

VEHICLE DATA MARKET

Global Study



**FREE
BROCHURE**

The first investigation
of OEM strategies and
car data hubs

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

Vehicle Data Market Global Study - Free abstract

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

Strategy consulting services



Market research services



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



Telematics solution providers



Device & location suppliers



Insurers, aggregators & assistance providers



Mobile telecom players



Fleet & fuel, ITS & regulators



Banks & private equity investors



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



Defined strategic positioning in insurance telematics value chain

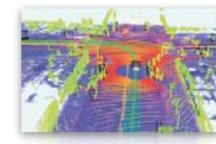


Defined market entry strategy & business case of a new fleet Telematics Service Provider

Vehicle data aggregator



Defined strategy & business plan of its telematics business



Evaluated the market potential of HD maps for autonomous vehicles

Consortium of OEMs & map makers



Helped the insurer understand and anticipate the impact of Autonomous Vehicles on its business

European bank-insurance group



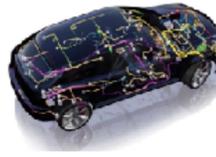
Defined its future vehicle connected services global strategy

Global roadside assistance group



Helped evaluate OEMs' interest for its new vehicle market place

Vehicle data hub



Identified & selected potential M&A targets in European connected car services

Vehicle data hub



Helped the company define its strategy towards OEMs in North America

Vehicle data hub



Defined connected vehicle data strategy for innovative telematics services provision and monetisation

Vehicle data aggregator



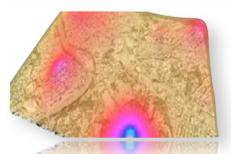
Helped evaluate European OBD market opportunities in FMS, UBI and roadside assistance

Major telematics device vendor



Helped define the specifications of its eCall on-board unit

Global automotive OEM



Defined the company's strategy to leverage mass cellular positioning data



Identify opportunities from connected & autonomous vehicles for the space sector

Space agency

We have helped many OEMs and vehicle data market places

AUTOMOTIVE OEMs



DAIMLER

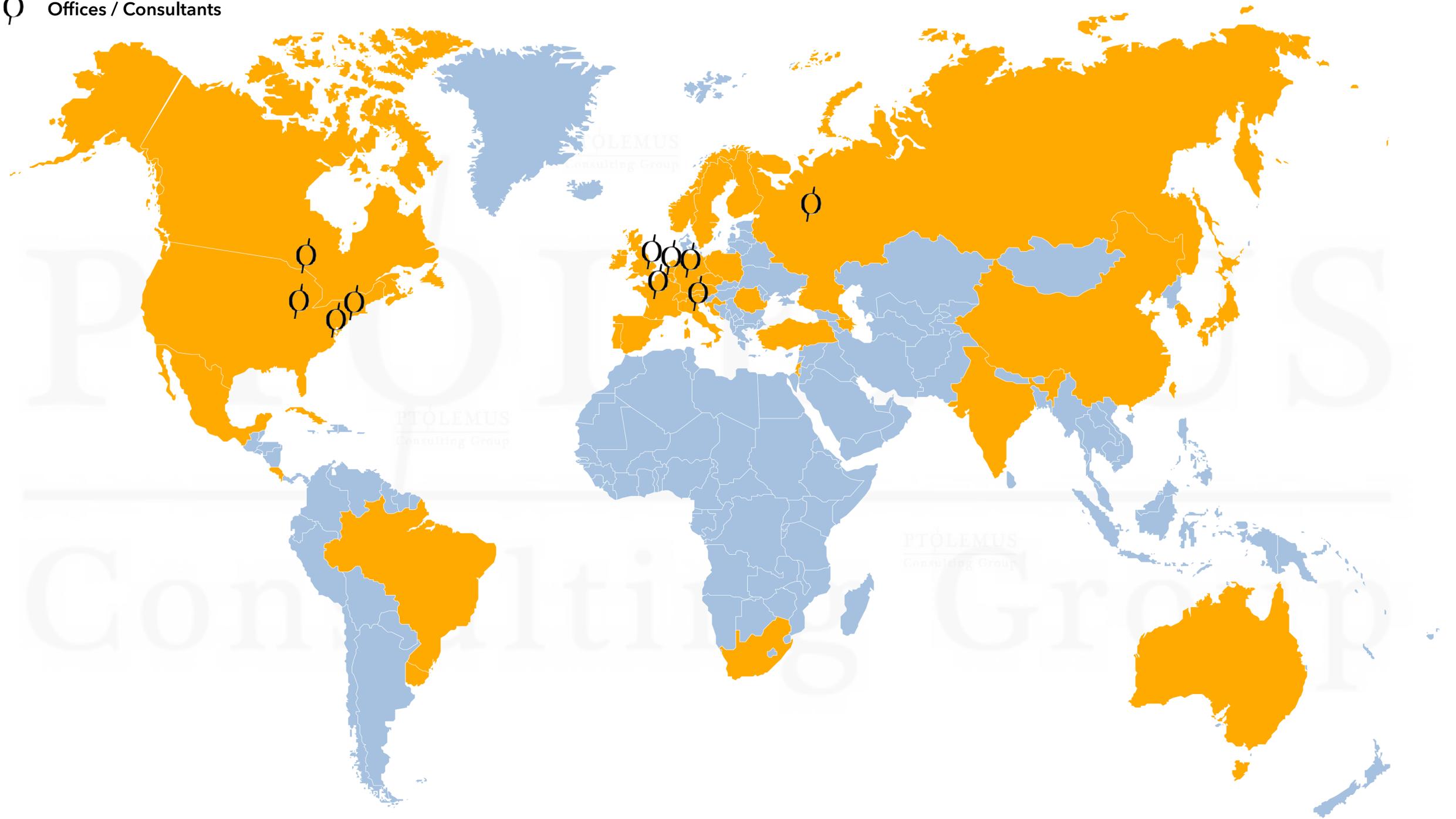


VEHICLE DATA HUBS



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.

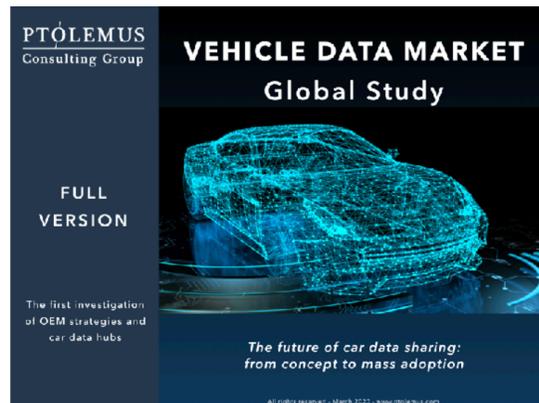
Will VDHs take off? This 600-page report responds to this question and many more.

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

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



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.

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.



Erik Jonnaert
ACEA Secretary General

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?"



Jean-Marc Zulesi
French MP

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

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

Karima Delli

Chair, Committee on Transport & Tourism, European Parliament



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

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

In the context of the European Green Deal, the reparability 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.

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



Jean-Marc Zulesi
French MP

Dr. Christian Knobloch
Knobloch & Gröhn GbR



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

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.

Jocelyn Delattre
ACEA



The OEM remains responsible that the car works for the vehicle's lifetime. Therefore it must set the rules that must be complied with.

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



Ted Gunning
LeasePlan CEO

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.

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



BMW CarData

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.

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

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

Caruso simplifies the usage across all OEMs.



Alexander Haid
Managing Director, Caruso



Richard Barlow
CEO, wejo

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.

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.

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 collected 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 €304 billion in 2030
 - The bulk of it will be insurance, diagnostics, repair and maintenance, fleet management
 - These 4 markets will represent **46% 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
 - €304 billion for all service providers (including OEMs)
 - €5.5 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

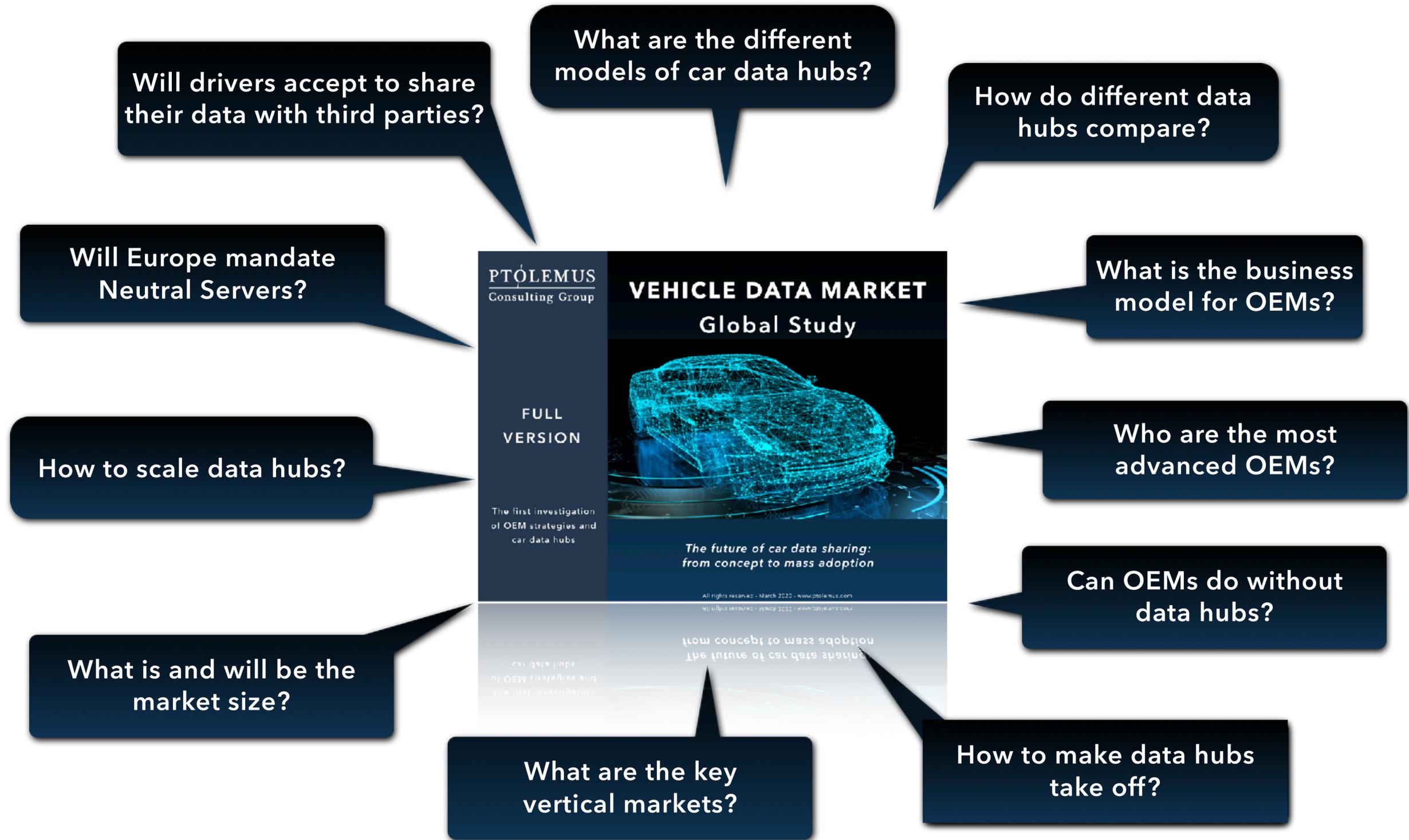


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- A. The datasets currently supplied by connected cars
- B. The demand for car data
- C. The benefits for each stakeholders

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- A. OEM challenges around sharing data
- B. The historical growth of the aftermarket ecosystem
- C. The role of third party data hub suppliers

3. How are OEMs embracing the change?

- A. 5 OEM strategic scenarios
- B. The major OEM profiles
- C. Implementation case studies

4. The trends impacting the market: why have OEMs no choice?

- A. How mega trends are pushing VDHs
- B. The impact of the local regulation on data sharing

5. How big will the data hub market be?

- A. Our methodology
- B. The market size for 3 stakeholder categories:
 - OEMs
 - Vehicle data hubs
 - Vertical Service Providers
- C. The market size in 8 verticals:
 - UBI
 - Roadside assistance
 - Remote diagnostics & maintenance
 - Payments (tolling, parking, fuel)
 - Leasing
 - Rental & car sharing
 - Traffic
 - Advertising

D. The market size in 3 regions

- North America
- Europe
- Asia (China)

E. How the VDH impact each business model

6. The supply landscape

- A. The technology chain
- B. The VDH existing business models
- C. The key success factors for a VDH
- D. Player assessments
- E. VDH supplier profiles
 - Caruso
 - CCC-X
 - HERE
 - High Mobility
 - LexisNexis
 - Otonomo
 - Terbine
 - Verisk Analytics
 - wejo

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*



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



We listed 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

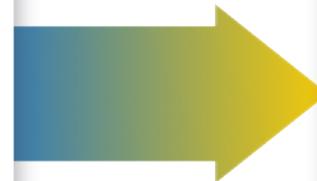


The market of car data sharing could shift from aftermarket solutions to embedded solutions

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. inaccessible 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)



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
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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 from 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...

