

COMMERCIAL FLEET TELEMATICS

Global Study

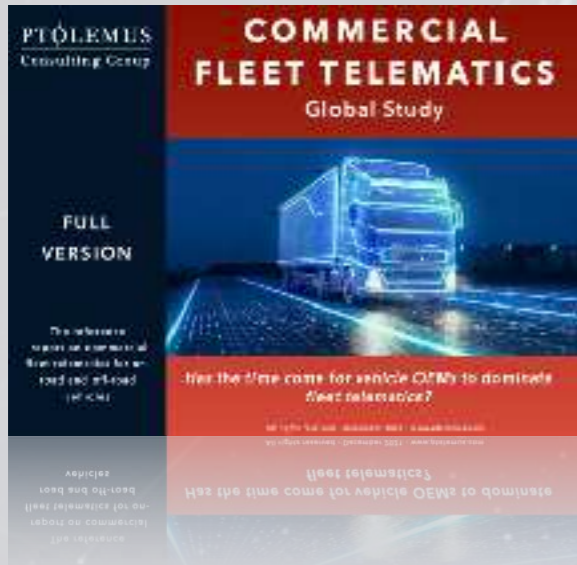
ABSTRACT

The reference report on commercial fleet telematics for on-road and off-road vehicles



Has the time come for vehicle OEMs to dominate fleet telematics?

This is the most complete report on telematics solutions for commercial fleets of on-road and off-road vehicles



More than just market research.

A strategic analysis on the telematics business of commercial vehicle and heavy equipment fleets

- A **635-page** analysis of the global commercial fleet telematics market based on:
 - 11 years of constant market surveillance
 - 26 interviews with key stakeholders
 - Nine months of desk research
- An in-depth introduction to the commercial fleet telematics market, with analyses into the telematics value chain, new technologies, benefits of telematics, and the Covid-19 impact
- A **Total Cost of Ownership (TCO) analysis of commercial vehicles**
- **Granular analysis of telematics in on-road, construction and agricultural industries** that includes:
 - Cost structure, revenues and telematics needs of fleet operators
 - Supply and demand analysis of current telematics solutions
 - Major players in the telematics value chain and their strengths
- An in-depth assessment of **39 companies** supplying fleet telematics (**23 TSPs and 16 OEMs**) analysing:
 - Their telematics business and corporate strategy
 - Their value proposition, pricing model, target segments, positioning and partnerships
 - A benchmark and gap analysis of their solution
- **2020-2030 bottom-up market forecasts encompassing:**
 - The number of vehicles in use for both on-road fleet telematics and off-road fleet telematics
 - Subscriptions and revenues for the on-road telematics market, split by OEM and aftermarket
 - Subscriptions and revenues for the off-road telematics market, split by OEM and aftermarket
 - Regional projections for Europe, Americas, Asia Pacific, Africa and Middle East

The study answers the following key strategic questions on the commercial fleet telematics landscape

What is the strategy of major OEMs in telematics?

What are customers' expectations to a fleet telematics service provider?

How can telematics improve the TCO of commercial fleet vehicles?

What will be the role of aftermarket devices in the future commercial fleet telematics market?



What are the trends and drivers for commercial fleet telematics growth between 2020 and 2030?

Will OEMs' telematics solutions challenge existing TSPs' business?

What is the impact of government legislation on the commercial telematics industry?

What will be the role of new and emerging players in the CFT* value chain?

What will be the size of the commercial fleet telematics market in 2030 by region?

In which country will CFT* grow the most by 2030?

Which suppliers are leading in the market?

What are the differences between on-road and off-road commercial fleet telematics?

The commercial fleet telematics market is growing, and OEMs will strengthen their position to the detriment of TSPs



Fleet telematics relies on various technologies to create, transmit, store, analyse and visualise vehicle data.

Technological progress in areas like vehicle connectivity, geo-location and electrification opens for a potential shift in who the dominant players in fleet telematics are.

Since the mid-90s, the industry has been heavily associated with the aftermarket, with countless players providing both hardware and service solutions to meet the needs of commercial fleets.

Old habits die hard...

The on-road* commercial fleet market is still wary of telematics. There is general agreement that telematics, **if correctly implemented**, can yield significant benefits. However, there are still

too many examples of data overload occurring, with fleet demands for more personalised insights being overlooked in favour of meeting the demands of the many.

In the off-road* segment, issues abound with respect to data privacy and vehicle ownership rights in North America and Europe. However, big telematics growth drivers are the shortage of skilled operators, the sub-optimal management of the vehicle TCO** and the inefficient operation of equipment.

... but OEMs are responding

Aftermarket Telematics Service Providers (TSPs) currently dominate the on-road commercial fleet telematics market. That dominance will increasingly be challenged during this decade.

OEMs' strategic position benefits from being present in the entire

value chain. They keep adding connectivity to their vehicles.

By 2024, we expect approximately 83% of all new vehicles to have embedded telematics.

Almost all OEMs have adopted the strategy of offering free, often time-limited telematics solutions with the purchase of a new vehicle or machine equipment.

In addition to connectivity, OEMs keep adding app marketplaces with many specialist services to their vehicles. The recently added app marketplace from Daimler, Volvo, MAN and Navistar illustrate this. They allow third-party integrations from both large full-service TSPs such as Geotab. The examples of Navistar's integration with Geotab, Samsara and Cloudera as well as Daimler's fully "open" Virtual Vehicle™ are illustrations of much more to come.

The commercial fleet telematics market is growing, and OEMs will strengthen their position to the detriment of TSPs

The connected, autonomous and electrified future for commercial vehicles will play into the hands of OEMs

The previously mentioned OEM-TSP partnerships enable TSPs to source vehicle data directly from OEMs. This removes the need for aftermarket hardware and will help OEMs become a major source of vehicle data for both TSPs and fleet operators. It will enable fleet operators to **monitor, maintain**, and crucially **compare electrified products** with their existing fleet vehicles.

With the shift to electrified powertrains, TSPs will further increase their reliance on OEM-supplied data, unless there is a universal demand from fleet operators for other solutions.

The post 2025 target of full operational L4+ autonomy for commercial vehicles (i.e. in South

Korea) adds to the factors working in OEMs' favour.

The scene is therefore all set for the market to swing towards OEM-related solutions from 2025 to 2030. PTOLEMUS forecasts that subscriptions to OEM-related services will **grow nearly twice as quickly as aftermarket subscriptions** during this decade. As a result, OEMs' share of active telematics subscriptions will grow from 3% in 2020 to 46% in 2030. This will leave OEMs near parity with TSPs.

A market that will multiply sixfold in volume

Today the global fleet telematics market counts 23 million active subscriptions. **Nearly 70% of these subscriptions are accounted for by the on-road sector**, with a balanced mix between Asia Pacific, Europe and North America.

In the next 8 years, APAC is forecast to grow twice as fast as Europe and North America, resulting in 70 million active subscriptions in the region by 2030.

The APAC growth will be predominantly driven by two factors. First, connected construction machinery from leading regional manufacturers like SANY and Liugong, supplying China and the region's insatiable thirst for "yellow iron" and the growth in construction. Second, significant autonomy developments from local TSPs such as G7 in partnership with Inceptio, advancing rapidly the autonomous on-road haulage industry.

Overall we expect commercial fleet telematics subscriptions to surpass **150 million**, and represent a global market worth **€24 billion by 2030**. Due to the sheer volume of vehicles, on-road telematics will dominate with 95% of the 2030 revenues, while the aftermarket will still account for 73% of global revenues.

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Our forecast analyses the growth and penetration rates of commercial fleet telematics across five continents

The five regions covered by the market forecasts



Commercial fleet vehicles market



OEM embedded telematic devices

Aftermarket telematics devices

For the on-road segment, our study encompasses HGVs, LCVs, buses and coaches

Scope of vehicles covered in this report

On-road fleets



- **Commercial road transport (CRT):**

- LCVs (< 3.5t) & HGVs (> 3.5t) are used for the goods transportation and distribution locally or internationally
- Different drivers, with different driving behaviours may drive the same vehicle in shifts
- Light duty trucks pertaining to personal use are not considered

- **Maintenance & utilities:**

- Light and some heavy commercial vehicles operating locally and travelling fewer miles than CRT fleets

- Used by companies such as telecom operators, roadside assistance fleets as well as electricity, water or sewage providers

- **Rental and leasing:**

- HCVs and LCVs are generally leased for a year or more involving 2 or more vehicles

- **Public sector:**

- Heavy vehicles designed for mass transportation such as buses and coaches (B&C)

For the off-road segment, our research covers construction, mining, forestry and agricultural equipment

Scope of vehicles covered in this report

Off-road fleets



- **Construction:** Vehicles between 1.5t and 20t such as excavators, loaders, backhoe loader, skid-steer loaders
- **Mining:**
 - **Underground equipment** such as underground drill rig and rock drill, bolter-miner, crushing equipment, underground loader, underground truck, Screening equipment
 - **Surface equipment** such as hydraulic & electric rope shovel, haulers (rigid & articulated), large dozer, dragline, surface drill rig and rock drill, large motor grader, large wheel loader, wheel tractor scraper
- **Forestry:**
 - **Felling & processing equipment** such as wheeled feller-buncher, tracked feller-buncher, processor, wheeled harvester, tracked harvester
 - **Loading & moving equipment** such as skidder, shovel logger, loader & knuckle-boom loader, forwarder, loader forwarder
- **Agriculture equipment:** Vehicles between 2.5t and 20t including tractors, combines, loaders, etc.

PTOLEMUS would like to thank the following companies for their participation in this report



The report mentions more than 170 companies (1/3)

Company	Type	Company	Type	Company	Type
ABAX	TSP	BOMAG	OEM	CyntrX	Software
Actia Telematics Services	TSP	Bosch	Tier-1 supplier	DAF	OEM
Advantage Truck Centre	Aftermarket	CalAmp	TSP	Daimler	OEM
Ag Leader	TSP	CarTrack	TSP	Danlaw	Tier-1 supplier
AGCO	TSP	CASE CE	OEM	Deutsche Telekom	Network
AKTIO	Rental	CAT-Perkins	Engine manufacturer	Deutz	Engine manufacturer
ALD Automotive	Fleet leaser	Caterpillar	OEM	Doosan	OEM
All Trucks	Aftermarket	CEABS	TSP	eDriving	Software
Arabian Jerusalem Equipment Trading	Resale	Cellutrak	TTP	Epiroc	OEM
ARI	TSP	Chainway TSP	TSP	EROAD	TSP
ARVAL	Leaser	Chevin	Software	Europcar Mobility Group	Leaser
Arvento	TSP	CLAAS	OEM	Fleet Complete	TSP
AT&T	Network	Cloudera	Software	FLEETCOR	Fuel card issuer
Auto Truck Group	OEM	CNH Industrial	Engine manufacturer	Fleetio	TSP
Autonomous Tractor Corporation	OEM	Continental	Tier-1 supplier	Fleetmatics	TSP
AUTOTRAC	TTP	Coretex	TSP	Ford	OEM
Blue Sky Network	Network	Ctrack	TSP	FPT	Engine manufacturer
Bobcat	OEM	Cummins	OEM	FUSO	OEM

The report mentions more than 170 companies (2/3)

Company	Type	Company	Type	Company	Type
G7	TSP	Ituran	TSP	Mercedes-Benz bank	Insurer
Geotab	TSP	IVECO	OEM	Microlise	TSP
Globallogic	Software	JCB	OEM	MiX Telematics	Software
Globalstar	TTP	John Deere	OEM	Mobiliz	TSP
GPS Bulgaria	TSP	Kiloutou	Rental	Monarch Tractor	OEM
GPS Insight	TSP	Komatsu	OEM	Munic	Tier-1 supplier
Greenroad	TSP	Kubota	OEM	Navistar	OEM
Gurtam	TSP	Lease Plan	Leaser	Nextraq	TSP
HABBL	Software	Leica Geosystems	TSP	NIKOLA	Engine manufacturer
HBS Systems	TSP	LEX Autolease	Leaser	Octo	TSP
Herc Rentals	Rental	LHP Engineering Solutions	TSP	Omnilink	TSP
Hitachi	OEM	Liebherr	OEM	Omnitracs	TSP
Hyundai	OEM	Lonestar Freightliner	OEM	Onix	TSP
Imperial Logistics	Logistics fleet	Lytx	TSP	Orange Business Services	Network
In-Charge Energy	TSP	Mack	OEM	ORBCOMM	TSP
Inmarsat	Network	MAN	OEM	PACCAR	OEM
Iridium	TTP	Masternaut	TSP	Platform Science	Software
Isuzu	Engine manufacturer	Mecalac	OEM	Position Logic	TSP

The report mentions more than 170 companies (3/3)

Company	Type	Company	Type	Company	Type
Proterra	OEM	Solera	Network	Tracker	TSP
Qualcomm	TTP	SOLINFTEC	TSP	Trackunit	TSP
Queclink	TTP	Spireon	TSP	Transics	TSP
Renault Trucks	OEM	T-Systems	Network	Transtron	Tier-1 supplier
RIO Platform	TSP	Takeuchi	OEM	Trimble	TSP
RoadTrack	TSP	TATA Motor	OEM	Truck Pro	Aftermarket
Ruptela	TTP	Technoton	TTP	Truckcom	TTP
Samsara	TSP	Telefonika	TTP	TuSimple	TSP
Samsara	TSP	Telepass	TSP	UTA	Fuel & toll service provider
Sandvik	OEM	Teletrac Navman	TSP	Verizon Connect	TSP
Sany	OEM	Teltonika	TTP	Viasat Group	TSP
Sascar	TSP	Tierra	TSP	Vodafone Business	Mobile network operator
SCANIA	OEM	Tigercat	OEM	Volvo Trucks	OEM
Sigfox	Network	TOMTOM Telematics	TSP	Wacker Neuson	OEM
SinoloV	TSP	Top Truck	Aftermarket	Webfleet Solutions	TSP
Skanska	OEM	TEXA	Tier-1 supplier	ZF Friedrichshafen	Tier-1 supplier
SkyBitz	TSP	Topcon	Software	Zonar	TSP
Solectrac	OEM	Total	Fuel card issuer		

The report was written by an international team of six experts



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 vehicle 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.

Within PTOLEMUS, Frederic has led 160 consulting projects and helped many world leaders define their strategy and implement it including:

- **Fleet services providers** e.g. AGC, Arvento, Astrata, Bridgestone, BP, Danlaw, DKV Euroservice, Easytrip, ENI, Fleet Complete, Hitachi, Nationwide Insurance, OMV, Routex, TomTom and WEX.
- **Automotive OEMs and their tier-1 suppliers:** AAA Data, AGC Automotive, Bridgestone, Allianz

Partners, AXA Partners, Cihon, CNH Industrial, Coyote System, Europ Assistance, HERE Technologies, Michelin, Scania, Telit, TomTom, Toyota and wejo.

- **Some of the world's most prestigious telematics / analytics suppliers:** Alfa Evolution (UnipolSai), Arvento Mobile Systems, Danlaw, DriveFactor, Eliocity, Fleet Complete, LexisNexis / Wunelli, Mobile Devices, Movelo, Octo Telematics, Orion, Pioneer, Qualcomm, Sentiance and Vodafone Automotive.
- **Financial investors** including Advent International, Amadeus Capital Partners, Amundi, Apax Partners, Bain Capital, Baupost Group, Capvis, Cinven, CIP Capital, Crédit Agricole, CVC Capital Partners, Disruptive Capital Partners, Investcorp, Silver Lake Partners and Time for Growth.

Frederic, who contributed to the 2 previous versions of this study, also reviewed this report.



Andrew Jackson
Research Director, London

With a career in market research spanning 14 years, **Andrew has over 10 years of experience working in the automotive and industrial sectors for companies** such as Datamonitor, EurotaxGlass and JATO Dynamics;

Over the years, he has been sought to share his opinion via a variety of publications such as the *Financial Times*, the *Wall Street Journal* and *Automotive Industries*, *AMonline*, *Fleetworld* and *Fleet News* as well as a variety of national newspapers. He is also interviewed on global automotive events by Bloomberg, CNBC and Reuters.

Andrew has delivered **advisory services, custom projects, data and insights for some of the biggest names in automotive and mobility**, including: BCA, Continental, CNH Industrial, Delphi, Johnson Controls, Hitachi, Hyundai, LeasePlan, Mannheim, Mercedes Benz, Mobis, Philips Automotive Lighting, PSA, SEAT, Tenneco and Volkswagen.

Projects he participated in include:

- Helping Rothschild & Co. conduct the due diligence of Leaseplan, one of the world's largest car leasing operators;
- Helping a major manufacturing group in evaluating the global landscape of telematics strategies and applications of engine manufacturers and TSPs in the on-road, agricultural, industrial and marine markets;
- Helping a leading global battery manufacturer define its Eastern European sales strategy;
- Assisting a Fortune 500 group in assessing the competition and market potential for the telematics-enabled automotive parts they were manufacturing,

A Certified Member of the Market Research Society (CMRS), Andrew designed, researched, wrote and performed a complete review of this report.

The report was written by an international team of six experts



Marissa Burkett
Consultant, Paris

Marissa has over **5 years of consulting experience** for clients such as Advent International, AGC Automotive, Axxès, CIP Capital, GSGroup, Nationwide, the Netherlands' DoT, OMV, Transurban and the US Federal Acquisition Service.

She has **completed several assignments related to tolling, fuel card and other fleet services** including

- **A survey of the European market of toll service providers to haulage fleets for the Netherlands'**

Department of Transport in the context of its planned RUC scheme,

- For a major fuel card and ETC provider, an in-depth **analysis of services proposed to truck fleets** including fuel card services, fleet telematics, tolling and tax refund,
- A global benchmarking of **connected insurance programmes to fleets** for an insurance company.

Marissa designed and led the research, analysis and writing of this report.



Jacopo Scudellari
Research Analyst, Brussels

A graduate of urban and mobility planning from Politecnico di Torino, Jacopo has developed expertise in **Electronic Tolling Collection (ETC), congestion charging, and electric vehicles (EVs)** by assisting companies such as Advent International and Hitachi Automotive Systems.

