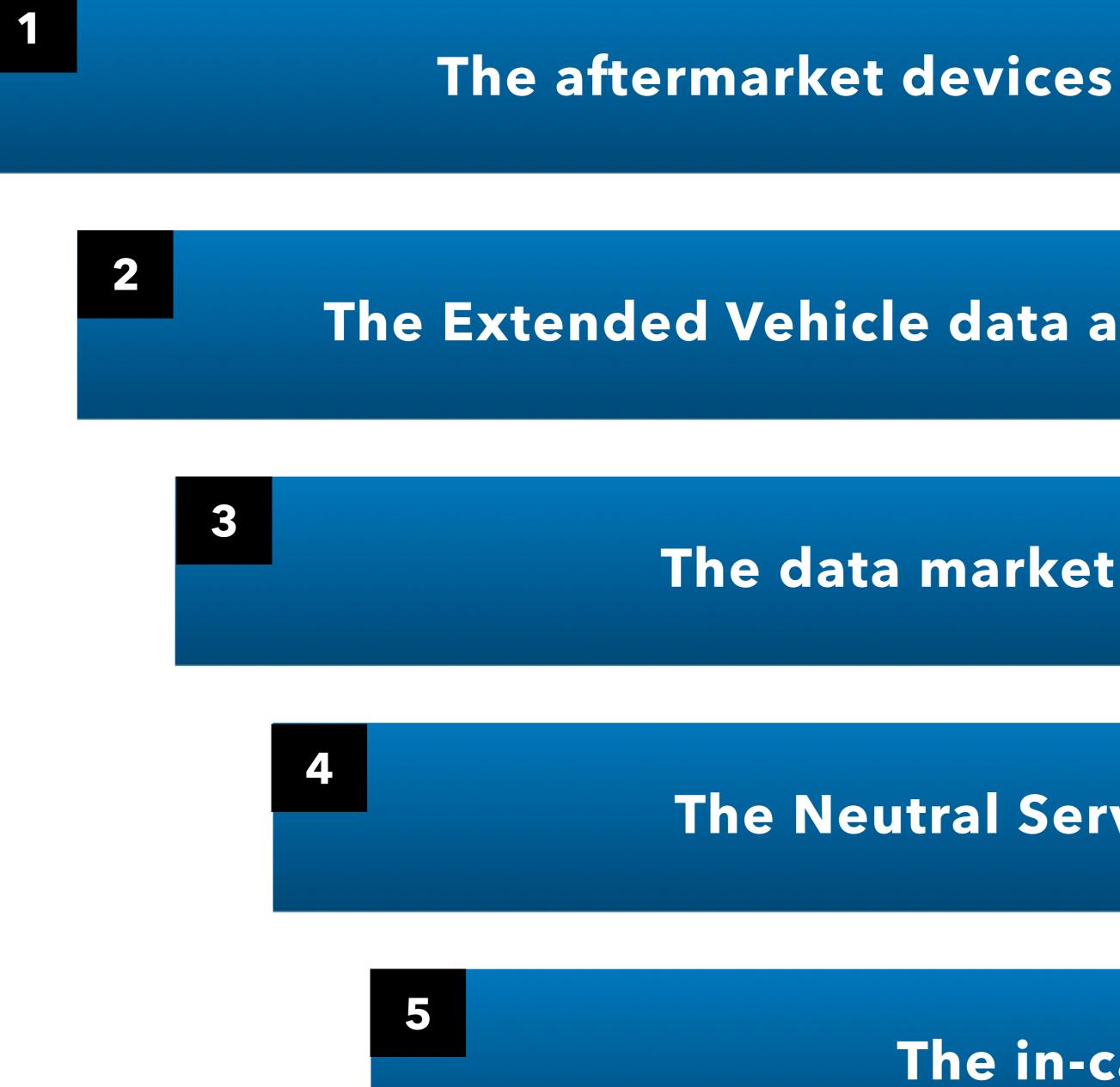
5 approaches are being developed to facilitate a take off of connected car data sharing

1 The aftermarket devices

2 The Extended Vehicle data architecture

3 The data market place

4 The Neutral Server initiative

5 The in-car interface

Source: PTOLEMUS

The market of car data sharing could shift from aftermarket solutions to embedded solutions

How OEMs can widen the opportunity of embedded devices
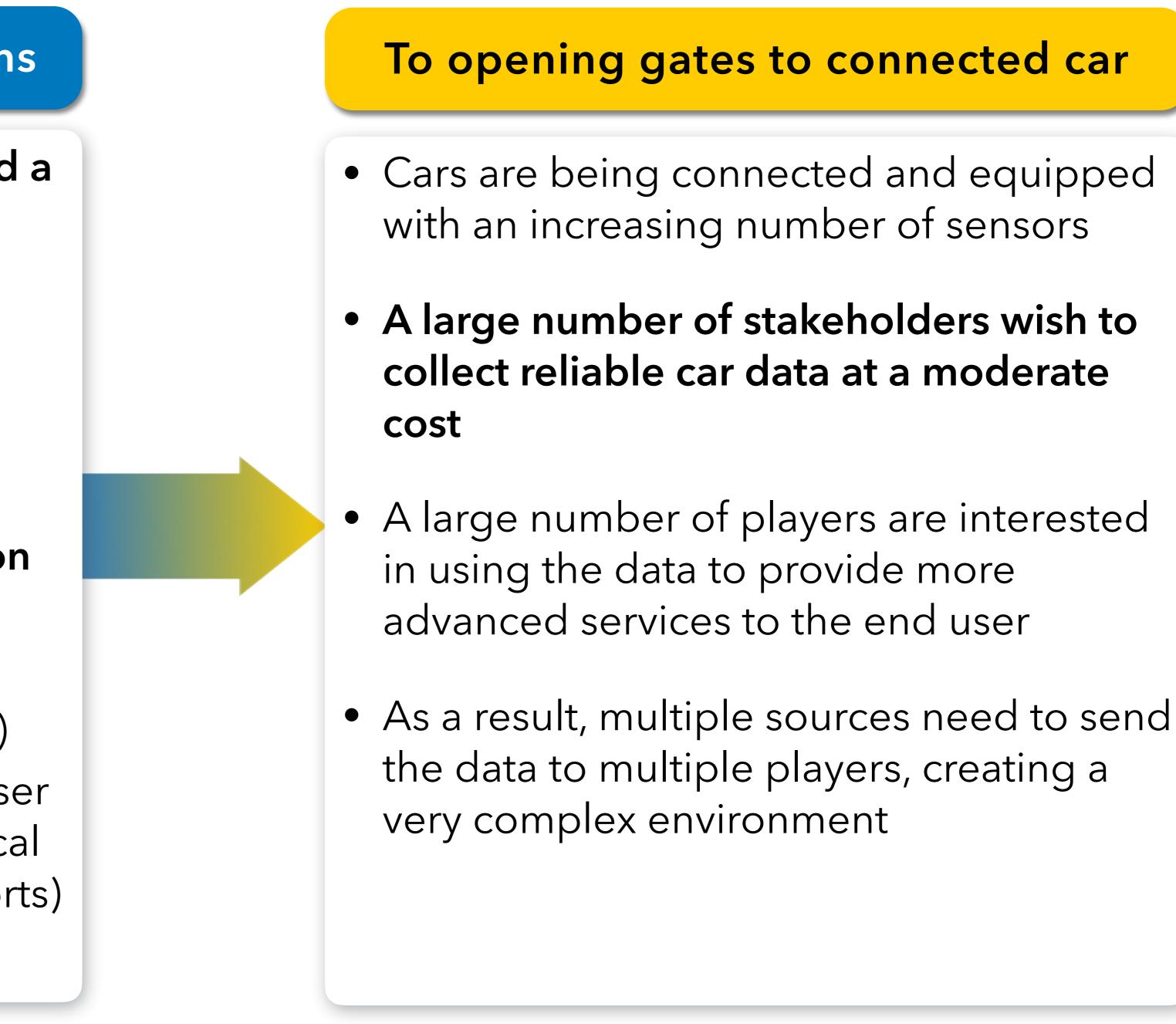
From aftermarket installed solutions

- **Until recently, the OEMs had not found a business case to share car data**
  - Cars were not connected
  - Connectivity was too pricey
  - Users were not ready to pay for connected data

- **Thus the collection of car data relied on aftermarket telematics devices**
  - Creating new cost items (device sourcing, installation, connectivity,…)
  - Resulting in complexity, unfriendly user experience and sometimes impractical situations (e.g. unaccessible OBD ports)

To opening gates to connected car

- Cars are being connected and equipped with an increasing number of sensors

- **A large number of stakeholders wish to collect reliable car data at a moderate cost**

- A large number of players are interested in using the data to provide more advanced services to the end user

- As a result, multiple sources need to send the data to multiple players, creating a very complex environment

In the traditional paradigm, sharing data did not make sense for car makers

How OEMs can use car data sharing to establish a new paradigm

Traditional OEM paradigm

✳ Deliver a product

✳ Relatively low margin on cars sold

⭐ **High margin on repair**

✳ Limited lifetime relationship with customers (usually maximum during the warranty period)

Source: PTOLEMUS

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But the good old days are over…

How OEMs can use car data sharing to establish a new paradigm

Traditional OEM paradigm

* ✳ Deliver a product
* ✳ Relatively low margin on cars sold
* ⭐ **High margin on repair**
* ✳ Limited lifetime relationship with customers (usually maximum during the warranty period)

Mounting challenges

* ✳ Environment changes
* ✳ Strengthened emission guidelines
* ✳ Move towards electric (reengineer motors, no infrastructure)

* ✳ Move toward AVs (cost of development)
* ✳ Cities moving away from the car paradigm (MaaS, speed limits, forbidden diesel, limited parking opportunities)

* ✳ Move away rom car ownership (shared mobility, MaaS, new generation not car focused, ageing of new car buyers)
* ✳ Tech giants invading automotive

OEMs currently compensate with
* ⭐ **Move towards SUVs**
* ✦ **Industry consolidation**

But this cannot last…

Vehicle data sharing must enable the OEMs' transition to a new business paradigm

How OEMs can use car data sharing to establish a new paradigm

Traditional OEM paradigm

* ✳ Deliver a product
* ✳ Relatively low margin on cars sold
* ★ **High margin on repair**
* ✳ Limited lifetime relationship with customers (usually maximum during the warranty period)

Future OEM paradigm

* ★ **Deliver an experience**
* ★ **(Much) larger share of recurring revenues**
* ★ **Less OEMs, controlling the platform** (hardware, software, apps / services, financing)
* ★ **Longer service lifetime** and much increased retention for new car purchase

Mounting challenges

* ✳ Environment changes
* ✳ Strengthened emission guidelines
* ✳ Move towards electric (reengineer motors, no infrastructure)

* ✳ Move toward AVs (cost of development)
* ✳ Cities moving away from the car paradigm (MaaS, speed limits, forbidden diesel, limited parking opportunities)

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* ✳ Tech giants invading automotive

OEMs currently compensate with
* ★ **Move towards SUVs**
* ✦ **Industry consolidation**

But this cannot last…

We have identified 9 main challenges that impact OEMs' willingness and ability to share data

Risk aversion

Technical immaturity

Build an ecosystem

Slow business transformation

What are the challenges around sharing data?

Manage safety & security

Lack of understanding value

Manage privacy & compliance

Find the business model

Create a customer experience / sell cars

VDHs collect data from OEMs and transform it into data, insights or even complete solutions

Definition

A vehicle data hub (VDH) is an entity that offers easy access to **harmonised vehicle data** and/or **analytics** and/or **solutions to third parties**

Structure

Legend: Data flows ➡ Data 🟢 Indexing ▭

DATA PROVIDERS

Data provider 1
Data provider 2
Data provider n

VDH

A
B
C

Data

Analytics

Solution

DATA CONSUMERS

Data consumer 1
Data consumer 2
Data consumer 3

Players

AAADATA | arity® | CARUSO dataplace | LexisNexis® | mojio | otonomo | THE FLOOW | Verisk | wejo

Without data hubs, service providers must establish 1-to-1 relationships with many data providers

The data flow ecosystem without exchange enablers

Without data hubs, each new connection requires a new development & integration, creating complexity

The data flow ecosystem without exchange enablers

- - - > Data request   · · · > Data flow

CONNECTED CAR

Aftermarket   Line-fitted

Other data providers

External developers

This complex one-to-one relationship system shows limits in terms of **efficiency** and **risk consistency** on data type and quality

Multiple OEM platforms

Multiple cloud servers

Service providers

Multiple aftermarket platforms

Multiple cloud servers

B2C   B2B

Vehicle owner

Business customers

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VDHs are placing themselves between data providers and service providers to ease data exchange

The data flow ecosystem with a Vehicle Data Hub

Vehicle data hubs can potentially solve key ecosystem challenges

KEY CHALLENGES TO DATA EXCHANGE

- New developments required
- Highly fragmented market
- Lack of know how in data processing
- Lack of understanding of data value
- Barriers to access data directly
- Cost of the aftermarket solutions
- Diversity of the car data taxonomy

ADVANTAGES OF DATA HUBS

- Focused on data and IT: privacy and security
- Small and agile
- Third party neutrality
- Well funded
- Attracted new generation of data scientists
- Scalability of the model: centralising and standardising
- Experience with vertical service providers

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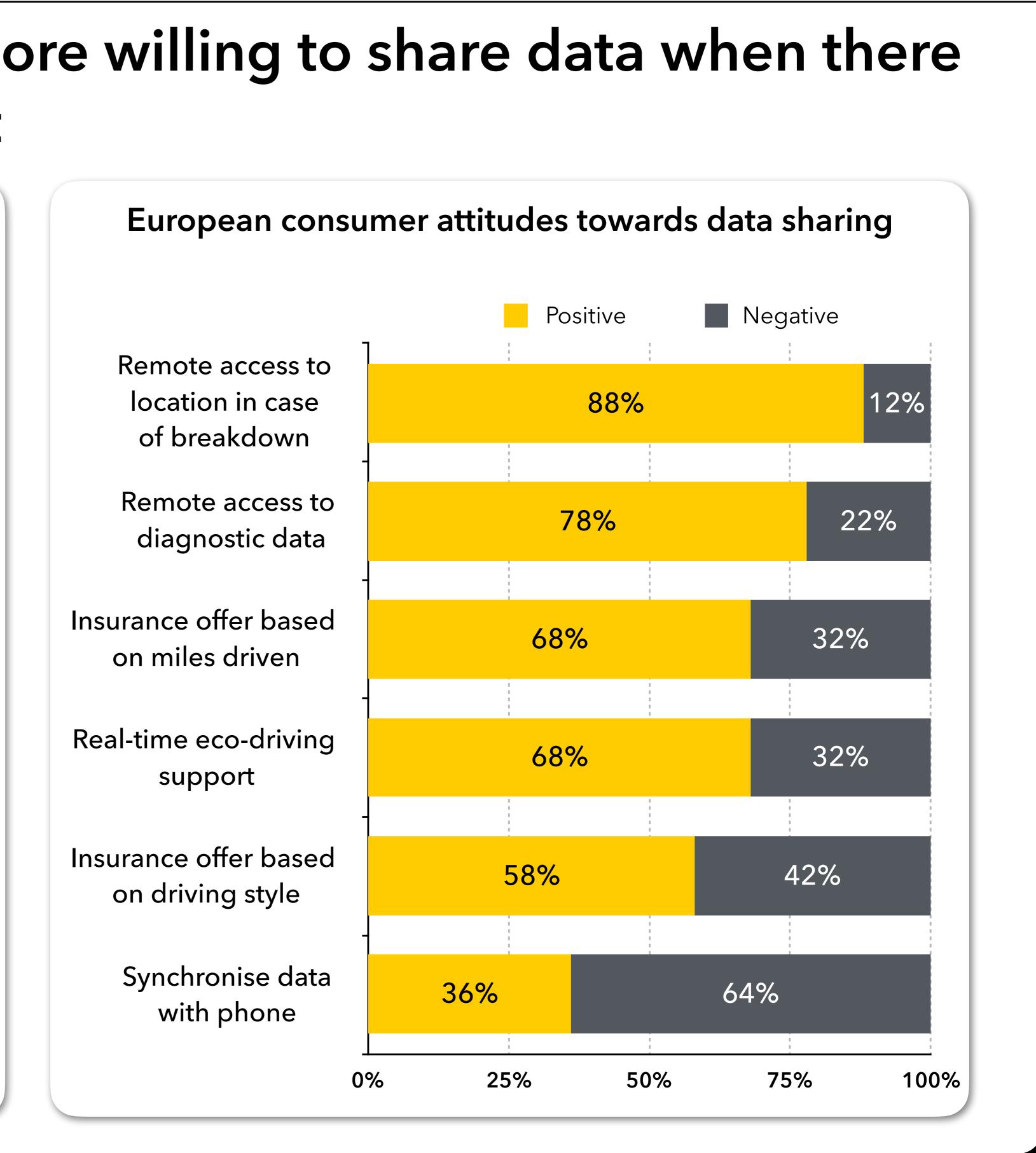
Source: Interviews conducted by PTOLEMUS

OEMs currently see 3 potential tiers of value to generate from their data

Internal use cases

- **Internal use cases to improve the business**, including:
  - Diagnostics data to understand vehicle use and health
  - This data can also be fed back into R&D for future vehicle design
- This is perceived as the **most valuable tier**

Customer-facing services

- Creating **more services and value within their own dealer and services network**
  - This includes e.g. predictive maintenance and scheduled services
- This requires a **shift in business model and operational capacit**y to a **services mode**l
- This internal value for their customers is one reason why OEMs have been hesitant to share data outside select partners and use cases

Selling data

- **Monetising data by selling to third parties on the open market** is being investigated by OEMs at varying levels of maturity
- It is currently still seen as **the least valuable tier**
- OEMs are looking to understand what the value of their data will be

Consumers are more willing to share data when there is a safety benefit

- Consumers are becoming increasingly savvy regarding how their data is used
  - The Facebook-Cambridge Analytica data scandal in 2018 caused a backlash against tech companies that base their business model on data

- What's more, while consumers are used to trade data for services, sharing location data from vehicles could be a trickier sell

- Attitudes to privacy and data use vary by country, as does regulation (*See Section 3D*)

- The FIA* found that **remote location access in case of emergency was the most accepted use of vehicle data among European consumers** (*see right*)

- A survey by HERE in 2019 found that **70% of consumers in 10 markets share their location at least sometimes**, 2% higher than in 2018
  - The increased willingness is clearest in the mobility sector, where **76% of consumers are likely to share location data with navigation, maps, transport and other mobility services**
  - UK citizens are more likely to share location data, while the French and Germans are the least

European consumer attitudes towards data sharing

Legend: Positive (yellow), Negative (dark)

Category	Positive	Negative
Remote access to location in case of breakdown	88%	12%
Remote access to diagnostic data	78%	22%
Insurance offer based on miles driven	68%	32%
Real-time eco-driving support	68%	32%
Insurance offer based on driving style	58%	42%
Synchronise data with phone	36%	64%

The majority of OEMs are at the trial phase of working with data hubs

OEM positioning for data hubs

High

Connected services and data maturity

Low   **Willingness to partner with VDHs**   **High**

Car manufacturers have 5 options to choose from when approaching data sharing

1

Do nothing

2

Create 1-2-1 direct connections with key vertical partners & OEMs only

3

Partner with tech giants

4

Develop own data hub or access

5

Partner with one or several data hubs
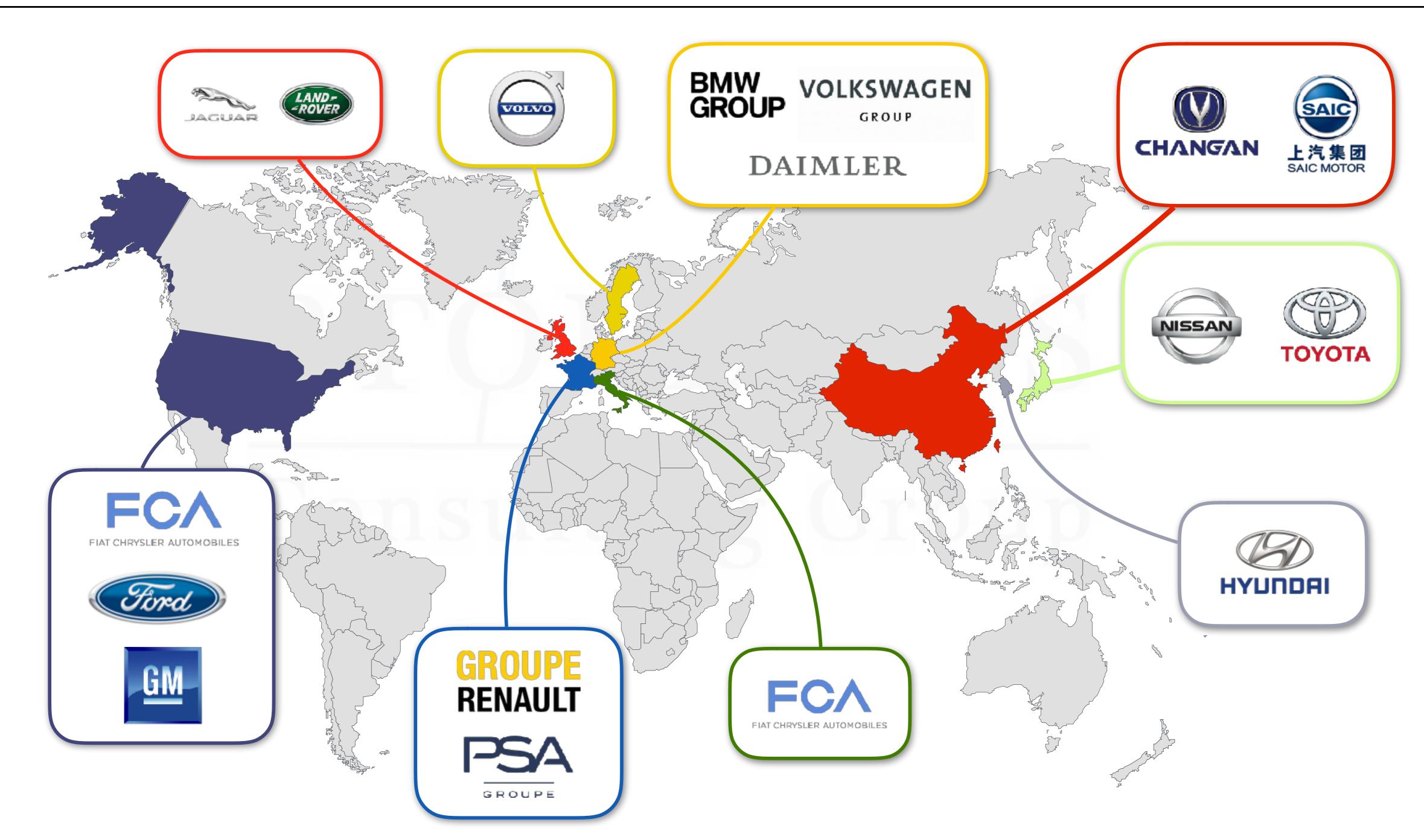
Several OEMs have chosen multiple options simultaneously