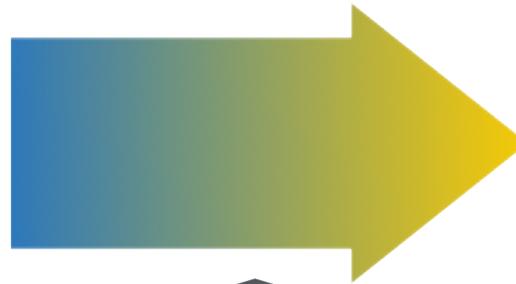


Vehicle data sharing must enable the OEMs' transition to a new business paradigm

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

Traditional OEM paradigm

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- ★ **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)

- * Move away from car ownership (shared mobility, MaaS, new generation not car focused, ageing of new car buyers)
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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

Manage safety & security

Lack of understanding value

Manage privacy & compliance

Find the business model

**Create a customer
experience / sell cars**

**What are the
challenges
around sharing
data?**

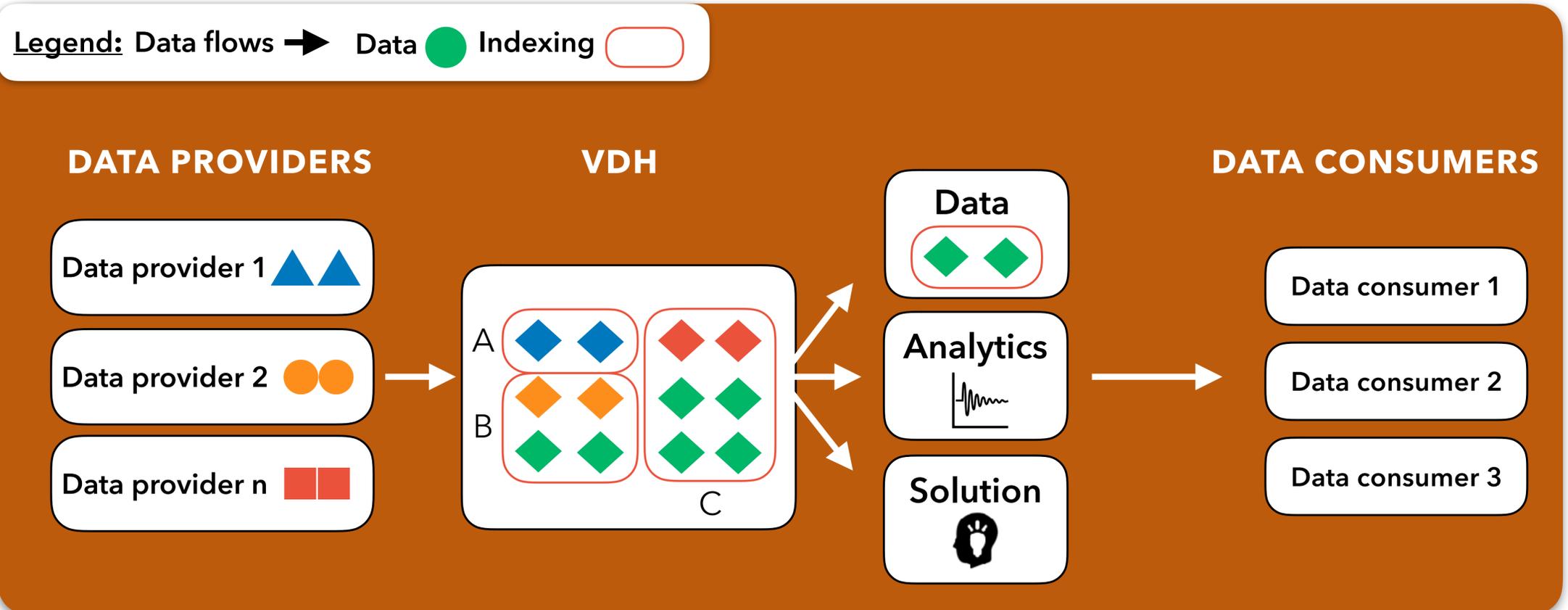


VDHs collect data from OEMs and transform it into data, insights or even complete solutions

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



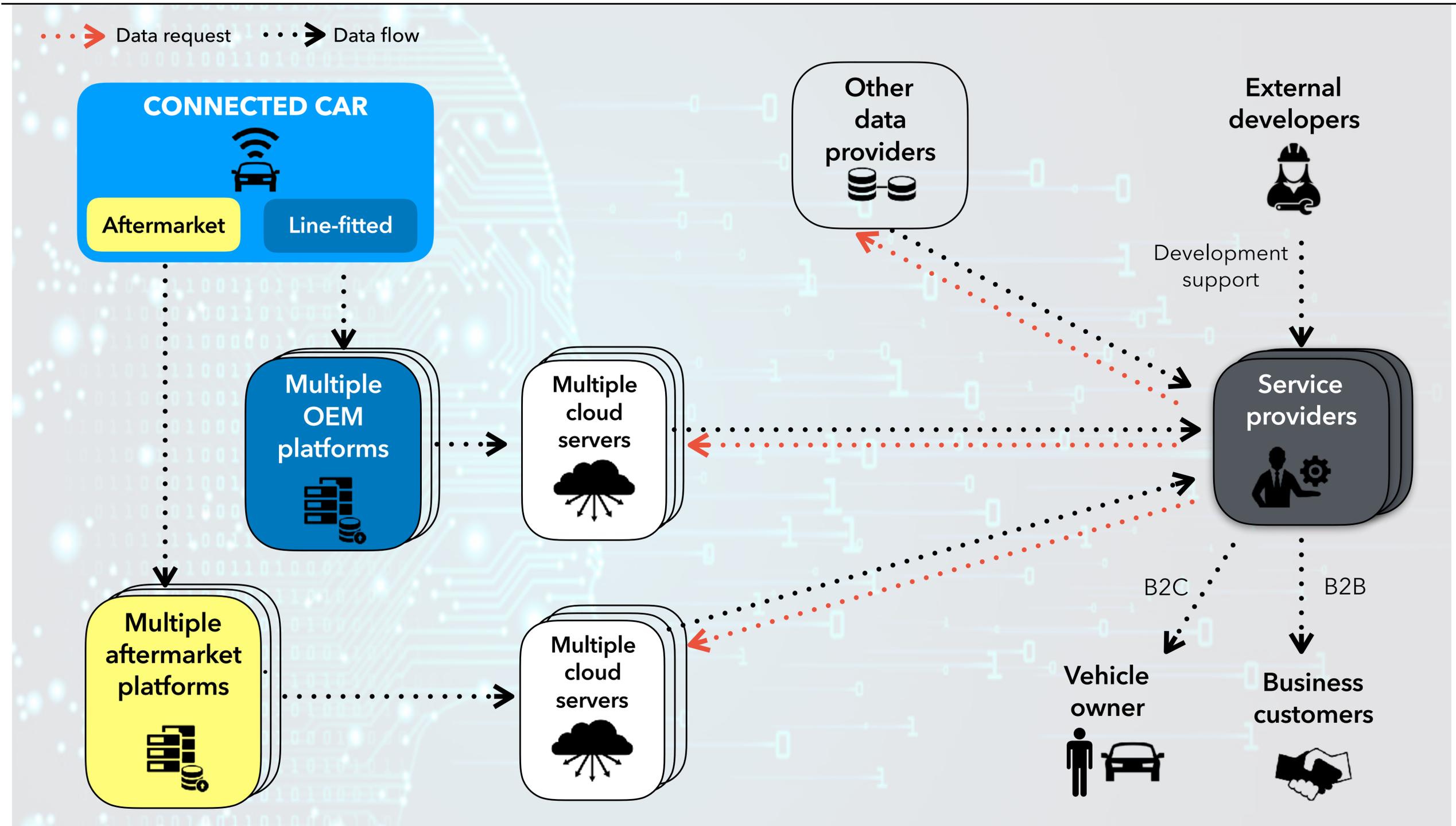
Players





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

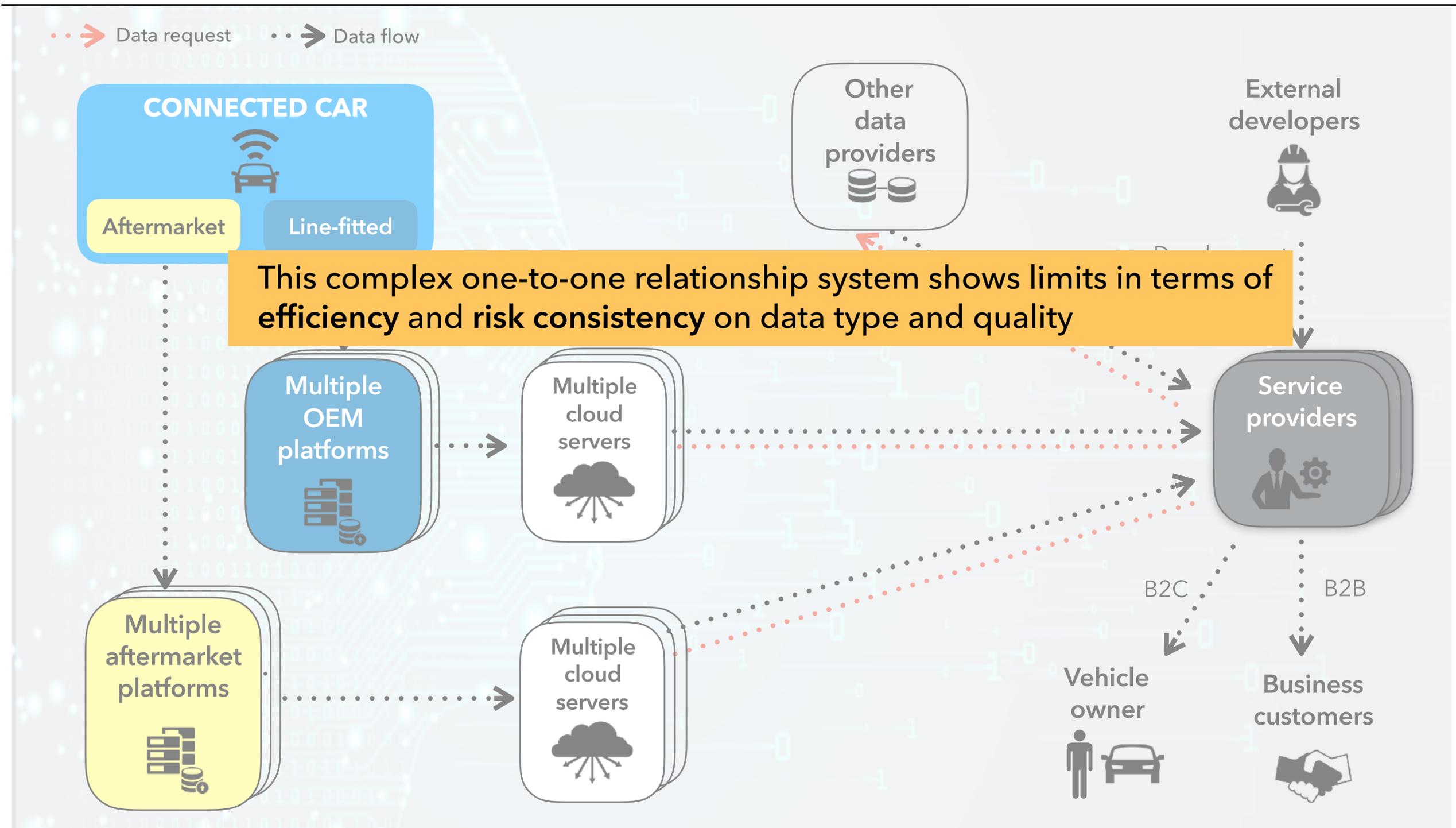
The data flow ecosystem without exchange enablers