He has gained knowledge of state of the art of the **European and Asia Pacific ETC market**, the main tolling systems currently adopted and the technologies in use while updating the third edition of the ETC Global Study.

He has also **appraised the US electric vehicle market** for a company engaged in the development, manufacture, sales and services of automotive components.

Before joining PTOLEMUS, Jacopo worked for the Politecnico di Torino, Turin, carrying out **research work about the spatial impacts of the diffusion of Autonomous Vehicles (AVs).**



Vijay Govindaraju
Research Analyst, Brussels

Vijay has gained 3 years of experience in the automotive and mobility sector. He has specialised in marketing and market research, gaining experience from companies such as Kantar TNS, **Michelin, Moët Hennessy, Nestlé, Renault, Royal Enfield, Sundram Fasteners and Telepass.**

For **Royal Enfield, a major Indian motorbike OEM**, he developed the annual marketing plan for the Southern region while keeping in view the target customer segments. He contributed to

the launch of Royal Enfield's latest model, the Interceptor 650cc.

Within **Kantar** in Paris, he launched brand market research studies on top brands and provided periodic performance presentations. He tracked KPIs such as awareness, equity scores, competitive mapping and delivered key insights and market drivers to the client.

For a new entrant, he also conducted an **analysis of the impact of COVID-19 on a Scandinavian economy.**



Nan Chu
Research Analyst, Brussels

Nan Chu has a strong background in **marketing research** covering China & Europe, enabling stakeholders in industries such as ICT, logistics and biopharmaceutical, to identify, explore and leverage business opportunities, and to accompany customers to relevant trade events.

Some of Nan's projects include:

- For a **global mobile network operator**, identifying IoT business opportunities in the Chinese market;
- For a **free trade zone authority in China**, he analysed the business advantages in

Belgium and researched their potential partners in the field of logistics and E-commerce in Belgium;

- For a **Chinese pharmaceutical company**, he helped establish stakeholders' connections with the biopharmaceutical industry in Belgium for future support on technology and training on European market access standards.

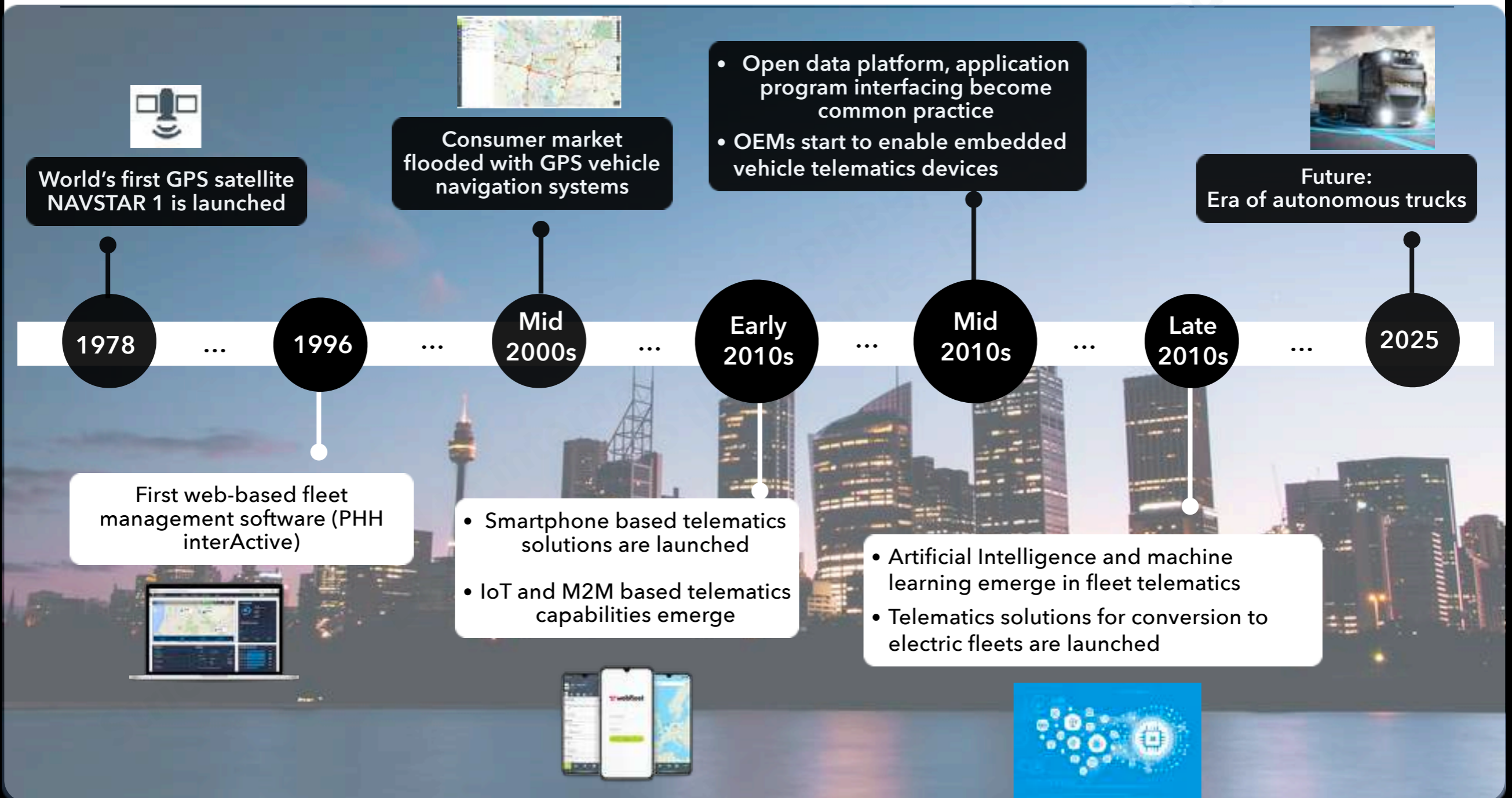
Nan is a Chinese native speaker, fluent in English and French, and intermediate in Dutch.



**Extract from:
Introduction to commercial fleet telematics**

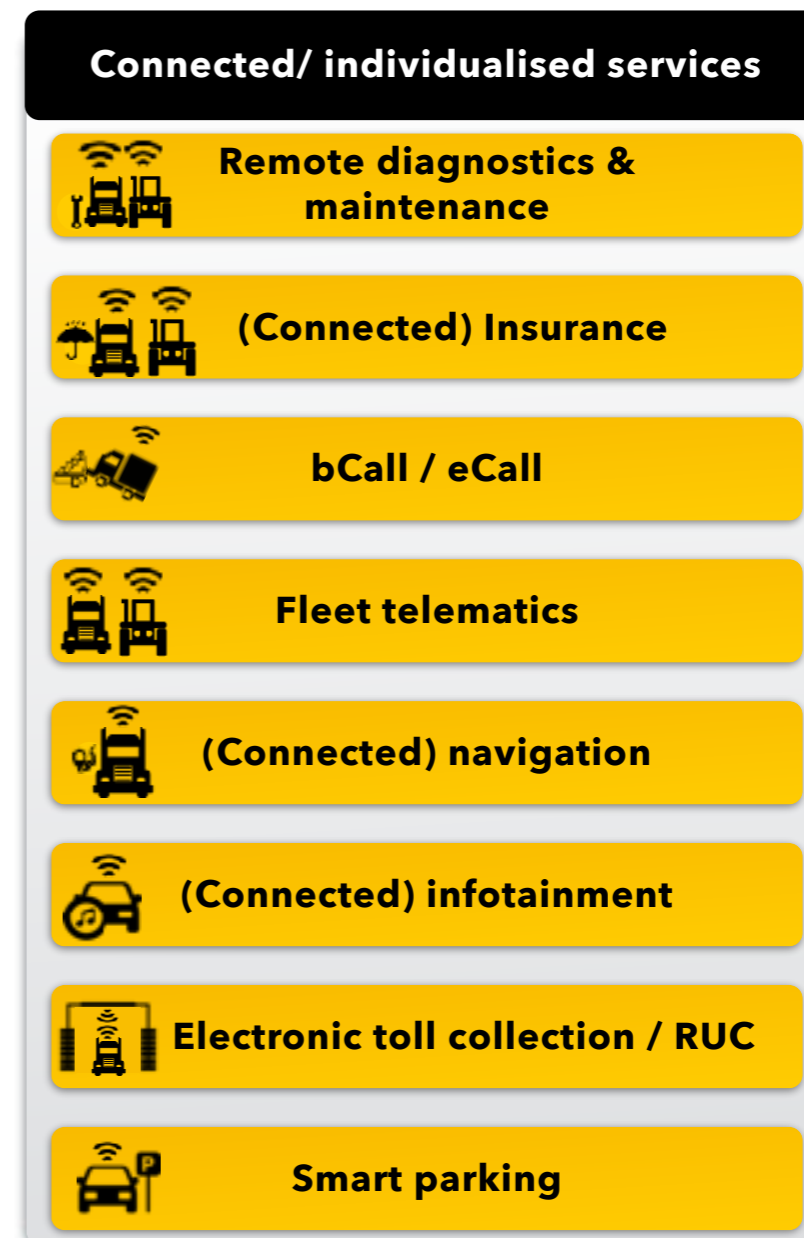
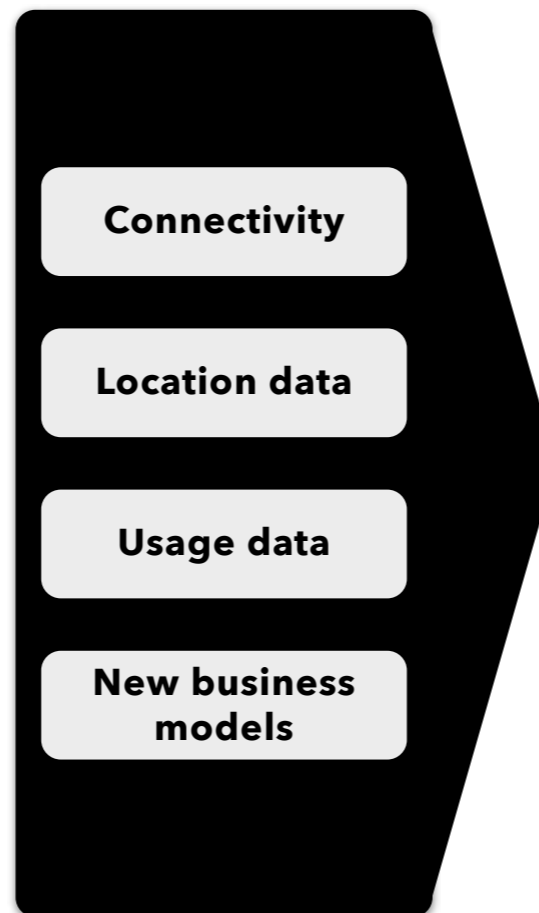
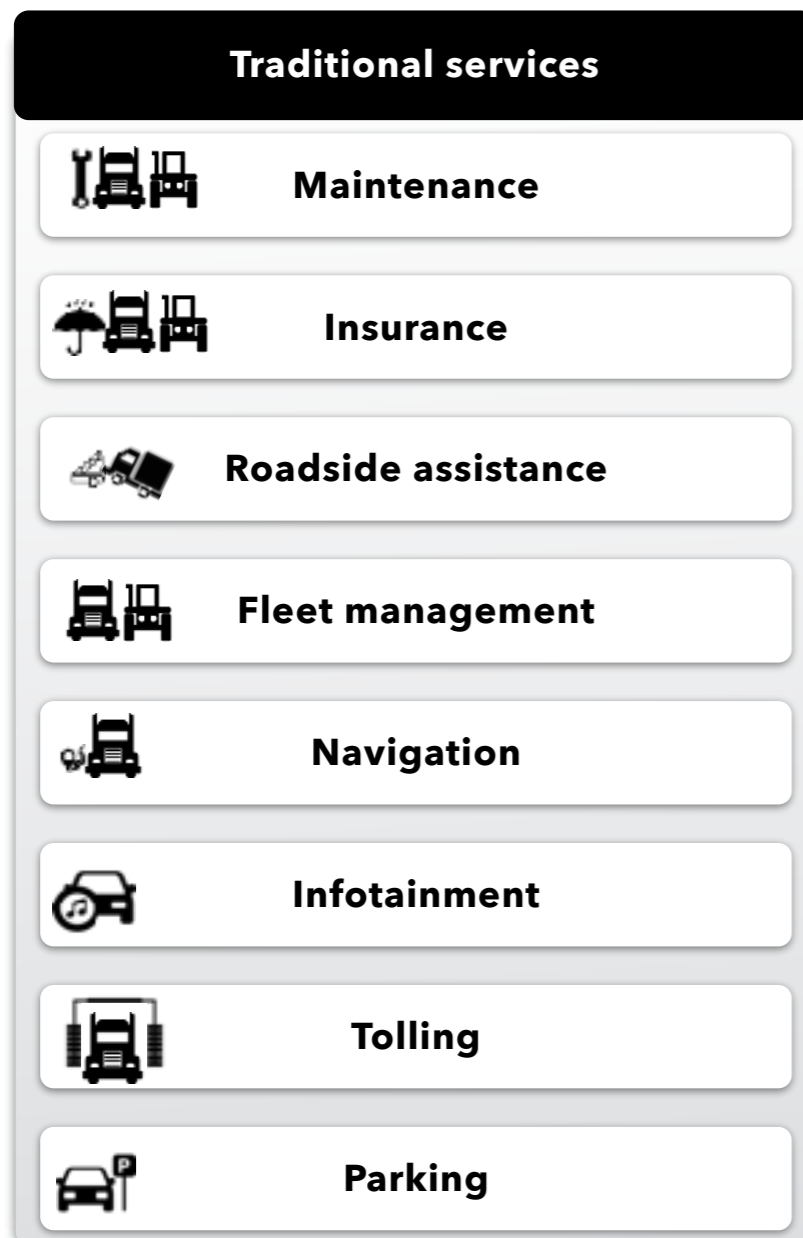
First introduced circa 1996, fleet telematics has radically evolved over the last decade into data-driven services

History of global fleet telematics



As many industries, fleet management is revolutionised by connectivity, geo-location & data-driven concepts

New mobility paradigms



We cover several vehicle categories in both the on-road and off-road segments in this report

On-road vehicles

LCVs



HGVs



Buses & coaches



Off-road vehicles

Tractor



Combines



Excavator



Mining haul truck



Feller buncher



Loader



The core purpose of fleet telematics is to optimise operational processes, increase uptime and control costs

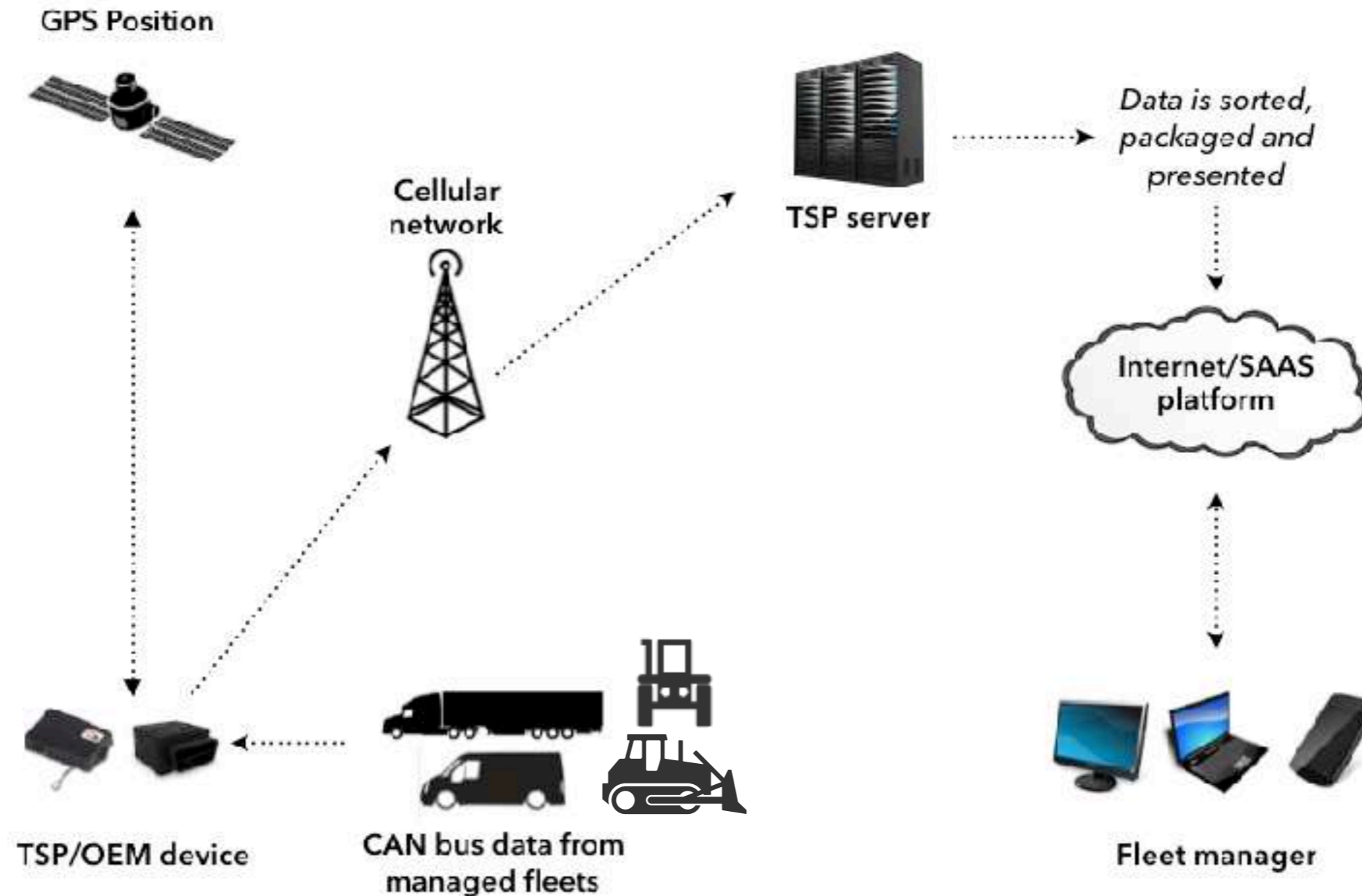
Definition of fleet telematics

- Fleet telematics refers to the technology used for fleet management, which combines **telecommunication, informatics and global navigation satellite system (GNSS)** to share vehicle data with a central system.
 - **A dedicated device connected to the vehicle** gathers data on vehicle and driver activities which is transmitted to the server to visualise data on software platforms
 - A telematics device can be a **black box, plug-in OBD or even a smartphone**
 - Key applications of include **vehicle tracking, fuel consumption and driver behaviour monitoring**
- It is important to differentiate fleet telematics from fleet management, as:
 - **Fleet management** refers to processes & organisation using software that register the use of fleet assets such as vehicles, job orders, drivers shifts, etc. **It does not automatically require data transmitted from the vehicles.**
 - **Fleet telematics** is a subscription-based service that **connects real-time vehicle data to a central system** in charge of managing assets, drivers, goods, etc.
 - ✓ It uses a dedicated device in the vehicles to gather and transmit data. And also encompasses fleet management data as part of the transmitted information.