Source: PTOLEMUS

We have investigated 15 car makers on their data sharing strategy

OEMs analysed and profiled

We detail 7 case studies of OEMs actually sharing data

Implementation case studies (1/2)
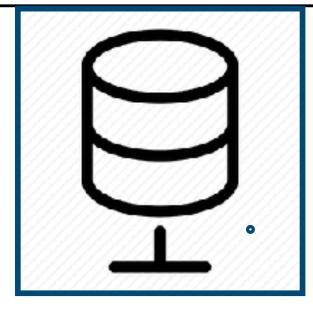
Traffic & navigation

Parking

Predictive assistance

OEMs

Roadside assistance

We detail 7 case studies of OEMs actually sharing data

Implementation case studies (2/2)

We analyse 9 major vehicle data hubs in depth

VDH profiles

We represent the vehicle data ecosystem using a 5-step technology chain

Vehicle data technology chain

RAW DATA PROVISION

- Data generation
- Capture of vehicle generated data:
  - Line-fitted solution
  - Aftermarket solution
- Data supply

DATA ANALYSIS

PROCESSING

- Cleaning
- Harmonisation
- Indexing
- Aggregation
- Summarisation
- Enrichment

ANALYTICS

- Descriptive analytics
- Diagnostic analytics
- Predictive analytics
- Prescriptive analytics

DATA EXCHANGE

- Platform to access data market places
- Data packaging
- Data exchange management
- Billing and revenue recognition
- Security management

SERVICE & PRODUCT DEVELOPMENT

- App development
- App development support through a development environment

SERVICE & PRODUCT OFFERING

- B2B
- B2C
- B2B2C

ENABLING LAYERS

CONNECTIVITY
- Communication network
- SIM provision & activation
- Data transmission
- Security management

IT
- Data hosting
- Integration with back-end systems
- Security management
- Open source data platform services

Several players are positioning on multiple steps

Examples of players along the technology chain

RAW DATA PROVISION	DATA ANALYSIS		DATA EXCHANGE	SERVICE & PRODUCT DEVELOPMENT	SERVICE & PRODUCT OFFERING
	DATA PROCESSING	DATA ANALYTICS			

Enabling layers

CONNECTIVITY — AT&T

IT — Microsoft, aws, IBM, ERICSSON

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OEMs can make up to 8 types of data-related partnerships, only 4 are VDHs

1 Data oriented OEM: eg. **BMW GROUP**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

2 VDH exchange oriented: eg. **CARUSO dataplace**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

3 VDH analytics oriented: eg. **wejo otonomo**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

4 VDH service oriented: eg. **Verisk**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

5 VDH development oriented: eg. **H1**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

6 Service developer: eg. **HARMAN**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

7 Connectivity enabler: eg. **AT&T**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

CONNECTIVITY ENABLER

8 IT enabler: eg. **aws**

| RAW DATA PROVISION | DATA ANALYSIS (DATA PROCESSING / DATA ANALYTICS) | DATA Exchange | SERVICE & PRODUCT DEVELOPMENT | SERVICE & PRODUCT OFFERING |

IT ENABLER

Source: PTOLEMUS - Note: We position the players based on their key current capabilities
All of the VDHs are exploring and developing additional components to add to their offer
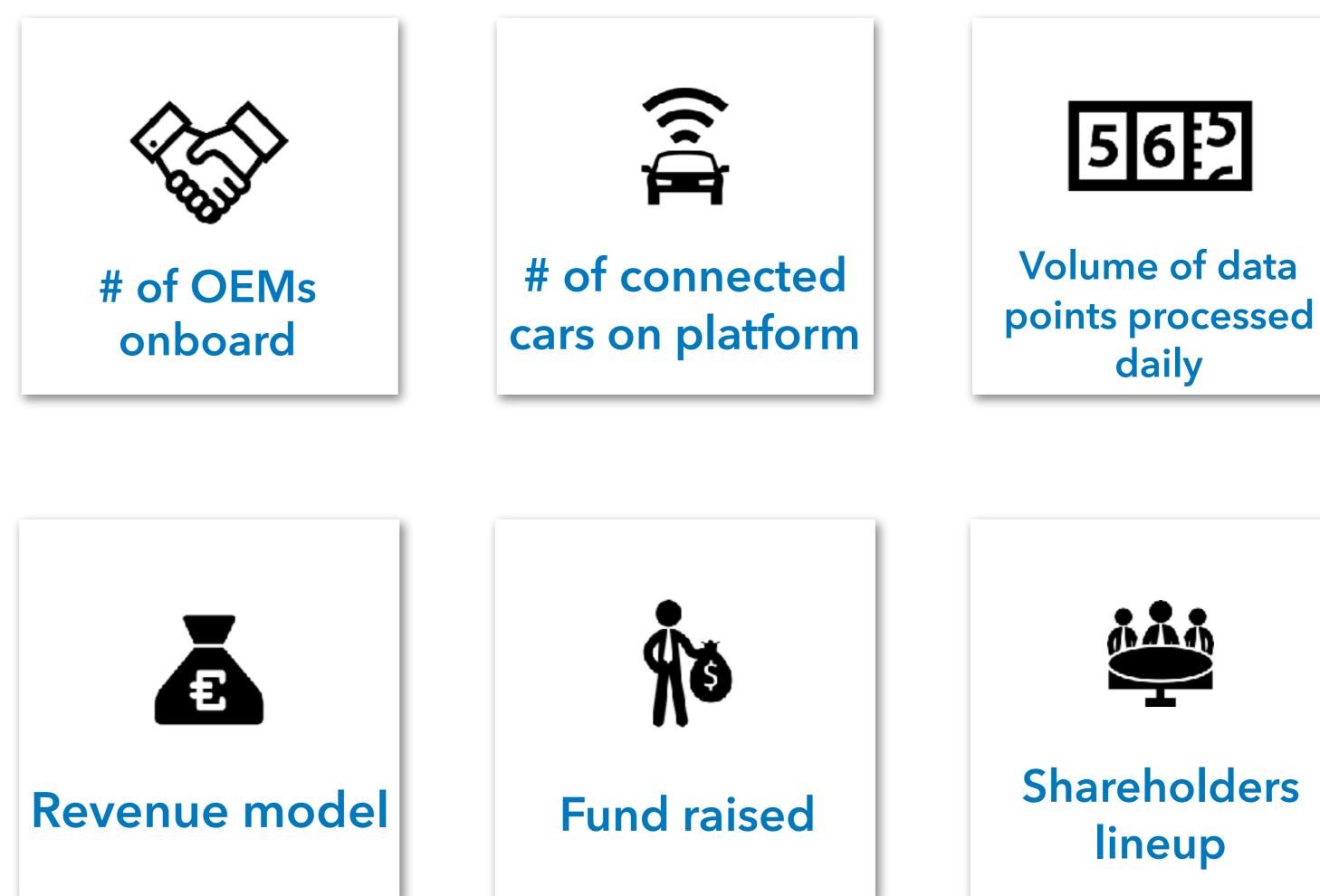
We compare VDH suppliers on 10 different metrics

Comparison criteria

VDH platforms launch timeline	Supported functions	# of OEMs onboard	# of connected cars on platform	Volume of data points processed daily

Covered vertical markets	Geographical coverage	Revenue model	Fund raised	Shareholders lineup

Source: PTOLEMUS

We analyse 7 strategic variables that a VDH has to tackle in order to succeed

Range of vertical markets

Horizontal extent

Vertical focus

Solution focused on specific verticals

Geographical coverage

Global

Local

Network effect

Direct

Indirect

Pricing

Transaction

Subscription

Trust and transparency

Security

Privacy

Relationship with providers and consumers

Disintermediation

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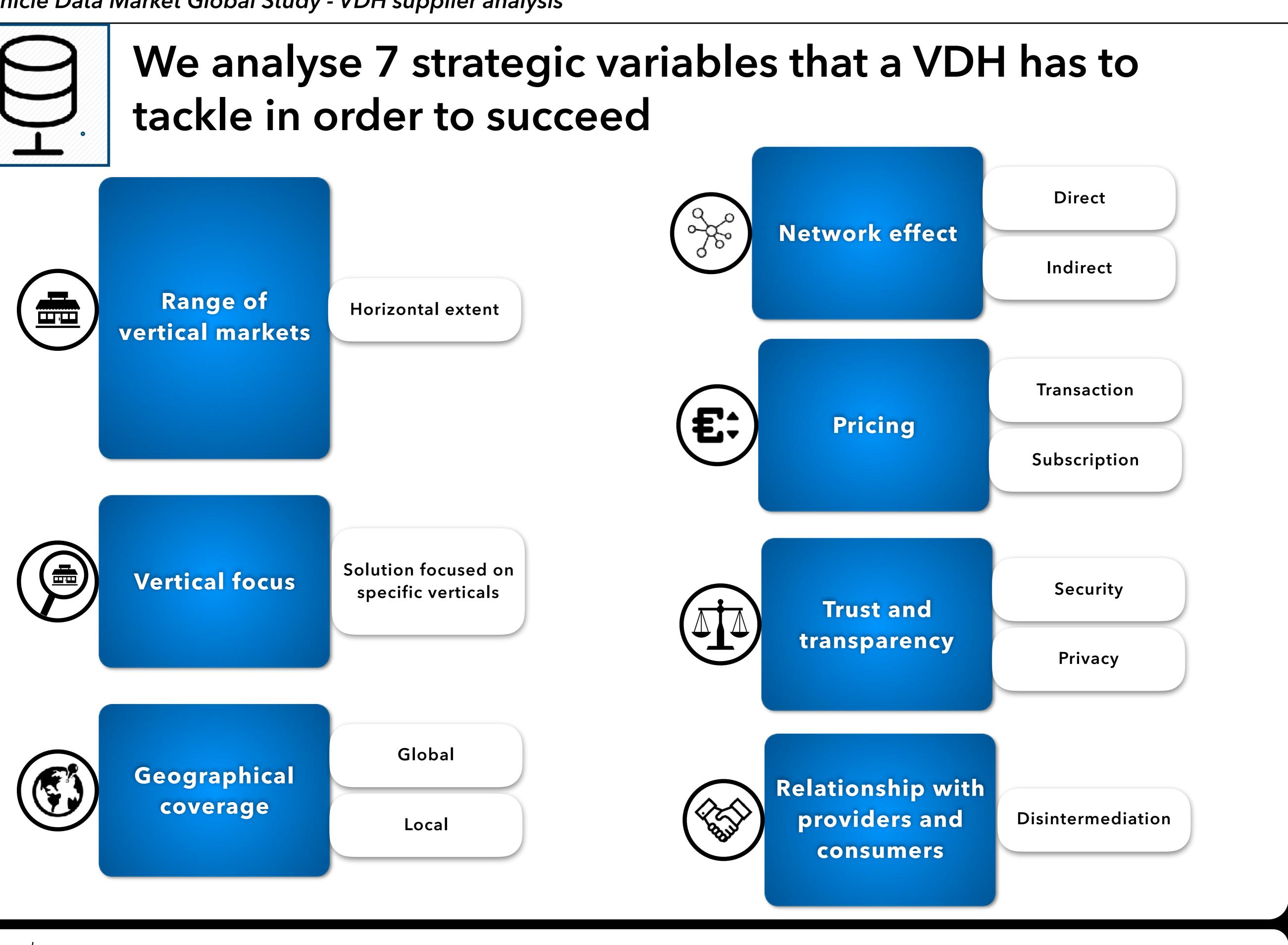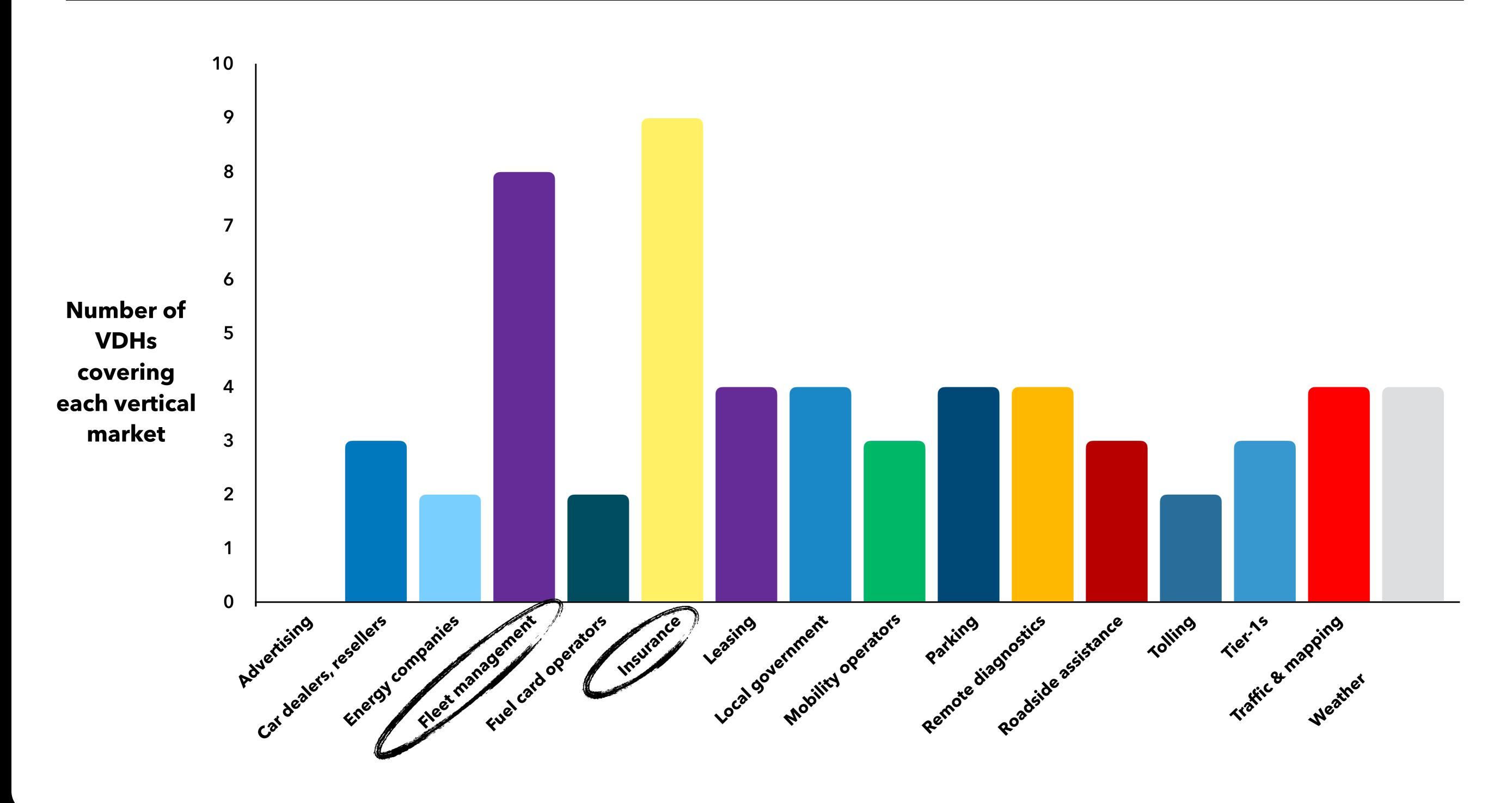
Source: PTOLEMUS

Insurance and fleet management are the most targeted markets by data hubs

Vertical markets targeted by the 9 major VDHs today

Number of VDHs covering each vertical market

Source: Interviews with the VDHs

Most data hubs are covering Europe and North America

Geographical coverage of VDHs per region

■ Currently present   ■ Potential future expansion

	NORTH AMERICA	SOUTH AMERICA	EUROPE	AFRICA	AUSTRALIA	ASIA
CARUSO dataplace			Currently present			
CCC	Currently present		Potential			Currently present *
H1			Currently present			
LexisNexis	Currently present		Currently present			
otonomo	Currently present	Potential	Currently present			Potential
TERBINE	Currently present					
wejo	Currently present	Potential	Currently present			🇯🇵 🇰🇷 🇨🇳
here	Currently present	Currently present	Currently present	Currently present	Currently present	Currently present
Verisk	Currently present	Potential	Potential	Potential	Potential	Potential

Only hubs can allow OEMs to connect to a large number of stakeholders in many industries

OEMs see the opportunity to partner up with multiple VSPs using a VDH

The race to access connected car data will have 3 consequences for VDHs:

- Establishing partnerships with the VSPs, VDHs can scale their offering to the OEMs and to the end users

- Enabling access to a wider range of datasets, VDHs are creating an ecosystem of multiple marketplaces

- Competing with the traditional service providers, VDHs are at an advantage using standardised OEM data

The race has started to connect to car makers

Number of agreements with OEMs

Public **Under NDA**

- Most VDHs are finalising contracts with several OEMs

- Until the on-boarding process is official, contracts remain secret

- **We present here both publicly announced contracts and those under NDA**
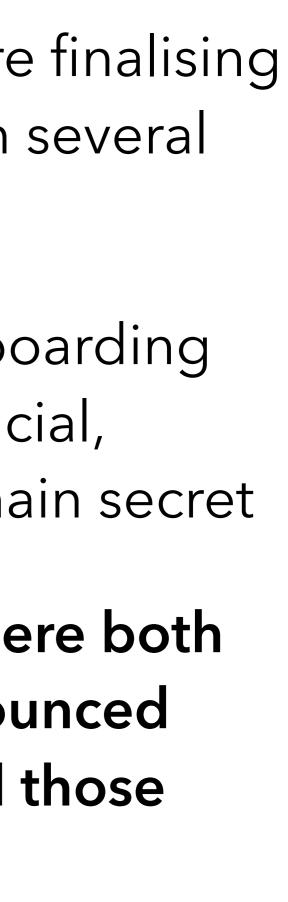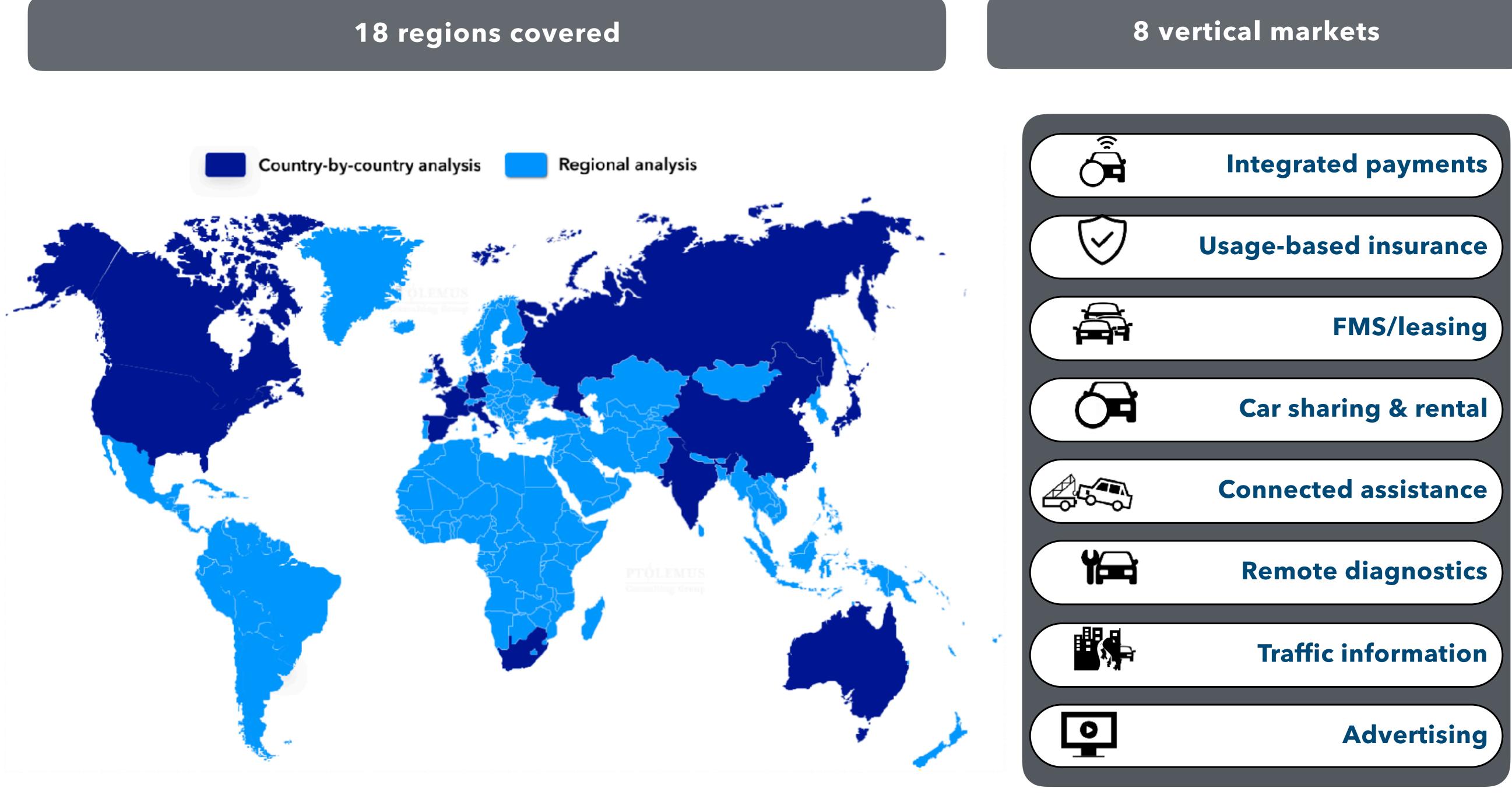
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Source: VDHs

Our market sizing covers 18 regions and 8 verticals

18 regions covered

Country-by-country analysis Regional analysis

8 vertical markets

- **Integrated payments**
- **Usage-based insurance**
- **FMS/leasing**
- **Car sharing & rental**
- **Connected assistance**
- **Remote diagnostics**
- **Traffic information**
- **Advertising**

Our forecast analyses the growth and penetration rates of VDHs for both private and company cars

Scope of market forecast

Africa

Asia-Pacific

Europe

Latin America

North America

Passenger car market

Privately owned cars

Company cars

Methodology

- We assessed the **value proposition and the business models** for the VDHs in each vertical market

- We analysed the environment of each sector and consider **competition, technology, demand and regulatory trends**

- The forecast is built in **3 steps**:

    1. We project the **number of connected cars** addressable for each service*

    2. We assess the **penetration of VDHs** for each connected service

    3. We estimate the **average revenue per car** for each service

Source: PTOLEMUS - Note: * It may differ between each service, as an OEM connected device may not support all applications

We have forecast the VDH market for 10 verticals and 3 stakeholder categories

- PTOLEMUS has made a **bottom-up estimate and forecast of 10 connected car services worldwide**