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

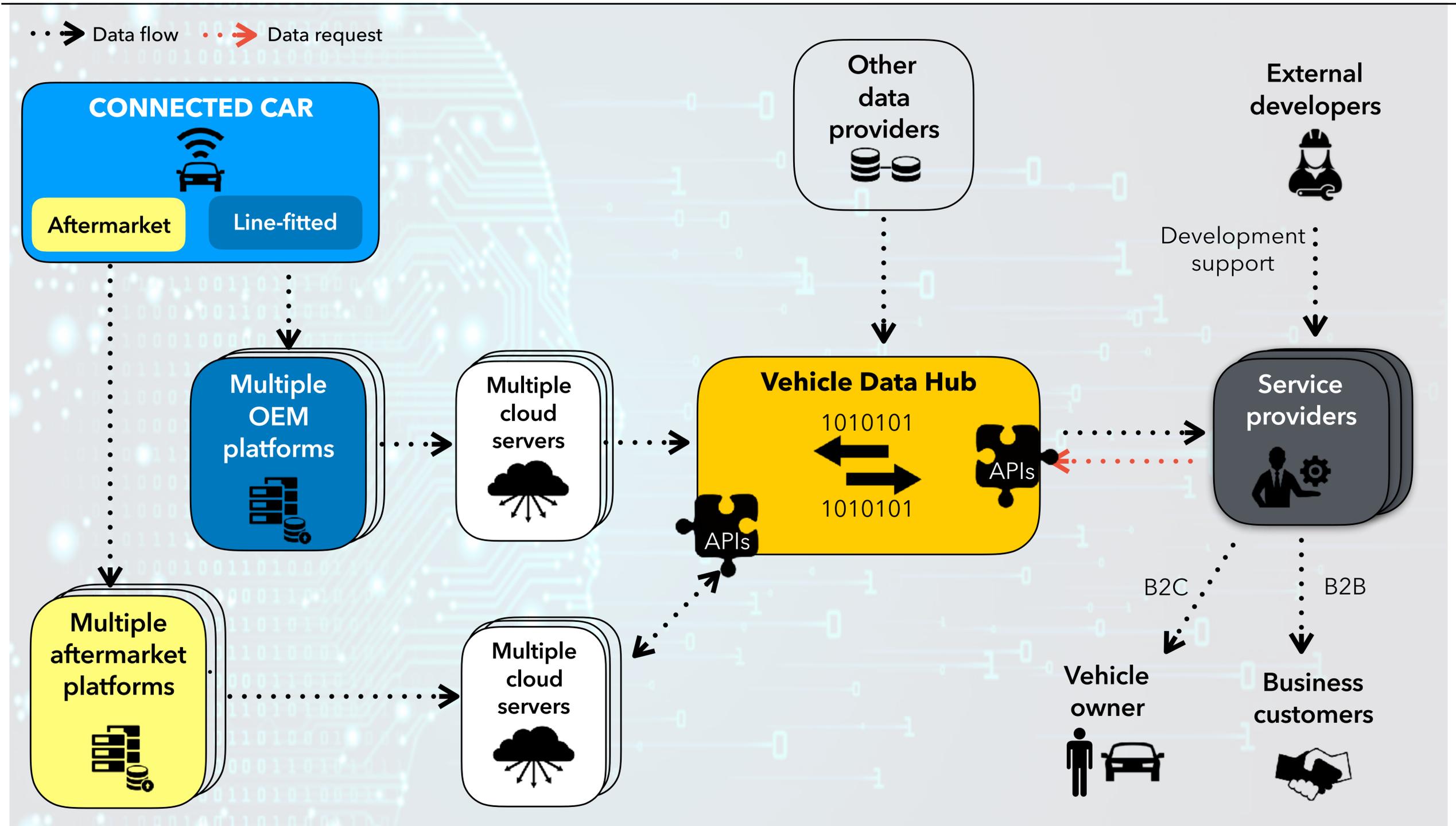
The data flow ecosystem without exchange enablers





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

The data flow ecosystem with a Vehicle Data Hub



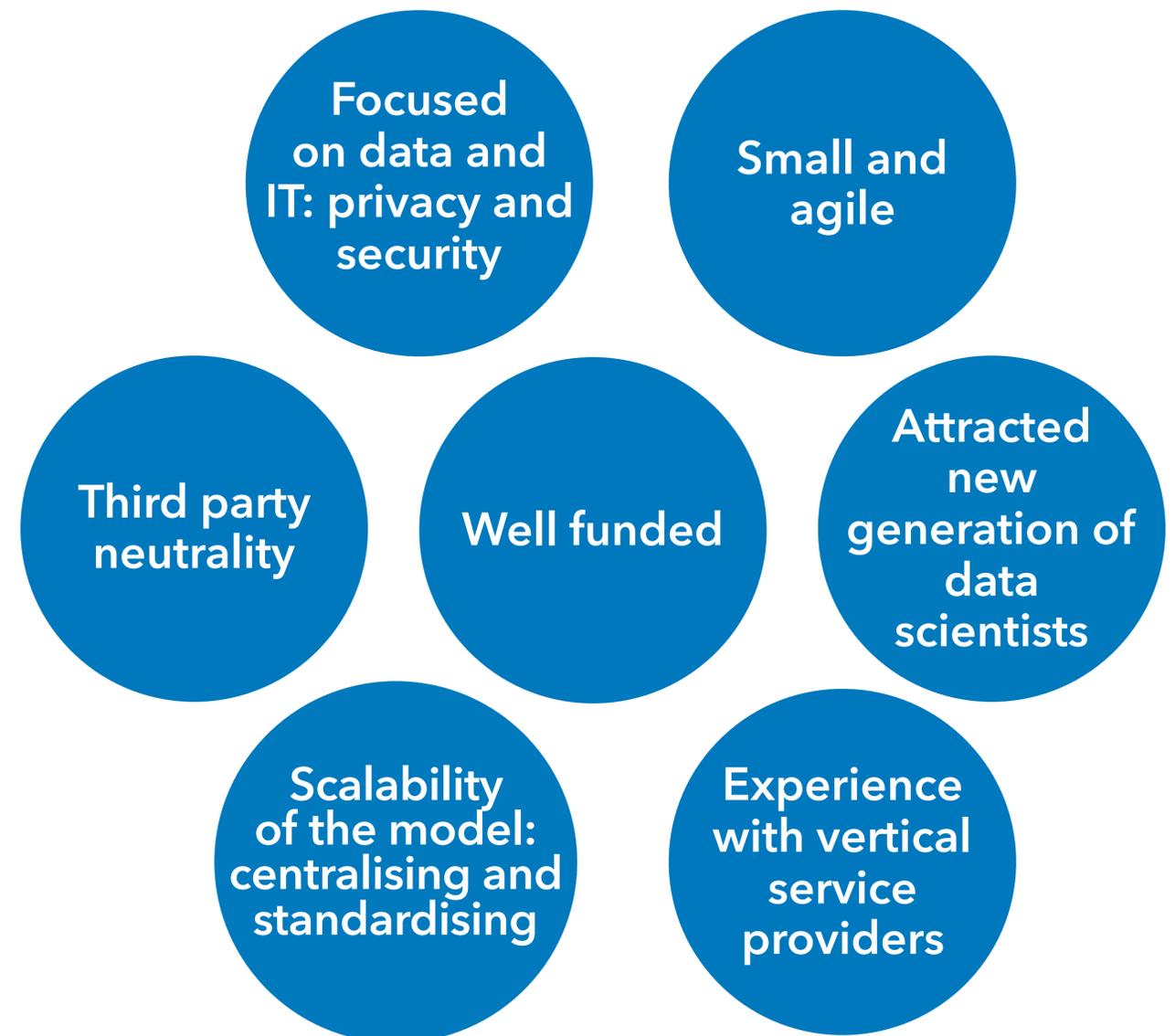


Vehicle data hubs can potentially solve key ecosystem challenges

KEY CHALLENGES TO DATA EXCHANGE

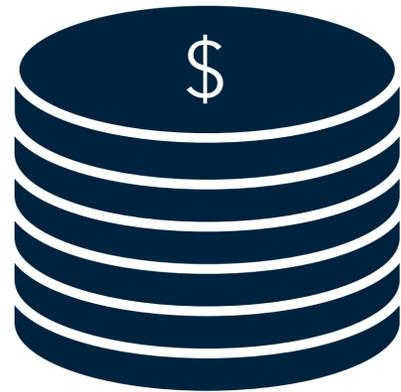


ADVANTAGES OF DATA HUBS



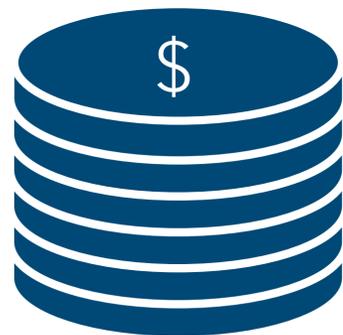


OEMs currently see 3 potential tiers of value to generate from their data



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 capacity** to a **services model**
- 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

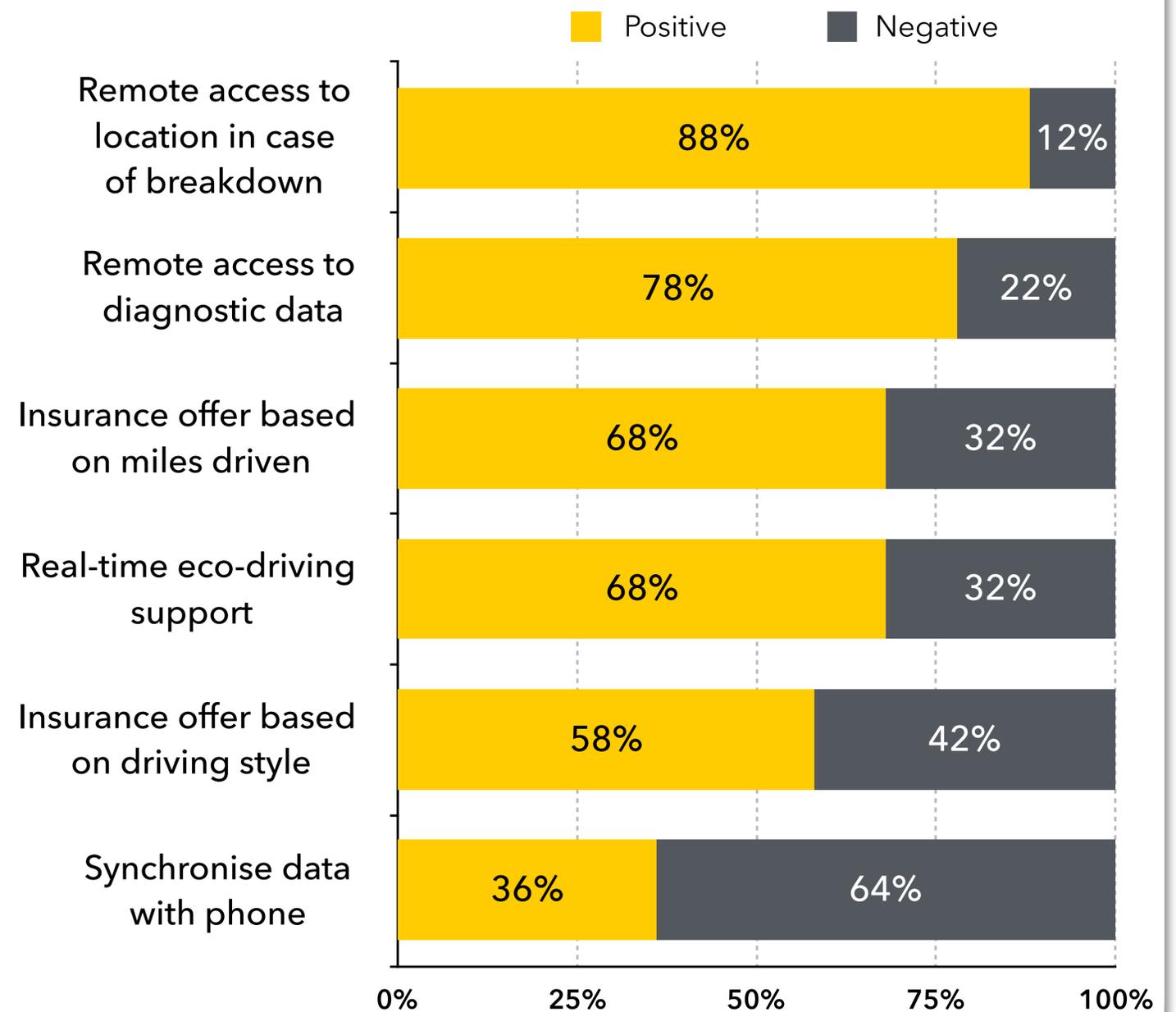
- **Monetising data by selling to third parties on the open market** is being investigated by OEMs at varying levels of maturity
- It is currently still seen as **the least valuable tier**
- OEMs are looking to understand what the value of their data will be