Telematics involves various technologies to create, transmit, store, analyse and visualise data

High-level description of a commercial fleet telematics system



The connectivity required for fleet telematics is made possible via either aftermarket or line-fitted devices

Technologies able to deliver connected vehicle services

Aftermarket

Black box

Fuel level sensor


ISA*

TSP box


OBD device

ELD**


Tolling/ETC device

Dash cam


PND

Smartphone


Speed camera locator

Smartwatch


Line-fitted

OEM system

Event data recorder


TSP black box



Tachograph


Semi-embedded ETC device


Vehicle keys


OEM smartwatch


Fixed

Removable

Portable

Telematics systems render an array of applications for both the on-road and off-road fleet segments

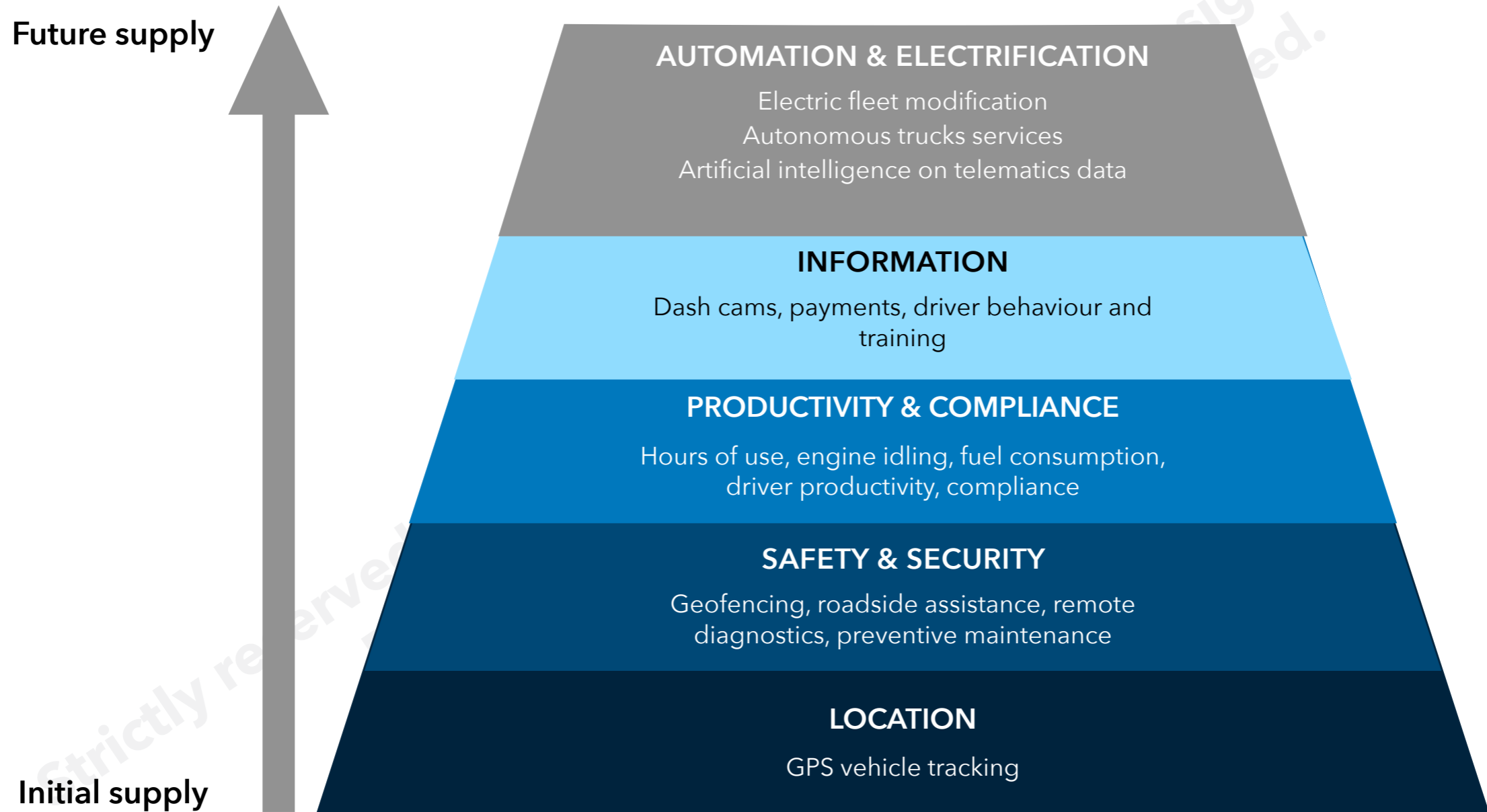
Typical applications of fleet telematics devices*

- Fleet management data
- Vehicle geofencing
- Route guidance, scheduling and dispatch
- Productivity assessment and consulting
- Preventive and predictive maintenance
- Remote diagnostics
- Driver scoring and training
- Usage-based insurance
- FNOL and claims assistance
- Toll, parking, fuel payment
- Fuel card integration
- Driver/contractor management
- Tax reporting service



Fleet telematics services are constantly upgrading based on market needs

The Maslow pyramid - Evolution in the supply of fleet telematics services*



Telematics Service Providers (TSPs) are able to generate revenues from three complementary sources

Typical TSP revenue sources

1. Device & installation:

- Upfront fee
- Devices can be leased/rented
- Device fee can also be included in the service package
- This is generally a one-time cost incurred by the client

2. Service provision:

- Monthly/yearly subscription fees per vehicle
- Subscription charges are customisable based on the necessary telematics features required by the client
- Includes installation and device, data access and connectivity, analytics and reporting
- Value-added services

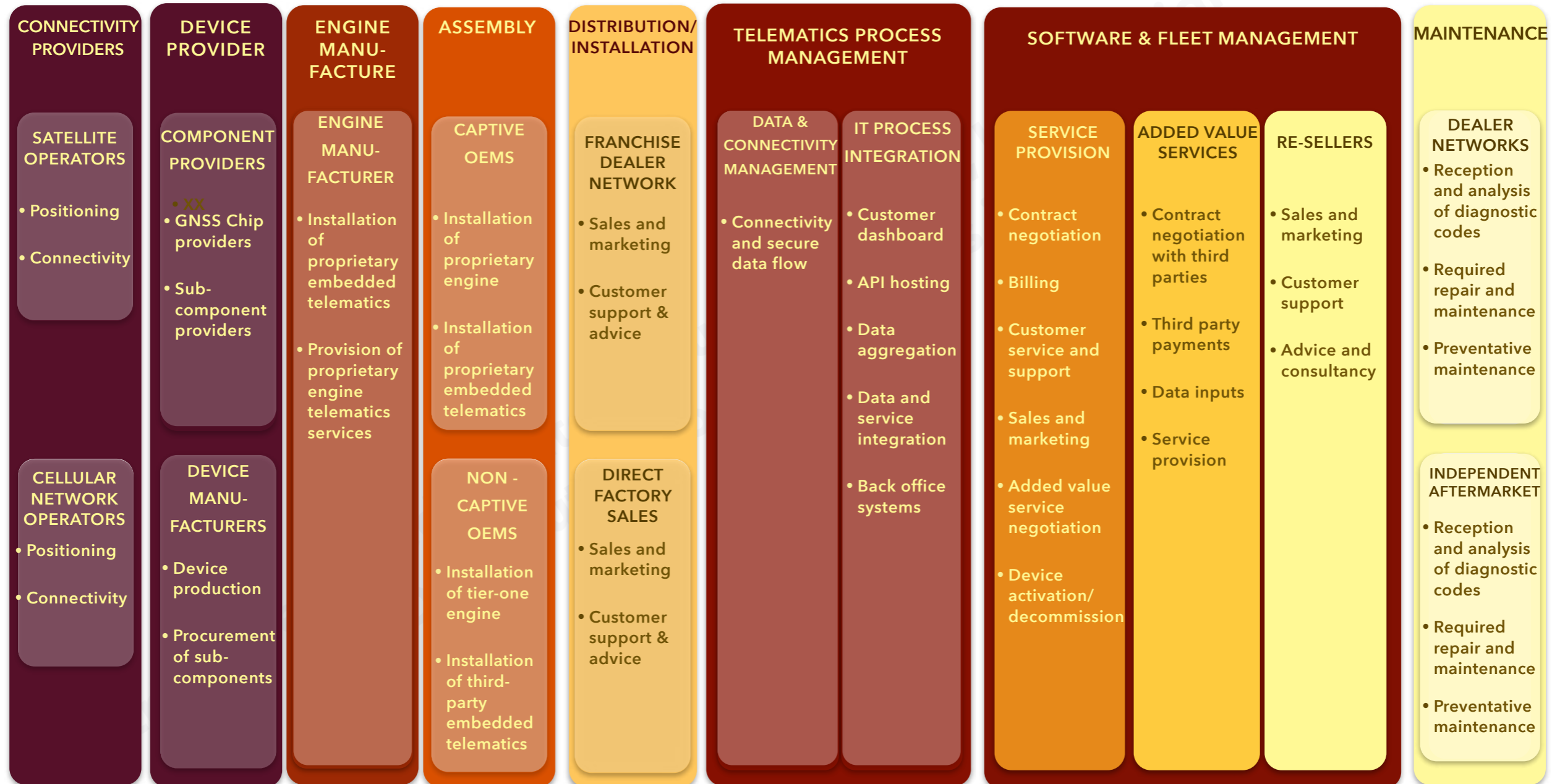
3. Integration & consulting:

- Generally based on a daily rate and the number of man days, services are provided as part of an after-sales care package
- Consulting can be in the form of improving fleet productivity, efficiency and reducing overall TCO



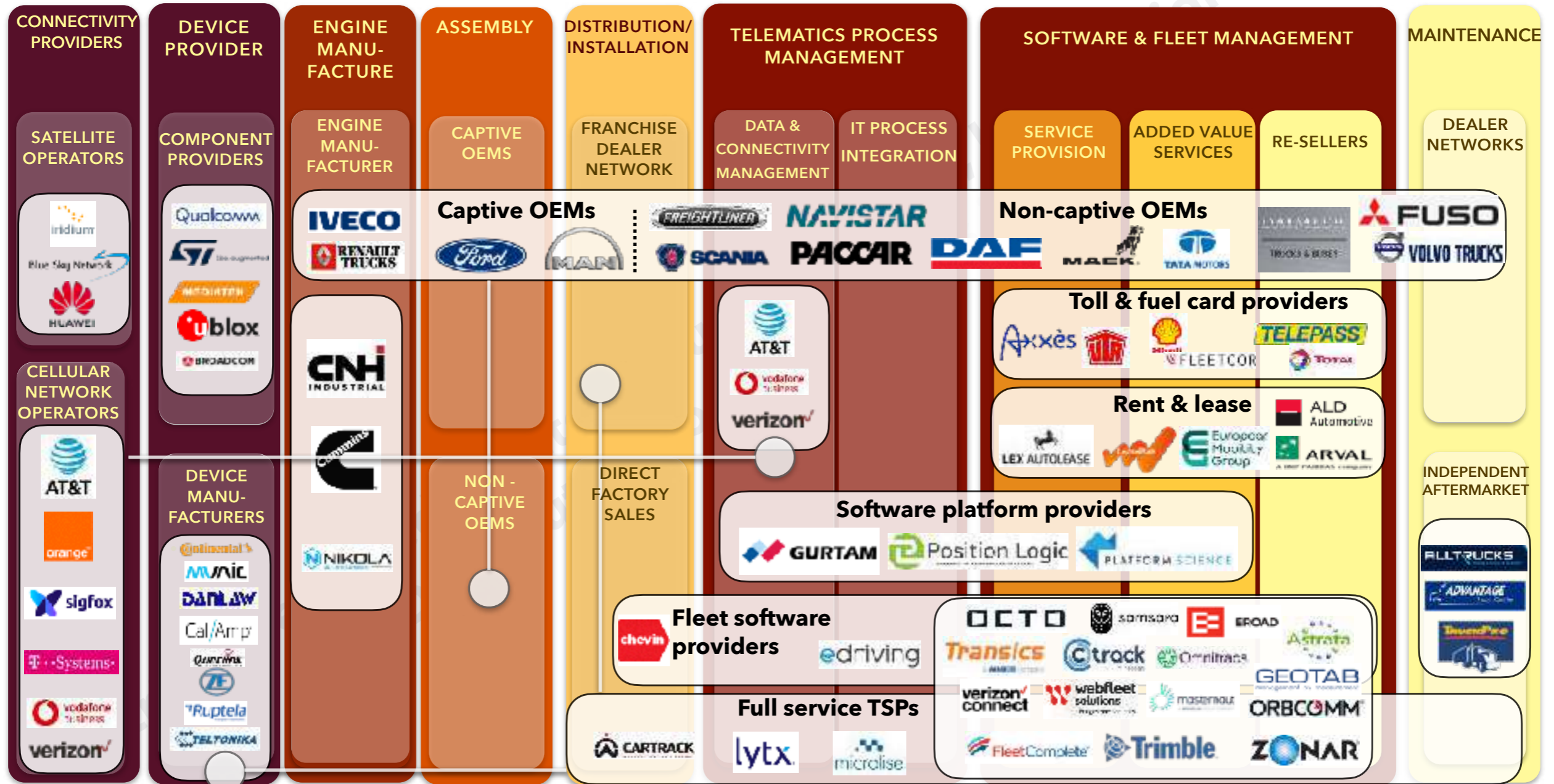
The fleet telematics value chain is split into eight major blocks

Industrial telematics value chain segments (OEM & aftermarket)



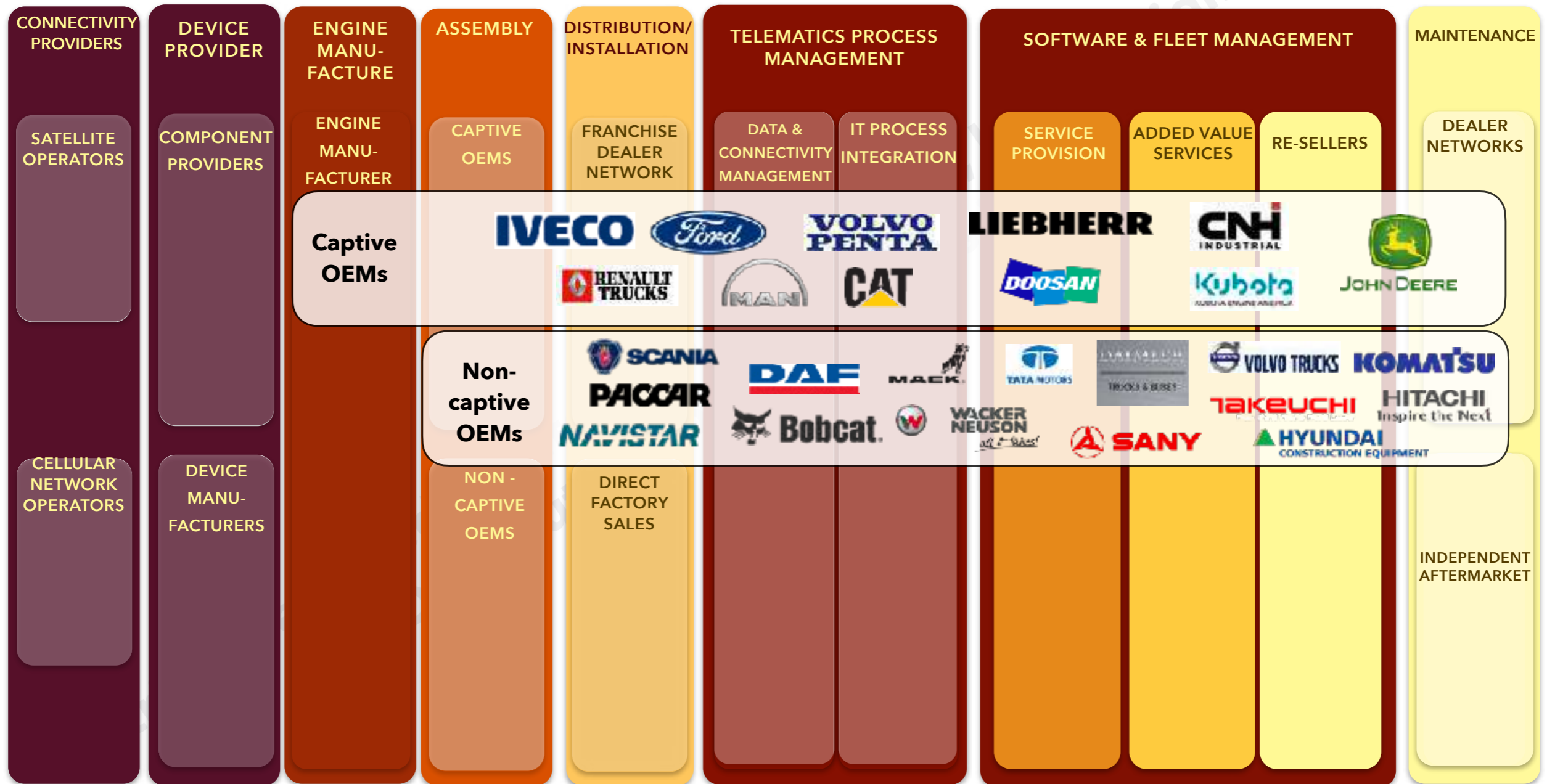
The telematics service provision value chain is highly fragmented but well served