- We analyse the connected car services and the economic impact for **3 categories of players**:

1. **Original Equipment Manufacturers (OEMs)**
   - The car manufacturers **who install embedded telematics devices in the vehicle**
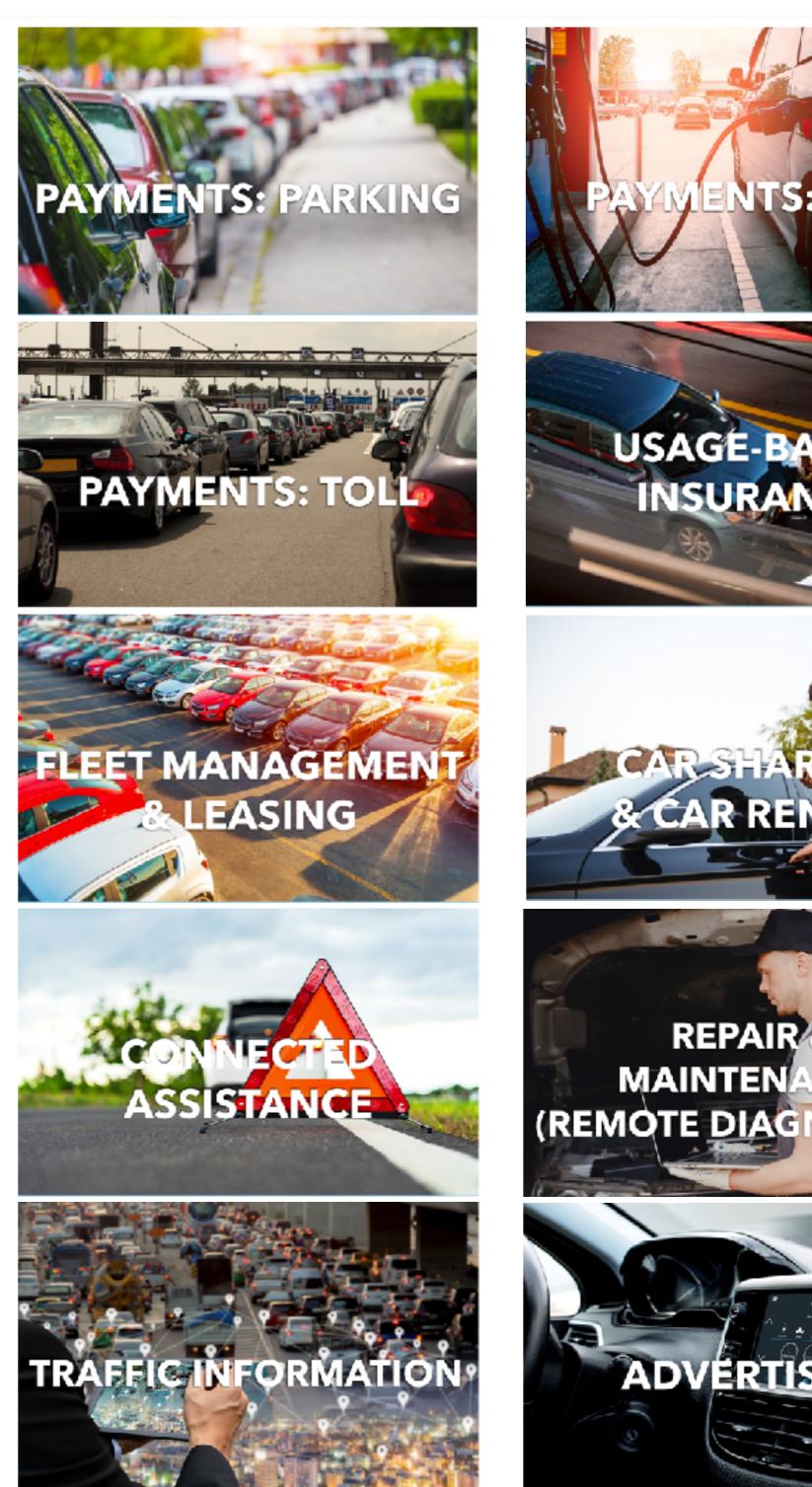
2. **Vehicle Data Hubs (VDHs)**
   - **Liaise with the OEMs** to advise them on the quality and value of their data
   - Manage/monetise the data and **builds the market**
   - Can be **specialised in one service** (e.g. Verisk or LexisNexis for insurance) or generalists **managing end-to-end relationships** for several verticals (wejo, Otonomo)
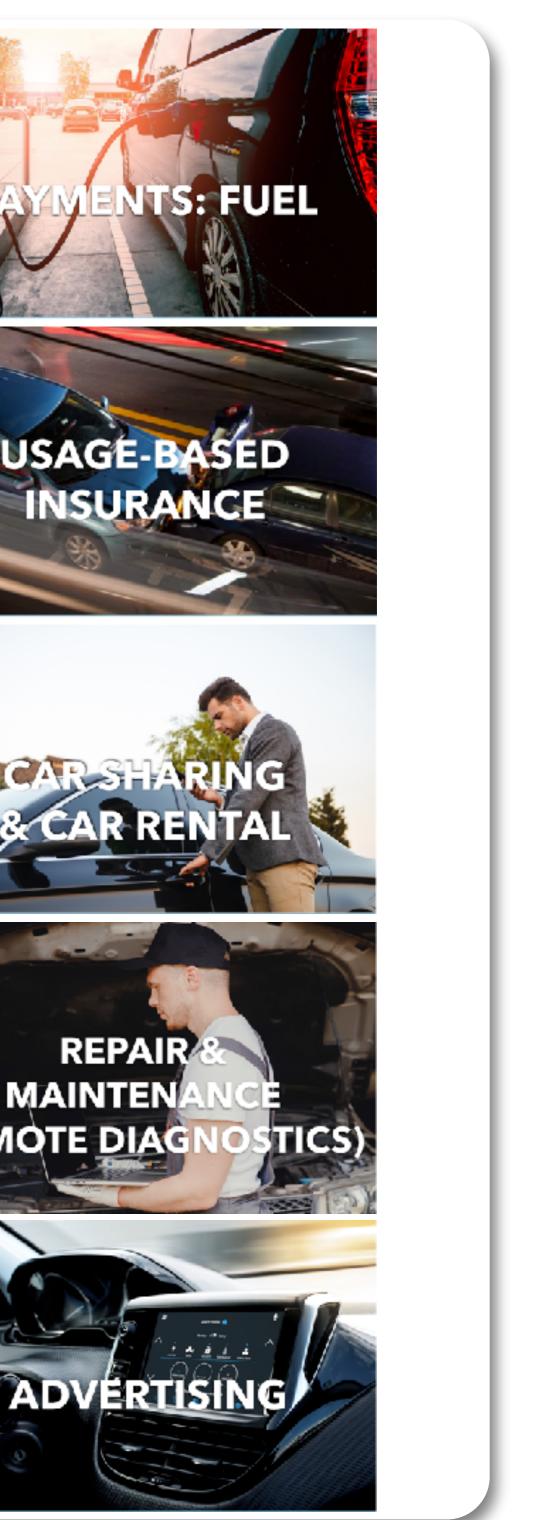
3. **Vertical Services Providers (VSPs)**
   - Offer to end-customers the **services listed** beside

PAYMENTS: PARKING

PAYMENTS: FUEL

PAYMENTS: TOLL

USAGE-BASED INSURANCE

FLEET MANAGEMENT & LEASING

CAR SHARING & CAR RENTAL

CONNECTED ASSISTANCE

REPAIR & MAINTENANCE (REMOTE DIAGNOSTICS)

TRAFFIC INFORMATION

ADVERTISING

The car parc is expected to reach 1.3 billion in 2030 while almost 600 million will have embedded devices

Number of cars in use worldwide (million)

Global CAGR
2018-30, 1.2%

Number of cars with embedded telematics (million)

- Africa
- Asia - Pacific
- Latin America
- North America
- Europe

Global CAGR
2018-30, 13.3%

We predict that the total revenues using car data will exceed €300 billion in 2030

Revenues generated from VDHs for the different stakeholders (€ million)

Revenues generated for VDHs and OEMs

VSPs revenues generated through VDHs

We expect VDHs' penetration to grow significantly in all markets, particularly UBI, diagnostics & traffic
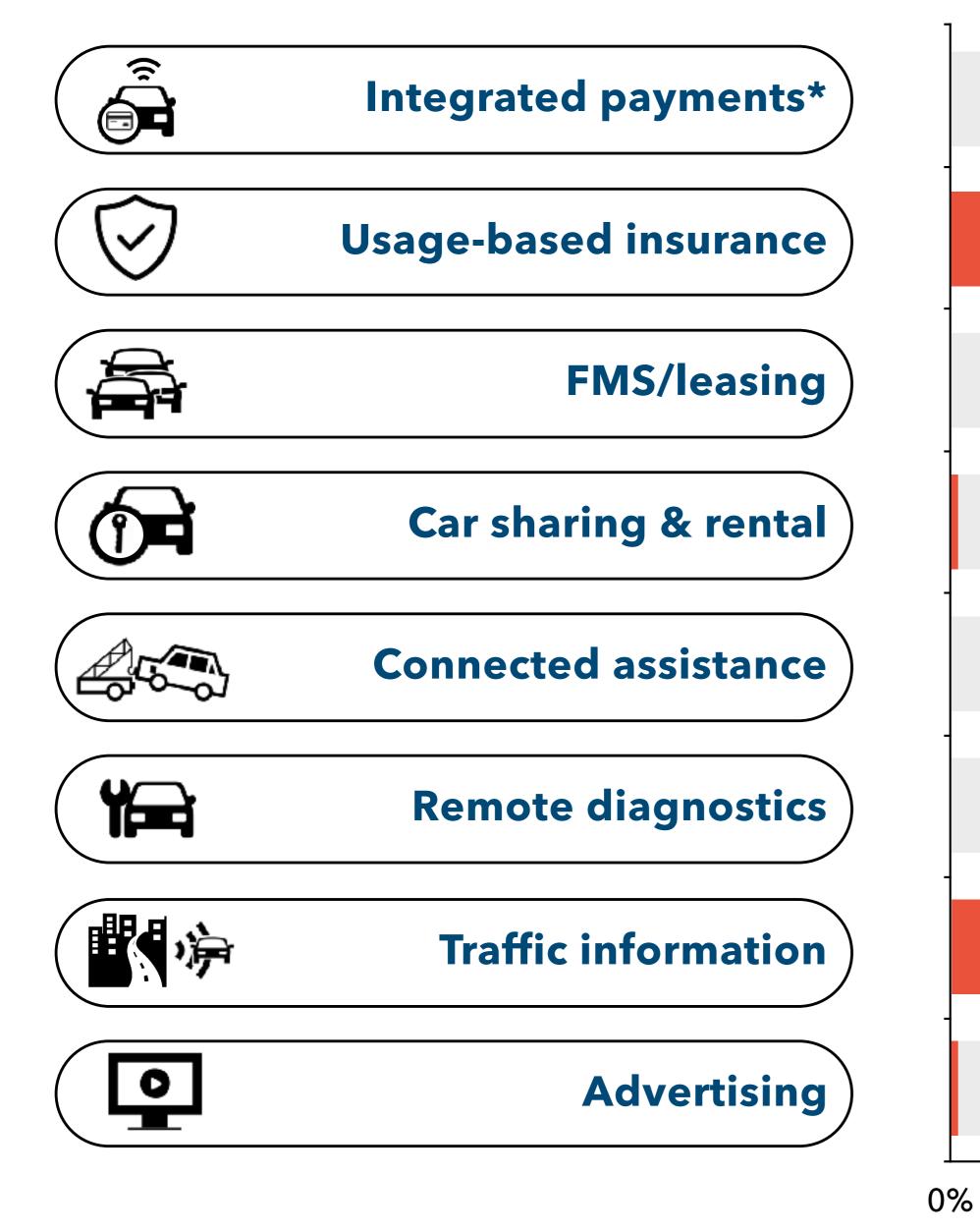
VDHs' penetration in cars in use with embedded connectivity

2020

2030

■ VDH   ■ Rest

■ VDH   ■ Rest

- Integrated payments*
- Usage-based insurance
- FMS/leasing
- Car sharing & rental
- Connected assistance
- Remote diagnostics
- Traffic information
- Advertising

0%   25%   50%   75%   100%   0%   25%   50%   75%   100%

Source: PTOLEMUS VDH forecasts;
Note: Integrated payments considered as tolling for comparison; Note: The addressable market for the services differ

The first global analysis of the connected car data market is now available as a single, worldwide company licence

The facts, figures and analysis... behind the hype

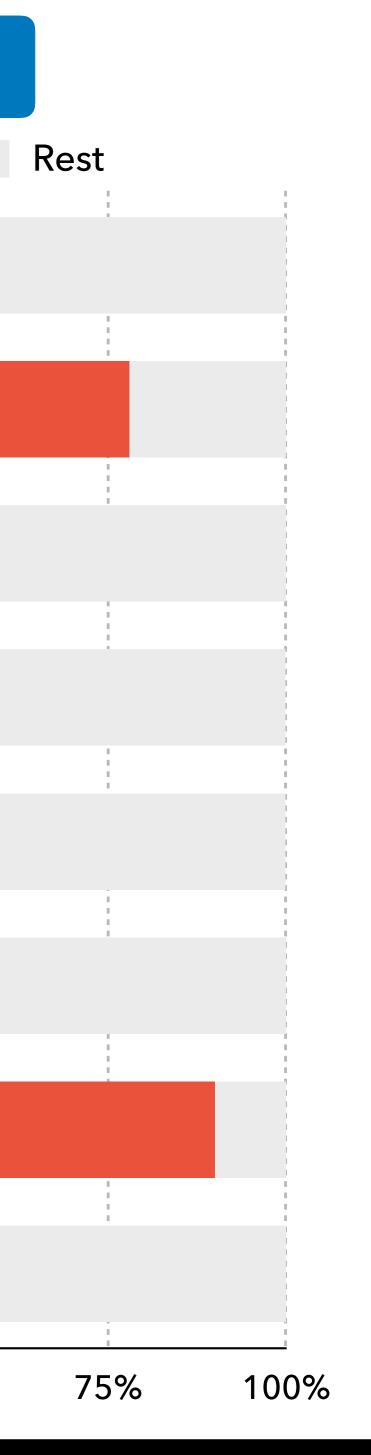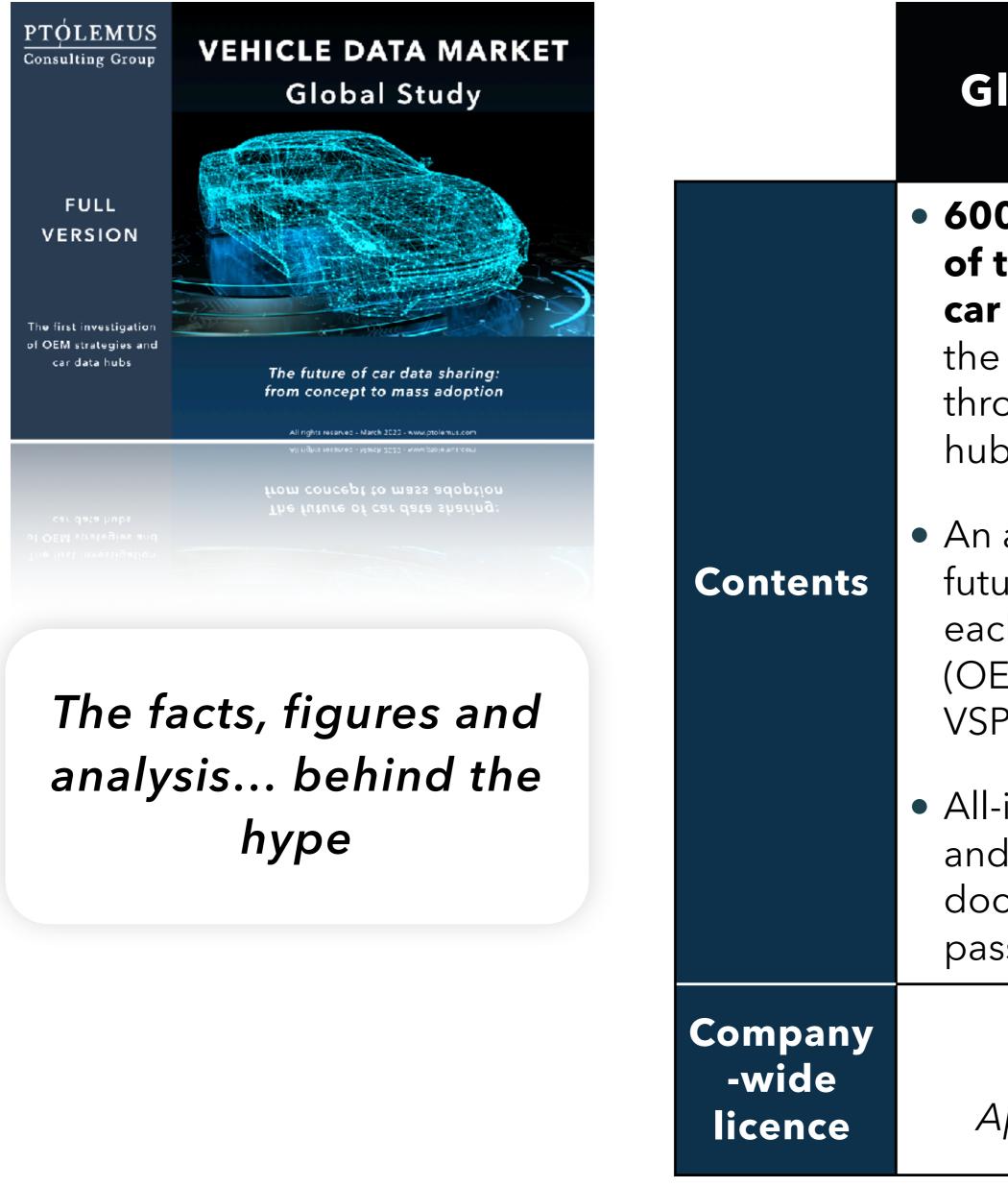|	**Global Study**	**Global market forecasts**	**Global market analysis**	**Data sharing strategy workshop**

Contents	• **600-page analysis of the connected car data market** and the monetisation through vehicle data hubs
	
	• An assessment of the future strategies of each stakeholder (OEMs, VDHs*, VSPs*)
	
	• All-in-one searchable and interactive document (PDF, password-protected)
		• **Excel market forecast outputs** for each of the 8 connected services in 18 countries
		
		  - Nb of connected cars using a VDH
		
		  - Revenues generated by VSPs, OEMs, VDHs
			• **Excel market forecast outputs** for each of the 8 connected services
			    +
			• **Section 5:** in-depth analysis of
			
			  - The impact of VDHs on the 8 business models
			
			  - Outputs and rationales by VSPs, OEMs, VDHs
				• **Half-day workshop in your offices:** the full study presented to your board or strategy team

Company-wide licence	**€ 5,990** *Approx. $6,400*	**€ 1,990** *Approx. $2,100*	**€ 2,990** *Approx. $3,200*	**€ 2,000*** *Approx. $2,100*

To receive more information, contact our research team at <u>VDM@ptolemus.com</u>
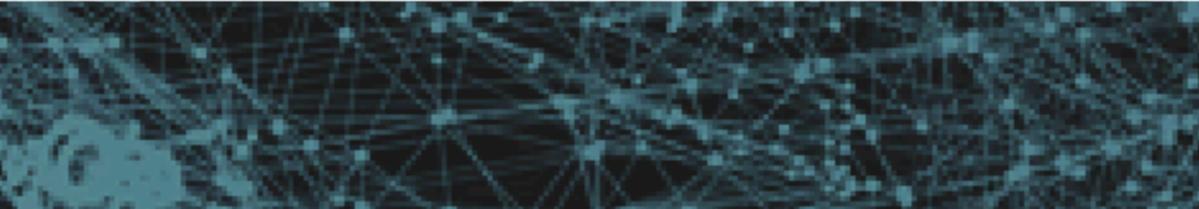
PTOLEMUS Consulting Group

Section 1:
What are the benefits of sharing car data?

A   What datasets can connected cars supply?

B   What is the demand for connected car data?

C   What are the benefits of sharing car data between the different stakeholders?