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

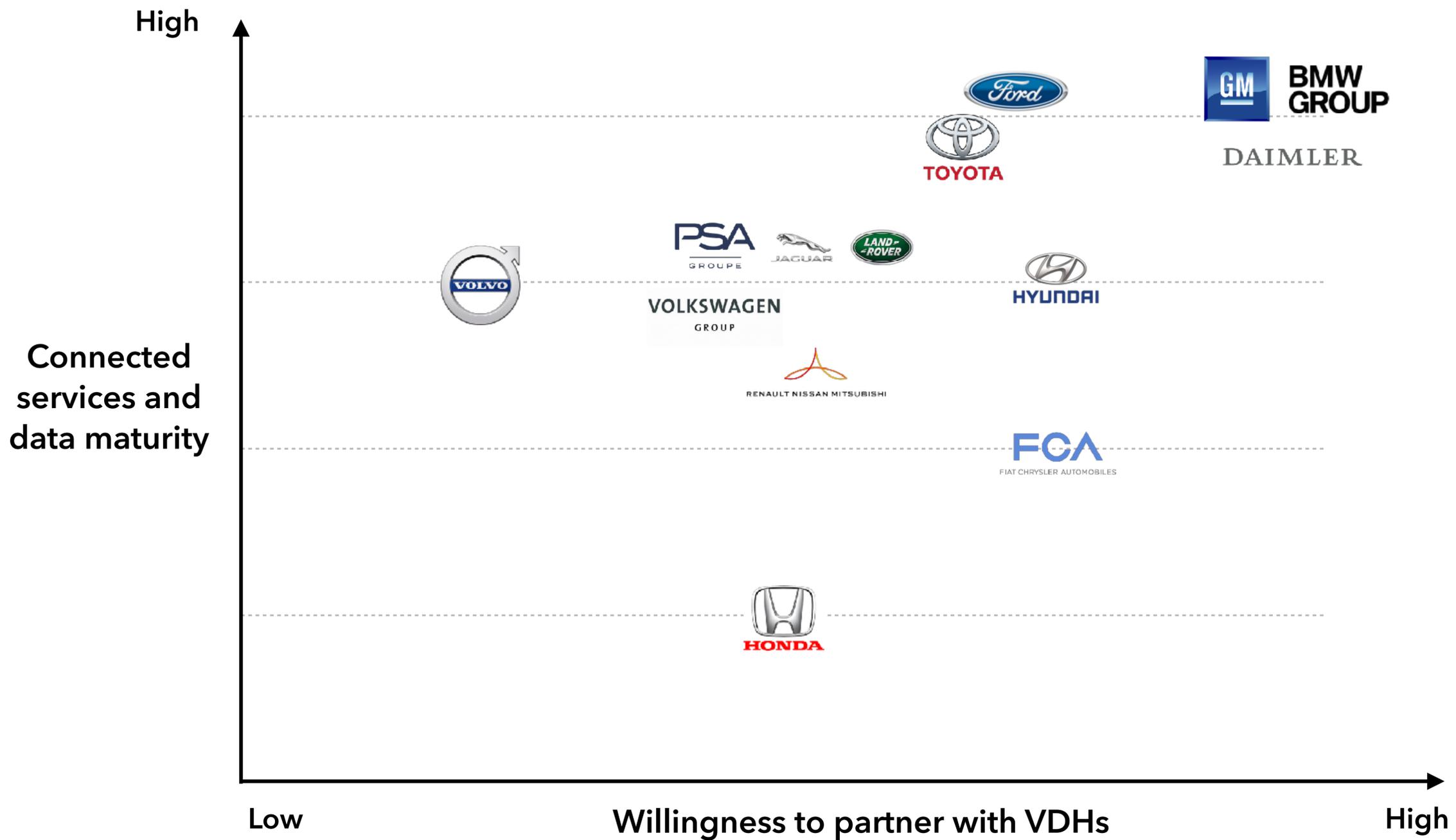
European consumer attitudes towards data sharing





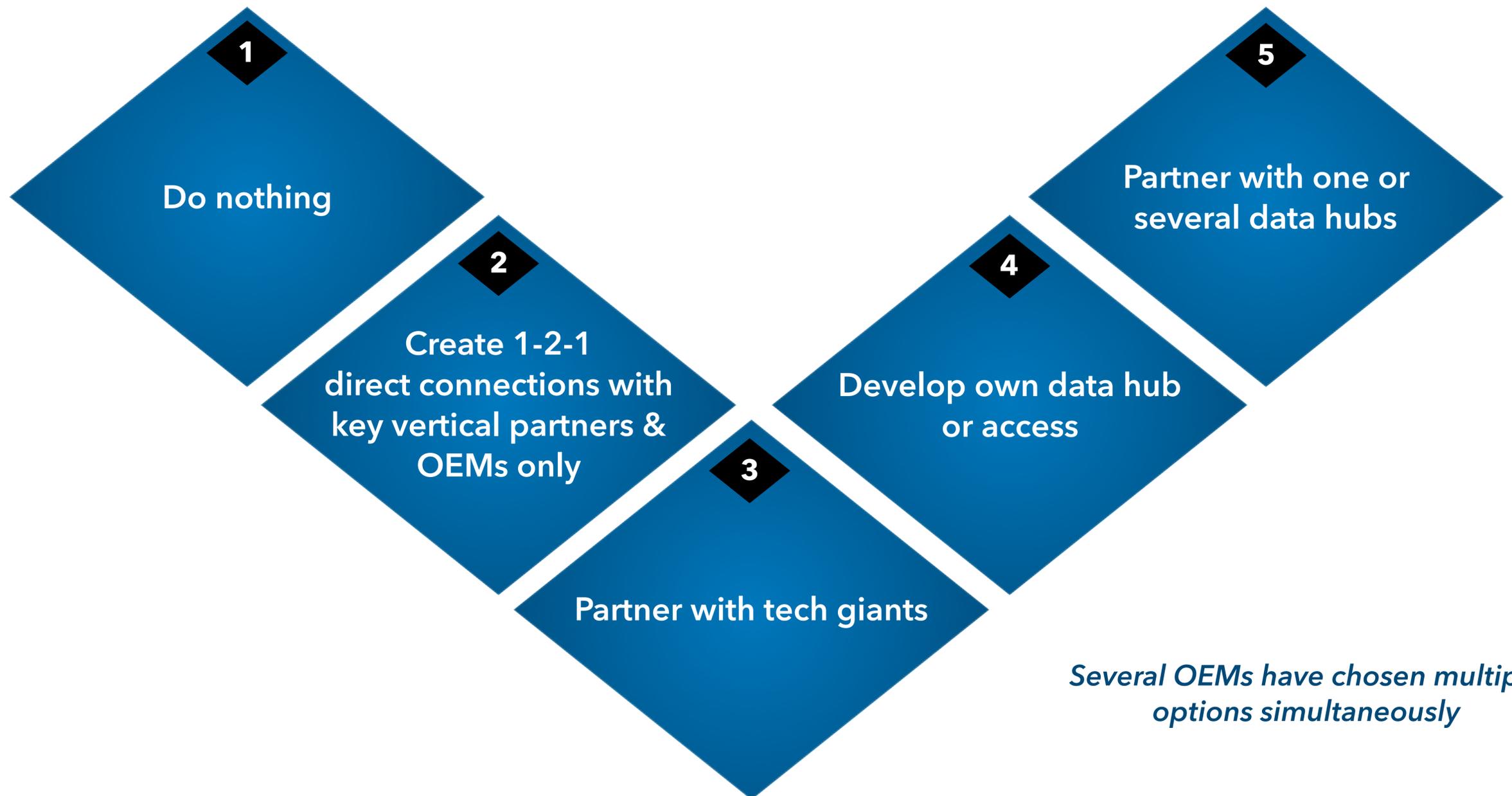
The majority of OEMs are at the trial phase of working with data hubs

OEM positioning for data hubs





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

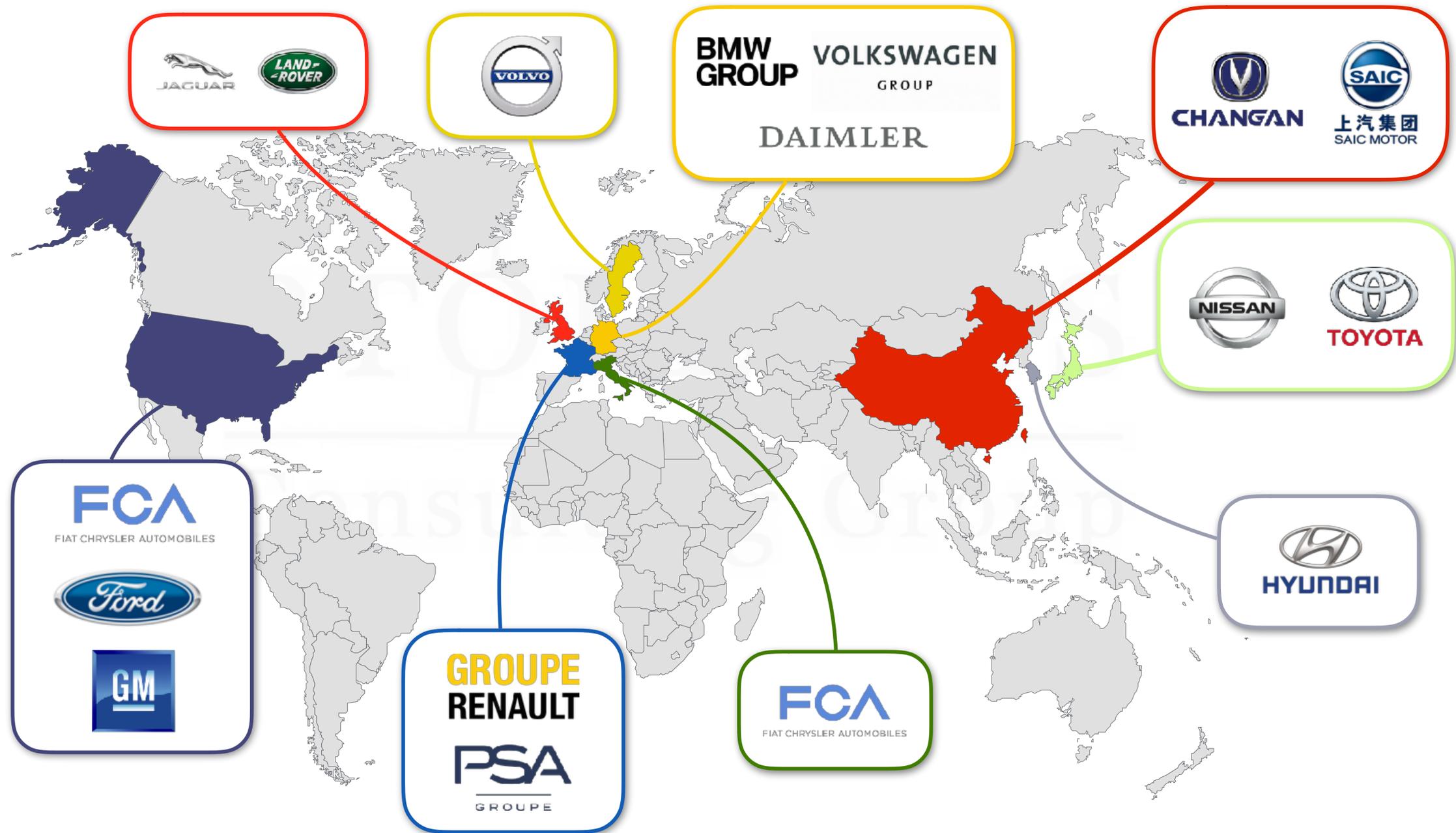


Several OEMs have chosen multiple options simultaneously



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 (2/2)

  Insurance



  Insurance



    Insurance





We analyse 9 major vehicle data hubs in depth

VDH profiles

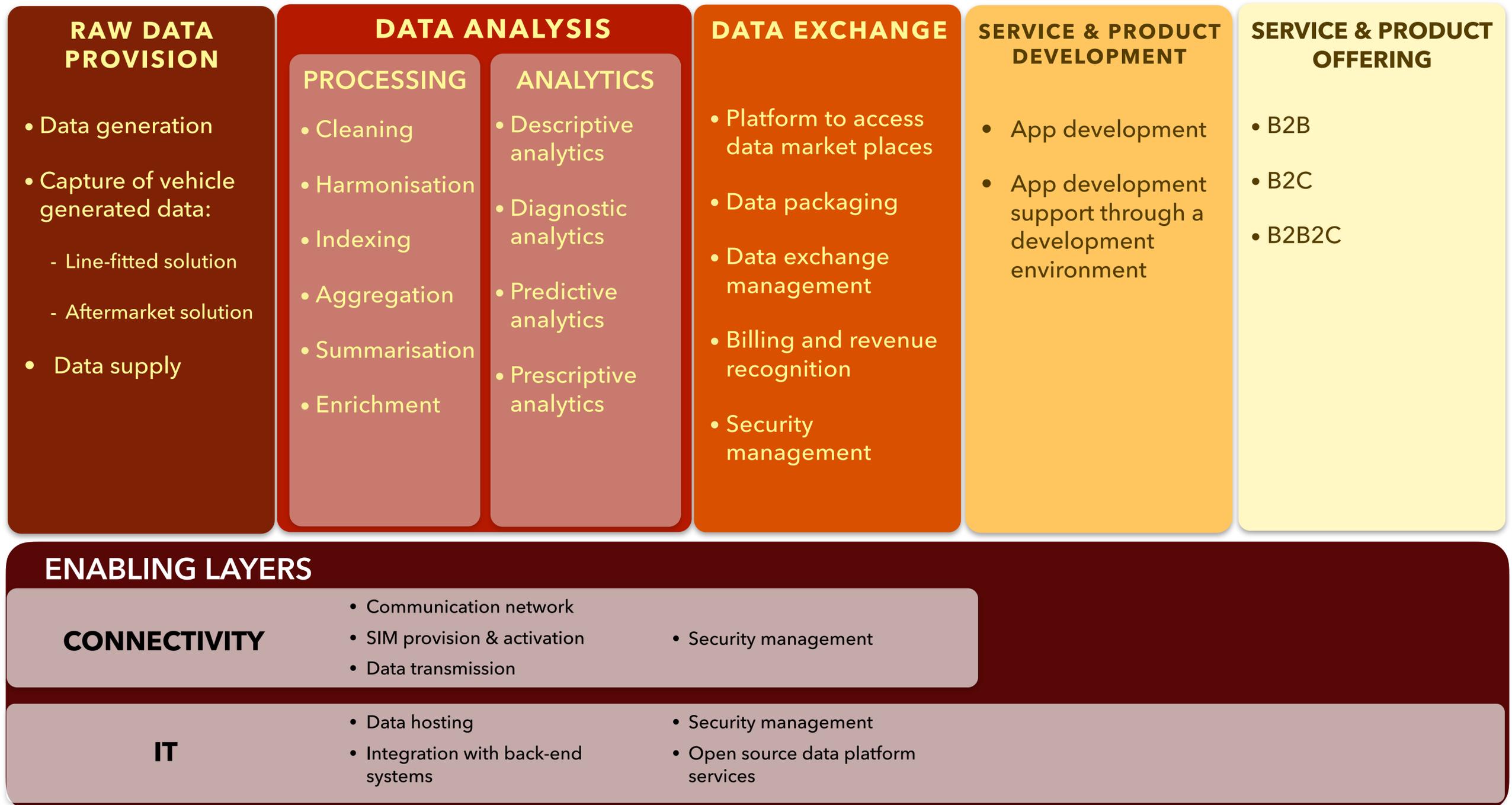
The grid displays nine different VDH profiles, each with a unique color scheme and data points:

- CARUSO:** Blue interface, "Join the CARUSO ride", 2017, TechAlliance APX, Corat, Mobilia, Ovran, LKQ...
- CCC:** Blue interface, "CCC X", 1988, Advice: international, Chicago, US, 2000+*, MBA stage, 50ba km**
- here:** Teal interface, "here", 1982, Audi, BMW, Bosch, Continental, Daimler, Intel and Plessey, Amsterdam, The Netherlands, +9,000, -€1 billion*, MBA stage, +.a
- H1:** Grey interface, "H1", 2013, IBB and other private investors, Berlin, Germany, 24, P.A., -€1.5M, P.A.
- LexisNexis:** Red interface, "LexisNexis", 1988, FTSE 100, RELX Group, Alpharetta, Georgia, US, 4,700, € 2.44 billion, IPO stage, 103B+
- otonomo:** Blue interface, "otonomo", 2015, Aviv, Bossener Venture Partners, Dal, Hesse, MediaMatrix Mobility..., Herzliya Pituoch, Israel, 51-200, P.A., -€4.8 million, 33CB KM*
- TERBINE:** Orange interface, "TERBINE", 2016, Angel investors, Family offices, Las Vegas, US, 31, P.A., €2.9 million
- Verisk:** Blue interface, "Verisk", 1911, Public (NASDAQ), Jersey City, New Jersey, USA, 1,600+, -€1.36 million, Public, 101 billion km**
- wejo:** Yellow interface, "wejo", 2014, CM and other investors, Tottenham, Cheshire, UK, 200+, €2.7M*, -€1.04M, 140B+*



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

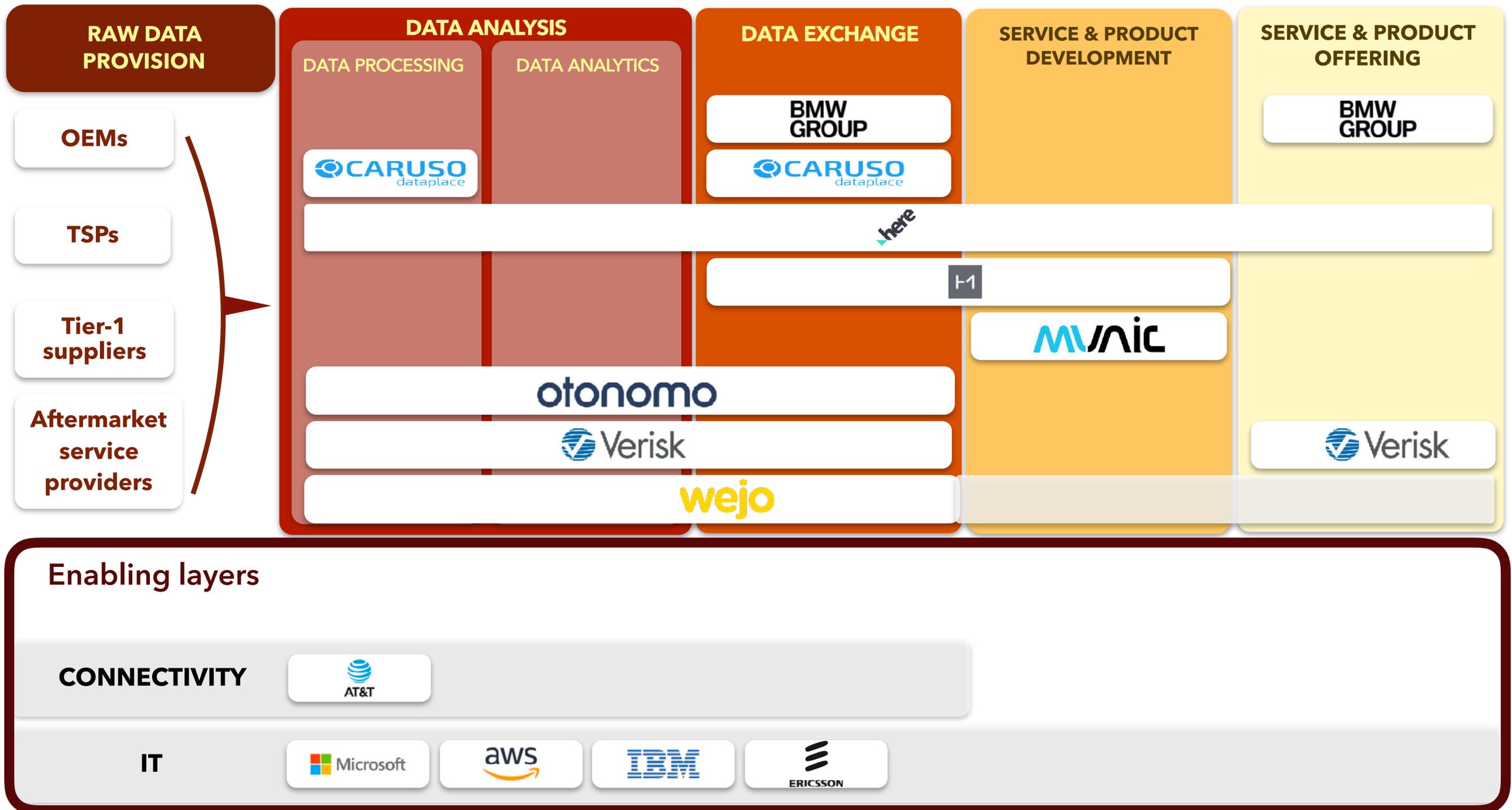
Vehicle data technology chain





Several players are positioning on multiple steps

Examples of players along the technology chain





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



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



Range of vertical markets

Horizontal extent



Vertical focus

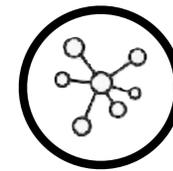
Solution focused on specific verticals



Geographical coverage

Global

Local



Network effect

Direct

Indirect



Pricing

Transaction

Subscription



Trust and transparency

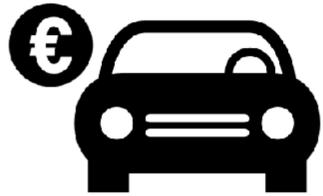
Security

Privacy



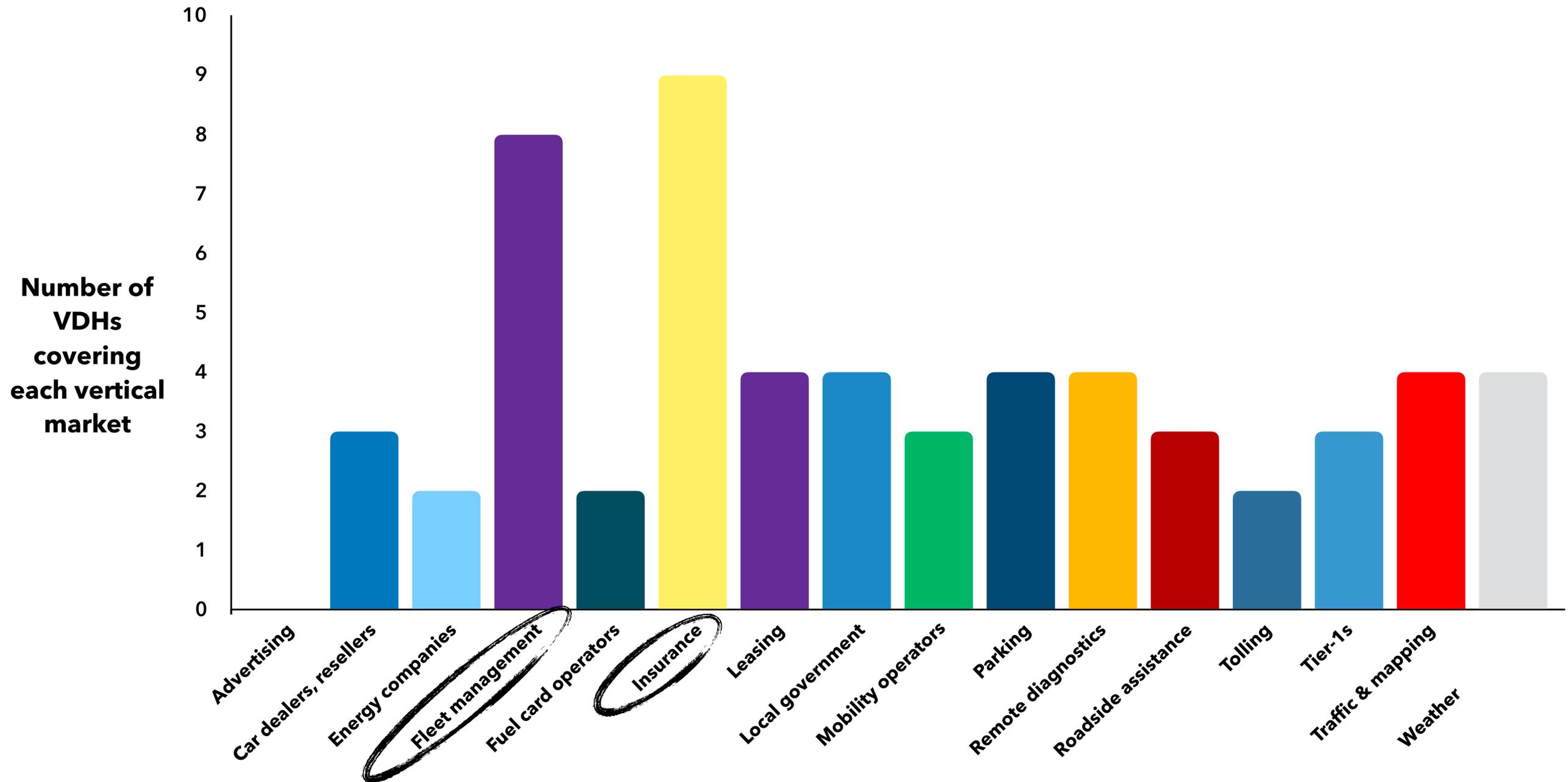
Relationship with providers and consumers