Companies active in the **on-road** commercial fleet telematics value chain



OEMs are prevalent throughout the entire fleet telematics value chain (1/2)

OEMs active in the commercial fleet telematics value chain



OEMs are prevalent throughout the entire fleet telematics value chain (2/2)

OEMs' role in the commercial fleet telematics value chain

CAPTIVE OEMs



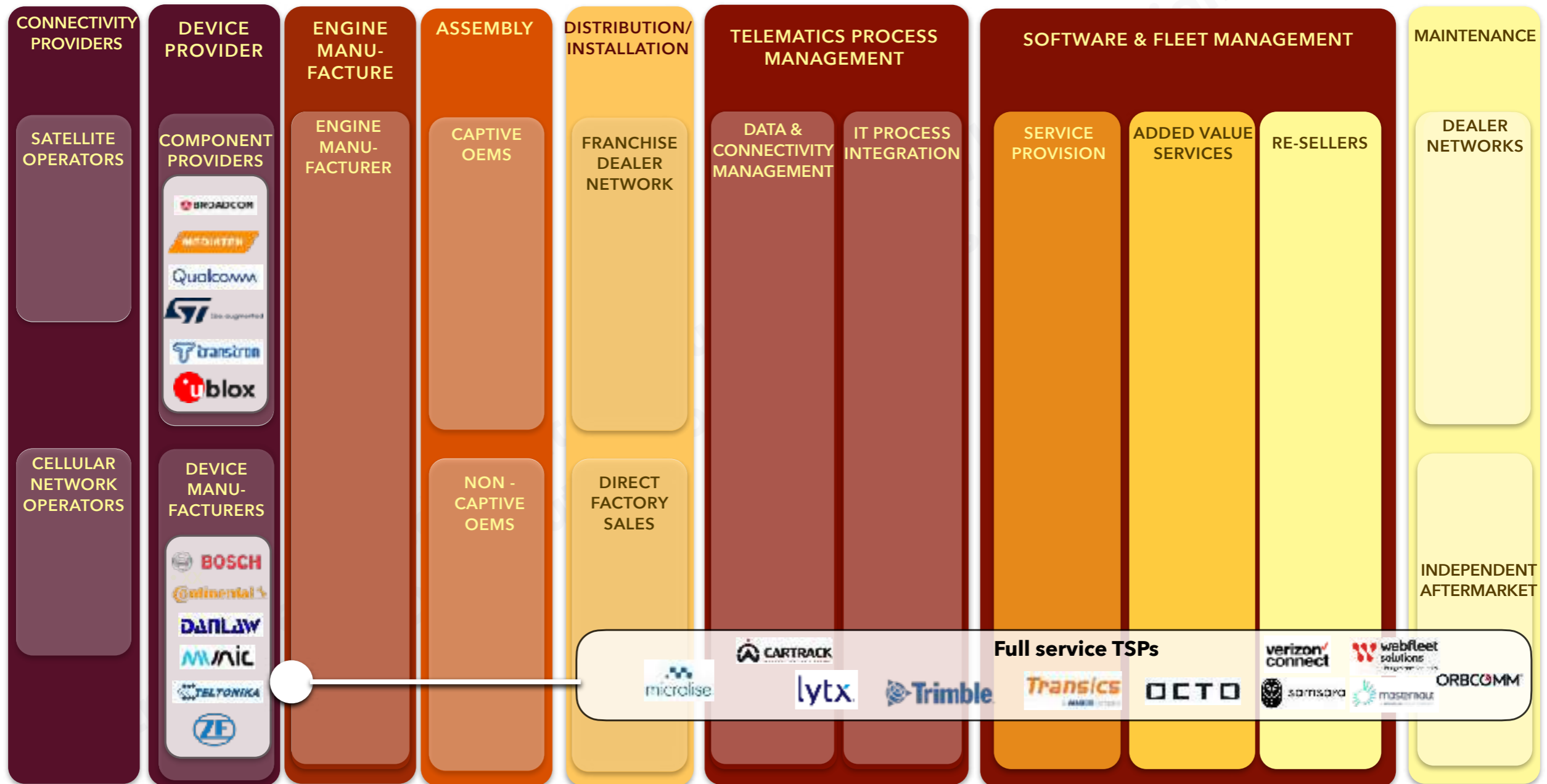
NON-CAPTIVE OEMs



- OEMs are active throughout the value chain from engine manufacturing to service & maintenance via franchised dealer networks and maintenance repair shops
- OEMs can be considered as either "captive" or "non-captive" based on engine manufacturing:
 - Captive OEMs are highly integrated manufacturers that are able to design and manufacture parts as well as the assembly of a final vehicle
 - They can manufacture their own engines, enabling them to have full access to all vehicle data via the CAN-bus (vehicle data network)
- Non-captive OEMs do not have similar access to engine data generated by third-party supplied engines, other than the data that is available via the standardisation protocols defined by SAE J1939 and its variations (i.e. MilCAN, AEMP 2.0, FMS-standard, etc.)
- For example, MAN, part of TRATON Group, is a captive OEM, as it builds its own engines and furthermore offers telematics solutions through an in-house telematics company, RIO
- In the off-road industry, companies such as CAT and John Deere are prominent OEMs that also sell their engines to smaller OEMs such as Diverto and Elgin for use in their machinery

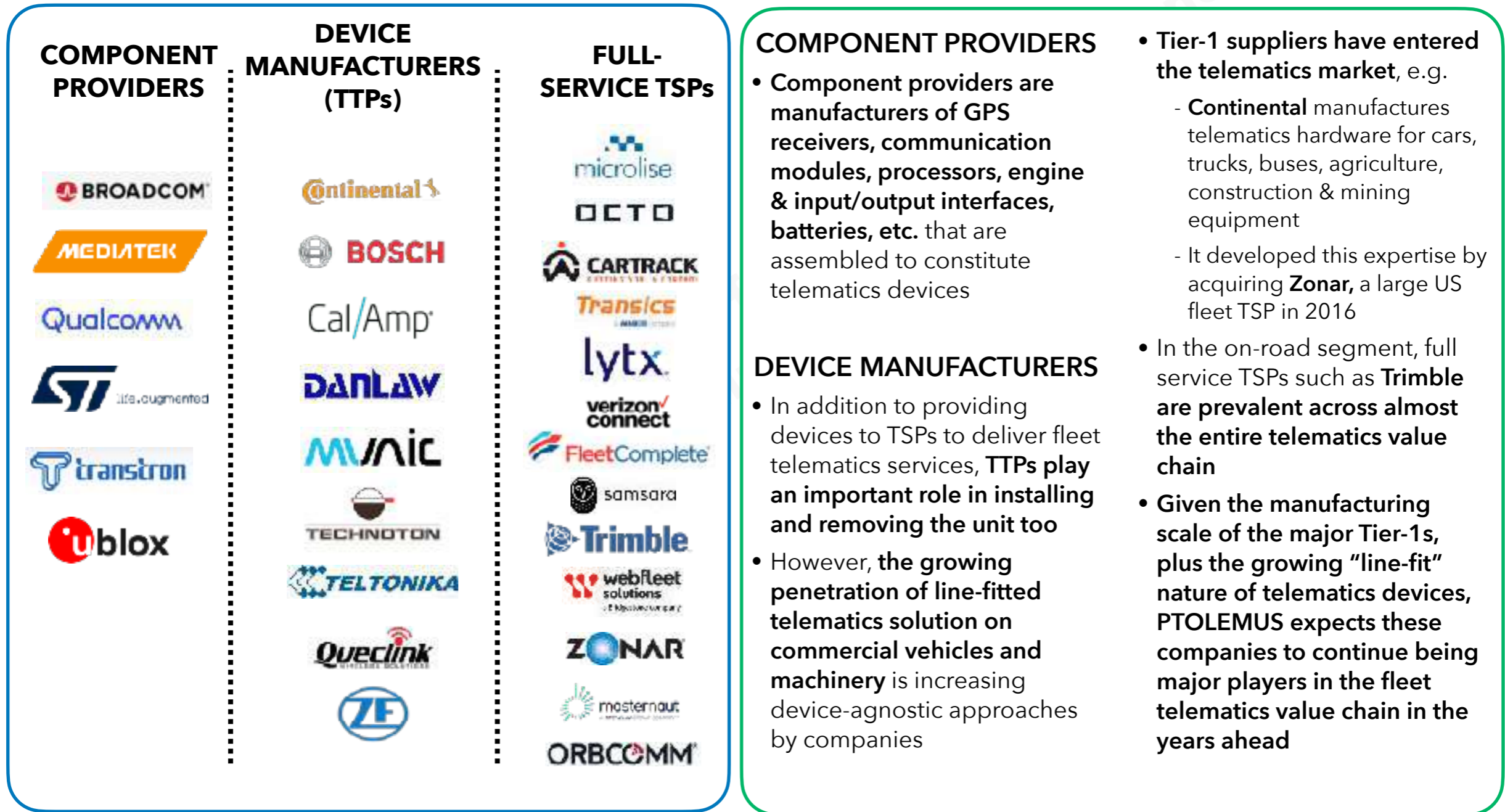
TSPs' aftermarket devices are increasingly competing with OEM devices embedded in new vehicles (1/2)

Device manufacturers active in the commercial fleet telematics value chain



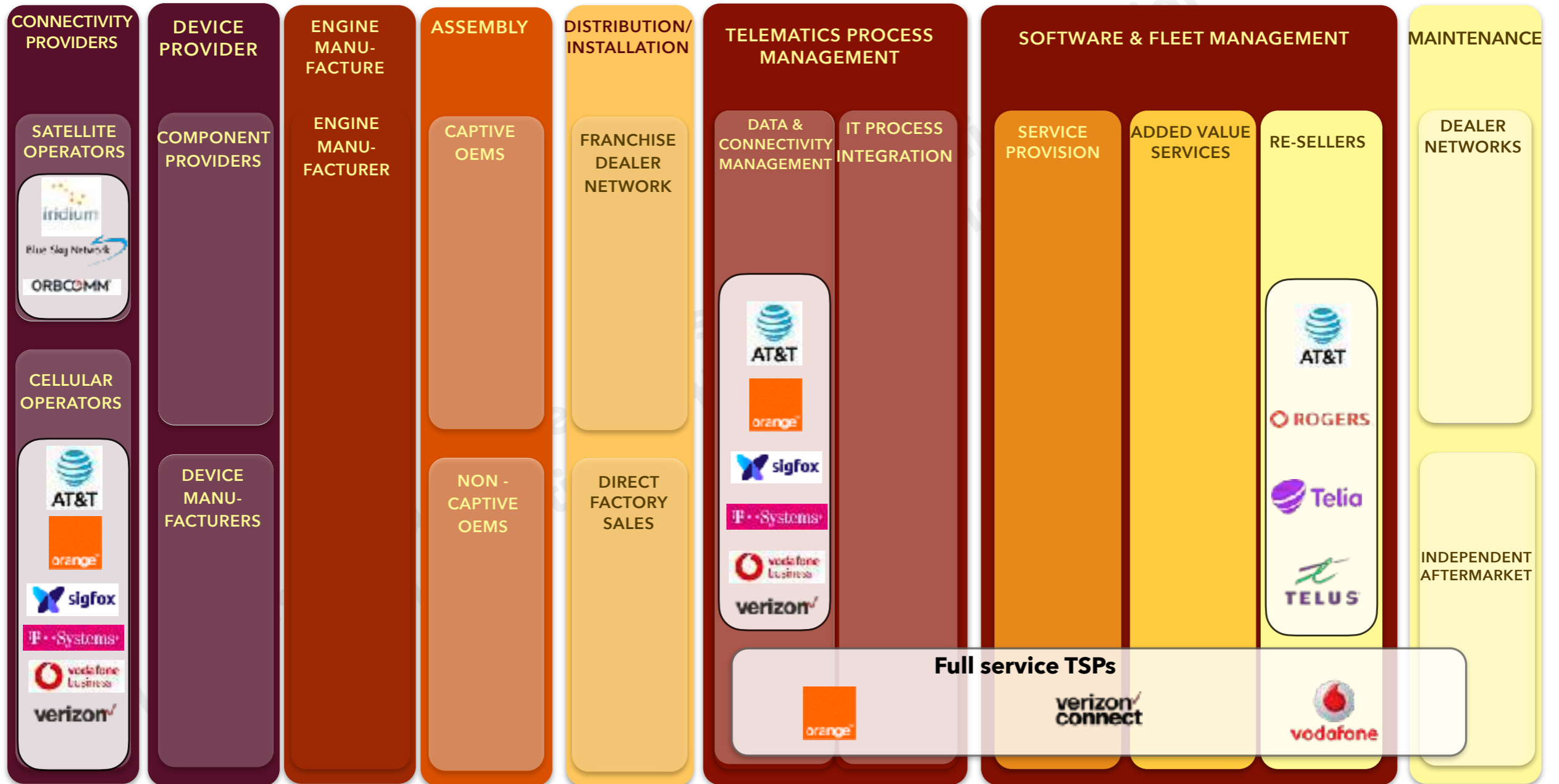
TSPs' aftermarket devices are increasingly competing with OEM devices embedded in new vehicles (2/2)

Role of device manufacturers in the commercial fleet telematics value chain



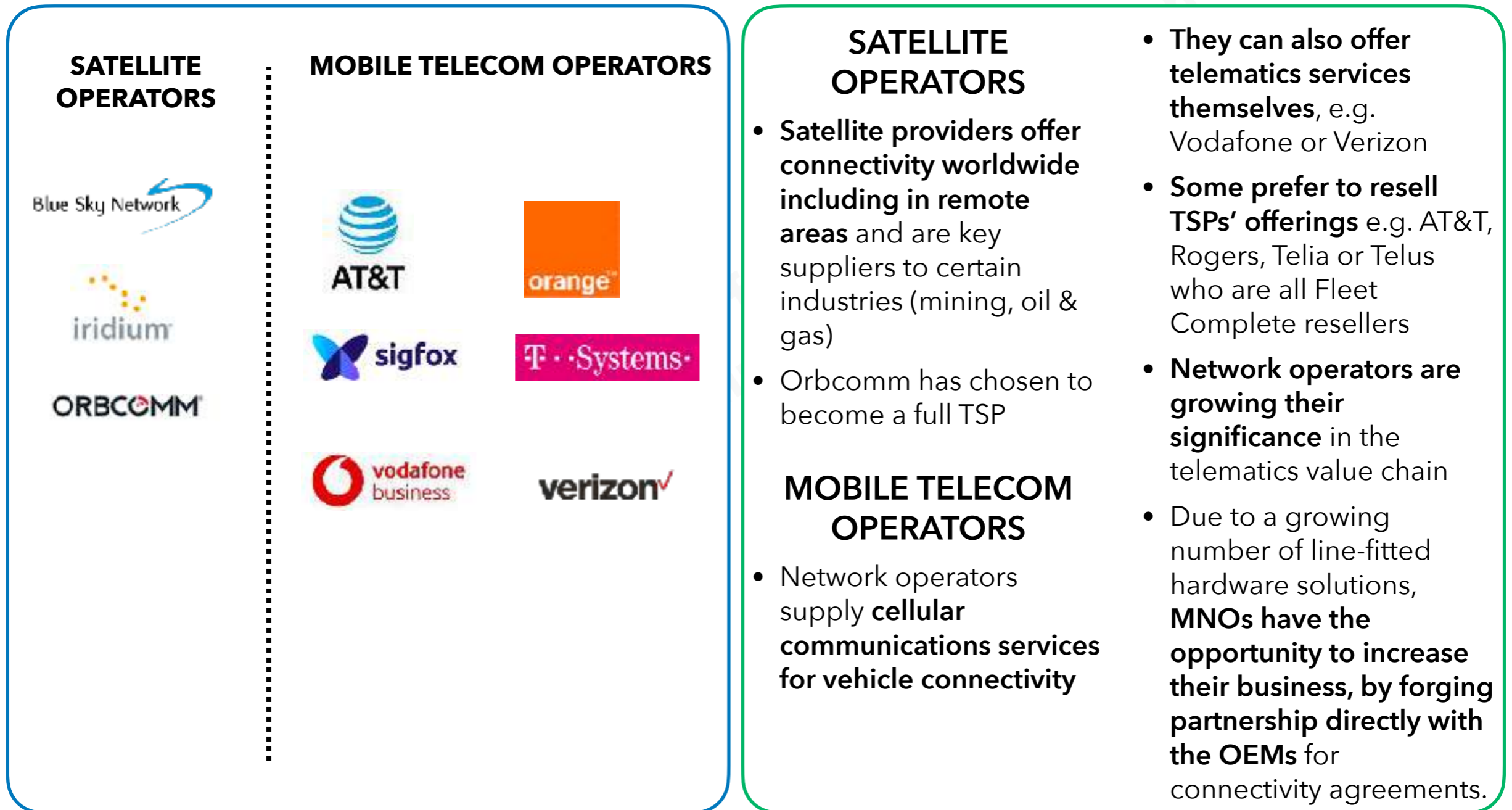
Telecom operators are suppliers of TSPs but can also compete against them or resell their solutions (1/2)