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Many devices are being used to collect car data

Technologies able to deliver connected vehicle services

Aftermarket

Black box	ISA*
Fuel level sensor	TSP box

OBD device	Tolling/RUC device
ELD	Drive cam

PND	Speed camera locator
Smartphone	Smartwatch

Line-fitted

OEM system	Event data recorder

Semi-embedded system

Vehicle keys	OEM smartwatch

Fixed   **Removable**   **Portable**
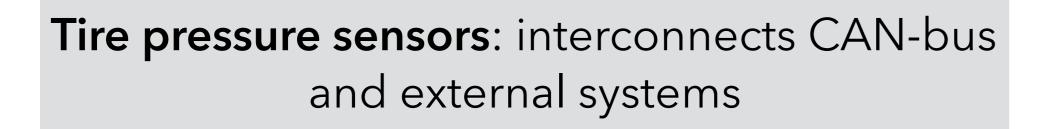
The potential volume of data exchanged naturally increases with the number of car sensors

Example of sensors

CAN-bus: internal communication bridge between Electronics Control Units

Autonomous vehicle LIDAR

DSRC radio: vehicle to vehicle and to infrastructure communication
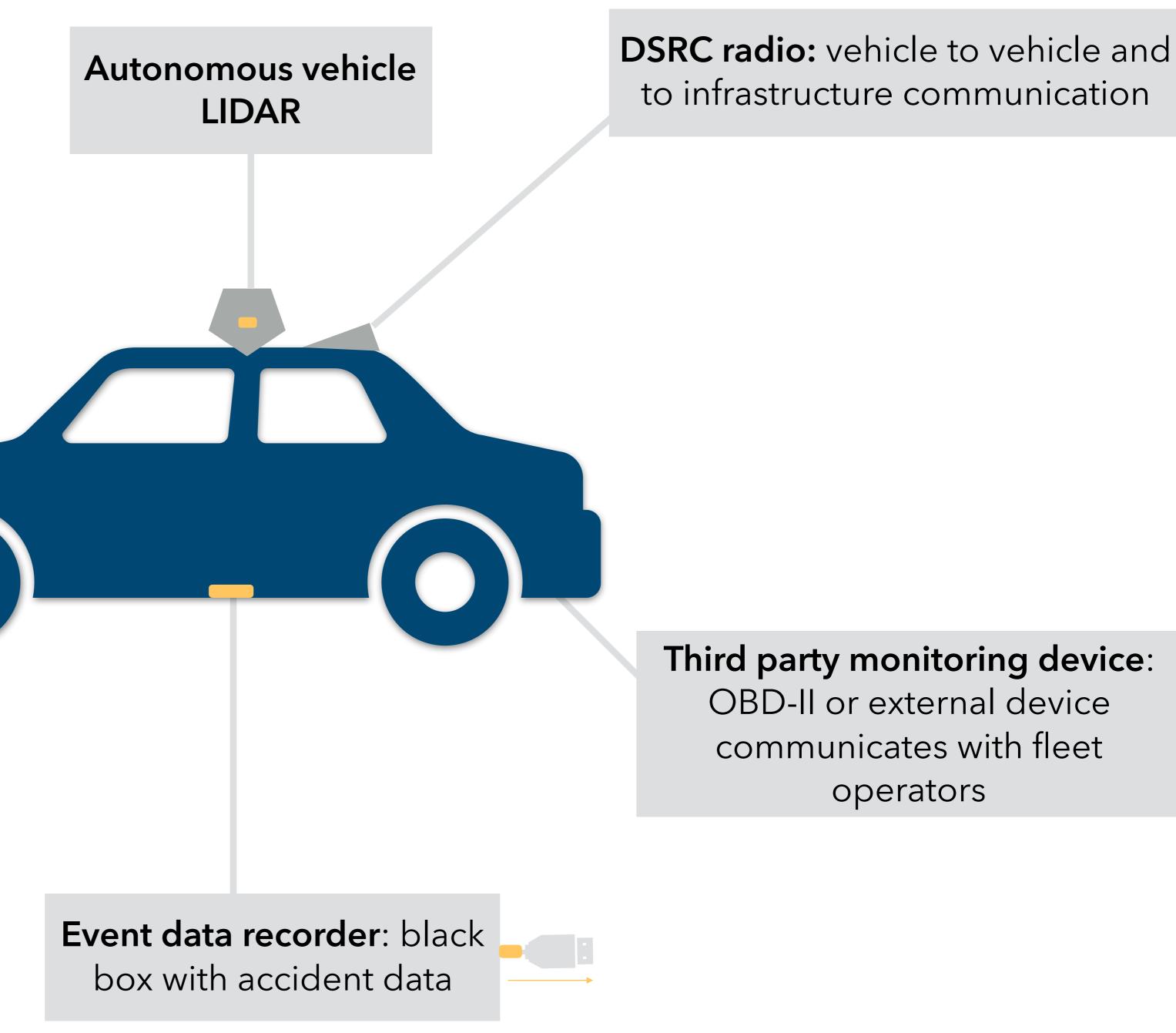
Telematics Control Unit (TCU): interconnects CAN-bus and external systems

Tire pressure sensors: interconnects CAN-bus and external systems

Third party monitoring device: OBD-II or external device communicates with fleet operators

Event data recorder: black box with accident data

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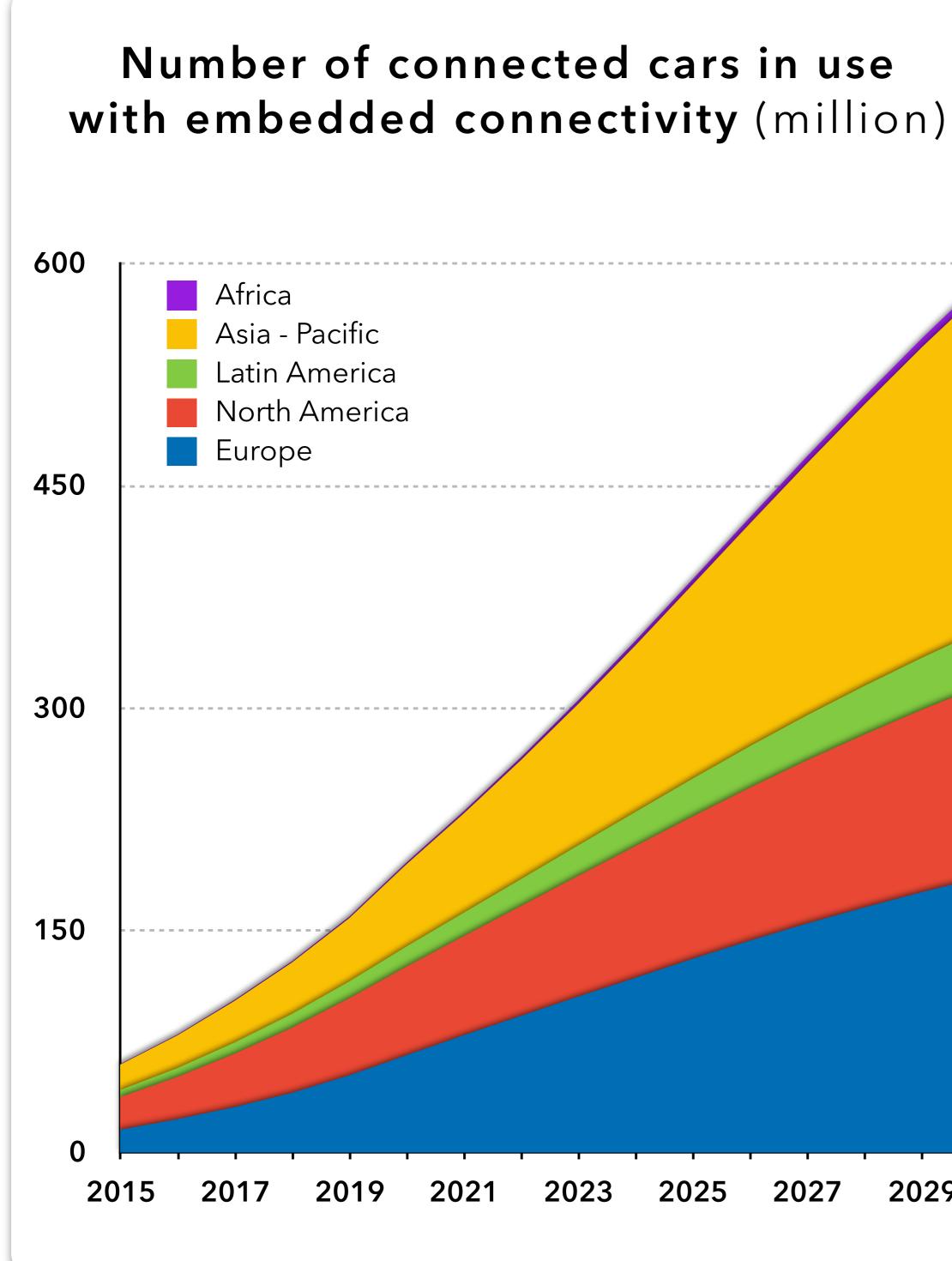
The increasing volume and diversity of car datasets will be an increasing challenge for OEMs

Number of connected cars in use with embedded connectivity (million)

- **We expect the number of OEM embedded devices to reach almost 600 million by 2030**
  - The number of sensors embedded in cars is skyrocketing, generating large volumes of coding lines and data
  - Since April 2018, all new car models in Europe are connected due to the eCall mandate
  - 4G and 5G are expected to lead to a substantial decrease in the cost / Mbit of connectivity

- **The vast number of car models produced each year** - often built on different platforms from many OEMs - **is generating heterogenous datasets, therefore creating complexity for car makers**

Section 1: What are the benefits of sharing car data?

A — **What datasets can connected cars supply?**

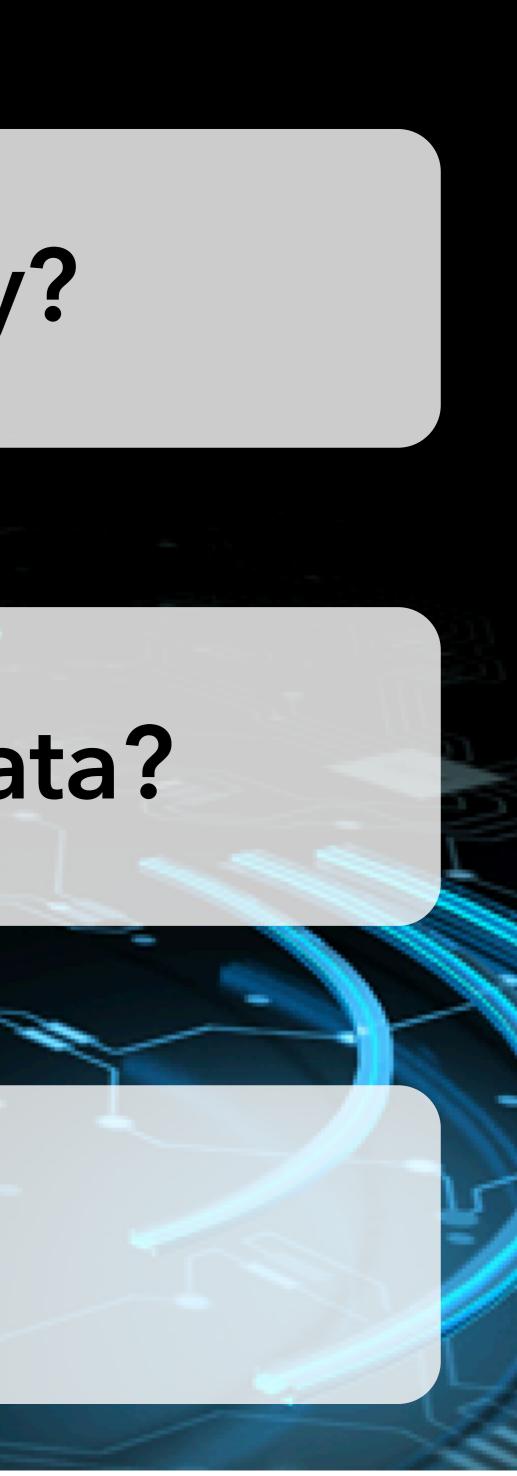**B** — What is the demand for connected car data?

C — What are the benefits of sharing car data between the different stakeholders?

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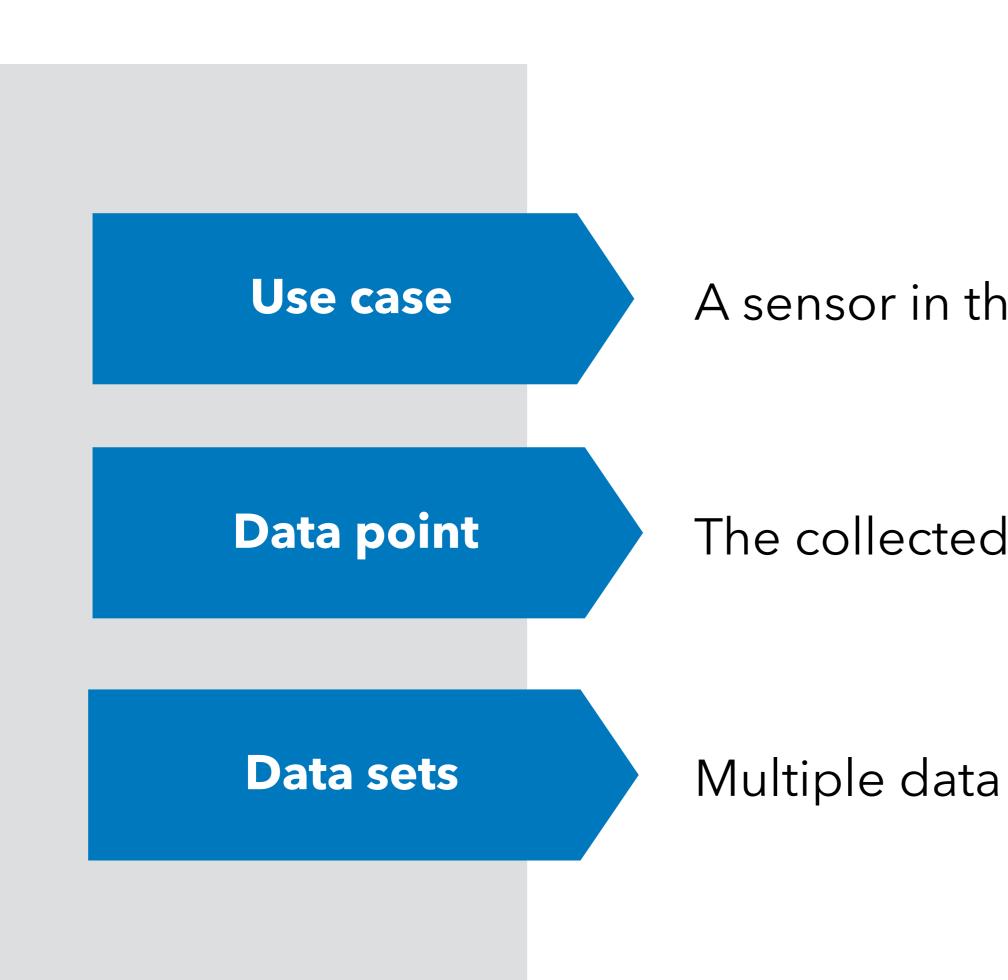
Let us first agree on the vocabulary related to car data

Basic vocabulary used for car data (1/2)
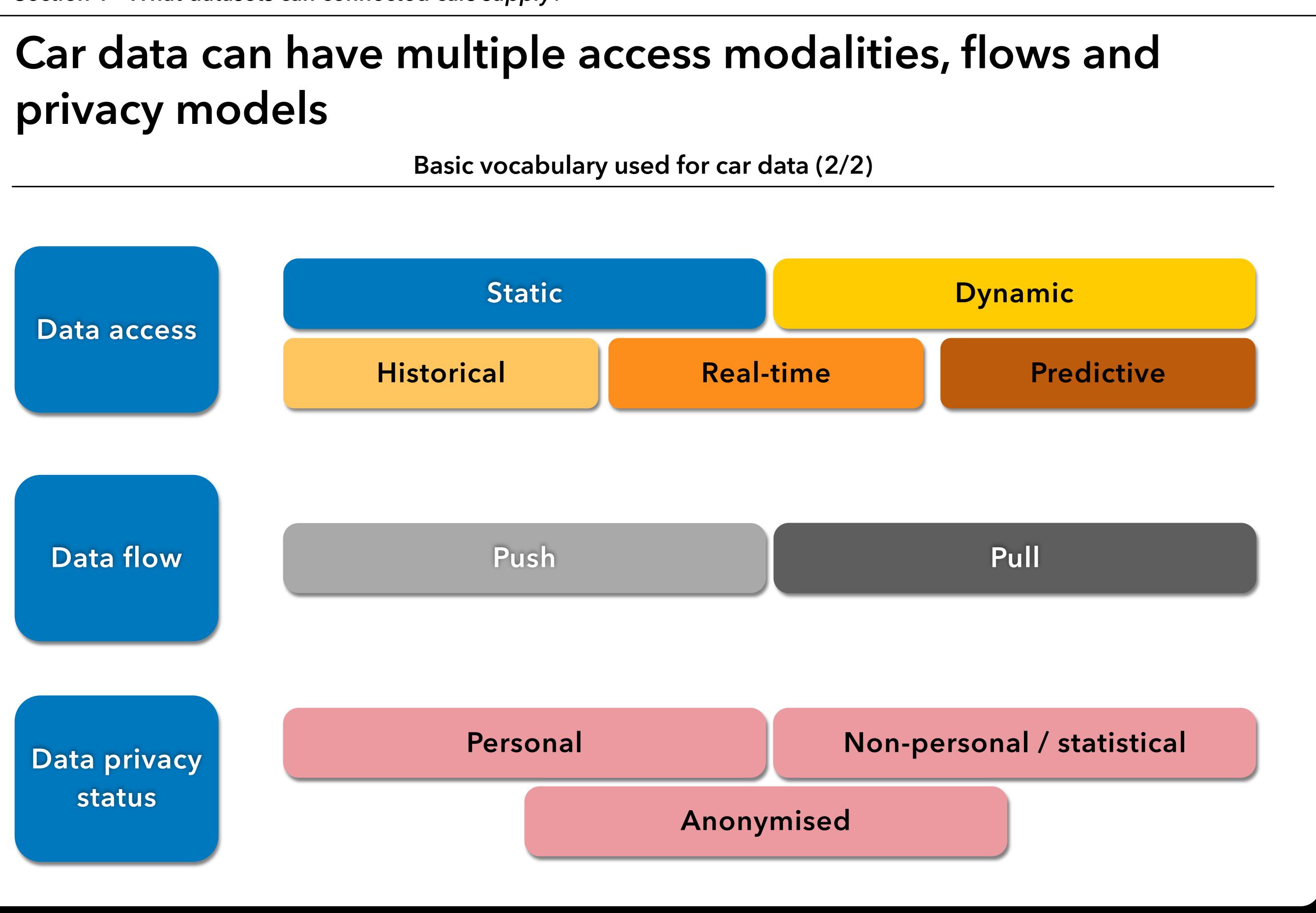
Use case — A sensor in the car generates data to meet a certain **use case**

Data point — The collected **data point** is captured at a certain time

Data sets — Multiple data points are commonly bundled into **data sets**

Car data can have multiple access modalities, flows and privacy models

Basic vocabulary used for car data (2/2)

Data access	Static	Dynamic
	Historical	Real-time	Predictive

Data flow

Push	Pull

Data privacy status

Personal	Non-personal / statistical

Anonymised

Source: PTOLEMUS

The car data sets collected can be static or dynamic

Static data

Driver data
- Name
- Age
- Gender
- Contact details
- MVR records
- Background check
- Etc.

Vehicle data
- Brand / Make
- Model
- Year
- Body
- VIN
- Registration
- Engine size
- Power
- Fuel type
- Etc.

Fleet data
- Fleet account address
- Fleet manager
- # of vehicles by type
- Vehicle ownership
- Company type
- Etc.

Dynamic data

Contextual data
- Exterior temp
- Ambient pressure
- Weather
- Traffic
- Road category
- Time
- Speed limit
- Idling
- Etc.

Vehicle health data
- DTCs
- Maintenance need
- Battery level
- Coolant temp
- Light status
- Oil temp
- Oil pressure
- Tyre pressure
- Fuel level
- Etc.

Driver data (dynamic)
- Claims history
- Fatigue
- Health record
- HoS
- Distraction
- Etc.

Driving data
- Location
- Speed
- Mileage
- Acceleration
- Braking
- Cornering
- Crash
- Etc.

In-cab data
- Nb passengers
- Navigation
- Seat belts
- Etc.

Transaction data
- Ship from address
- Destination address
- Invoice #
- Order #
- Product code
- Commodity code
- Product description
- Quantity
- Unit measure
- Extended amount
- Freight amount
- Duty amount

Dynamic data is becoming more important and is leading the way towards predictive insights

Data access modalities

Static data

- **Does not change after being recorded**
- It is a fixed data set

Dynamic data

- **May change after it is recorded**
- Periodically updated or changes asynchronously over time as new information becomes available

Historical

- **About past events** and circumstances

Real-time

- Captured in (near) real time at a certain **frequency**
- Transmitted at a certain **latency**
- Usually timestamped

Predictive
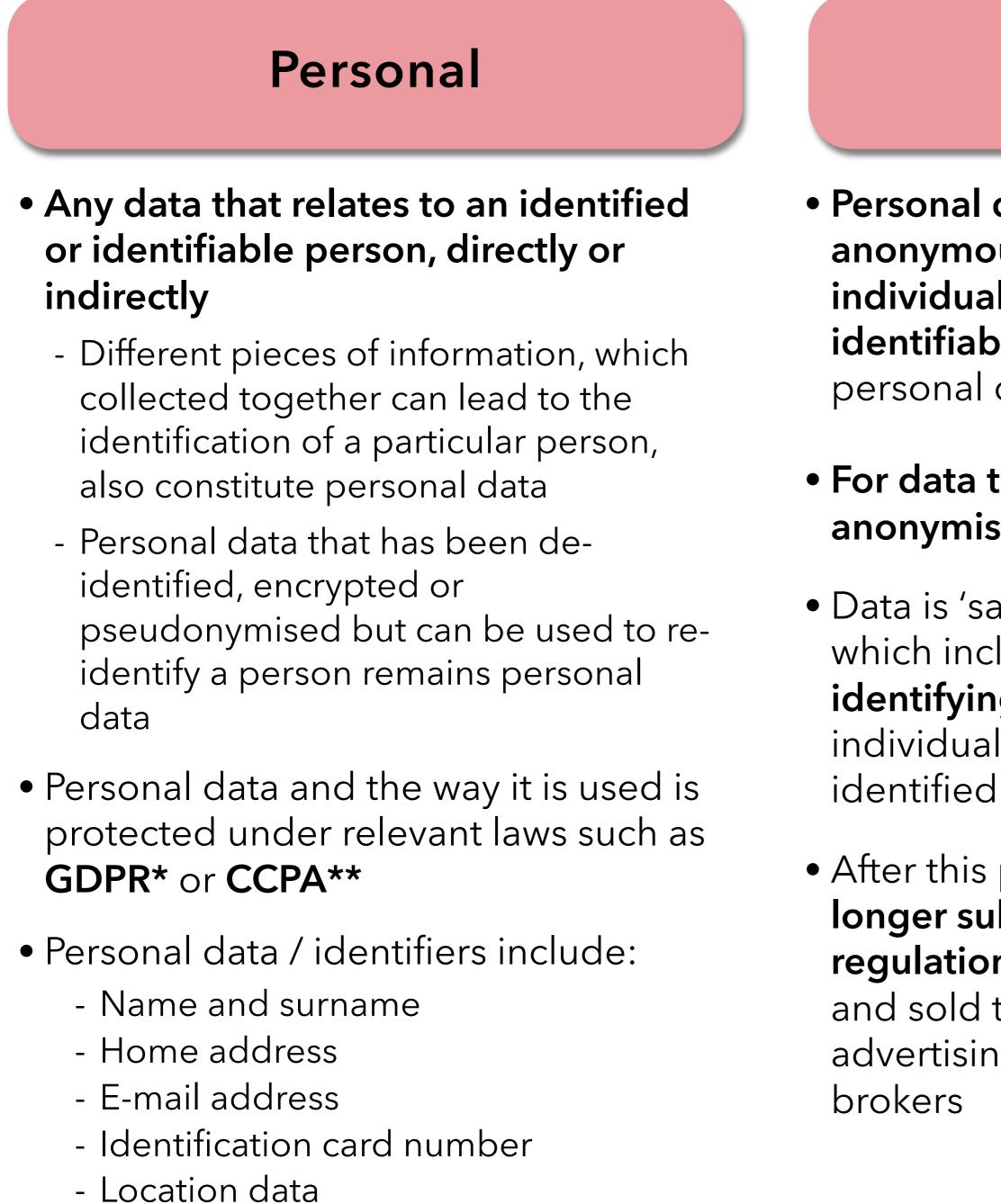
- Usually **based on the analysis** of aggregated historical data
- **Generally providing the most valuable insights**

➡ Historical data are very useful to design taxonomy, discover use cases, experiment and test applications before going to development and production

➡ Predictive data can only be produced if historical data are well understood and categorised