Disintermediation



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

Vertical markets targeted by the 9 major VDHs today





Most data hubs are covering Europe and North America

Geographical coverage of VDHs per region

■ Currently present
 ■ Potential future expansion

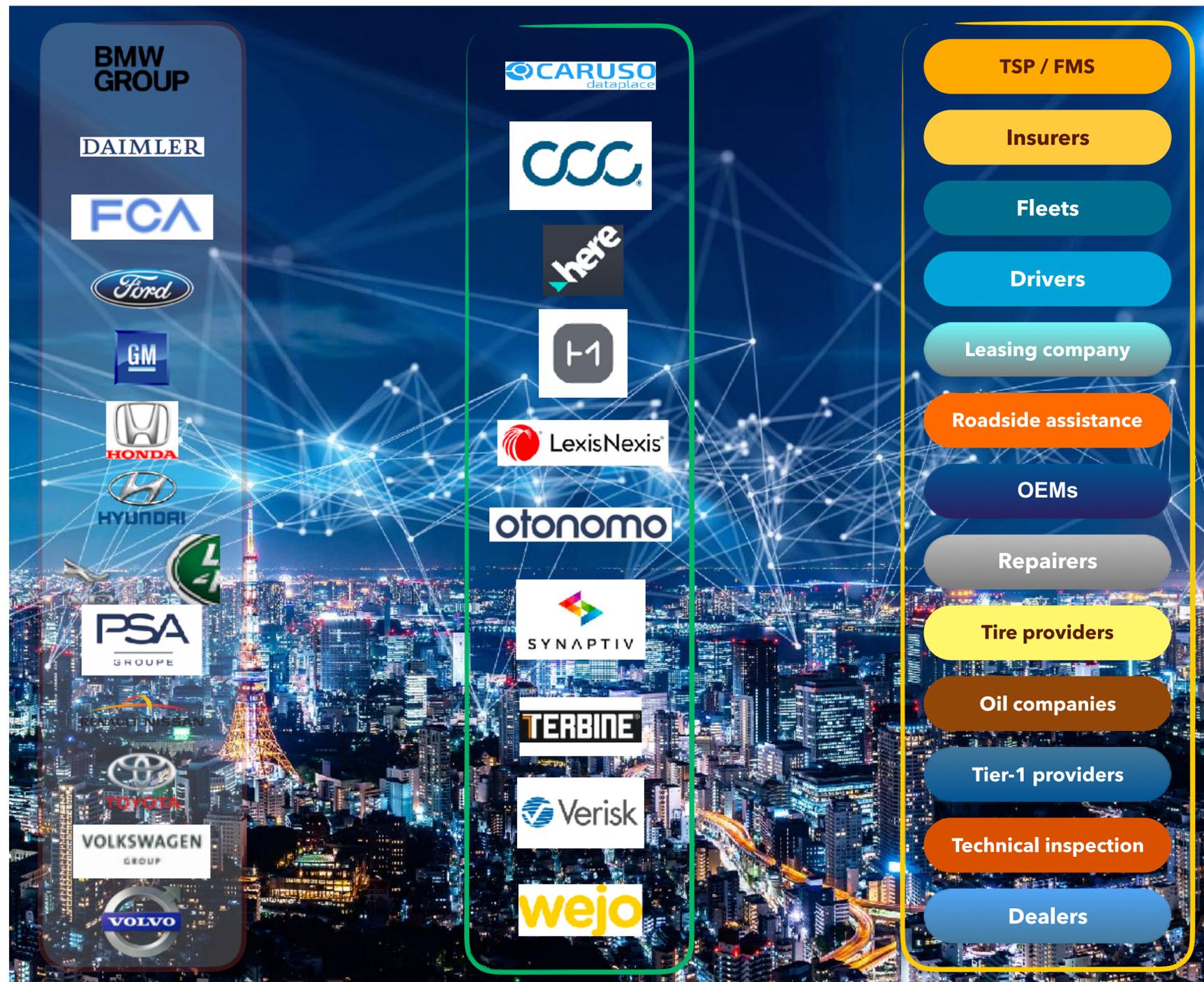


VDH	NORTH AMERICA	SOUTH AMERICA	EUROPE	AFRICA	AUSTRALIA	ASIA
CARUSO dataplace			Currently present			
CCC	Currently present		Potential future expansion			Currently present *
H1			Currently present			
LexisNexis	Currently present		Currently present			
otonomo	Currently present	Potential future expansion	Currently present			Potential future expansion
TERBINE	Currently present		Potential future expansion			
wejo	Currently present	Potential future expansion	Currently present			Potential future expansion (Japan, South Korea, China)
here	Currently present	Currently present	Currently present	Currently present	Currently present	Currently present
Verisk	Currently present	Potential future expansion				



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



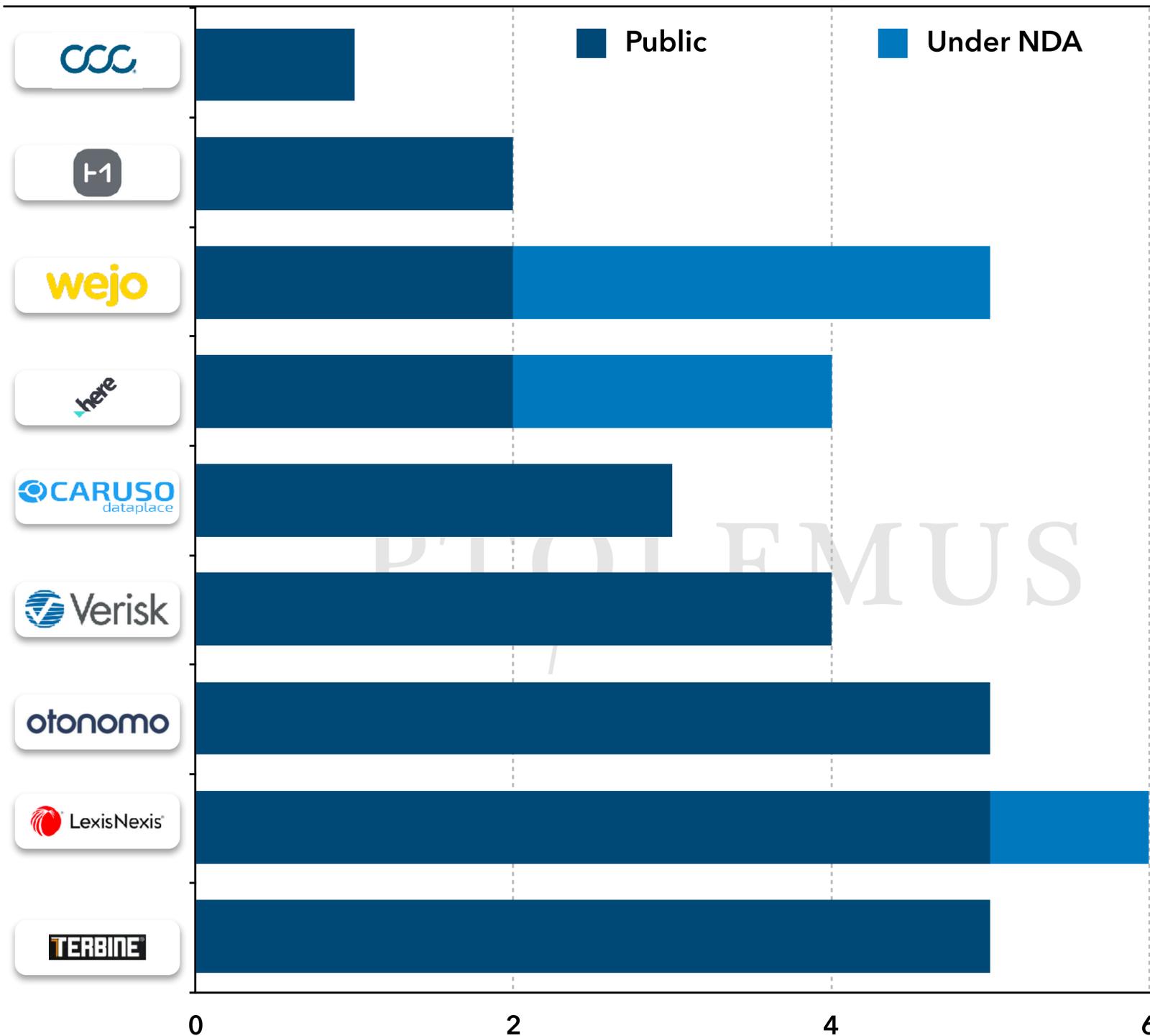
The race to access connected car data will have 3 consequences for VDHs:

- 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



- 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**

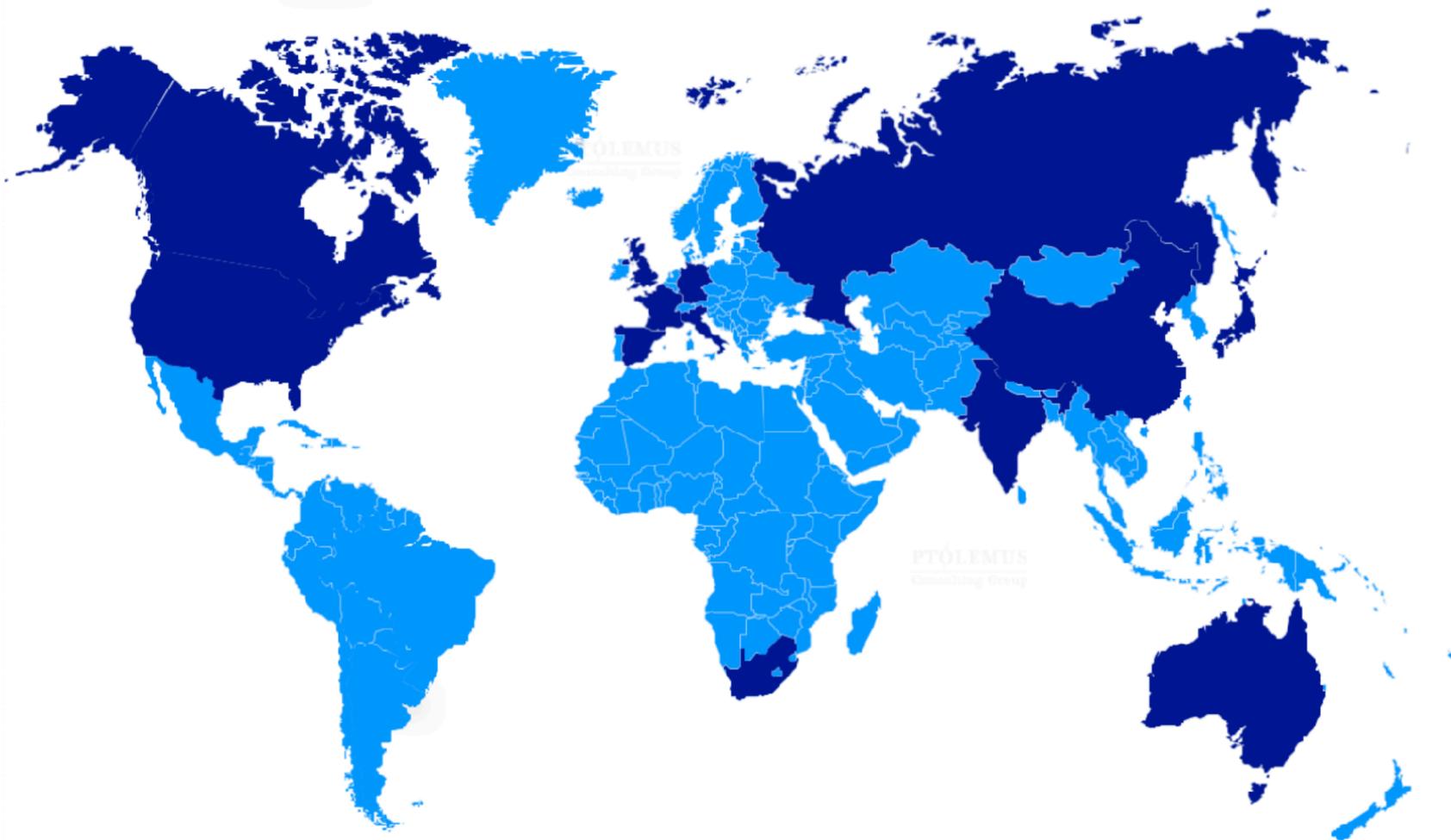


Our market sizing covers 18 regions and 8 verticals

18 regions covered

8 vertical markets

Country-by-country analysis Regional analysis



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



Passenger car market



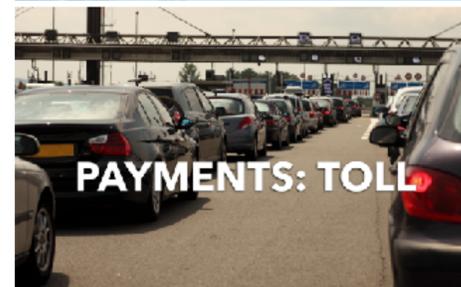
Methodology

- 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



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

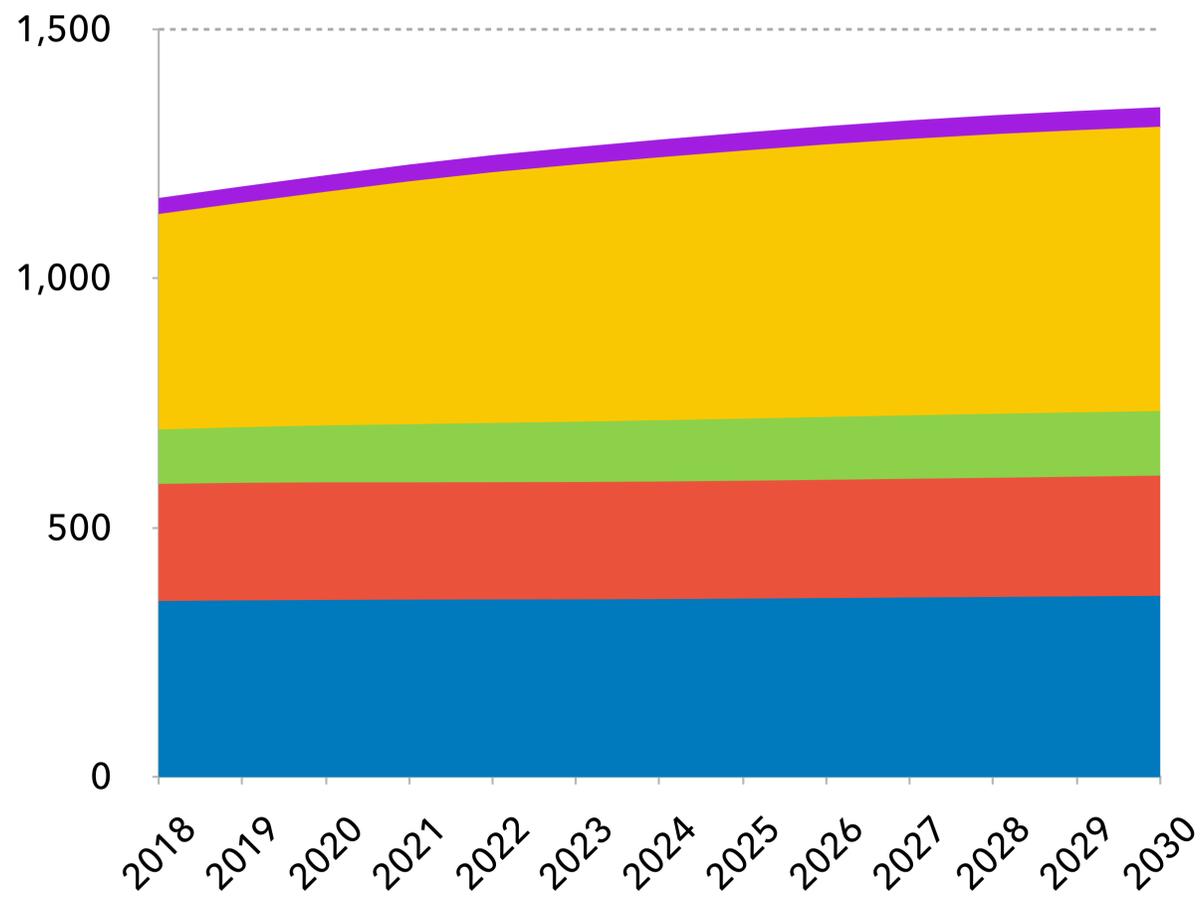
- PTOLEMUS has made a **bottom-up estimate and forecast of 10 connected car services worldwide**
- We analyse the connected car services and the economic impact for **3 categories of players**:
 - 1. Original Equipment Manufacturers (OEMs)**
 - The car manufacturers **who install embedded telematics 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





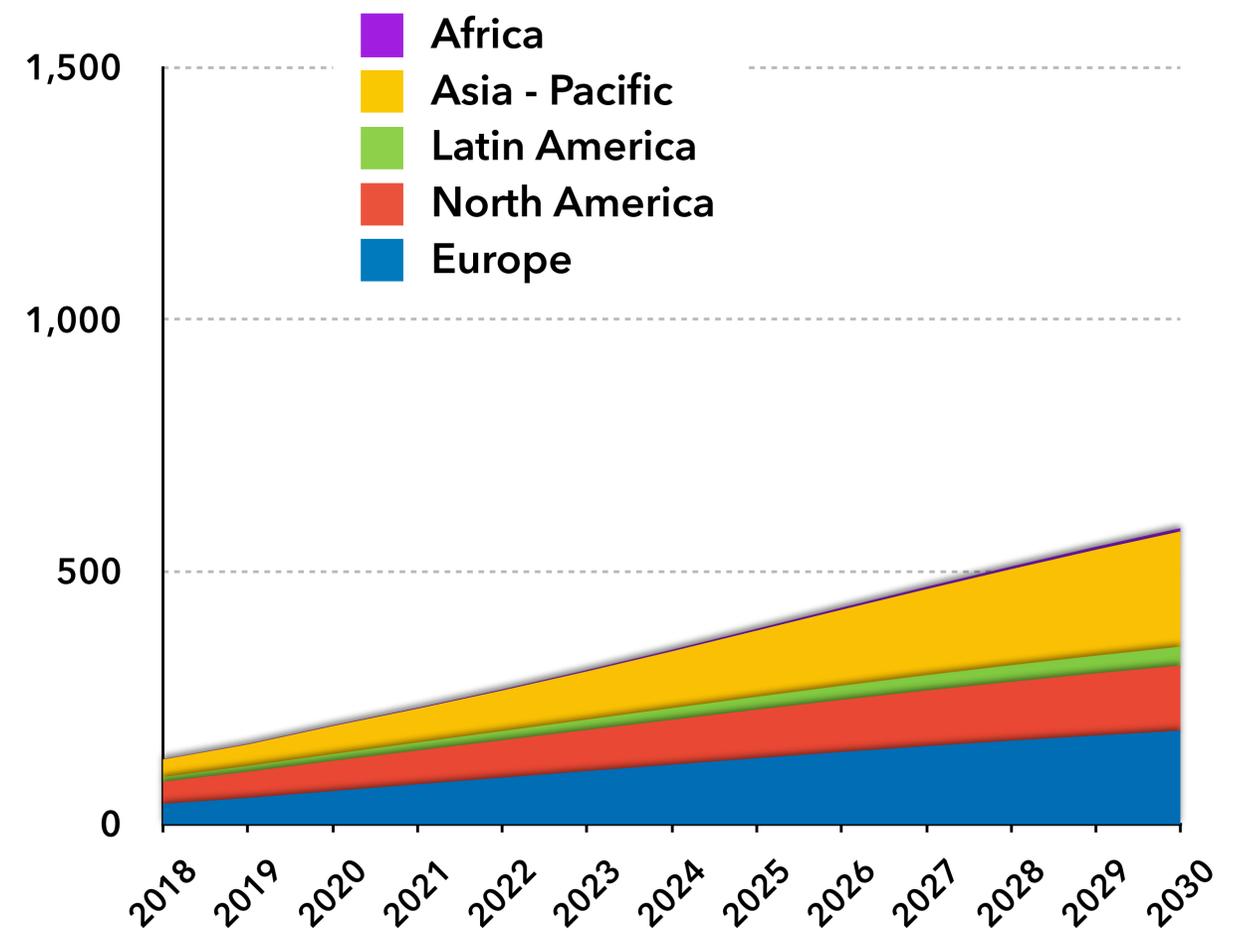
The global car parc is expected to reach 1.3 billion in 2030 while almost 600 million will have embedded devices

Number of cars in use (million)



Global CAGR
2018-30, 1.2%

Number of cars with embedded telematics (million)



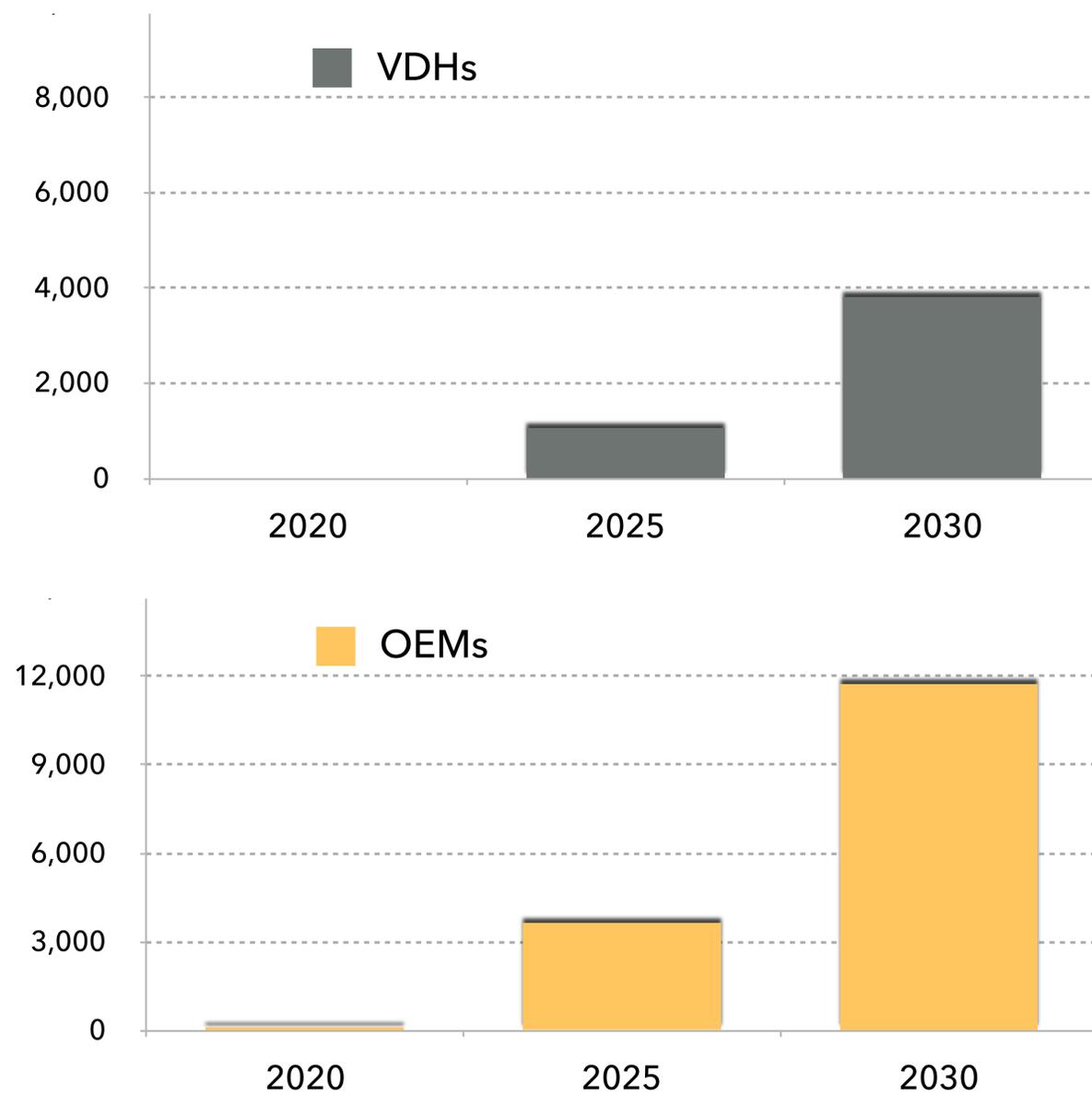
Global CAGR
2018-30, 13.3%



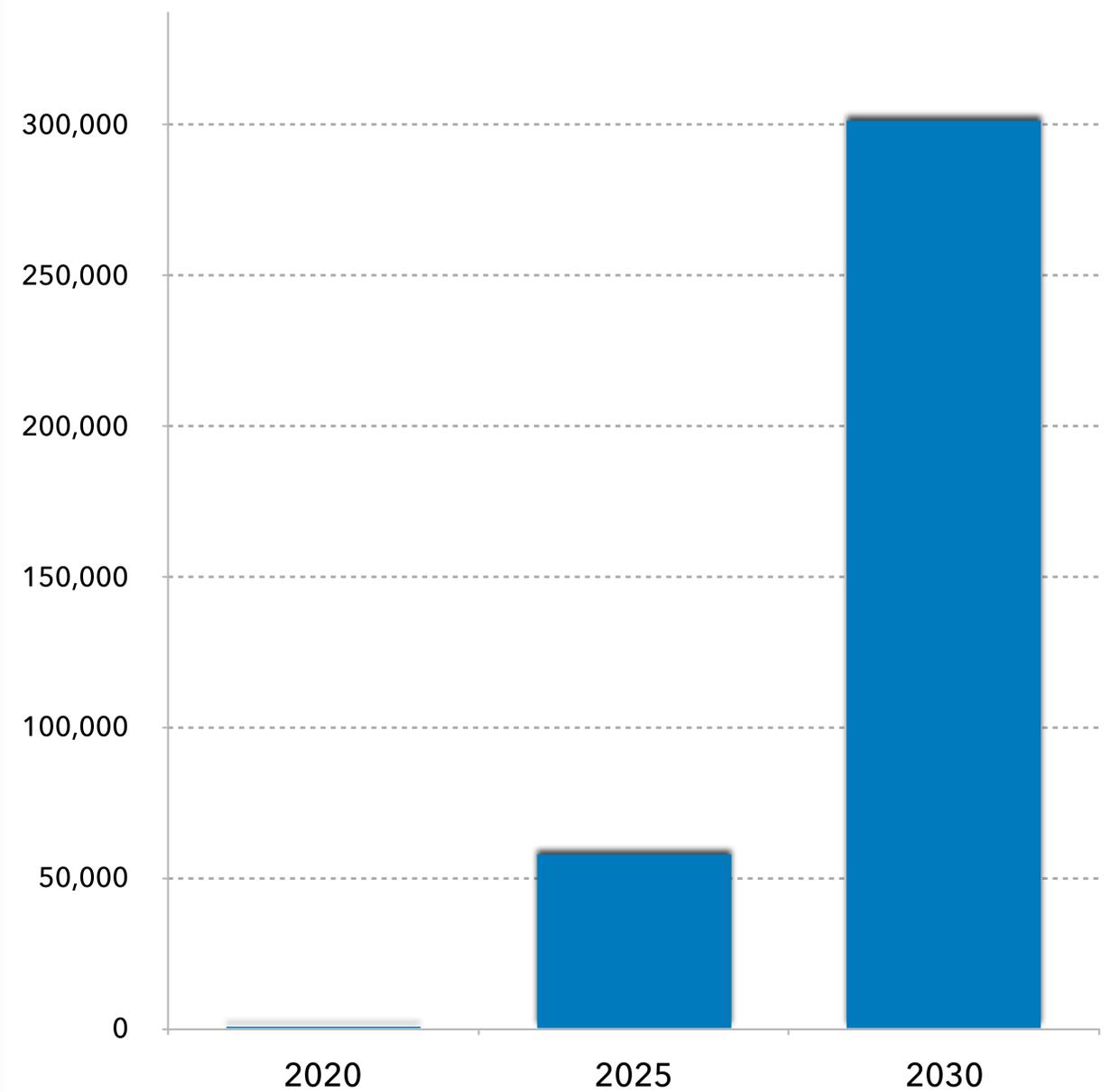
We predict that the total revenues using car data will exceed €300 billion in 2030