Telecom operators active in the commercial fleet telematics value chain



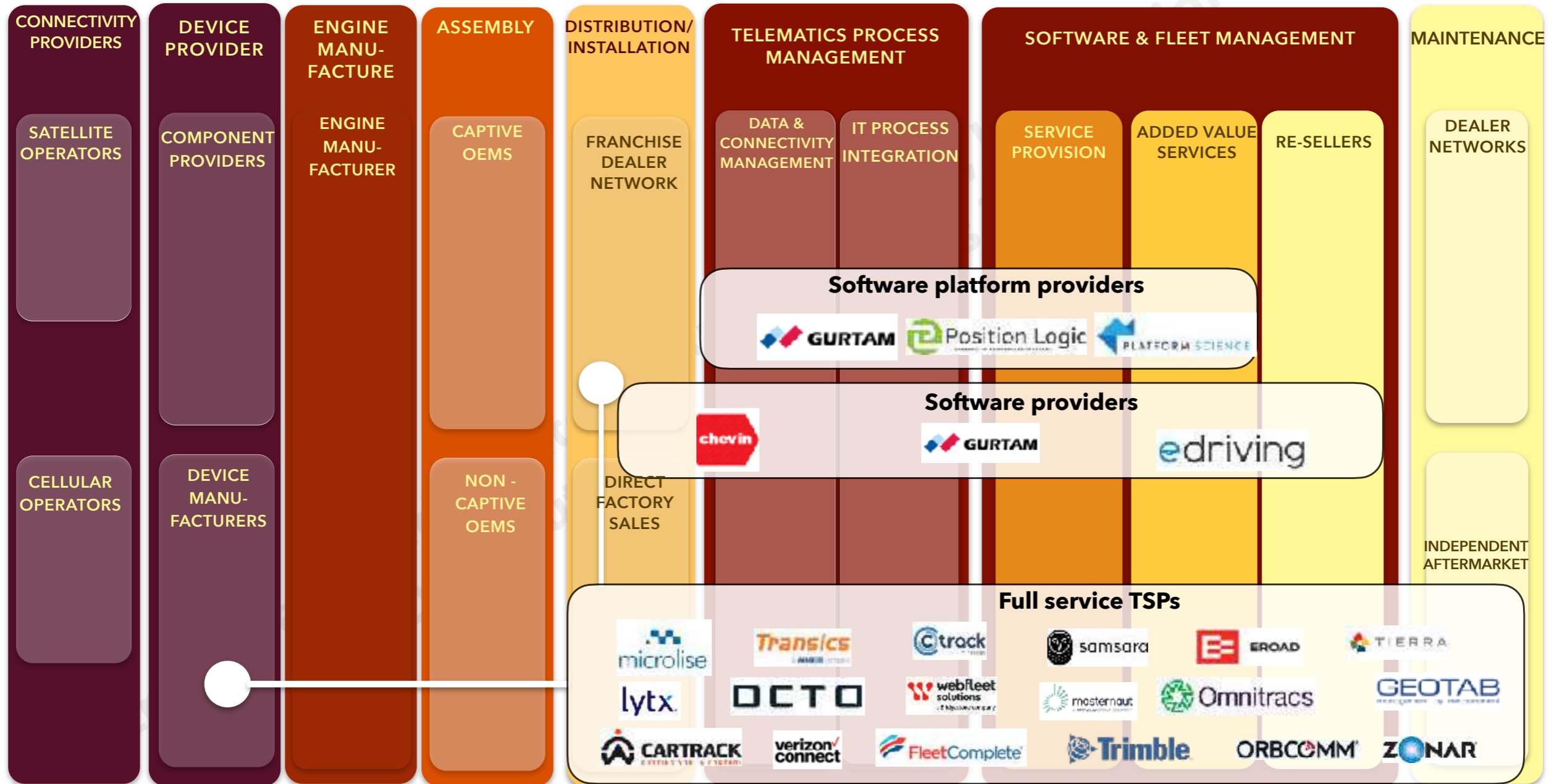
Telecom operators are suppliers of TSPs but can also compete against them or resell their solutions (2/2)

Role of telecom operators in the commercial fleet telematics value chain



OEM-embedded hardware is shifting the focus of TSPs towards offering improved, data-driven fleet services (1/2)

TSPs active in the commercial fleet telematics value chain



OEM-embedded hardware is shifting the focus of TSPs towards offering improved, data-driven fleet services (2/2)

Role of TSPs in the commercial fleet telematics value chain

FULL SERVICE TSPs



FLEET SOFTWARE PROVIDERS



FULL SERVICE TSPs

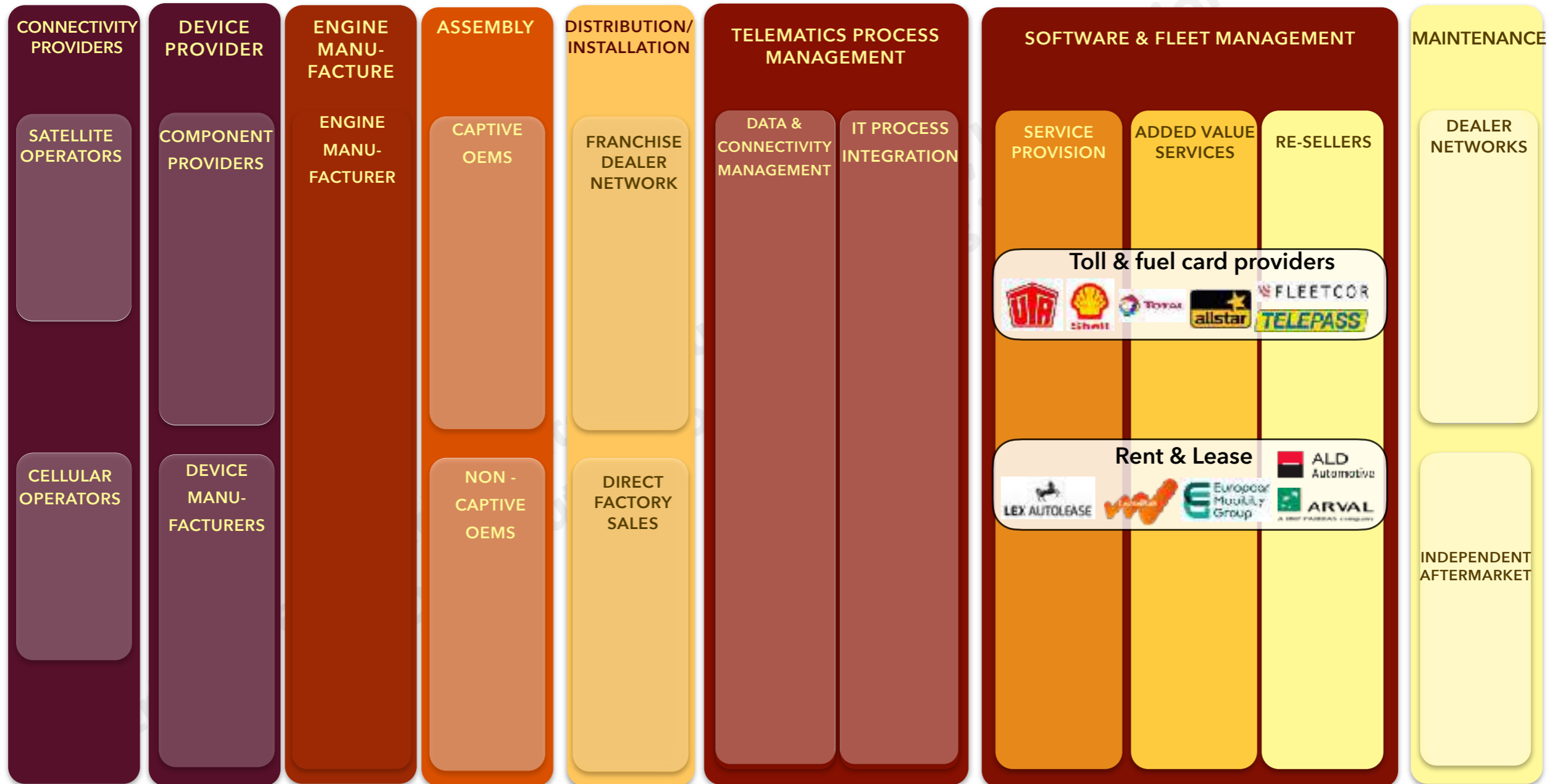
- Full service TSPs are providers that source and/or **manufacture their own devices and have complete influence along the value chain:**
 - They have capabilities to manufacture and install telematics devices, as well as the provision and maintenance of the fleet management software too
- Examples of full service TSPs include **Transics, Masternaut and Webfleet Solutions** that have been acquired by larger vehicle supplier companies, WABCO, Michelin and Bridgestone respectively.
 - This enables the TSPs to **reinforce their position and integrate services from their parent company**

FLEET SOFTWARE PROVIDERS

- Unlike TSPs, **software providers don't necessarily include hardware provision in their offer:**
 - They are increasingly developing an **agnostic software solution that can be integrated into different devices** and can also directly connect with the vehicle's line-fitted hardware.
- **Gurtam is an agnostic telematics provider**, offering a software system called "Wialon", that is compatible with 2400 types of devices
- In the near future, **we expect that telematics providers will shift completely to a software value proposition** due to the increase in prevalence of the line-fitted connectivity provided by OEMs from the factory

Leasers, toll and fuel card players are rapidly adapting to integrate telematics into their value proposition (1/2)

New players active in the commercial fleet telematics value chain



Leasers, toll and fuel card players are rapidly adapting to integrate telematics into their value proposition (2/2)

Role description of new players in the commercial fleet telematics value chain

TOLL & FUEL CARD PROVIDERS



RENTAL & LEASING COMPANIES



TOLL & FUEL CARD PROVIDERS

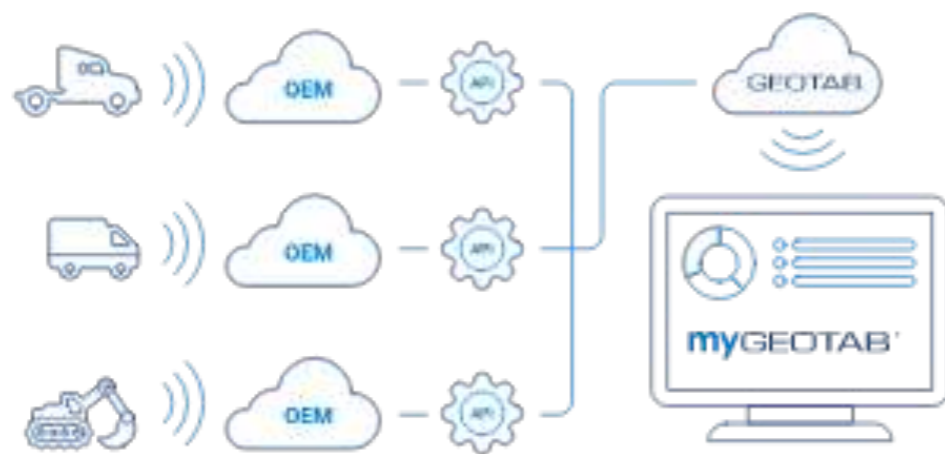
- Toll and fuel card providers are **interested to expand their traditional services in FMS:**
 - They operate mainly in **partnership with TSPs** with aftermarket solutions, but in the future we expect to see more collaboration with OEMs due to the growing prevalence of the line-fit data
- **Shell introduced in 2021 'Shell Telematics'** to save cost for fuel and insurance in partnership with GEOTAB and connected payments in collaboration with Daimler
- **Telepass has formed the service KMaster, integrating tolling services** with telematics to monitor the fleet in real time

RENTAL & LEASING COMPANIES

- Rental and leasing companies provide telematics solutions as a value added service for their customers:
 - **These players can offer their own solution or operate in partnership with TSPs**
- Arval has its own telematics solutions, **Active Link, integrated since 2018 in all its vehicles**
- **ALD Automotive announced in 2020 an agreement with Ford to provide new integrated fleet leasing and management solutions** across Europe, under the name Ford Fleet Management

OEMs will strengthen their position in the telematics landscape through vehicle data ownership

Embedded telematics and vehicle data sharing by on-road OEMs



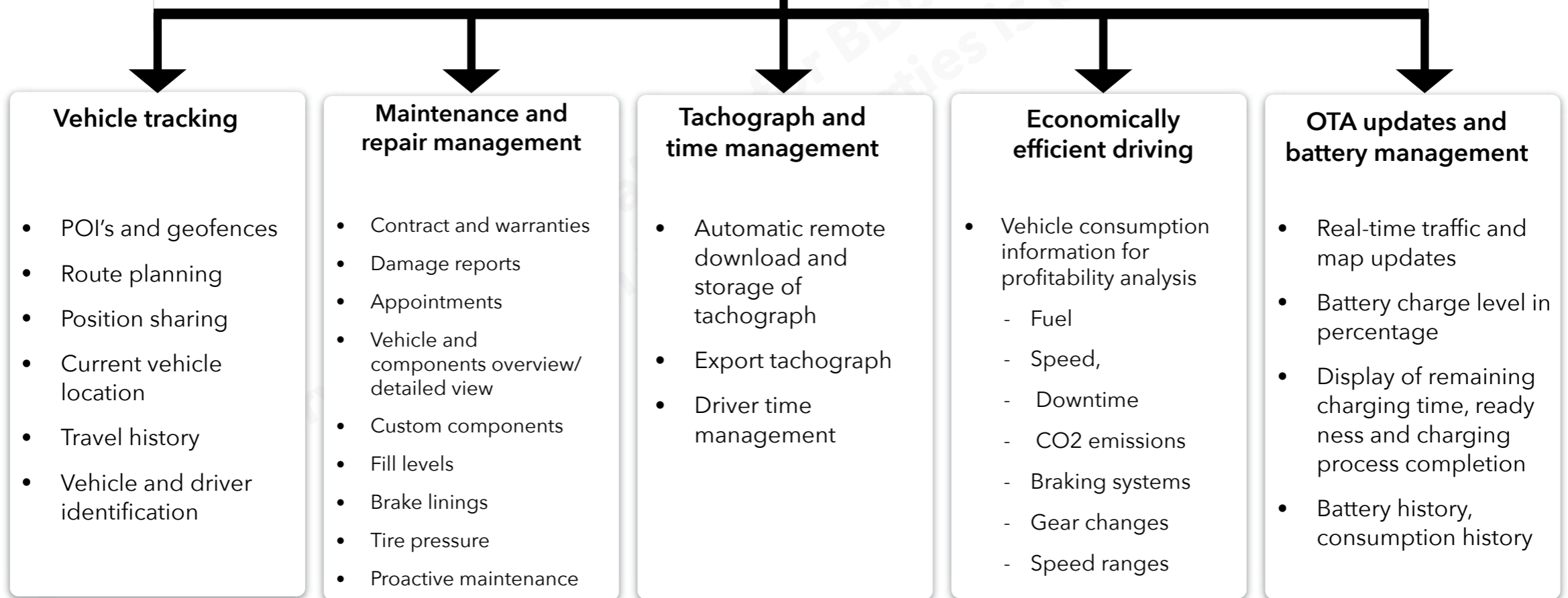
- **Customer-centric fleet telematics services from OEMs are, by comparison to the major third-party TSPs, relatively under-developed:**
 - Not all OEMs are equally capable of handling mixed fleet data through their fleet telematics platform
- However, approximately 83% of all vehicles manufactured will have embedded telematics by 2024
- This means that **aftermarket telematics hardware devices will slowly start to disappear as OEMs leverage the data ownership** from their embedded devices
- The breadth of **OEMs' data is richer** than that from an aftermarket device, due to the full access OEM devices have to CAN data, which can be useful to develop new vertical services
- In such a situation, **OEMs will be well positioned to engage in partnerships with TSPs and generate revenue via the sale of data access**
- OEMs such as Navistar have already engaged in an open platform-enabling data exchange with several TSPs



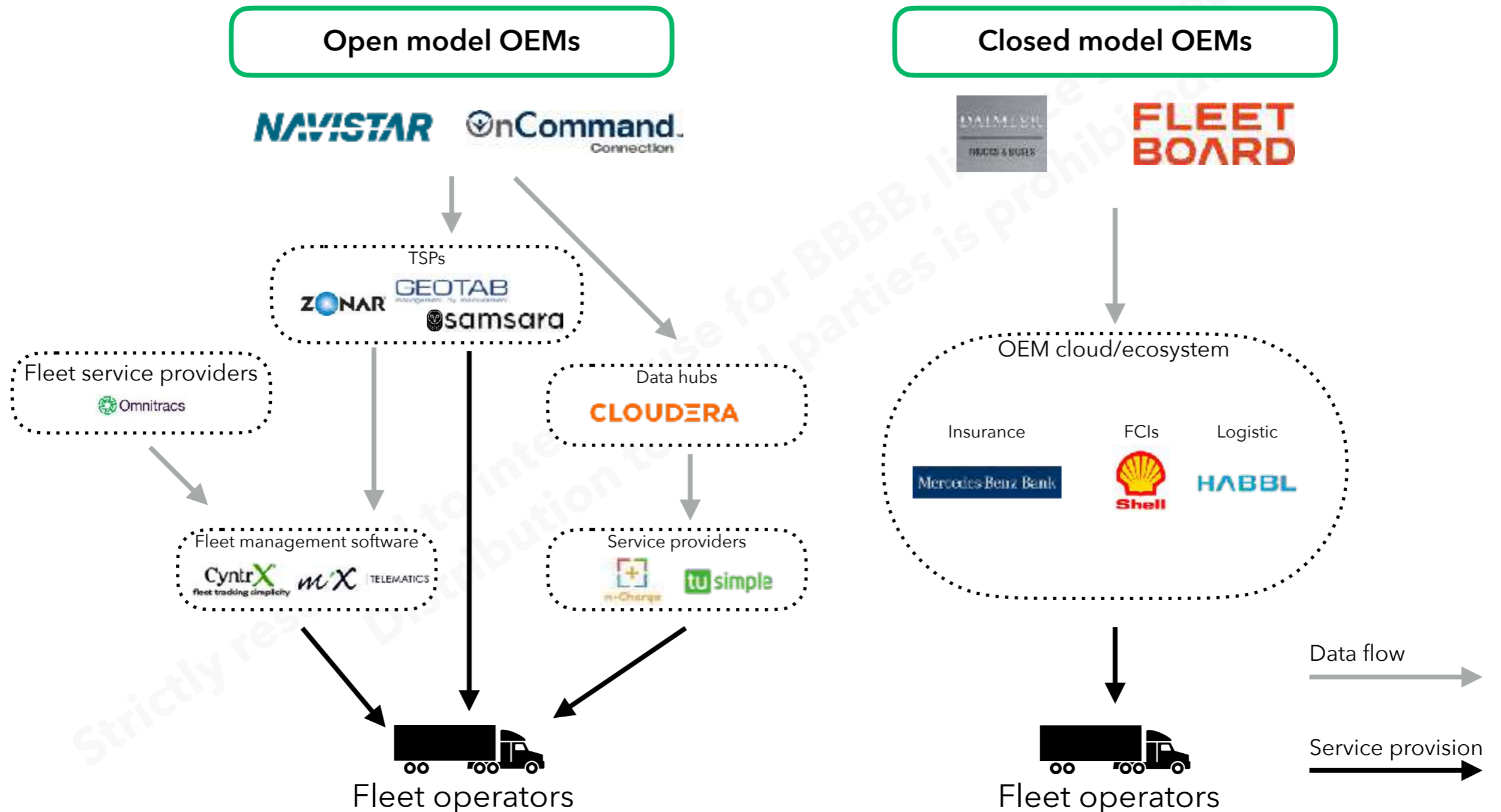
MAN offers fleet telematics services that include tracking, maintenance and compliance services