Data protection regulations impacts the 3 tiers of data

Personal, anonymised and non-personal data

Personal	Anonymised	Non-personal / statistical

Personal

- **Any data that relates to an identified or identifiable person, directly or indirectly**
 - Different pieces of information, which collected together can lead to the identification of a particular person, also constitute personal data
  - Personal data that has been de-identified, encrypted or pseudonymised but can be used to re-identify a person remains personal data
- Personal data and the way it is used is protected under relevant laws such as **GDPR*** or **CCPA****
- Personal data / identifiers include:
  - Name and surname
  - Home address
  - E-mail address
  - Identification card number
  - Location data

Anonymised

- **Personal data that has been rendered anonymous in such a way that the individual is not or no longer identifiable** is no longer considered personal data
- **For data to be truly anonymised, the anonymisation must be irreversible**
- Data is 'sampled' and anonymised, which includes **stripping the data of identifying characteristics** so that individuals cannot, in theory, be identified
- After this process, the data is **no longer subject to data protection regulations,** so it can be freely used and sold to third parties like advertising companies and data brokers

Non-personal / statistical

- **Data that is not personal and that can not lead to the identification of the person**
- This data still enables to identify circumstances, analyse behaviours

Source: PTOLEMUS - Note: * European General Data Protection Regulation ** California Consumer Privacy Act

BMW is transparent on the datasets it provides access to
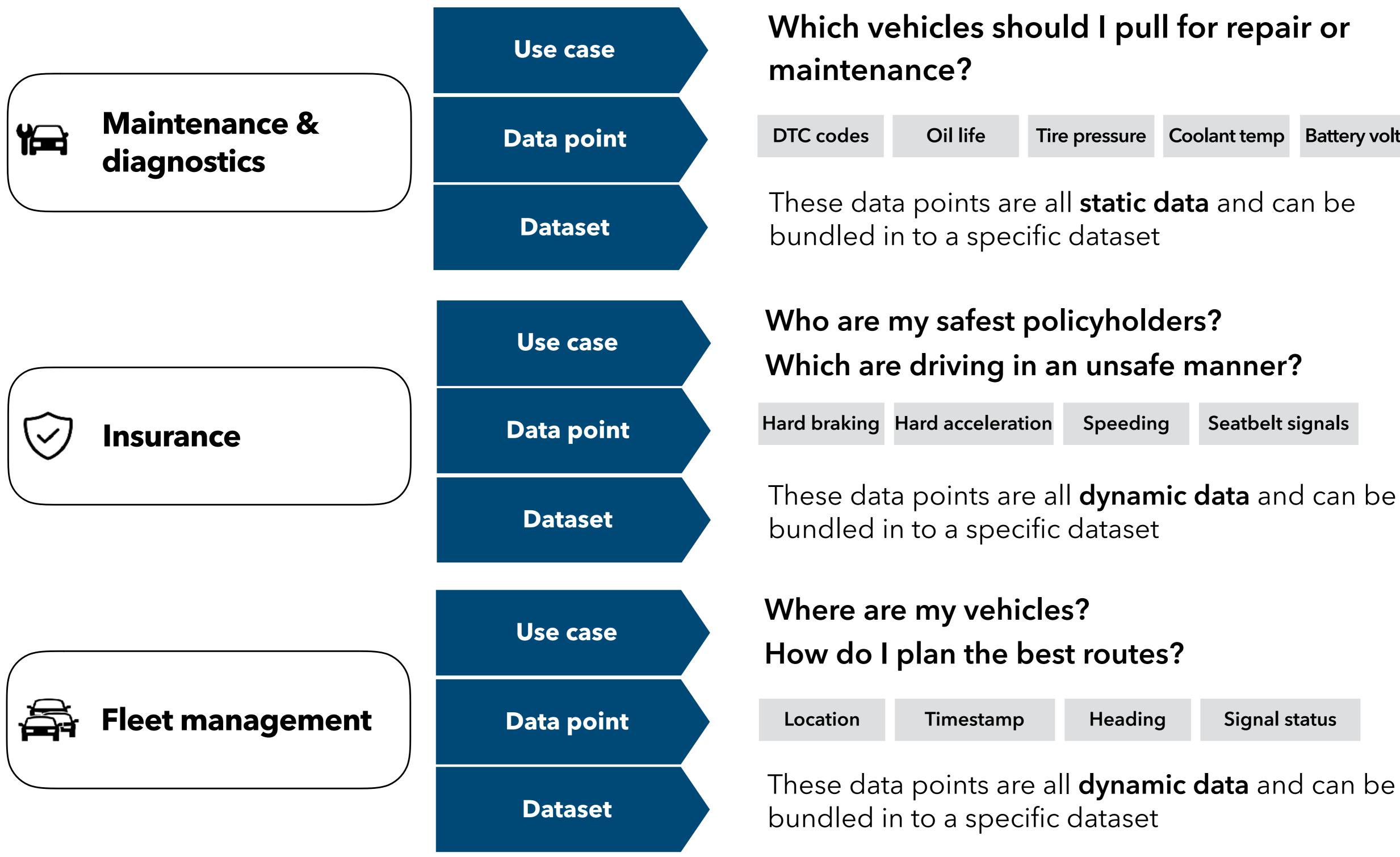
BMW available data points to third parties via *BMW CarData*

Maintenance, insurance and fleet management are some of the most frequent applications

Maintenance & diagnostics

Use case

Which vehicles should I pull for repair or maintenance?

Data point

| DTC codes | Oil life | Tire pressure | Coolant temp | Battery voltage |

Dataset

These data points are all **static data** and can be bundled in to a specific dataset

Insurance

Use case

Who are my safest policyholders?

Which are driving in an unsafe manner?

Data point

| Hard braking | Hard acceleration | Speeding | Seatbelt signals |

Dataset

These data points are all **dynamic data** and can be bundled in to a specific dataset

Fleet management

Use case

Where are my vehicles?

How do I plan the best routes?

Data point

| Location | Timestamp | Heading | Signal status |

Dataset

These data points are all **dynamic data** and can be bundled in to a specific dataset
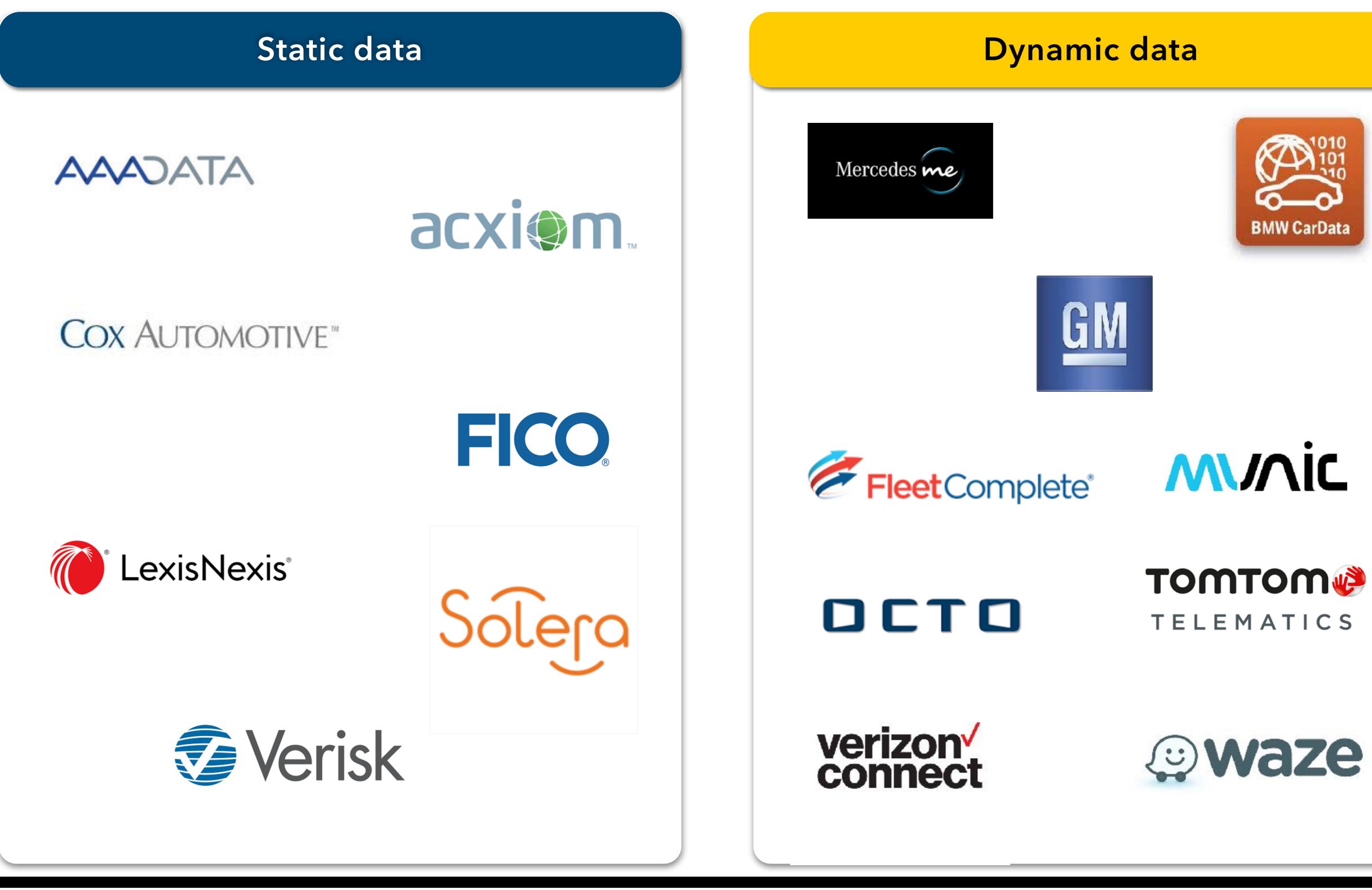
Source: PTOLEMUS, Smartcar

Capturing and providing connected car data is not new and numerous suppliers already exist using aftermarket devices

Static data	Dynamic data

Source: PTOLEMUS - Note: List is not exhaustive

Which car datasets are available today?

We first listed which datasets* are available today, both static and dynamic

We then identified which stakeholders control these datasets*

Finally, the analysis explains which stakeholders control the largest number of critical datasets*
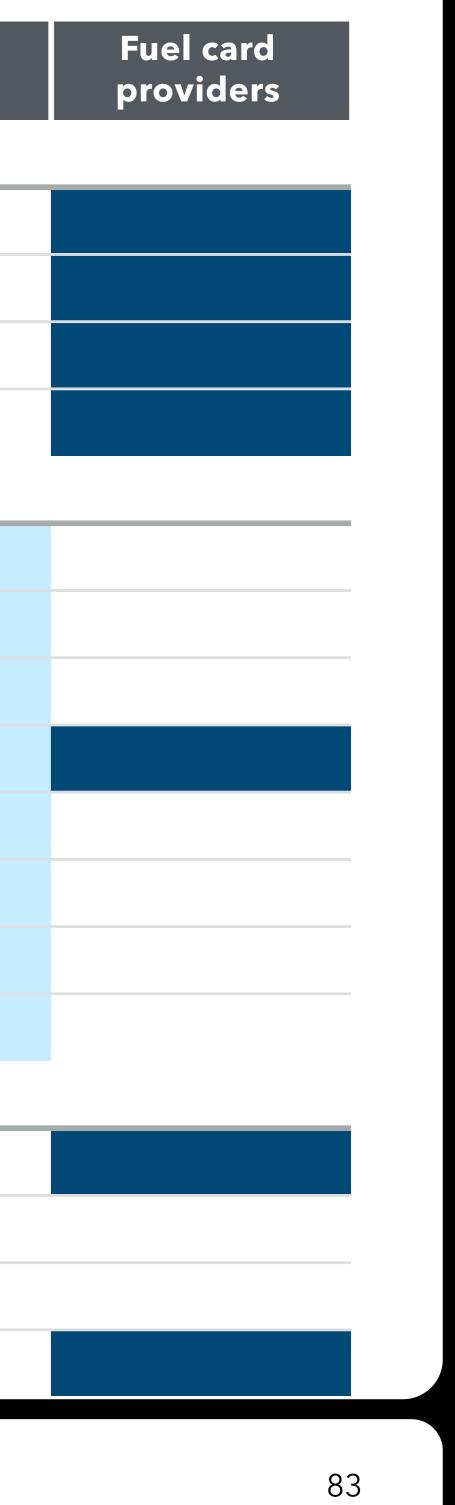
The stakeholders that control the static raw datasets

List of **static** data points and level of control for each stakeholder - Fleet cars

■ Full control   ■ Partial control   ■ Limited control

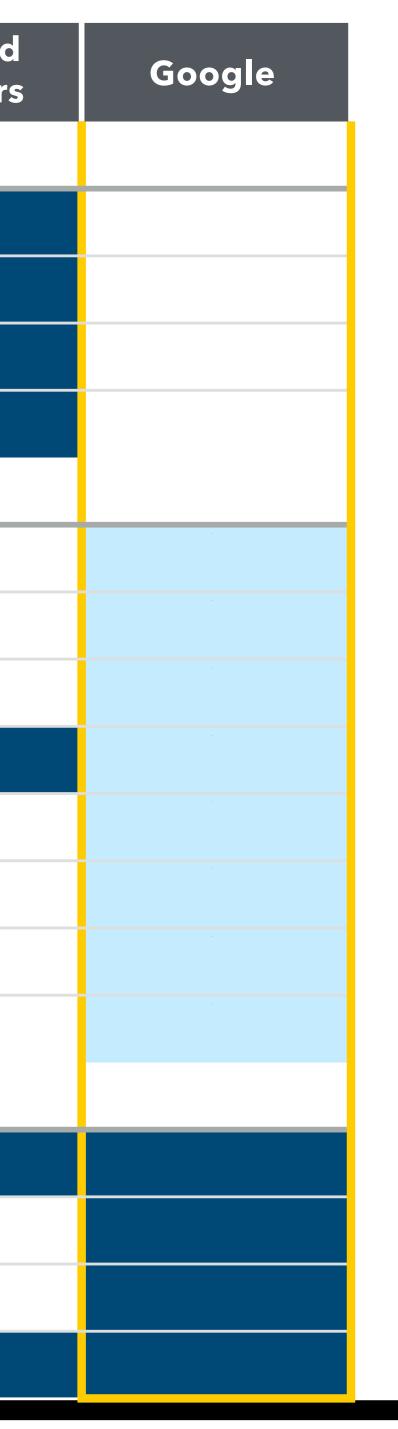|	Fleets	Fleet TSPs*	OEMs	Dealers / workshops	Leasers /FMCs*	Insurers	Fuel card providers
Fleet data							
Fleet account address	Full	Full		Full	Full		Full
Fleet manager	Full	Full		Full	Full		Full
# of vehicles by type	Full	Full		Full	Full		Full
Vehicle ownership	Full			Full	Full		Full
Vehicle registration data							
Brand	Full		Full	Partial	Full	Limited	
Model	Full		Full	Partial	Full	Limited	
Body	Full		Full	Partial	Full	Limited	
VIN	Full	Full	Full	Partial	Full	Limited	Full
Registration #	Full		Full	Partial	Full	Limited	
Engine size	Full		Full	Partial	Full	Limited	
Power	Full		Full	Partial	Full	Limited	
Fuel type	Full		Full	Partial	Full	Limited	
Driver data							
Name	Full				Full		Full
Age	Full				Full		
Gender	Full				Full		
Contact details	Full				Full		Full

Google has access to all static driver data and most vehicle data

List of **static** data points and level of control for each stakeholder - Fleet cars

Legend: ■ Full control   ■ Partial control   ■ Limited control

	Fleets	Fleet TSPs*	OEMs	Dealers / workshops	Leasers / FMCs*	Insurers	Fuel card providers	Google
Fleet data								
Fleet account address	Full	Full		Full	Full		Full	
Fleet manager	Full	Full		Full	Full		Full	
# of vehicles by type	Full	Full		Full	Full		Full	
Vehicle ownership	Full			Full	Full		Full	
Vehicle registration data								
Brand	Full		Full	Partial	Full	Limited		Limited
Model	Full		Full	Partial	Full	Limited		Limited
Body	Full		Full	Partial	Full	Limited		Limited
VIN	Full	Full	Full	Partial	Full	Limited	Full	Limited
Registration #	Full		Full		Full	Limited		Limited
Engine size	Full		Full		Full	Limited		Limited
Power	Full		Full		Full	Limited		Limited
Fuel type	Full		Full		Full	Limited		Limited
Driver data								
Name	Full				Full		Full	Full
Age	Full				Full			Full
Gender	Full				Full			Full
Contact details	Full				Full		Full	Full

We then map who is in control of the dynamic raw datasets

List of **dynamic** data points and level of control for each stakeholder (1/2) - Fleet cars

■ Full control   ■ Partial control   □ Limited control

	Fleets	Fleet TSPs*	OEMs	Dealers / workshops	Leasers /FMCs*	Insurers	Fuel card providers
Driving data							
Location		■	■				
Speed		■	■				
Mileage		■	■				
Acceleration		■	■				
Crash data		■	■				
Driver data							
Claims history	■				■	■	
Fatigue		■	■				
Health record	■						
HoS		■	■				
Transaction data							
Item purchased							■
Item quantity							■
Identity of merchant							■
Amount spent							■

… identified players in control of the dynamic raw datasets

List of dynamic data points and level of control for each stakeholder (2/2) - Fleet cars

🟨 Full control 🟨 Partial control ⬜ Limited control

	Fleets	Fleet TSPs*	OEMs	Dealers / workshops	Leasers /FMCs*	Insurers	Fuel card providers
Vehicle health data							
DTCs		Full	Full	Limited			
Battery level		Full	Full	Limited			
Oil temp.		Full	Full	Limited			
Oil pressure		Full	Full	Limited			
Tire pressure		Full	Full	Limited			
Fuel tank level		Full	Full	Limited			
Contextual data							
Exterior temperature							
Ambient pressure							
Weather							
Traffic							
Road category							
Time							
Speed limit							

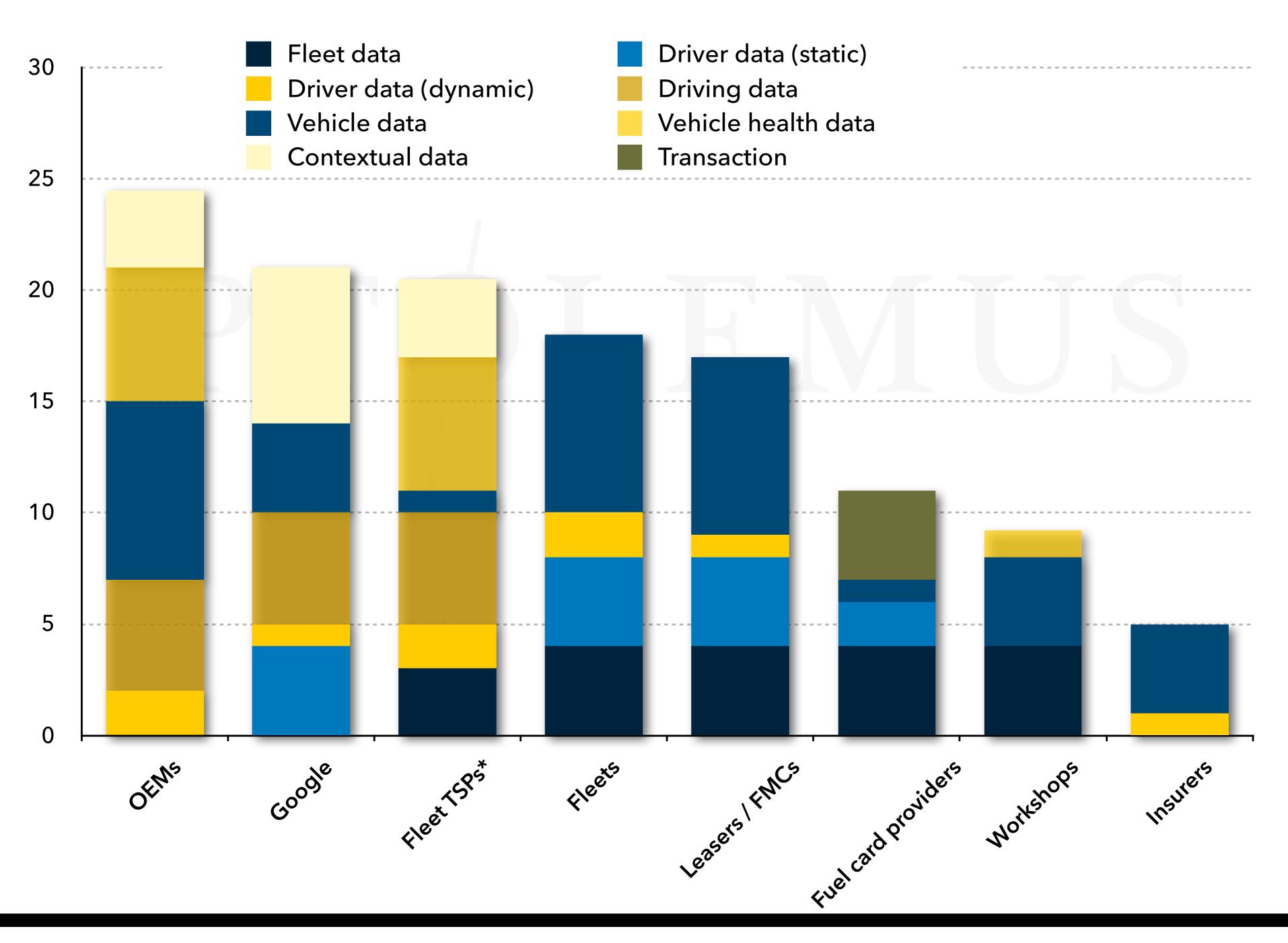# For comparison, Google holds a proxy to some dynamic driving datapoints

List of **dynamic** data points and level of control for each stakeholder (1/2) - Fleet cars

| | Full control | | Partial control | | Limited control |

	Fleets	Fleet TSPs*	OEMs	Dealers / workshops	Leasers / FMCs*	Insurers	Fuel card providers	Google
Driving data								
Location		■	■					■
Speed		■	■					■
Mileage		■	■					■
Acceleration		■	■					■
Crash data		■	■					■
Driver data								
Claims history	■				■	■		
Fatigue		■	■					
Health record	■							
HoS		■	■					■
Transaction data								
Item purchased							■	
Item quantity							■	
Identity of merchant							■	
Amount spent							■	

Google also holds contextual data

List of **dynamic** data points and level of control for each stakeholder (2/2) - Fleet cars

■ Full control   ■ Partial control   □ Limited control

	Fleets	Fleet TSPs*	OEMs	Dealers / workshops	Leasers / FMCs*	Insurers	Fuel card providers	Google
Vehicle health data								
DTCs		Full	Full	Limited				
Battery level		Full	Full	Limited				
Oil temp.		Full	Full	Limited				
Oil pressure		Full	Full	Limited				
Tire pressure		Full	Full	Limited				
Fuel tank level		Full	Full	Limited				
Contextual data								
Exterior temperature			Full					Full
Ambient pressure			Full					Full
Weather			Full					Full
Traffic			Full					Full
Road category			Full					Full
Time			Full					Full
Speed limit			Full					Full

Our investigation shows that the OEMs are in control of the largest number of critical data points today

Who controls the fleet cars' key data points?*

Legend:
- Fleet data
- Driver data (dynamic)
- Vehicle data
- Contextual data
- Driver data (static)
- Driving data
- Vehicle health data
- Transaction

- **OEMs are generating the largest number of key datasets**

- Fleet TSPs also can generate rich datasets

- **Google** is able to infer some data from the mobile phone but **does not have access to vehicle data**. Mobile phone data is also likely to be less precise, less frequent and higher latency than vehicle data for certain use cases

Source: PTOLEMUS - Note: (*) Measured as number of key data sets controlled by main stakeholders
TSPs: Telematics service providers, FMCs: Fleet Management Companies

Car makers can generate many of the most valuable datasets

- OEMs have the potential to generate the largest number of key datasets **when the right conditions are met:**

  - Connectivity
  - Driver consent
  - The ability to transform raw data into usable data

- **Fleet TSPs** also generate rich datasets

- **Google and Apple** have large technological capabilities but do not have access to underlying vehicle data

Section 1: What are the benefits of sharing car data?