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

Revenues generated for VDHs and OEMs



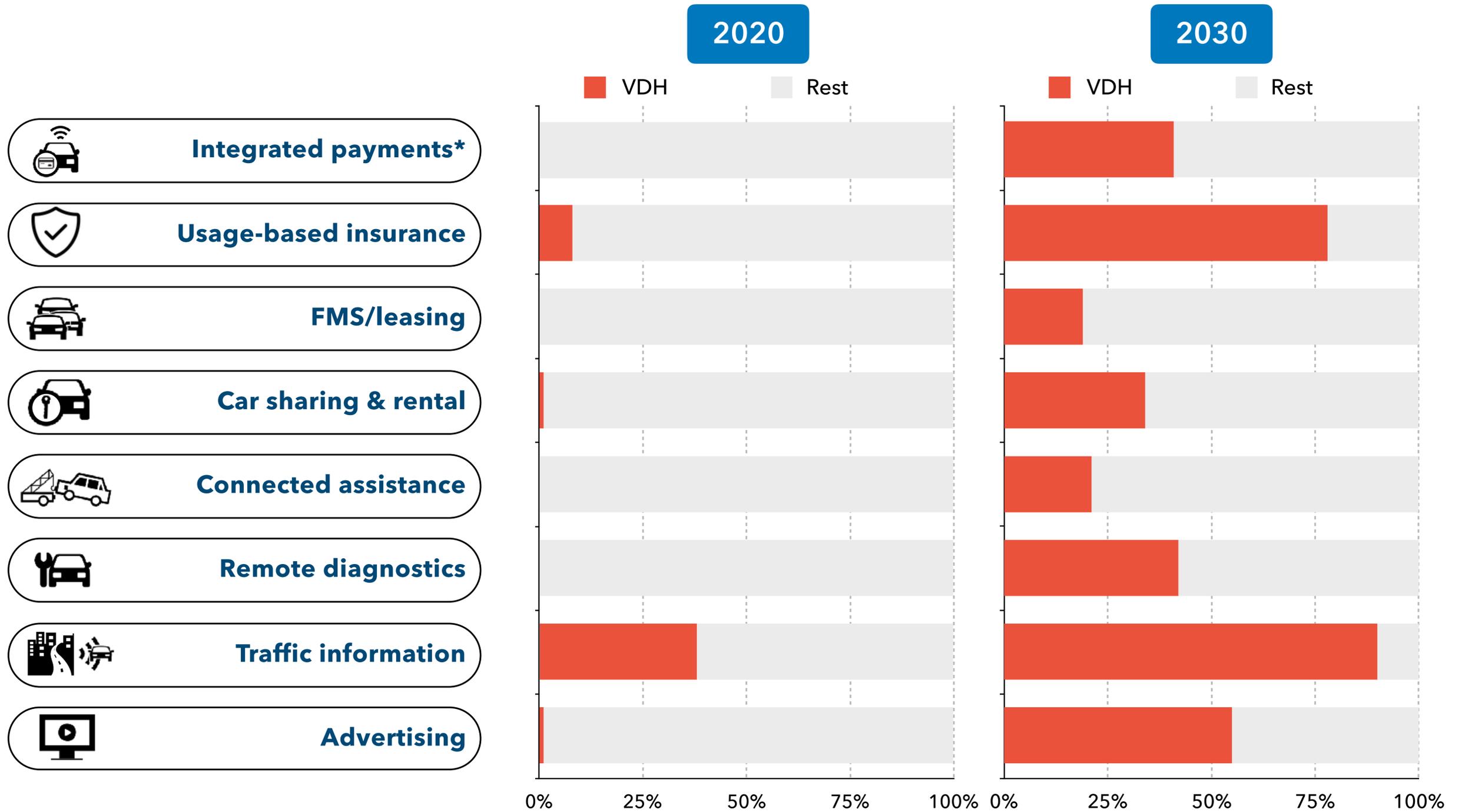
VSPs revenues generated through VDHs



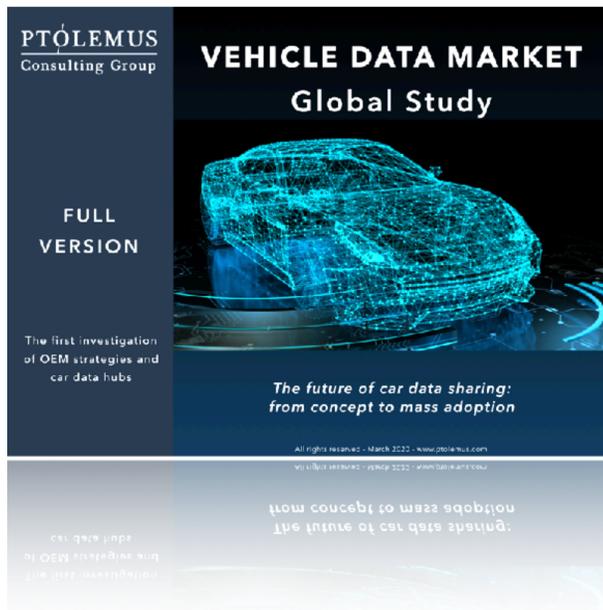


We expect VDHs' penetration to grow significantly in all markets, particularly UBI, diagnostics & traffic

VDHs' penetration in cars in use with embedded connectivity



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	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • Excel market forecast outputs for each of the 8 connected services in 18 countries <ul style="list-style-type: none"> - Nb of connected cars using a VDH - Revenues generated by VSPs, OEMs, VDHs 	<ul style="list-style-type: none"> • Excel market forecast outputs for each of the 8 connected services + • Section 5: in-depth analysis of <ul style="list-style-type: none"> - The impact of VDHs on the 8 business models - Outputs and rationales by VSPs, OEMs, VDHs 	<ul style="list-style-type: none"> • Half-day workshop in your offices: the full study presented to your board or strategy team
Company-wide licence	<p>€ 5,990 Approx. \$6,400</p>	<p>€ 1,990 Approx. \$2,100</p>	<p>€ 2,990 Approx. \$3,200</p>	<p>€ 2,000* Approx. \$2,100</p>

To receive more information, contact our research 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 assistance 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	Connectivity 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	Connectivity enabler
Invers	Mobility platform supplier	Mitsubishi Motors	Automotive OEM
JAC	Automotive OEM	Mobiledevices / Munic	Analytics provider
Jaguar Land Rover	Automotive OEM	Mojo	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 provider
PSA	Automotive OEM	Terbine	Data platform
PSA Group	Automotive OEM	Tesla	Automotive OEM
QNX	Operating system	Tfl (Transport for London)	Association
RACE	Automotive	The Floop	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

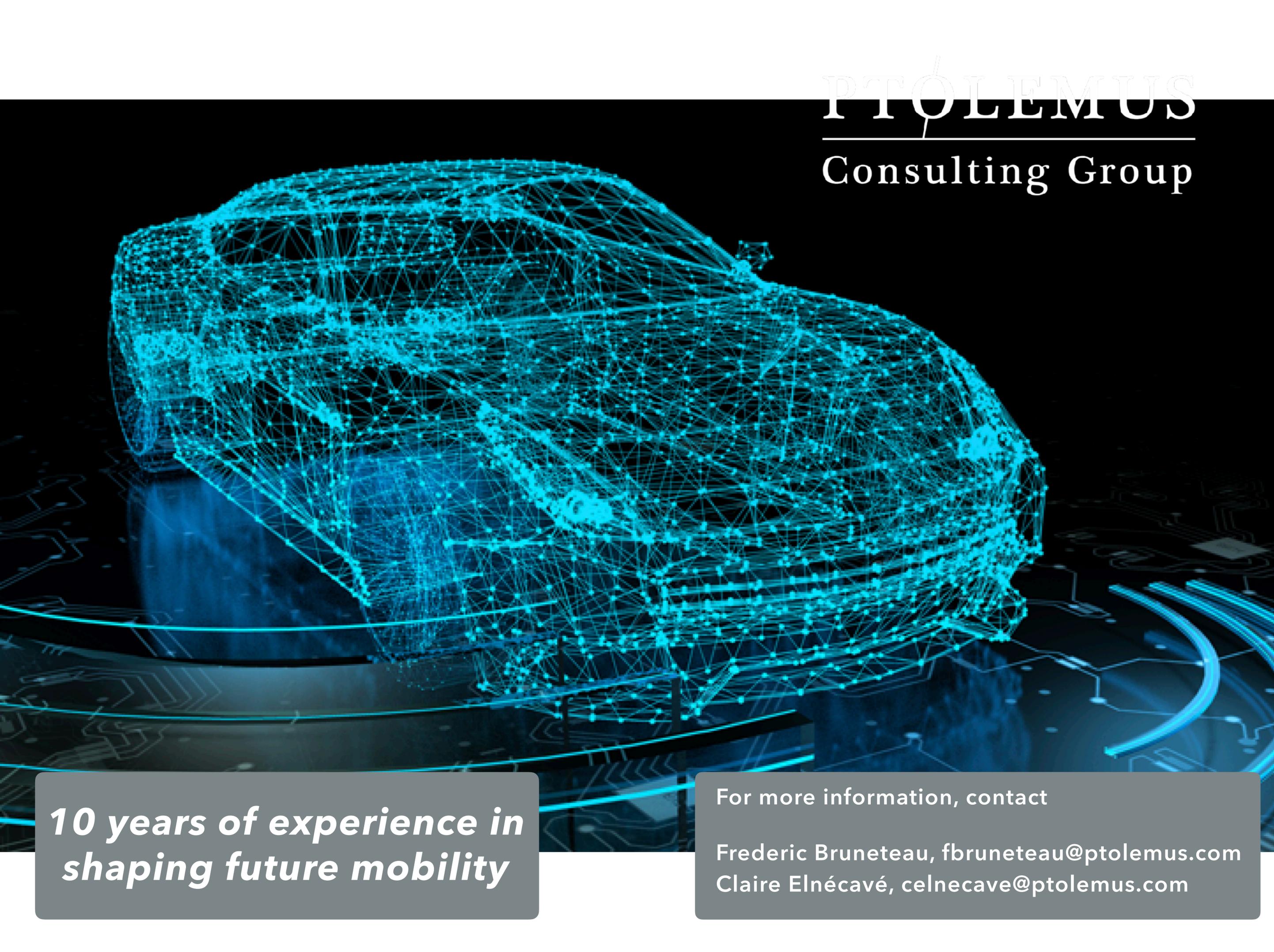
More than 250 companies are mentioned in the report ^(5/5)

List of companies mentioned

Company	Industry
USAA	Service Provider
Valeo	Tier 1
Valerann	Mobility data provider
VDA	German automotive association
Verisk	Vehicle Data Hub
Verizon	Connectivity provider
Verizon connect	Service Provider
Via Verde	TSP
VIMCAR	TSP
VISA	Payments platform
Vodafone	Connectivity 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

PTOLEMUS

Consulting Group

A blue wireframe car model is centered on a dark background. The car is composed of a dense network of blue lines and dots, giving it a digital, mesh-like appearance. The background features faint, glowing blue circuit patterns and lines, suggesting a high-tech or automotive theme.

***10 years of experience in
shaping future mobility***

For more information, contact

Frederic Bruneteau, fbruneteau@ptolemus.com
Claire Elnécavé, celnecave@ptolemus.com