Typical example of telematics services by on-road OEMs: MAN

MAN DigitalServices



OEMs are moving towards the 'open model' integrating additional fleet services from 3rd party providers



Aftermarket TSPs dominate fleet telematics due to their core strength: the ability to cover mixed fleets

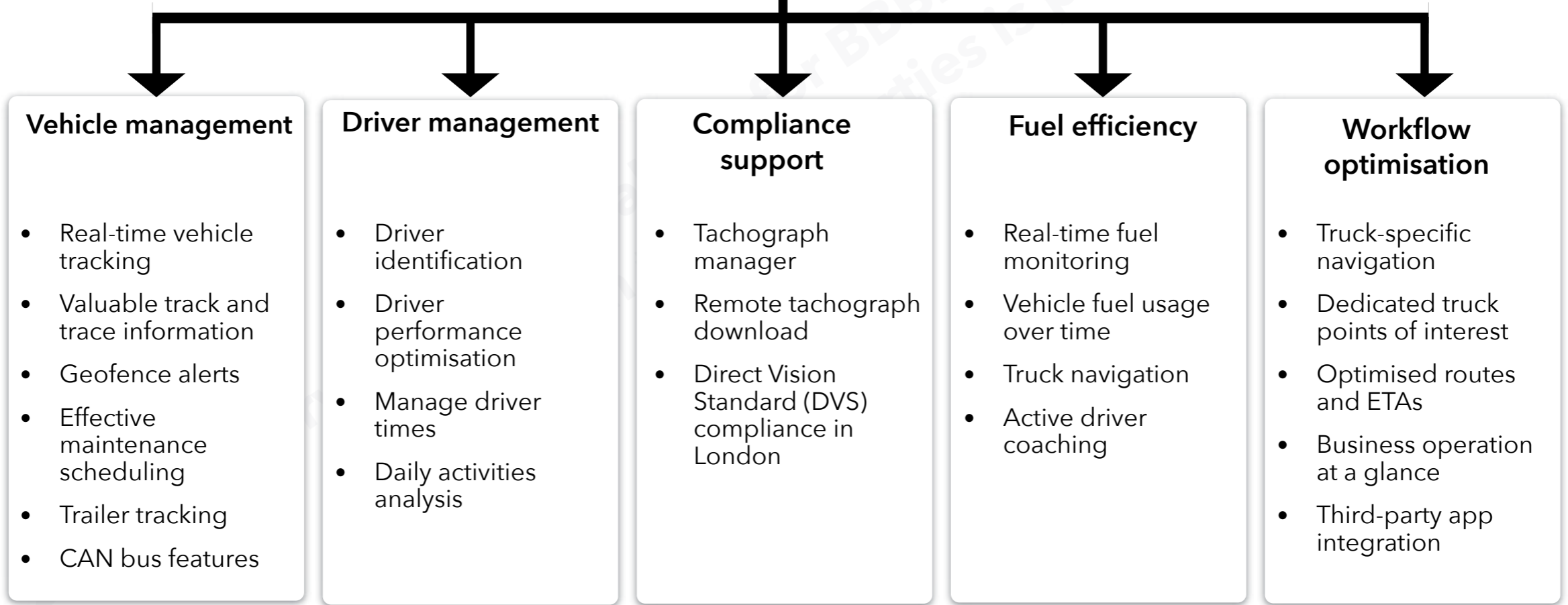
Telematics service providers' (TSP) fleet telematics strategy

- Aftermarket fleet telematics has been providing advanced data driven services to fleets since the mid-1990s:
 - Typically the services offered focus on major **fleet cost centres such as fuel, driver behaviour and vehicle management & health**
 - Unlike OEMs, **TSPs' key value proposition has been to offer flexible telematics solutions** for fleets comprising of any brands or vehicle types
- Aftermarket TSPs are leading the industry in **video telematics solutions** through in-cab video devices:
 - These solutions are not yet widespread due to data privacy concerns
 - In-cab recording is being developed by many TSPs, but until a practical solution is established, it is likely to remain a niche offer
- With OEMs building a presence in the market, **TSPs are focusing on the development of line-fit data-driven services**, and customisable, user-friendly interfaces



On-road telematics solutions typically focus on vehicle, driver, compliance, fuel, and workflow management

Typical example of telematics services by on-road TSPs : Webfleet solutions



Full service TSPs can integrate with specialist players to offer custom solutions through open platform marketplaces

Marketplace applications by TSPs*

GEOTAB



Asset tracking solutions



Camera & ADAS



Compliance



The driver challenge



EV charging



Fleet management



Fuel BI

Total: 160 applications

webfleet solutions
a Bridgestone company



Automated parking



Fleet operations



Routing and scheduling optimisation



Fuel tracker



Reporting solution

Total: 242 applications

verizon connect



Vehicle maintenance



Supply chain visibility



OEM FMS



Field service management



Fuel management



Supply chain visibility

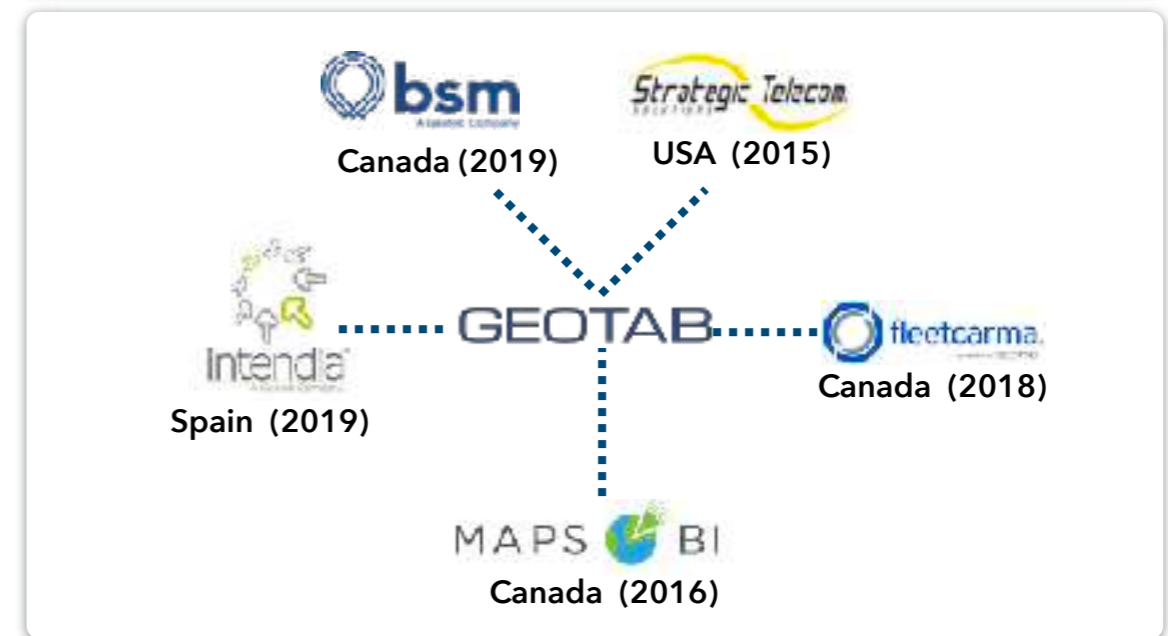
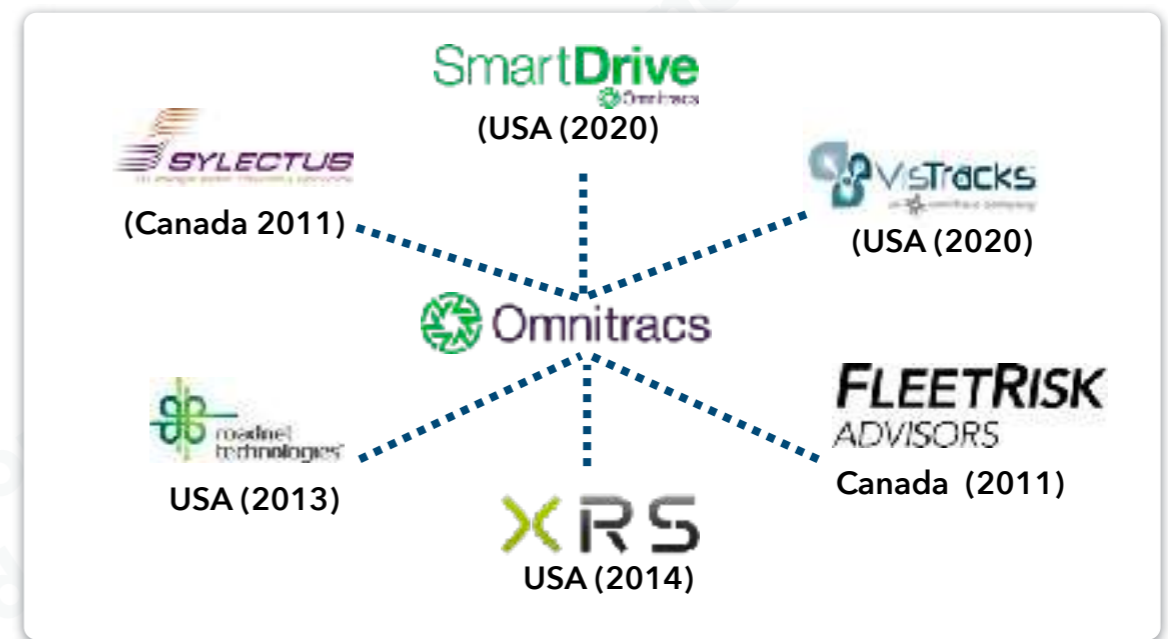


OEM FMS

Total: 37 applications

Large TSPs are following a strategy of acquiring smaller, complementary software providers to fuel service expansion

Acquisition of related companies by TSPs



Four concerns regarding telematics data are barriers to wider adoption for some in the on- and off-road market

The four key concerns surrounding telematics data



Primary concern is over the collection and storage of personal location data both in a live and historical context.
Video telematics is a step further intrusive as it collects and stores video imagery of the drivers.



Includes notification of use, driver consent for access or use by third parties and ensuring minimal use



Ensuring data integrity and restricting availability to relevant parties within the agreed jurisdiction(s)
Anonymisation and confidentiality of data is also key



Determining ownership of data and reliability of the collection device as well as firmware and back-office infrastructure
Resilience to hacking and unwanted data extraction is a growing concern

Driver resistance and privacy concerns are barriers to wider adoption of commercial fleet telematics

Driver concerns towards adoption of telematics

- According to the Arval mobility observatory barometer in 2020, **33% of global LCV fleet companies believe "telematics is too intrusive for the drivers"**:
 - **Tracking driver behaviour** is the underlying reason for most privacy concerns
- In 2014, the Transport Workers Union of Australia launched **a court case to restrict logistics company TOLL from installing driver facing and road facing cameras** in trucks:
 - But Australia's Fair Work Commission (FWC) found this issue in favour of the logistics company
- **Engagement with employees** beforehand, expressing the benefits of the new system can make a big difference
- **Gamification is seen as a must-have** in order to foster acceptance among drivers:
 - Using the system as **a tool with which to reward**, rather than simply monitor, can increase acceptance
- **Bringing services onto smartphones** and enabling driver insights can further increase user acceptance
- Promoting **usage of driver screens reducing paperwork and digitising workflow management** is also a motivating factor towards adoption of telematics for drivers



Introducing WEBFLEET video

Best-in-class videotelematics from Europe's #1 fleet management provider



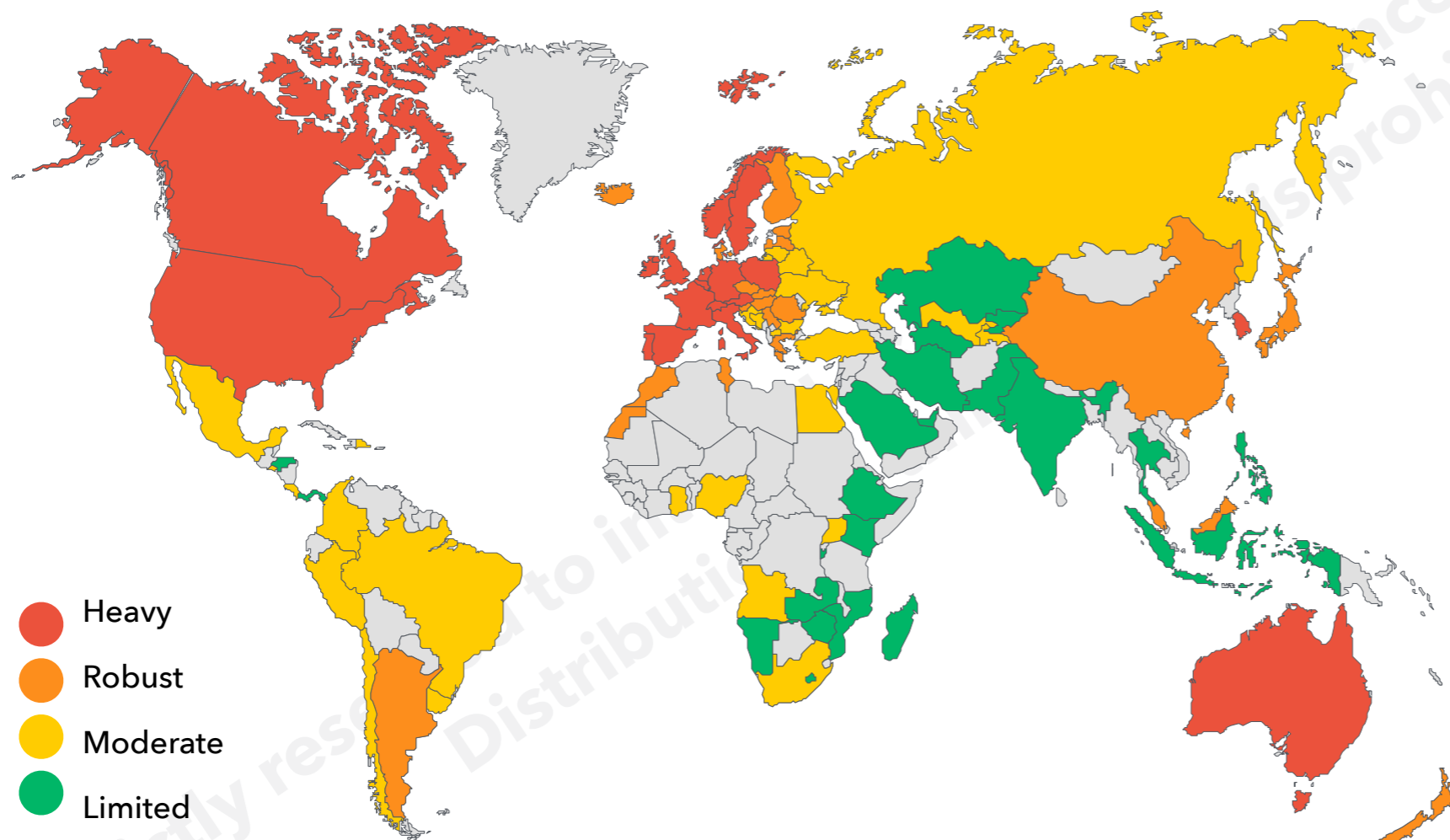
According to new regulations, personal data does not belong to TSPs or OEMs but to customers...