A	What datasets can connected cars supply?

B	What is the demand for connected car data?
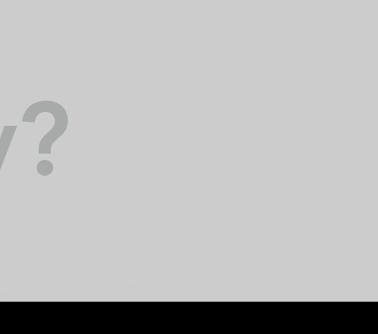
C	What are the benefits of sharing car data between the different stakeholders?

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We now analyse who are the potential customers for these datasets

We first identified the most valuable datasets* and the key players interested in the data

We then interviewed representatives of the key players

We analysed at which level each player is interested in the datasets*
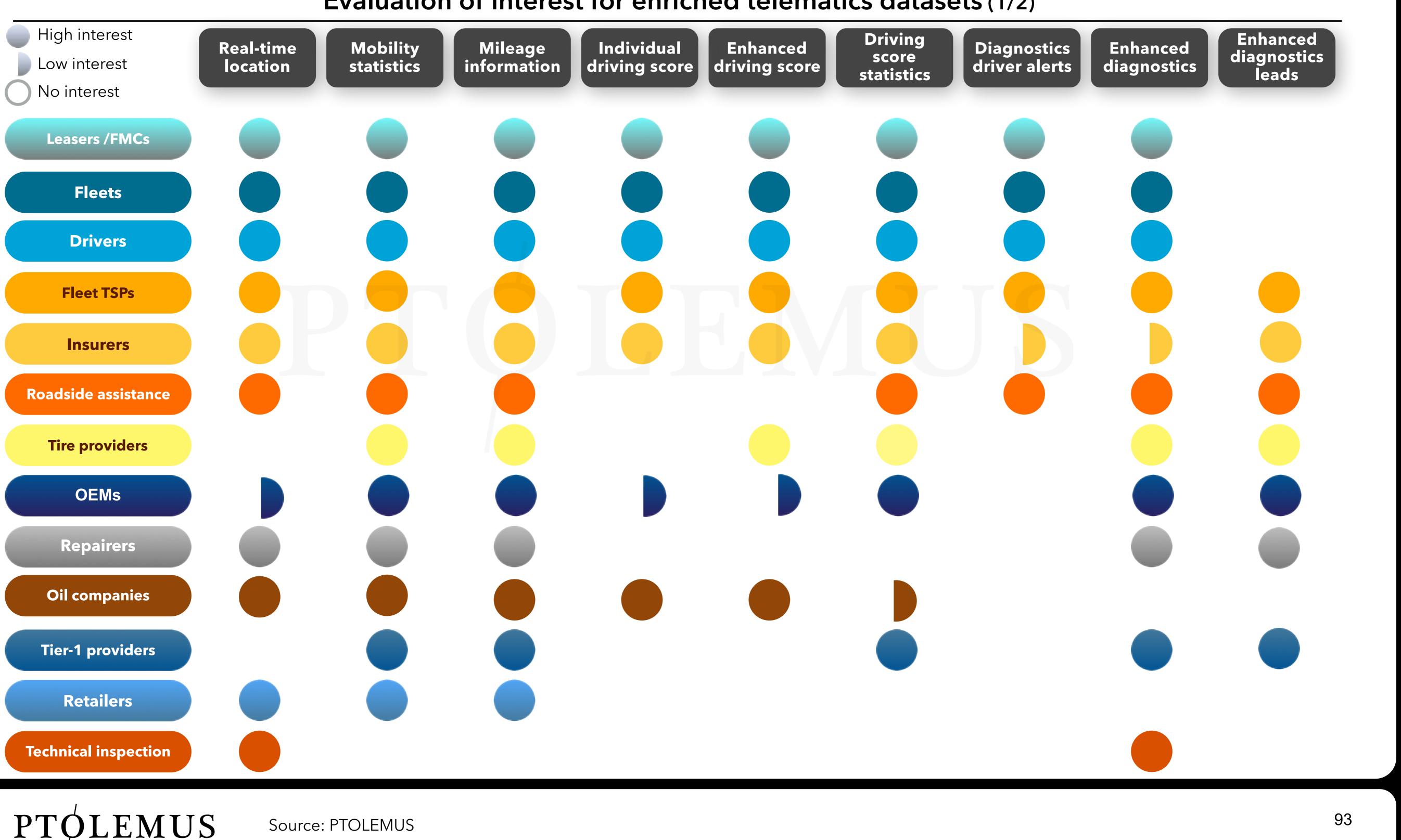
TSP / FMS

Insurers

Fleets

Drivers

Leasing company

Oil companies

Tier-1 providers

Technical inspection

Dealers

Roadside assistance

OEMs

Repairers
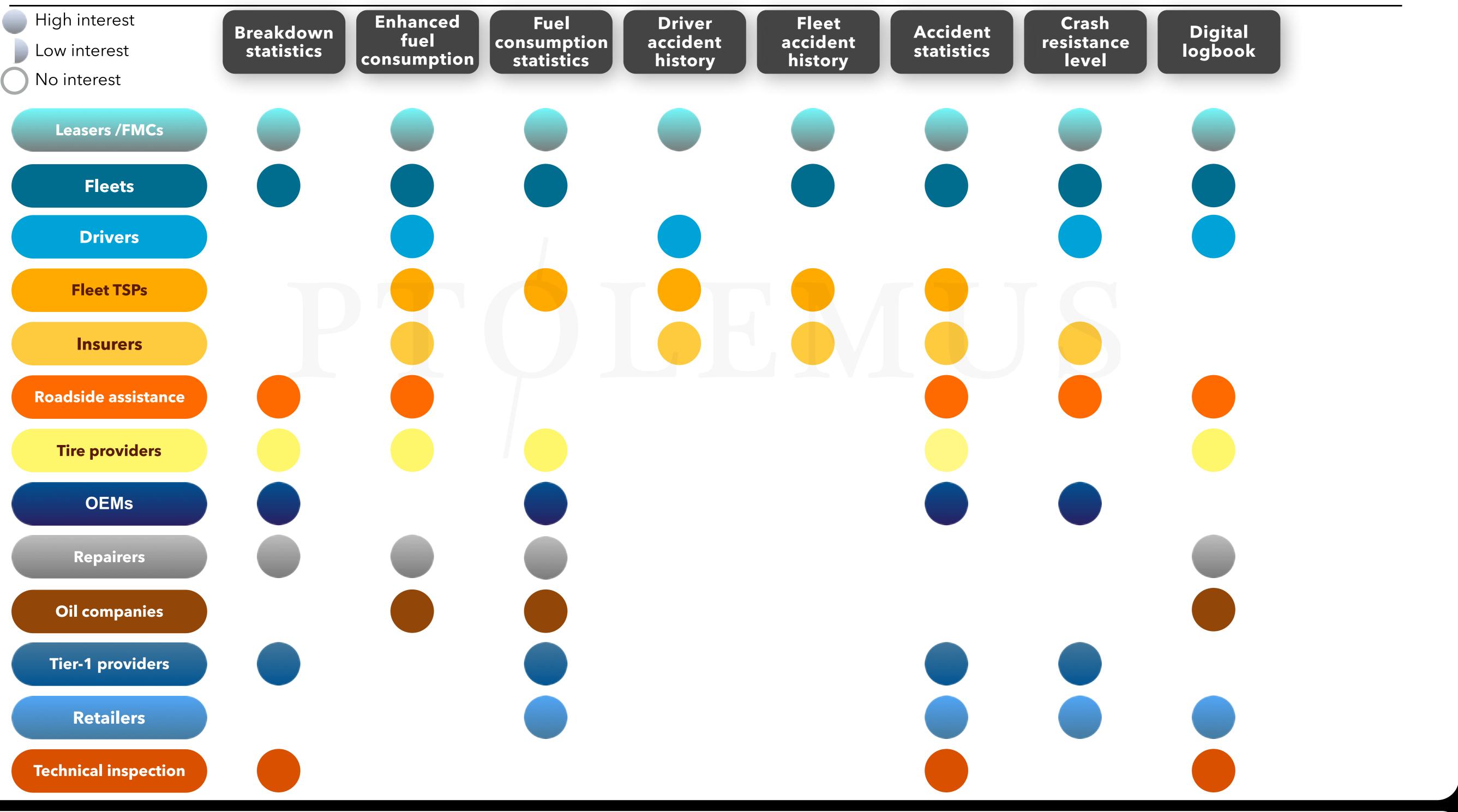
Tire providers

There are many potential customers for each identified connected vehicle dataset and use case

Evaluation of interest for enriched telematics datasets (1/2)

	Real-time location	Mobility statistics	Mileage information	Individual driving score	Enhanced driving score	Driving score statistics	Diagnostics driver alerts	Enhanced diagnostics	Enhanced diagnostics leads
Leasers /FMCs	◐	◐	◐	◐	◐	◐	◐	◐	
Fleets	●	●	●	●	●	●	●	●	
Drivers	●	●	●	●	●	●	●	●	
Fleet TSPs	●	●	●	●	●	●	●	●	●
Insurers	◐	◐	●	◐	◐	◐	◐	◐	◐
Roadside assistance	●	●	●			●	●	●	●
Tire providers		●	●		●	●		●	●
OEMs	◗	●	●	◗	◗	●		●	●
Repairers	◐	◐	◐					◐	◐
Oil companies	●	●	●	●	●	◗			
Tier-1 providers		●	●			●		●	●
Retailers	●	●	●						
Technical inspection	●							●	

Legend:
- ● High interest
- ◗ Low interest
- ○ No interest

There are many potential customers for each identified connected vehicle data set

Evaluation of interest for enriched telematics datasets (2/2)

Legend:
- High interest
- Low interest
- No interest

	Breakdown statistics	Enhanced fuel consumption	Fuel consumption statistics	Driver accident history	Fleet accident history	Accident statistics	Crash resistance level	Digital logbook
Leasers /FMCs	●	●	●	●	●	●	●	●
Fleets	●	●	●		●	●	●	●
Drivers		●		●			●	●
Fleet TSPs		●	●	●	●	●		
Insurers		●	●		●	●	●	
Roadside assistance	●	●				●	●	●
Tire providers	●	●	●			●		●
OEMs	●		●			●	●	
Repairers	●	●	●					●
Oil companies		●	●					●
Tier-1 providers	●		●			●	●	●
Retailers		●				●	●	●
Technical inspection	●					●		●

Leasers have a strong interest in connected car datasets

Evaluation of interest for enriched telematics datasets

- **Connected business models** are progressively making their way into **all traditional vehicle services**

- **Insurers do not have many datasets today** and will be interested in most of them

- **Leasers** are also eager to capture data to optimise asset management

PTOLEMUS
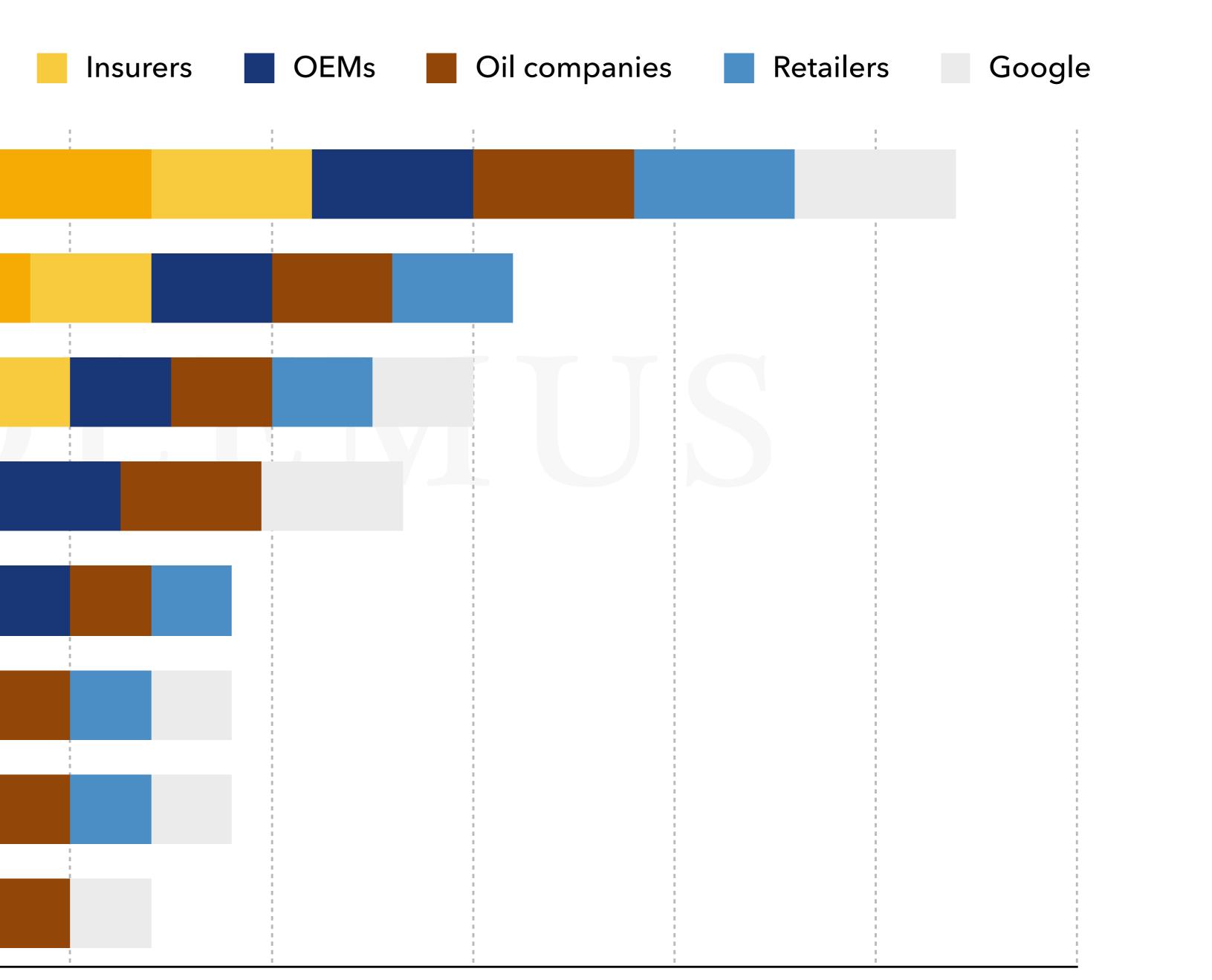
Vehicle data is the category of data that generates the highest level of interest

Demand for connected car data by category

Legend: ◼ Leasers / FMCs* ◼ Fleets ◼ Fleet TSPs ◼ Insurers ◼ OEMs ◼ Oil companies ◼ Retailers ◻ Google

Categories (top to bottom):
- Vehicle data
- Vehicle health data
- Driving data
- Contextual data
- Fleet data
- Transaction
- Driver data (dynamic)
- Driver data (static)

Source: PTOLEMUS - Note: * Fleet Management Companies
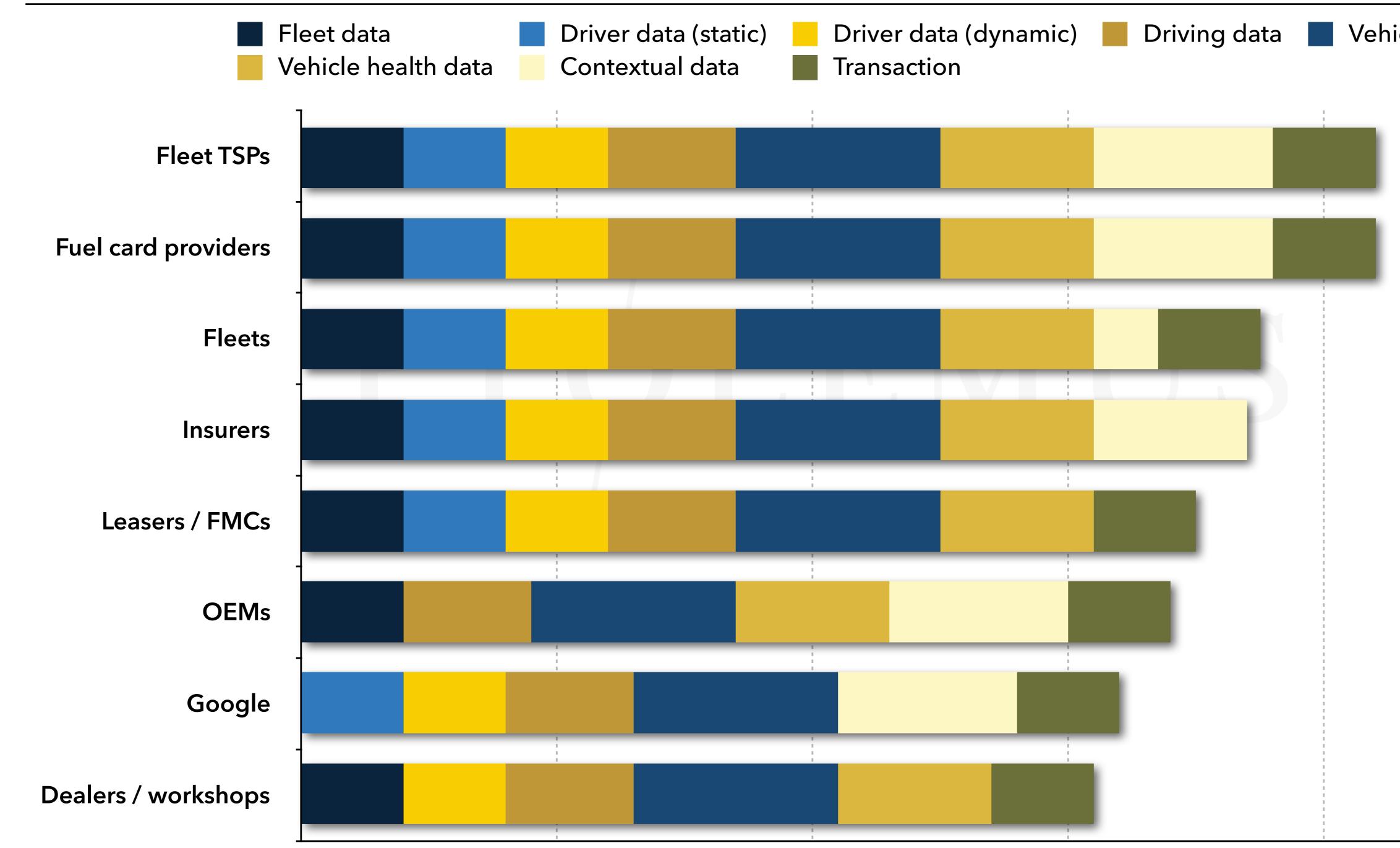
Our investigations have shown that fleet TSPs are the most data hungry, along with fuel card providers

Who can benefit from the data?

Legend:
- Fleet data
- Driver data (static)
- Driver data (dynamic)
- Driving data
- Vehicle data
- Vehicle health data
- Contextual data
- Transaction

Categories (y-axis):
- Fleet TSPs
- Fuel card providers
- Fleets
- Insurers
- Leasers / FMCs
- OEMs
- Google
- Dealers / workshops

We evaluated the market potential for car data

We identified key unmet customer needs*

We analysed how many datasets sellers offer and buyers need

We crossed analyses and estimated which data can be beneficial to the buyers

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Most of the busiest data exchange opportunities rely on data provided by the OEMs

Crossing data supply and demand

■ Highest match   ■ Very high match   ■ High match   ■ Medium match   ■ Low match

Controllers / Buyers	Fleets	Fleet TSPs	OEMs	Dealers / workshop	Leasers /FMCs	Insurers	Google
Fleets		Very high	High	High	Very high	Very high	High
Fleet TSPs	Very high		Very high	Very high	Very high	Highest	Medium
OEMs	Highest	Highest		Highest	Highest	Highest	Very high
Dealers / workshop	Medium	Medium	Medium		Medium	Medium	Low
FMCs	Very high	Very high	High	High		Very high	High
Insurers	Low	Low	Low	Low	Low		Low
Google	Very high	Highest	Very high	Medium	High	Highest	

We present here a heat map of the areas where demand and offer meet

Insurance and leasing are the verticals with the highest interest in leveraging car data

Crossing data controllers and data needs

■ Highest match   ■ Very high match   ■ High match   ■ Medium match   ■ Low match

Controllers \ Buyers	Fleets	Fleet TSPs	OEMs	Dealers / workshop	Leasers / FMCs	Insurers	Google
Fleets		Very high	High	High	Very high	Very high	High
Fleet TSPs	Very high		Very high	Very high	Very high	Highest	Medium
OEMs	Highest	Highest		Highest	Highest	Highest	Very high
Dealers / workshop	Medium	Medium	Medium		Medium	Medium	Low
Leasers / FMCs*	Very high	Very high	High	High		Very high	High
Insurers	Low	Low	Low	Low	Low		Low
Google	Very high	Highest	Very high	Medium	High	Highest	
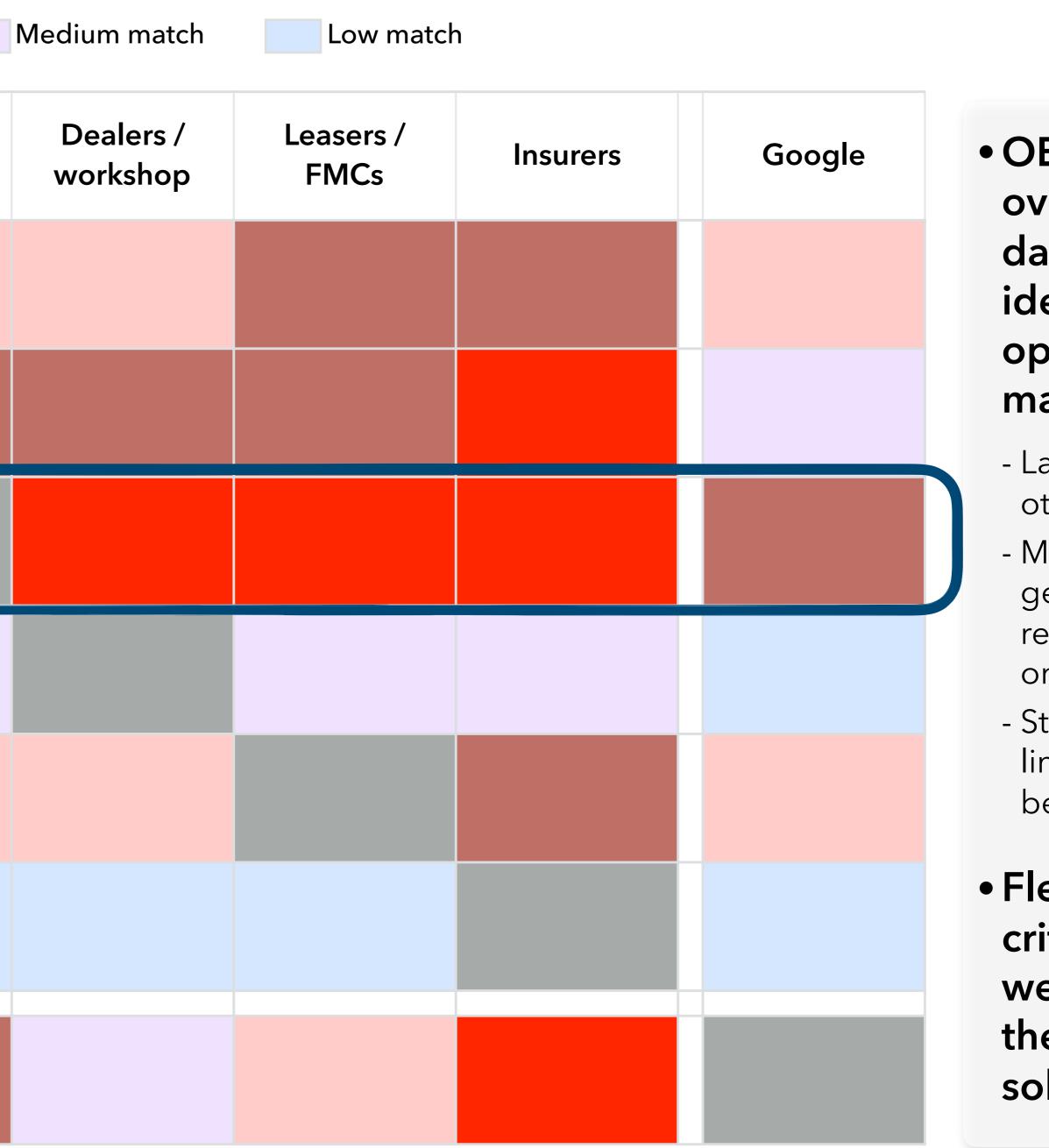
OEMs control critical datasets

Crossing data controllers and data needs

■ Highest match ■ Very high match ■ High match ■ Medium match ■ Low match

Controllers \ Buyers	Fleets	Fleet TSPs	OEMs	Dealers / workshop	Leasers / FMCs	Insurers	Google
Fleets		Very high	High	High	Very high	Very high	High
Fleet TSPs	Very high		Very high	Very high	Very high	Highest	Medium
OEMs	Highest	Highest		Highest	Highest	Highest	Very high
Dealers / workshop	Medium	Medium	Medium		Medium	Medium	Low
Leasers / FMCs*	Very high	Very high	High	Medium		Very high	High
Insurers	Low	Low	Low	Low	Low		Low
Google	Very high	Highest	Very high	Medium	High	Highest	

- **OEMs have control over the critical datasets, but are not ideally positioned to operate a date marketplace**
  - Lack of relationship with other OEMs
  - Mainly seeking to generate additional revenue stream based on data
  - Still need time before line-fitted connectivity becomes mainstream

- **Fleet TSPs control critical datasets as well and develop their own connected solutions**

The scarcity of dynamic datasets makes them more valuable

Measured as number of stakeholders who can benefit from datapoint

Measured as product of scarcity and breadth of beneficiaries

STATIC DATA	Scarcity of data controllers	Breadth of beneficiaries	Value potential
Fleet data			
Fleet account address			
Fleet manager			
# of vehicles by type			
Vehicle ownership			
Vehicle registration data			
Brand			
Model			
Body			
VIN			
Registration #			
Engine size			
Power			
Fuel type			
Driver data			
Name			
Age			
Gender			
Contact details			

DYNAMIC DATA	Scarcity of data controllers	Breadth of beneficiaries	Value potential
Driving data			
Location			
Speed			
Mileage			
Acceleration			
Crash data			
Driver data			
Claims history			
Fatigue			
Health record			
HoS			
Transaction data			
Item purchased			
Item quantity			
Identity of			
Amount spent			
Vehicle health data			
DTCs			
Battery level			
Oil temp.			
Oil pressure			
Tire pressure			
Fuel tank level			
Contextual data			
Exterior			
Ambient pressure			
Weather			
Traffic			
Road category			
Time			
Speed limit			

The most valuable datasets are dynamic:
- Driving data
- Driver data

Vehicle data has the highest potential, especially for fleets

- Fleet TSPs, fuel card providers, leasing and insurance companies are **the consumers with the most immediate appetite for data**

- **Fleet TSPs control critical datasets** and develop their own connected solutions

- **OEMs** control the critical datasets but **are not ideally positioned to run data market places** as they
    - Cannot easily build relationships with other OEMs*
    - Do not focus on generating additional revenue streams based on data
    - Need significant time before their line-fitted connectivity becomes mainstream

- Dynamic driving data and driver data is more valuable than static data

- Still, **vehicle data (static and dynamic - vehicle health data)** is the category of data that, currently, generates the highest level of interest

- Some bundles of data are already showing their large application, e.g.
    - **Mobility statistics**
    - **Mileage information**

Source: PTOLEMUS - Note: * For competition law reasons

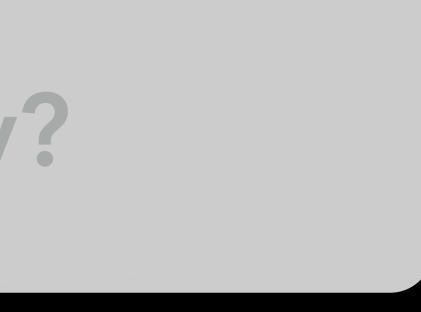# Section 1: What are the benefits of sharing car data?

A	What datasets can connected cars supply?
B	What is the demand for connected car data?
C	What are the benefits of sharing car data between the different stakeholders?

PTOLEMUS

We show some of the benefits of sharing car data, based on current accessible use cases

We identified key use cases improving significantly the user experience

We identified the data requested and available to meet each use case

We assessed the key benefits to data users

Even for a mature service such as traffic information, many use cases are still not met by the industry

Main consumer use cases for traffic information services*

A

Use cases currently not met are in **yellow**

B

Before the trip

During the trip

After the trip

- I want to know
  - which itinerary to take
  - how long my trip will take so I know when to leave
  - whether I should drive or take public transportation
  - which combination of transports will be the fastest
  - when I should leave to avoid traffic jams
  - when I should wake up to be on time where I need to be
  - which itinerary to take when driving abroad

- I want to know
  - where there are traffic jams
  - if there are dangers / accidents ahead
  - why there is a traffic jam
  - when I will arrive at my destination
  - which road to take to leave the traffic jam
- I want to avoid traffic jams when I am abroad
- I want to drive using the fastest route without trying to know where to go
- I want to have audio alerts telling me what is the traffic situation
- I want to be able to look easily at the traffic situation map while I am driving
- I want to minimise risks of strong braking by being alerted in advance
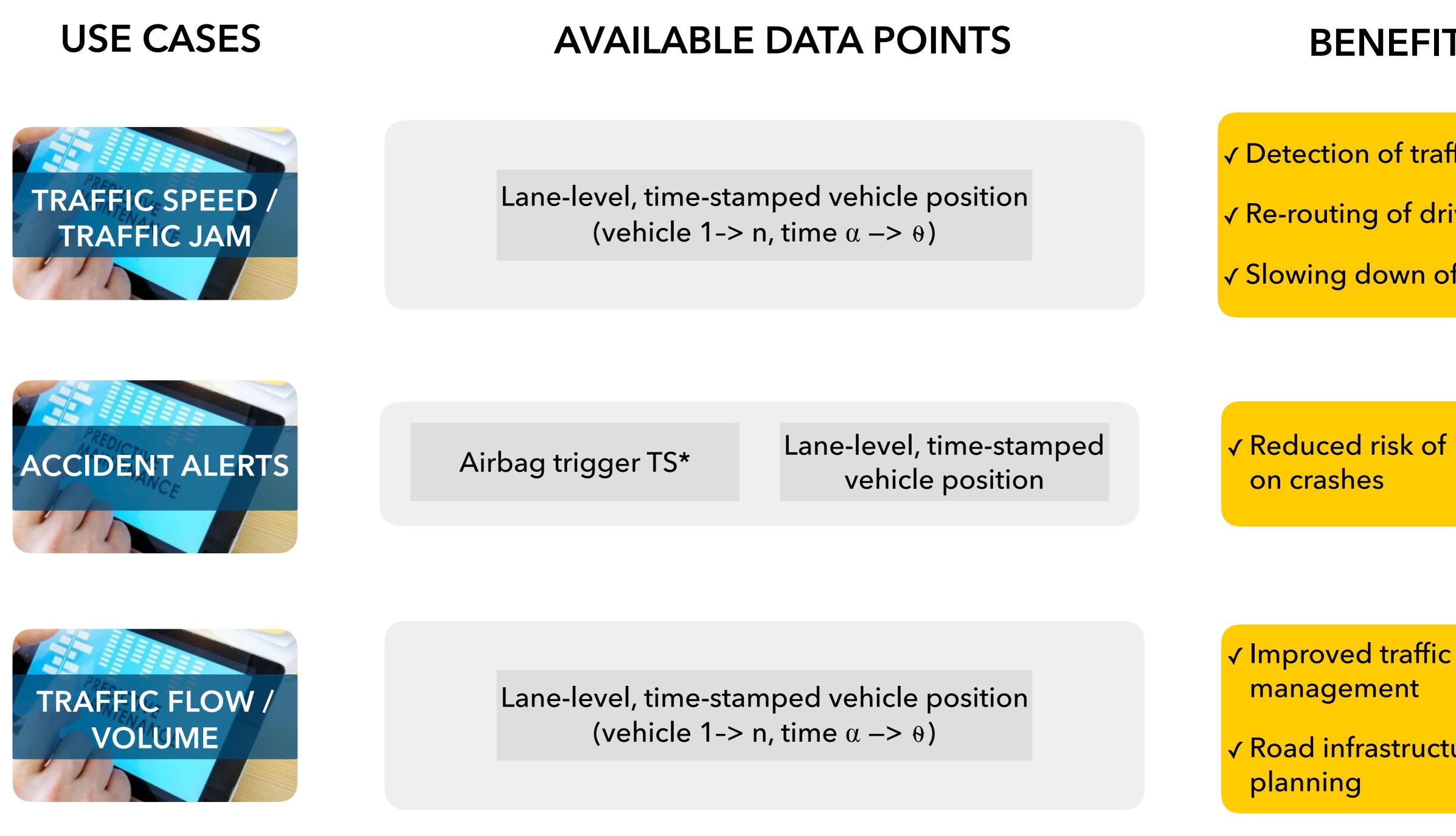
- I want to know how much time I saved thanks to my system
- I want to know how long my trip took
- I want to know whether my itinerary was the best one based on the actual traffic situation
- I want to know if my trip was "eco-friendly"
- I want to know how much my trip cost / how much I saved

Source: PTOLEMUS

But connected car data can already cover many traffic information use cases

What data sets are required for what use case (1/6)

USE CASES	AVAILABLE DATA POINTS	BENEFITS

TRAFFIC SPEED / TRAFFIC JAM

Lane-level, time-stamped vehicle position
(vehicle 1–> n, time α –> θ)

✓ Detection of traffic jams

✓ Re-routing of drivers

✓ Slowing down of drivers
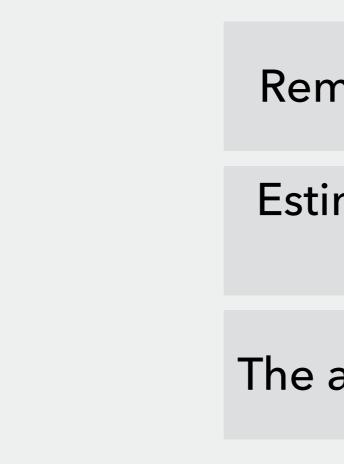
ACCIDENT ALERTS

Airbag trigger TS*

Lane-level, time-stamped vehicle position

✓ Reduced risk of knock-on crashes

TRAFFIC FLOW / VOLUME

Lane-level, time-stamped vehicle position
(vehicle 1–> n, time α –> θ)

✓ Improved traffic management

✓ Road infrastructure planning

Source: PTOLEMUS, VDHs, service providers - Note: for each use case, not all data points are necessary to deliver a value added service
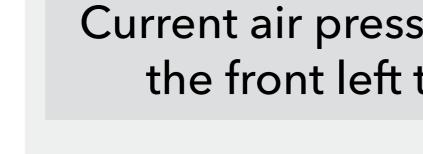
Car data can also inform drivers about the state of their vehicle consumables (1/2)

What data sets are required for what use case (2/6)

USE CASES	AVAILABLE DATA POINTS	BENEFITS

FUEL / BATTERY LEVEL

Remaining level of fuel / SOC (%)

Estimated remaining distance the vehicle can travel

The amount of fuel in the tank (in L)

✓ Avoid out of gas situation

✓ Predict refuelling / recharging

EV CHARGING STATUS

Indicates if the charging cable is currently plugged in

Charger voltage

Max charging current

Indicates the current state of the charge system

Departure time

✓ Facilitate organisation and planning

Source: PTOLEMUS, VDHs, service providers - Note: for each use case, not all data points are necessary to deliver a value added service

Car data can also inform drivers about the state of their vehicle consumables (2/2)

What data sets are required for what use case (3/6)

USE CASES	AVAILABLE DATA POINTS	BENEFITS

TIRE PRESSURE

Current air pressure of the front left tire

Current air pressure of the front right tire

Air pressure of each tire

Current air pressure of the back left tire

Current air pressure of the back right tire

✓ Increase safety

✓ Increase comfort

✓ Avoid breakdown

✓ Avoid accident

OIL LIFE SPAN

Remaining life span of a vehicle's engine oil (in L)

Engine oil's remaining life span (%)

✓ Avoid breakdown

✓ Predict oil change
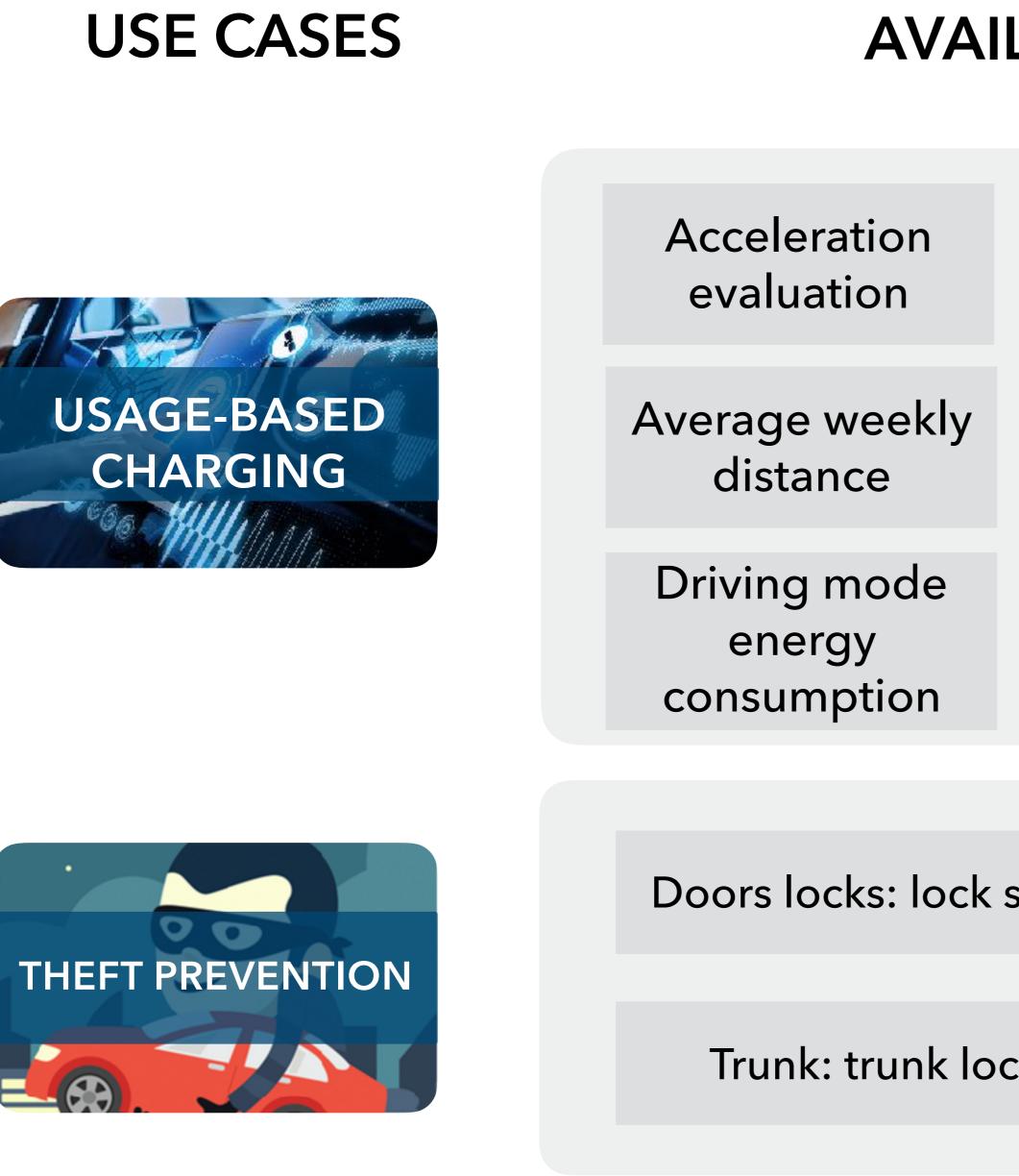
Source: PTOLEMUS, VDHs, service providers - Note: for each use case, not all data points are necessary to deliver a value added service

Car data can help drivers (and insurers) reduce risks

What data sets are required for what use case (4/6)

USE CASES

AVAILABLE DATA POINTS

BENEFITS

USAGE-BASED CHARGING

Acceleration evaluation	Driving style evaluation	Last trip energy consumption
Average weekly distance	Last trip battery remaining	Last trip energy consumption
Driving mode energy consumption	Last trip date	Mileage after last trip

✓ Better understand usage

✓ PAYD* / PHYD* Rewards/premium discount

THEFT PREVENTION

Doors locks: lock state	Vehicle location: heading
Trunk: trunk lock	Fuelling: gas flap lock

✓ Stolen vehicle recovery solutions

Source: PTOLEMUS, VDHs, service providers - Note: for each use case, not all data points are necessary to deliver a value added service
* PAYD: Pay-as-you-drive (mileage based), PHYD: Pay-how-you-drive (behaviour based)
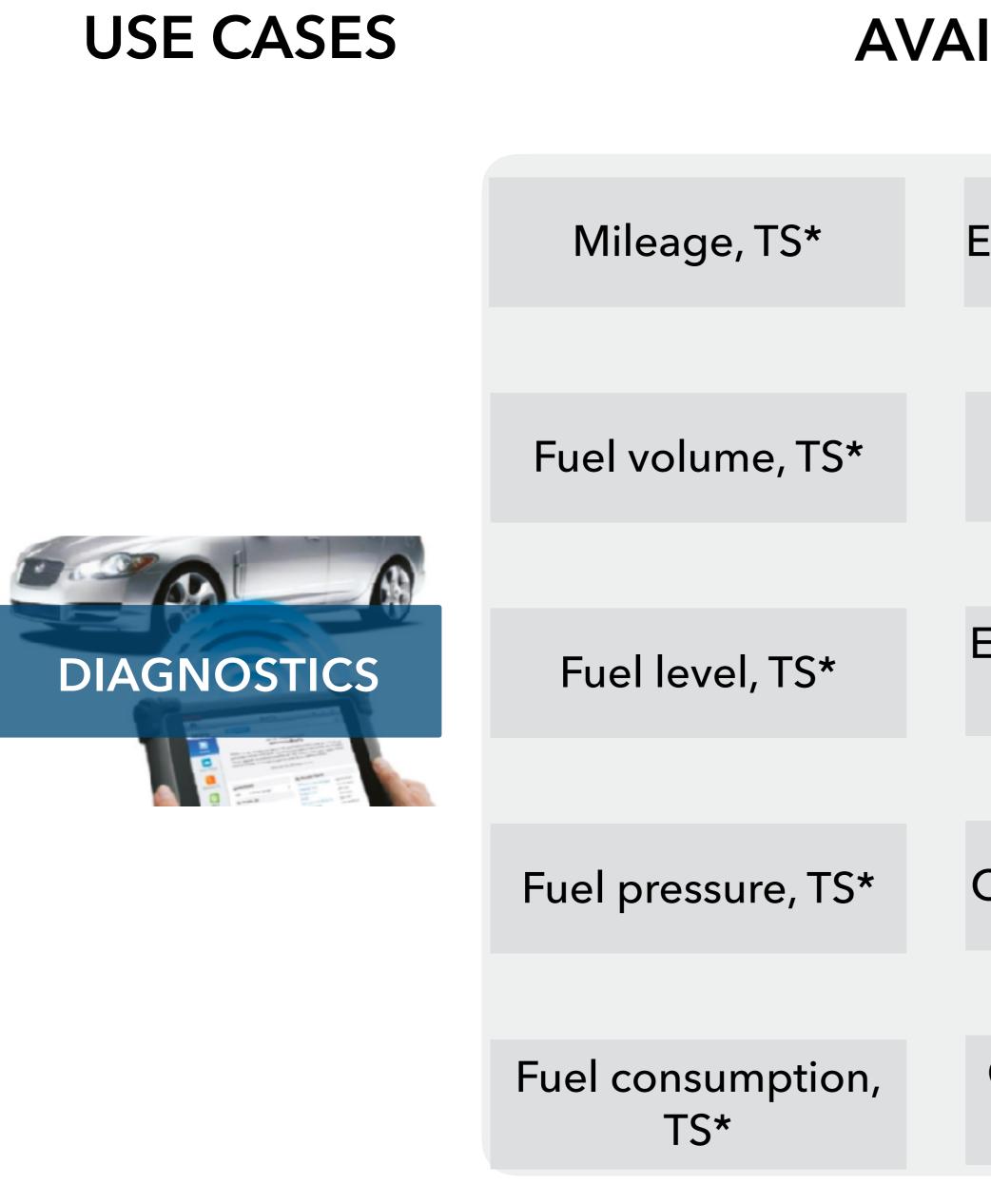
Numerous datasets can improve diagnostics

What data sets are required for what use case (5/6)

USE CASES

DIAGNOSTICS

AVAILABLE DATA POINTS

Mileage, TS*	Estimated range, TS*	Battery voltage, TS*
Fuel volume, TS*	Engine coolant T°, TS*	Check control messages, TS*
Fuel level, TS*	Engine temperature, TS*	Battery level, TS*
Fuel pressure, TS*	Oil temperature, TS*	Tire pressure, TS*
Fuel consumption, TS*	Odometer reading or DSMC, TS*	etc.