- Data monetisation leads to the inevitable conversation around **data protection**:
 - Companies are not only sharing their business data, but the **data of their customers**;
- Regulations such as the EU's **General Data Protection Regulation (GDPR)** and the **California Consumer Privacy Act (CCPA)** mean that automakers, insurers and third parties must comply with **strict personal data protection measures**:
 - In the USA, there are also initiatives to support a **federal level privacy bill**
- Personal data tends to mean any **information relating to an identified or identifiable person**, or "data subject", and can include photographs and social media posts
- In particular, **personally identifying information (PII)**, i.e. any data that can directly indicate who the person is, such as an ID or social security number, must be closely guarded
- Currently, most organisations handling data are taking the approach that all **data belongs to the customer** and are using opt-in measures when monetising or creating services based on that data



...and personal data protection laws will impact the way data is shared and monetised, including in the US

A comparison of data protection regulation and enforcement globally



- In markets with strict data protection laws, stakeholders will need to take measures to ensure customer data is protected
- This will also have an effect on the collection, handling, storage and/or use of Personally Identifiable Information (PII)
- However, **strong data protection laws have not prevented data-reliant services such as commercial fleet telematics from taking off in core markets such as North America and Europe**

Large fleets use telematics to maximise the utilisation of vehicles in a variety of ways

Operator efficiencies

- Fleet management
- Regulation compliance
- Make informed vehicle replacement decisions
- Driver management and safety solutions
- Track unauthorised vehicle use (e.g. location, after-hours use, theft)
- Collect mileage and fuel consumption data
- Route optimisation
- Driver performance training

Vehicle maintenance

- Improve preventive maintenance
- Reduce unplanned maintenance
- Minimise maintenance downtime period
- Increase safety during vehicle operation
- Identification of poor performing vehicles/parts for warranty
- Identification of vehicle tampering or misuse

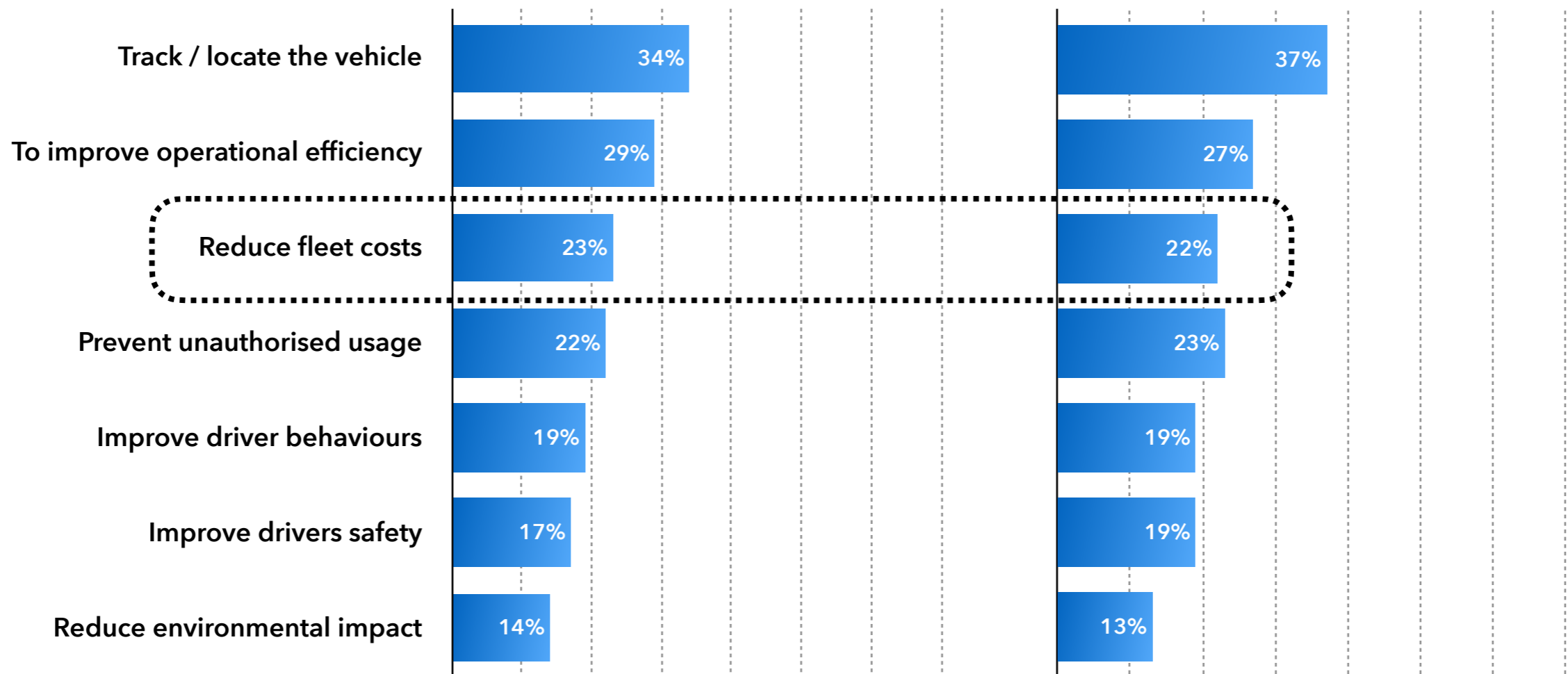
Fleet optimisation

- Decrease non-productive idle time
- Increase fuel economy
- Decrease emissions
- Track fuel costs
- Maximise fuel tax credits
- Increase compliance

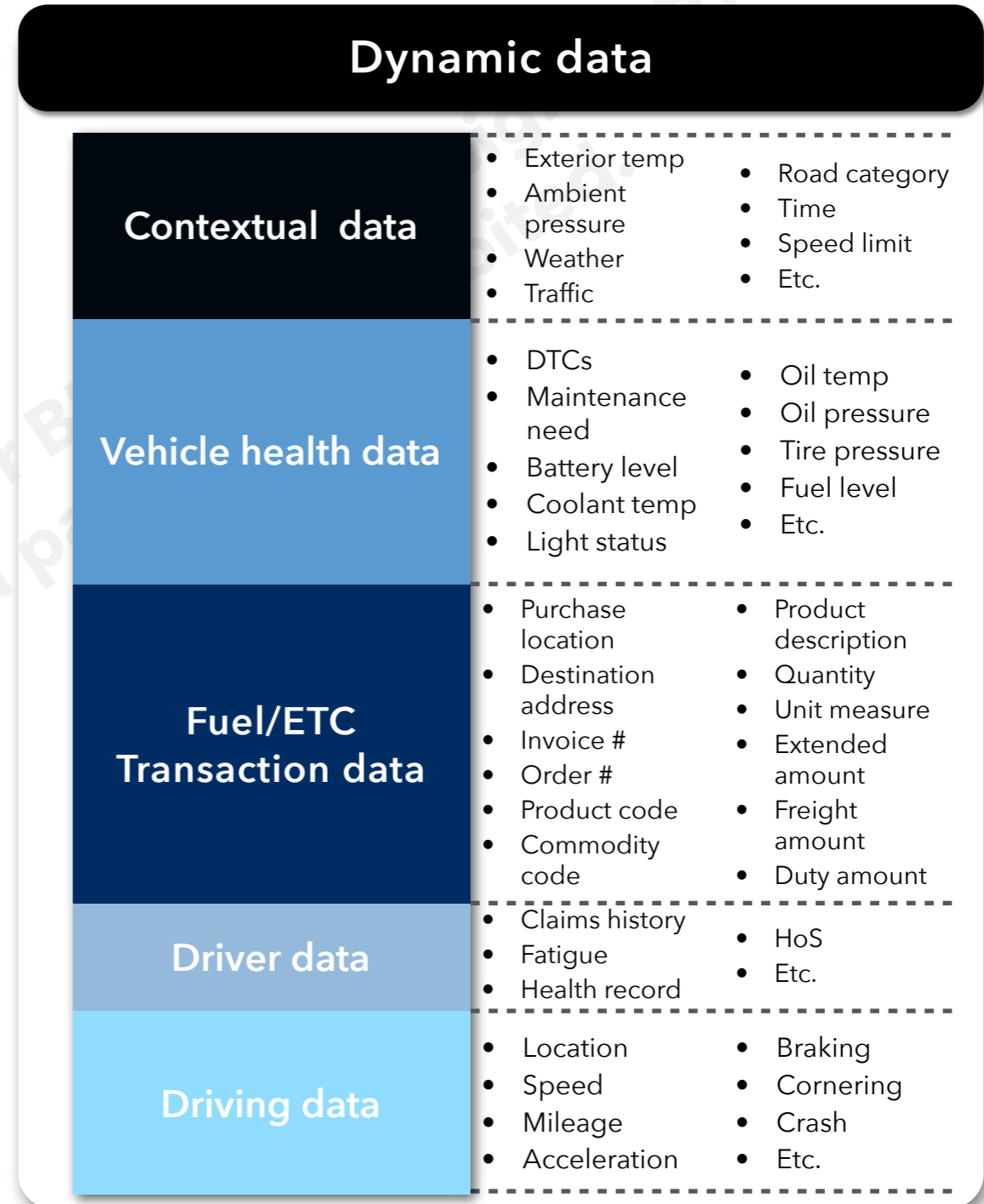
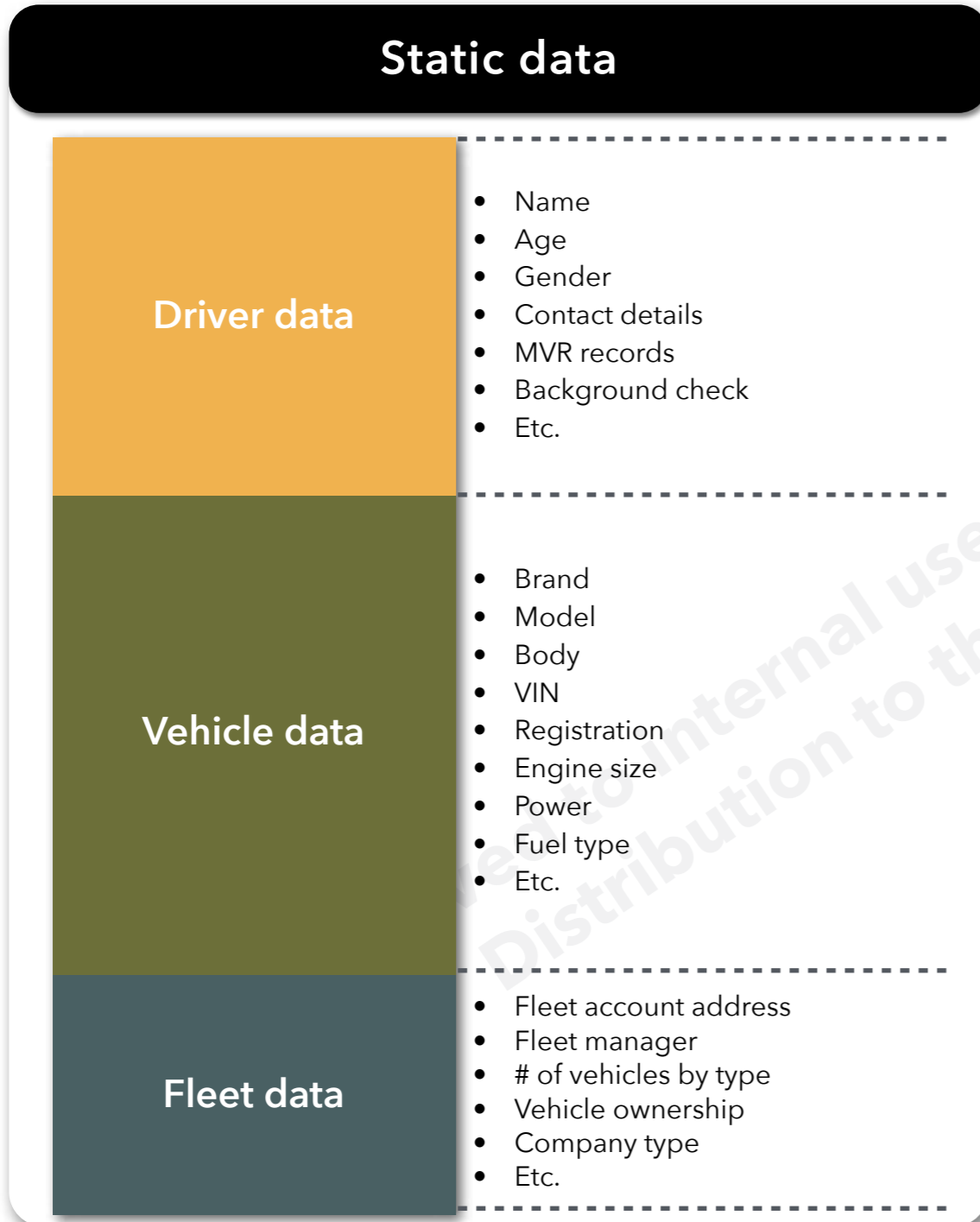
Track and trace, improving efficiency and reducing costs are important factors for adopting telematics in LCVs

Main reasons for using telematics by company size

Sample of fleets of light commercial vehicles (LCVs)

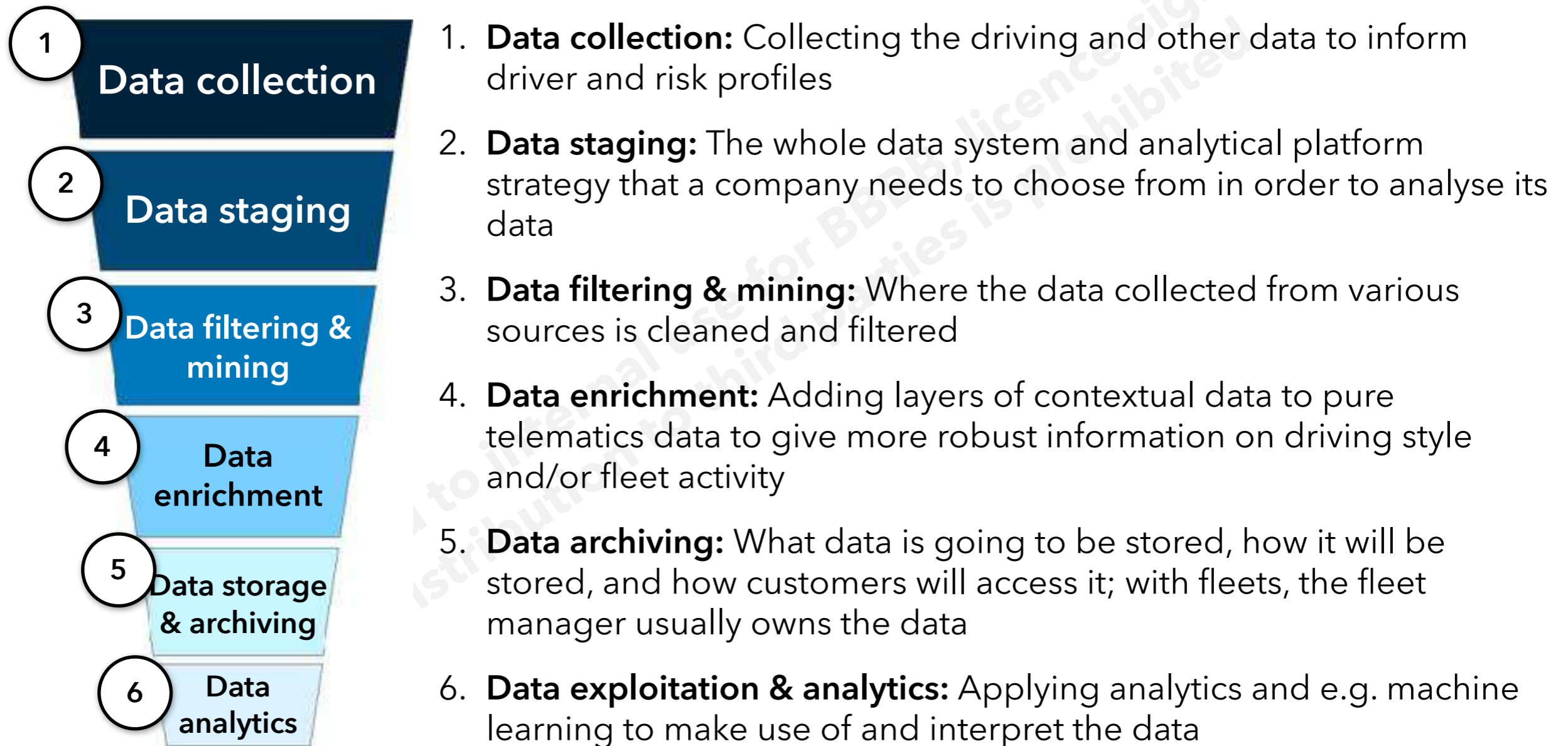


The data sets that are typically collected by telematics devices can be static or dynamic



There are six key steps in processing telematics data before applying analytics

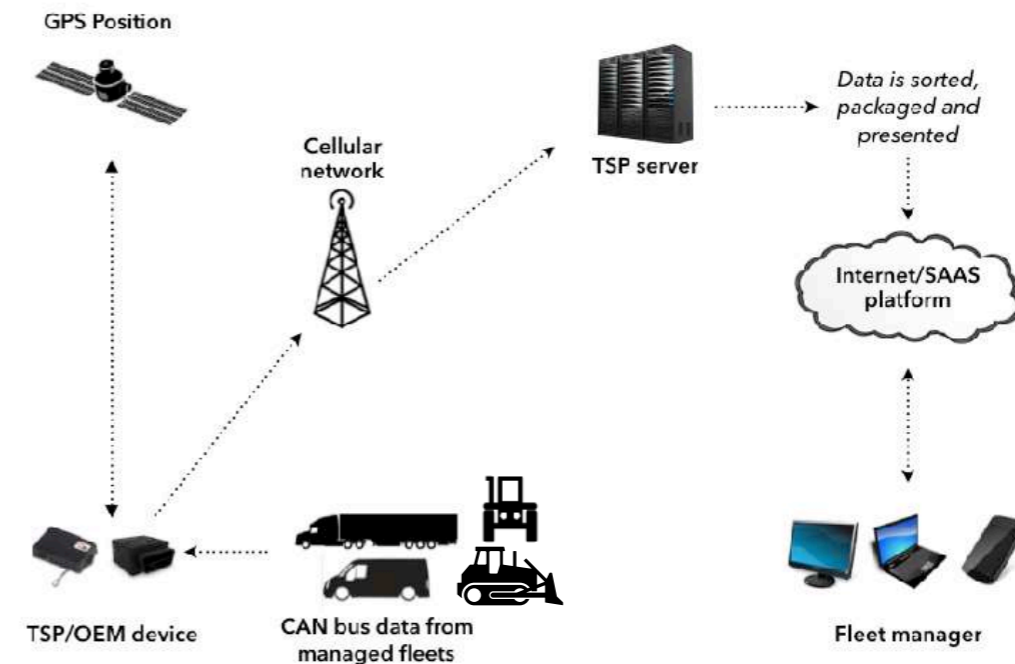
Six strategic steps in telematics data management



Data generated from the asset is transmitted, stored and processed to deliver insights through fleet software

- The traditional systems architecture of fleet telematics is **data creation, transmission, analysis and presentation**
- A vehicle can generate relevant functional data up to 25 GB per hour, and is generated by both the vehicle CAN as well as any installed telematics devices
- The TSP then collects the requisite **data from either the vehicle CAN or the telematics device(s)** and is sent via cellular, WiFi or satellite network connectivity, dependent on the chosen method of connection for the telematics service in operation
- Data stored in the cloud or on local servers is **sorted and processed through various analytical models** that derive insights about the fleet from the telematics data
- **The data is then presented** to the client/fleet manager in the form of a dashboard or a fleet management software
- The insights derived from fleet data is then used towards **improving the fleet performance, targeting to improve ROI of the fleet** through fuel consumption, scheduled maintenance and optimum usage of the asset
- As fleet requirements become more complex, TSPs require access to more data to generating new added value to the ecosystem - it is achieved through **integrating devices - black box with dash cameras, driver screens, etc**

Fleet telematics systems architecture



A multitude set of devices have evolved for fleet telematics, purpose built to deliver targeted services



Black box connected to CAN bus

- Pedals usage
- Engine revs
- Odometer
- True mileage
- Speed
- Time
- Ignition



Standalone black box

- Location
- Speed
- Mileage
- Geofencing
- Acceleration
- Crash detection
- Crash reconstruction



Dash camera

- Location
- Speed
- Time
- Video
- Imaging data
- Distraction
- Crash detection



OBD dongle

- Location
- Speed
- Mileage
- Geofencing
- Acceleration
- Crash detection
- Crash reconstruction



Screen device

- GPS/GSM
- Location
- Speed
- Mileage
- Geofencing
- Driver input:
 - Action
 - HoS



Smartphone

- Location
- Speed
- Mileage
- Time
- Acceleration
- Distraction
- Video
- Imaging

A black box connected to a vehicle CAN bus offers the most comprehensive suite of fleet telematics solutions

Key benefits

- A black box is a permanent device hardwired to the vehicle, unless needs to be changed or removed
- As ECUs communicate on single CAN system, it avoids the need for potentially complex wiring
- It enables the centralised management of data logging
- A robust system that is least impacted by electrical disturbances or electromagnetic interference
- Detailed information on engine, braking, gearbox, fuel consumption statuses are available to evaluate vehicle condition

Technology characteristics

- A black box has a **direct connection to vehicle CAN BUS** that ensures access to vehicle health data as well as dynamic driving data
- CAN bus (Controller Area Network) is a vehicle bus standard system that **enables the communication between multiple vehicle electronic control units (ECU)**.
- An electronic control unit (ECU) is part of a vehicle that **contain information and can share information** from other parts of the vehicle.
- **A CAN Bus acts like a central nervous system** through which information from ECU's of engines, antilock braking, fuel injection, gearbox communicate
- **A black box hardwired to the CAN Bus network** of a vehicle transmits information in using an internal sim card that uses a cellular network

Device example



Weight	250 grams
Supply voltage	129 VDC to 36 VDC
Operating temperature range	-40°F to +185°F
Communication	<ul style="list-style-type: none"> • 4G LTE, HSPA, GSM • WiFi (802.11 b/g/n) • Bluetooth
Motion sensor	<ul style="list-style-type: none"> • Accelerometer 3 axis +/-8g • Gyroscope 3 axis +/-2000°/s
CAN bus connectivity	Yes (ISO 11898-2:2016)
External interfaces	<ul style="list-style-type: none"> • Digital I/O • Serial I/O • USB (OTG, Host 2.0) • GNSS (GPS, Glonass, SBAS, QZSS, 56-ch)

The number of sizeable Telematics Service Providers has grown from 1 to 36 in 10 years!