BENEFITS

✓ Time saved (no garage visit)

✓ Instant read on potential issues

✓ Gain up to 80% of the time spent at service visits

✓ Prevent avoidable costs

✓ Keep vehicles on the road

✓ Manage more efficiently operating costs

Source: PTOLEMUS, VDHs, service providers - Note: for each use case, not all data points are necessary to deliver a value added service
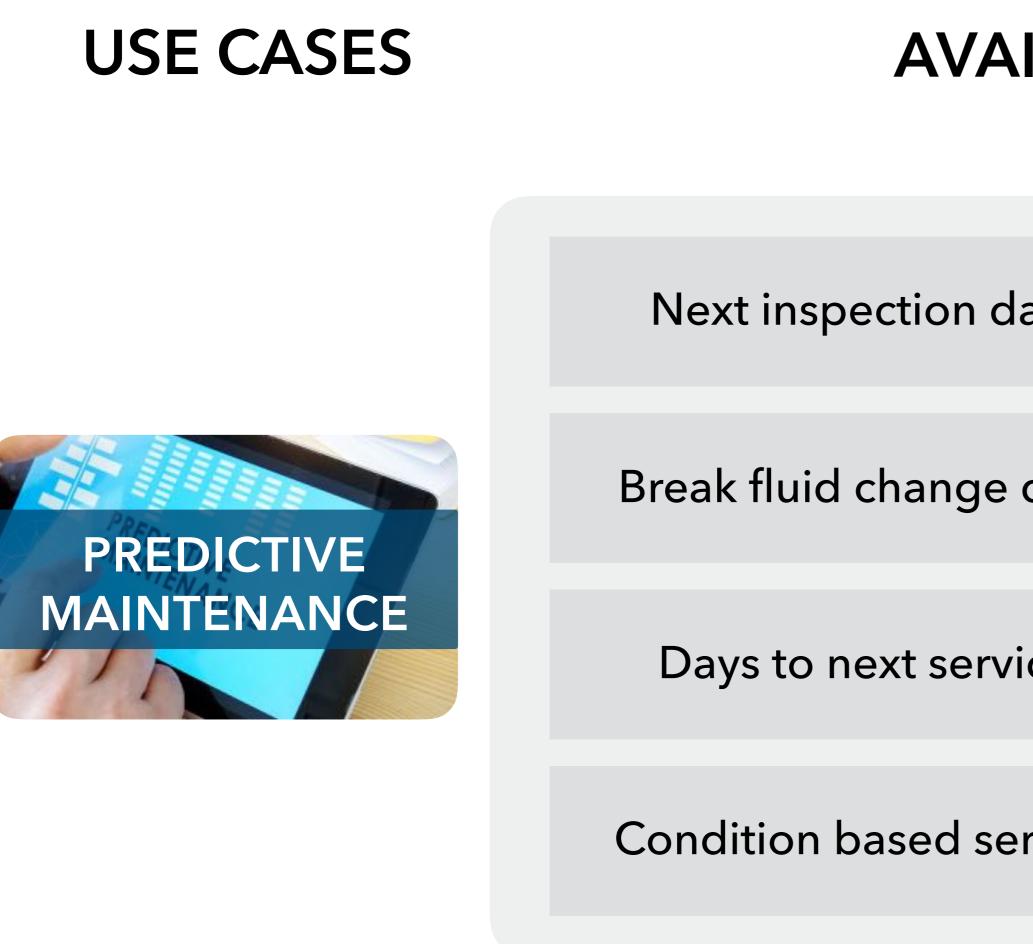
Repair & maintenance also greatly benefit from car data

What data sets are required for what use case (6/6)

USE CASES	AVAILABLE DATA POINTS	BENEFITS

USE CASES

PREDICTIVE MAINTENANCE

AVAILABLE DATA POINTS

Next inspection date	Km to next service
Break fluid change date	Service time threshold
Days to next service	Tele service availability
Condition based service	Months to exhaust inspection

BENEFITS

✓ Better maintenance planning

✓ Anticipate, plan and reduce cost of repair including downtime

- Turning alerts into insightful reports explaining their meaning and what needs to be done
- Providing drivers / fleet managers directions via mobile apps or through the car dashboard

- These datasets, when shared with dealerships and garages, enable them to provide customised service-models to customers according to their needs

Overall the driver will benefit from a smarter journey

Benefits for users (business & consumer)

ENHANCE CUSTOMER EXPERIENCE

- Save time
- Growing set of applications
- Trip recalculation
- Understand alerts
- Easy parking
- Increased safety
- Personalised programmes
- Traffic information & management
- Infotainment

ENJOY A SMARTER JOURNEY

SAVE MONEY

- Reduce downtime
- Predictive maintenance
- Avoid breakdowns
- Prevent car theft
- Pay per use
- Purchase vouchers

Car makers will both increase operational efficiency and generate revenues

Benefits for OEMs

IMPROVE PRODUCT DEVELOPMENT

Detect defective systems / parts

Avoid recalls

Improve vehicle quality

Improve engineering process

Optimise vehicle management

Save time

INCREASE PROFITABILITY

INCREASE OPERATIONAL EFFICIENCY

DEVELOP AN OEM-CENTRIC ECOSYSTEM

Offer a larger range of services

Attract consumer opt-ins

Monetise data

Increase value for partners

ENHANCE CUSTOMER RELATIONSHIP

Extend customer retention

Create greater value for customers

Increase customer satisfaction

Increase brand loyalty

Source: PTOLEMUS

Vertical service providers will develop new business models

Benefits for third-party service providers

IMPROVE CUSTOMER RELATIONSHIP

Receive insights (historical, real time, enriched data)

Better understand customers

Improve customer experiences

Retain existing customers

Qualify leads (e.g. repair, insurance)

Provide personalised quotes

Offer a larger and better tailored range of services

Create greater value for customers

SAVE TIME

Access to vehicle data from day 1

Avoid technical hurdle (device installation, …)

GENERATE NEW REVENUES

Up-sell new services

Monetise data

INCREASE PROFITABILITY

Avoid IT/technology costs and management
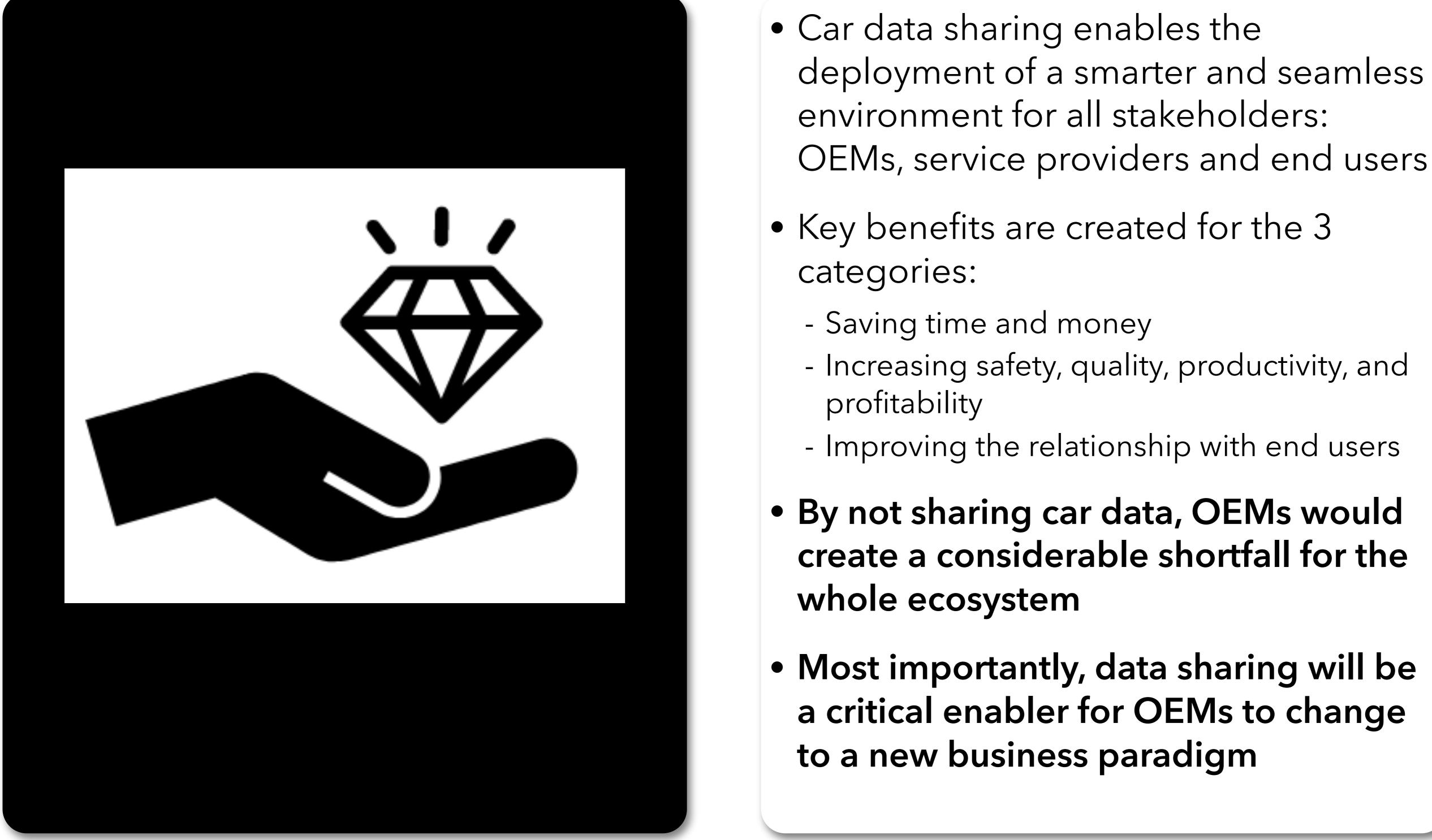
Avoid device direct and indirect costs

Optimise claim management (e.g. insurers)

Optimise vehicle management (e.g. fleets)

DEVELOP OWN APPLICATIONS FOR CUSTOMERS

INCREASE OPERATIONAL EFFICIENCY

The impact of sharing car data is global and all stakeholders benefit from it down to the end user

- Car data sharing enables the deployment of a smarter and seamless environment for all stakeholders: OEMs, service providers and end users

- Key benefits are created for the 3 categories:
  - Saving time and money
  - Increasing safety, quality, productivity, and profitability
  - Improving the relationship with end users

- **By not sharing car data, OEMs would create a considerable shortfall for the whole ecosystem**

- **Most importantly, data sharing will be a critical enabler for OEMs to change to a new business paradigm**

You have only read 15% of the report and 1% of the forecasts

What you've read

What the report contains

To obtain the full report,

contact our team at

VDM@ptolemus.com

More than 250 companies are mentioned in the report (1/5)

List of companies mentioned

Company	Industry	Company	Industry
AA	Roadside assistance provider	Autonomic	TSP
AAADATA	Data provider	Avis	Car sharing
ACEA	Automotive association	BAIC Motor	Automotive OEM
Acxiom	Analytics provider	Baidu	Search engine
ADAC	Automotive association	Be-Mobile	Service Provider
Agero	Roadside assistance	Bloomberg	Financial services
Aioi Nissay Dowa	Insurance	BMW Group	Automotive OEM
ALD Automotive	Leasing	Bosch	Tier 1
Alibaba	Technology	Bourns	Hardware provider
Alliance Renault-Nissan	Automotive OEM	BYD AUTO	Automotive OEM
Allianz	Insurance	Byton	Automotive OEM
AllState	Insurance	Cambridge Analytica	Data platform
Alphabet	Technology	anwb	Roadside assitance provider and
Amaguiz	Insurance	Car2Go	Carsharing/rental
Amazon	Technology	Carjojo	Analytics provider
Apple	Technology	CARUSO	Vehicle Data Hub
AppyWay	Parking	CCC	Data platform
Aptiv	Technology provider	CHANGAN	Automotive OEM
ARC Europe Group	Roadside assistance	CHERY	Automotive OEM
ARI Global	Fleet management	Citymapper	Service Provider
Arity	Mobility analytics	Cloudera	Technology provider
Arval	Service Provider	Continental	Tier-1
AT&T	Connectitvity provider	Cox Automotive	Analytics provider
Audi	Automotive OEM	Coyote System	Hardware provider

More than 250 companies are mentioned in the report (2/5)

List of companies mentioned

Company	Industry	Company	Industry
Daihatsu	Automotive OEM	FleetComplete	TSP
Daimler	Automotive OEM	Forbes	Publication
Dalberg Data Insights	Analytics provider	Ford	Automotive OEM
DAWEX	Data platform	FOTON	Automotive OEM
Deliveroo	Food order and delivery service	GAC Group	Cosulting firm
Denso	Tier 1	Garmin	Technology provider
DFLZ	Automotive subsidiary	GEELY Auto	Automotive OEM
DIRIF	Association	General Motors	Automotive OEM
Dolphin	TSP	Generali	Financial Services
DONGFENG	Automotive OEM	GENIVI	Software provider
Donlen	TSP	GEOTAB	Service Provider
Drive Time Metrics	Service Provider	Getaround	Carsharing/rental
EasyMile	Autonomous shuttle provider	GM	Automotive OEM
eBay	Ecommerce company	Go	Automotive
Element's	Financial services	Google	Analytics
Equifax	Consumer reporting agency	Grab	Service Provider
Ericsson	Technology provider	GROUPAMA	Insurance
Facebook	Social media network	GSMA	Telecom association
FCA	Automotive OEM	Hella	Manufacturing
Federation Internationale de	Association	HERE	HD map provider - data hub
FIA	Association	Hertz	Car rental
FICO	Data analytics provider	HighMobility	Vehicle Data Hub
FICOSA	Technology provider	Honda	Automotive OEM
First Data	Analytics provider	HUAWEI	Technology provider

More than 250 companies are mentioned in the report (3/5)

List of companies mentioned

Company	Industry	Company	Industry
HUI	Tier-1	Matmut	Insurance
Hyundai	Automotive OEM	Maven	Car sharing
IBM	Technology provider	Mazda	Automotive OEM
IFLYTEK	Software provider	McDonalds	Food and beverages
Infiniti	Automotive OEM	MERCEDES-BENZ	Automotive OEM
INRIX	Service Provider	Metavera	Technology provider
Intel	Technology provider	Microsoft	Technology provider
Inter Mutuelles Assistance	Assistance provider	MirroLink	Connectivty enabler
Invers	Mobility platfrom supplier	Mitsubishi Motors	Automotive OEM
JAC	Automotive OEM	Mobiledevices / Munic	Analytics provider
Jaguar Land Rover	Automotive OEM	Mojio	Service Provider
Just Eat	Food order and delivery service	MOPAR	Tier 1
KINGLONG	Automotive OEM	Motability	Financial services
KINTO	Software provider	MotorQ	Technology provider
Land Rover	Automotive OEM	MS&AD	Service Provider
Lear Corporation	Tier 1	Nationwide	Service Provider
LexisNexis	Data platform	Navya	Autonomous shuttle provider
LinkedIn	Social media network	NIO	Automotive OEM
MAAF	Insurance	Nissan Motor Corp	Automotive OEM
MaaS Global	Mobility platform provider	OCTO Telematics	Data platform
Macif	Insurance	OnStar	Automotive subsidiary
MAIF	Insurance	Open Street Maps	Service Provider
Maline assurance	Service Provider	Otonomo	Vehicle Data Hub
masternaut	TSP	Panasonic	Technology provider

More than 250 companies are mentioned in the report (4/5)

List of companies mentioned

Company	Industry	Company	Industry
Parkme	Parking enabler	Suzuki	Automotive OEM
Parkopedia	Parking data provider	Swiss Re	Service Provider
Parkwhiz	Parking enabler	SYNAPTIV	Vehicle Data Hub
PayTollo	Toll payment solution	TechAlliance	Association
Pioneer	Technology provider	Telenav	Location based service provider
Porsche	Automotive OEM	Telepass	Toll Service Operator
Progressive	Service Provider	Tencent	Software provioder
PSA	Automotive OEM	Terbine	Data platform
PSA Group	Automotive OEM	Tesla	Automotive OEM
QNX	Operating system	Tfl (Transport for London)	Association
RACE	Automotive	The Floow	TSP
Renault Nissan	Automotive OEM	Thinknear	Technology provider
RSA	Service Provider	Tomtom Telematics	Service Provider
SAIC Motor	Automotive OEM	Touring	Insurer
SAMSUNG	Technology provider	Toyota	Automotive OEM
Sdl	Software provider	TrafficMaster	Service Provider
Share Now	Carsharing/rental	TrafficNav	Service Provider
Shell	Fuel provider	TRAN (Committee on Transport	Association
Sirius XM	Satellite Radio broadcaster	Transpolis	Mobility platform
Smartcar	App environment for connected	Transport for West Midlands	Association
Solera	Software provider	TSG - Charge point	Electric charging infrastructure
Sonic	Automotive retailer	Turo	Carsharing/rental
StateFarm	Service Provider	Twitter	Social media network
Subaru	Automotive OEM	University of Michigan	University
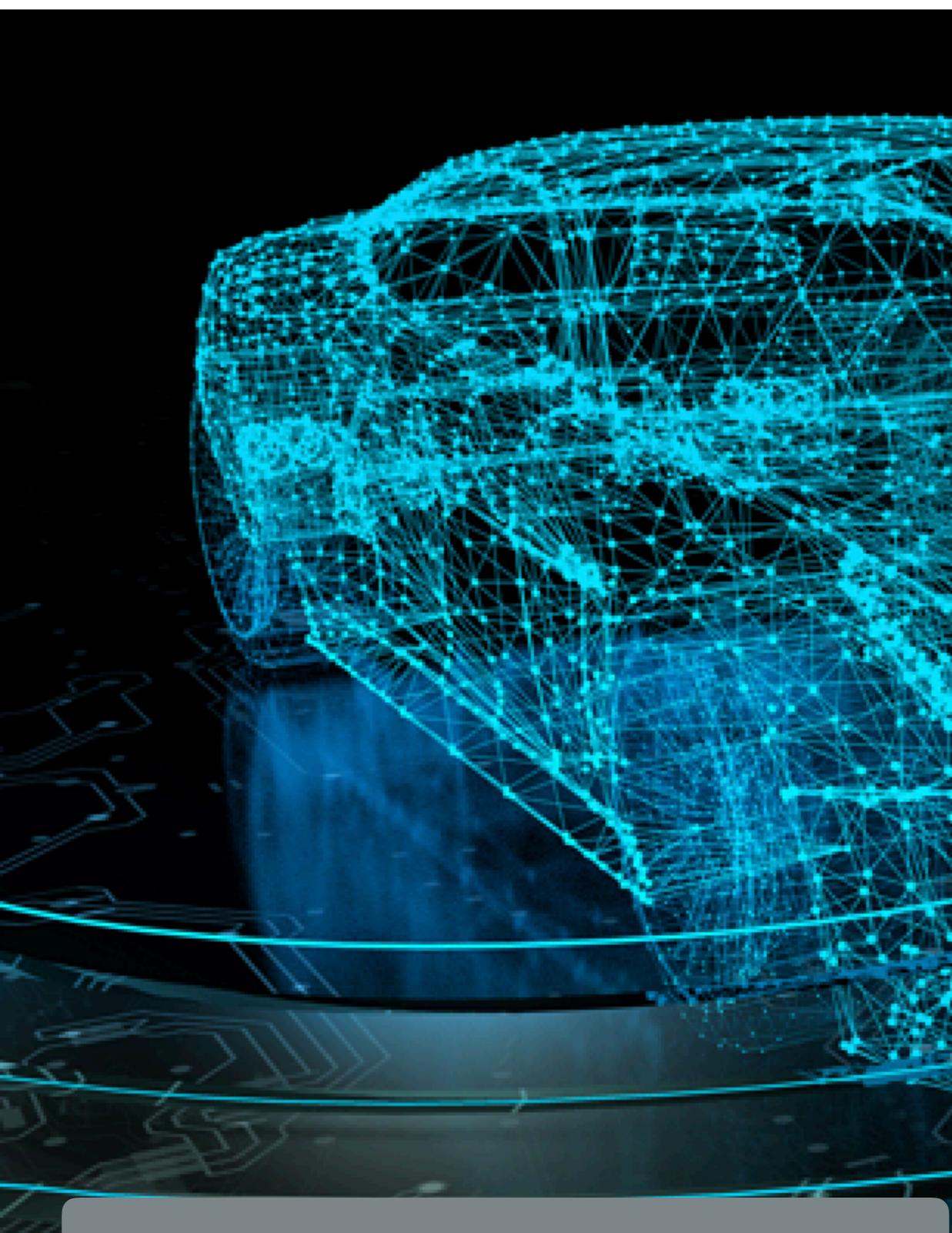
More than 250 companies are mentioned in the report (5/5)

List of companies mentioned

Company	Industry
USAA	Service Provider
Valeo	Tier 1
Valerann	Mobiltiy data provider
VDA	German automotive association
Verisk	Vehicle Data Hub
Verizon	Connectitvity provider
Verizon connect	Service Provider
Via Verde	TSP
VIMCAR	TSP
VISA	Payments platform
Vodafone	Connectitvity provider
Volkswagen	Automotive OEM
Volvo	Automotive OEM
Vtraffic	Service Provider
VW	Automotive OEM
Waycare	Mobility platform
Waymo	Automotive OEM
Waze	Map provider
wejo	Vehicle Data Hub
WMG	University
Worldline	Mobility platform
Xevo	Software provider
Yandex	Service Provider
Zenrin	Service Provider
ZOTYE	Automotive OEM

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