Fleet telematics suppliers with over 250,000 units tracked

2011



2013



2015



2017



2020



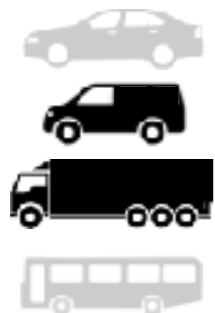


**Extract from:
Fleet telematics market assessment**

In this report we focus on LCVs & HGVs operating in the transportation sector, as well as buses and coaches

Commercial Road Transport (CRT)

- LCVs (< 3.5t) & HGVs (> 3.5t) are used for the **goods transportation and distribution** locally or abroad
- **Different drivers, with different driving behaviours** may drive the same vehicle in **shifts**
- **No personal use is allowed**
- HGVs, in particular, have **high and international mileage**



Maintenance & utilities

- **Light and some heavy commercial vehicles** operating locally and travelling **fewer miles than CRT fleets**
- Used by companies such as telecom operators, roadside assistance fleets as well as electricity, water or sewage providers



Rental & leasing

- Typically **passenger cars used for individual and business purposes**
- Includes short to long term rentals and cars used as part of urban and inter-urban car sharing schemes



Public sector

- Heavy vehicles designed for **mass transportation such as buses and coaches (B&C)**



- CRT are typically used for **goods' transportation and distribution nationally and internationally**
 - Trucks are used for long-haul distances, operating with one or multiple trailers
 - Vans are used for last-mile delivery
- Maintenance & utility vehicles are often used by **maintenance service providers**
 - For instance, roadside assistance providers who often face urgent service requests
- **Rental & leasing fleet vehicles**, as well as **LCVs and HGVs**, are generally **leased for a year or more**
- Commercial passenger vehicles are not included in the scope of this report

Commercial fleets can also be divided into three segments according to the number of vehicles

Small or "mini" fleets



< 5 vehicles

- Often includes "grey" fleets, in which the vehicle is registered as a private car
 - A large proportion of these fleets are small, especially in China and Latin America
 - The operation of small or "mini" fleets is decentralised and the fleet manager has less monitoring capacity on drivers
- This category has the least telematics coverage:
 - In the USA, less than 5% of small fleets have telematics

Medium fleets



5 - 150 vehicles

- Many of these fleets **may already have some form of telematics or safety system already installed**, such as video telematics
- In the UK, 41% of van fleets with more than 25 vehicles use telematics solutions and this increases to 53% for fleets larger than 50 vehicles

Large fleets



>150 vehicles

- A much smaller segment in fleet volumes, even with more vehicles to manage
- Large fleets are **more likely to have some form of telematics or safety system already installed**

Vehicle classifications differ between the regions

Europe



- There are three categories following the UNECE classification system, where trucks and vans used for goods delivery belong to Class N:
 - **N1**: under 3.5 tonnes (i.e. LCV)
 - **N2**: between 3.5 tonnes and 12 tonnes (i.e. MCV)
 - **N3**: over 12 tonnes (i.e. HGV)
- Similarly, for buses and coaches, the following categories apply:
 - **M1**: under 3.5 tonnes
 - **M2**: >8 seats but <=5 tonnes
 - **M3**: >8 seats and >5 tonnes
- In order to be consistent throughout this study, **we use the European classification of trucks as a standard to make the global analysis**



North America



- There are three categories including 8 specific classes based on gross vehicle weight:
 - **Light Duty Trucks**
 - ✓ Class 1-3: 0 to 14,000 lbs (0 - 6.5 tonnes)
 - **Medium Duty Trucks**
 - ✓ Class 4-6: 14,001 to 26,000 lbs (6.5 - 12 tonnes)
 - **Heavy Duty Trucks**
 - ✓ Class 7: 26,000 to 33,001 lbs (12 - 15 tonnes)
 - ✓ Class 8: over 33,001 lbs (over 15 tonnes)

China



- China has in the last decade adopted the UNECE classification system (as used by Europe), however, the old standard are still used by many businesses and institutions.
- In this standard there were four categories of vans and trucks classified by gross loading capacity:
 - **Mini**: less than 1.8 tonnes
 - **Light**: 1.8 tonnes to 6 tonnes
 - **Medium**: 6 tonnes and 14 tonnes
 - **Heavy**: 14 tonnes to 100 tonnes



Australia & New Zealand



- There are **two categories of commercial vehicles classified by gross combination mass**:
 - **LCVs**: up to 3.5 tonnes
 - **HGVs**: over 3.5 tonnes



Latin America



- **HGVs are usually defined by the configuration of their axles**, e.g. in Colombia:
 - **2/3/4**: Rigid vehicle with 2/3/4 axles
 - **2S1**: Articulated formed by a rigid of 2 axles and semi-trailer of 1 axle
 - **2S2**: Articulated formed by a rigid of 2 axles and semi-trailer of 2 axles

Depending on the size, type and classification of the vehicle, telematics services can vary...

Main types of on-road commercial vehicles and examples of associated telematics services

LCVs



Light Commercial Vehicles

- Used for last mile delivery and short haul transport
- They often require **routing** and **scheduling** services
- **Risk management** is an essential service for fleets working in urban area
- Since the introduction of congestion charge and low emission zones, **toll service provision** is becoming common
- Last-mile delivery, specially for parcels, is increasing so the number of LCVs used for this purpose in urban areas is becoming higher

HGVs



Heavy Goods Vehicles

- HGVs require accurate monitoring of fuel consumption given an average yearly distance between 120,000 and 200,000 km
- **Remote diagnostic** provides data to fleet managers about the vehicle's health situation. Warns in case of detection of a failure
- Freight transporters are requiring tools to estimate **trip costs**
- Fleet monitoring is also essential for **scheduling of deliveries** and **tracking** vehicles and goods

B&Cs



Buses & coaches

- Buses and coaches require accurate monitoring of fuel consumption given the high annual mileage covered
- They often require **routing** and **scheduling** services
- **Risk management** is an essential service for fleets working in urban area
- Fleet monitoring is also essential for the **scheduling of passenger routes** and **for tracking** vehicles for the safety and security of passengers

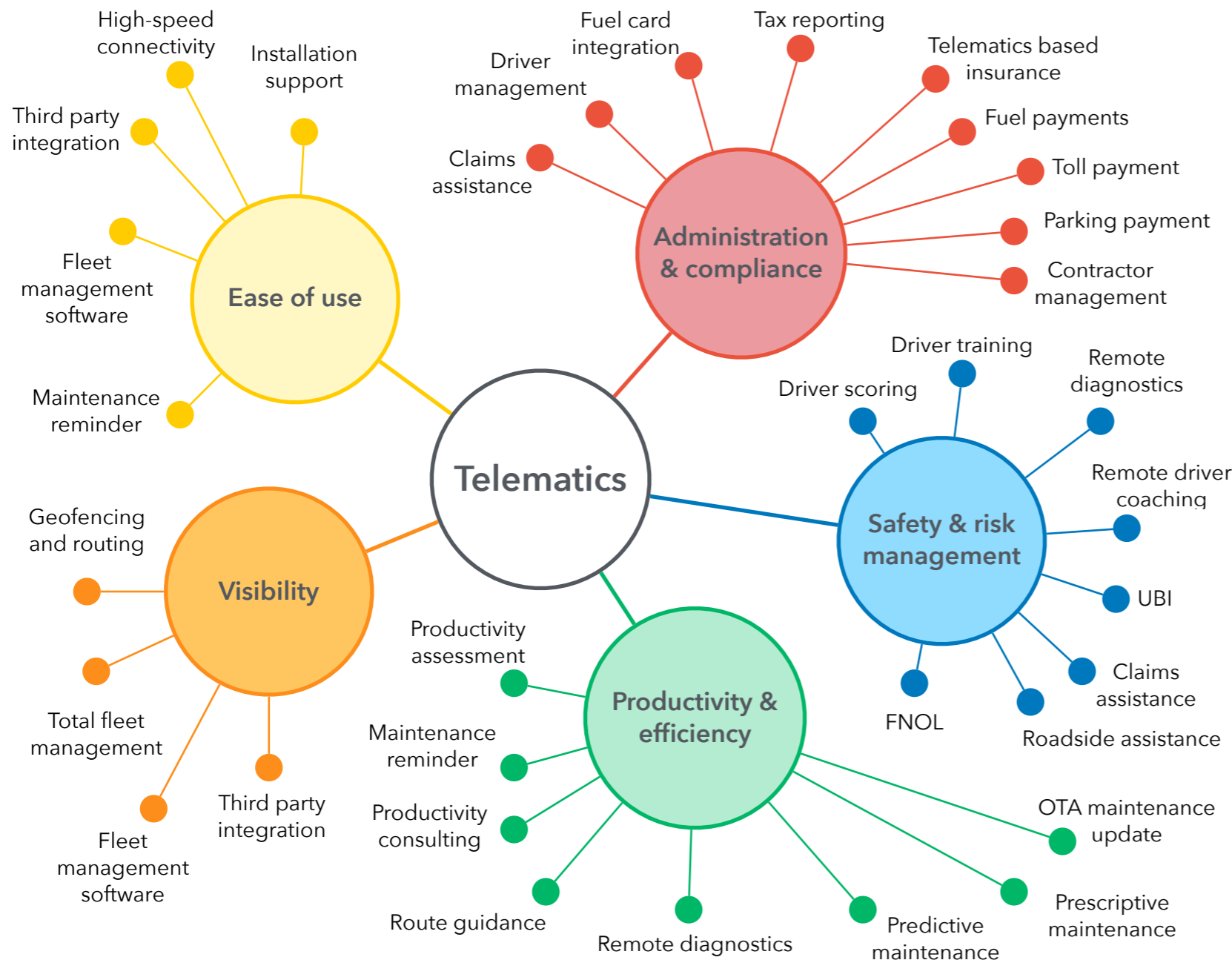
... but irrespective of the type of commercial fleet, the need for telematics is driven by a set of common objectives



- Telematics services provide to a fleet manager a **global overview of a vehicles' road-worthiness and operational status, the condition of the goods being transported by the vehicle, and the performance and status of the vehicle's drivers**
- Telematics sensors can provide a wide variety of vehicle and driver KPIs that can be used to **optimise fleet operations, save costs and improve driver safety**
- **Video telematics is one of the most recent developments** in this field, enabling enhanced driver monitoring and insurance claims management (due to collision footage being recorded via dash camera)
- However, whilst showing strong technical potential, data privacy concerns exist in relation to GDPR, hence until such concerns can be mitigated, uptake is expected to be constrained
- **Telematics solutions are also becoming increasingly relevant to fleets in terms of CO₂ emissions and the green agenda**
- By the virtue of **route optimisation features and driver training features**, commercial fleet telematics solutions are able to **significantly reduce the tailpipe emissions from entire fleets of vehicles**

On-road telematics caters to five main service categories: Visibility, ease of use, productivity, safety and compliance

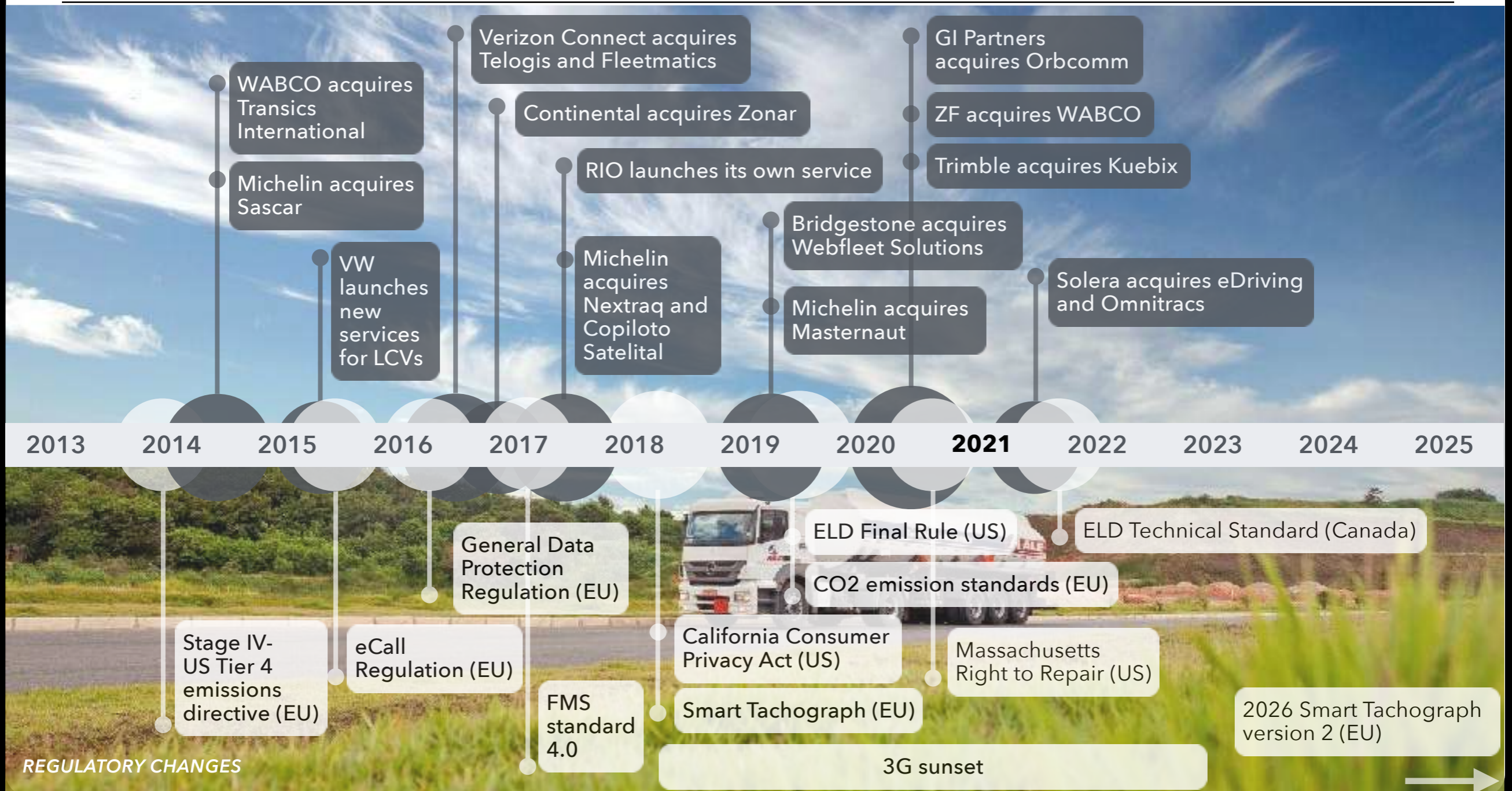
Telematics services ecosystem



- Fleet telematics covers a variety of services that **monitor operational activities**, but also **ensure legislative and tax compliance**:
 - In some cases services overlap in multiple categories, such as remote diagnostics and maintenance reminders
- The main goal for a fleet manager using commercial fleet telematics is to **increase the "visibility" of fleet vehicle usage**
- In doing so, the intention is to collect and analyse data from the operation of the vehicle fleet, and make improvements to the way in which the fleet is managed to either reduce cost or to increase productivity:
 - For example, route guidance can be used to reduce delivery times by avoiding congested areas and to reduce fuel consumption
 - Remote diagnostics and maintenance alerts, are used to **reduce unexpected "downtime" and prevent major breakdown**
 - Safety and risk management features are used to **prevent or reduce accidents and collisions, by monitoring, coaching and rewarding drivers**

The industry has consolidated in the last decade whilst been indirectly shaped by numerous regulations

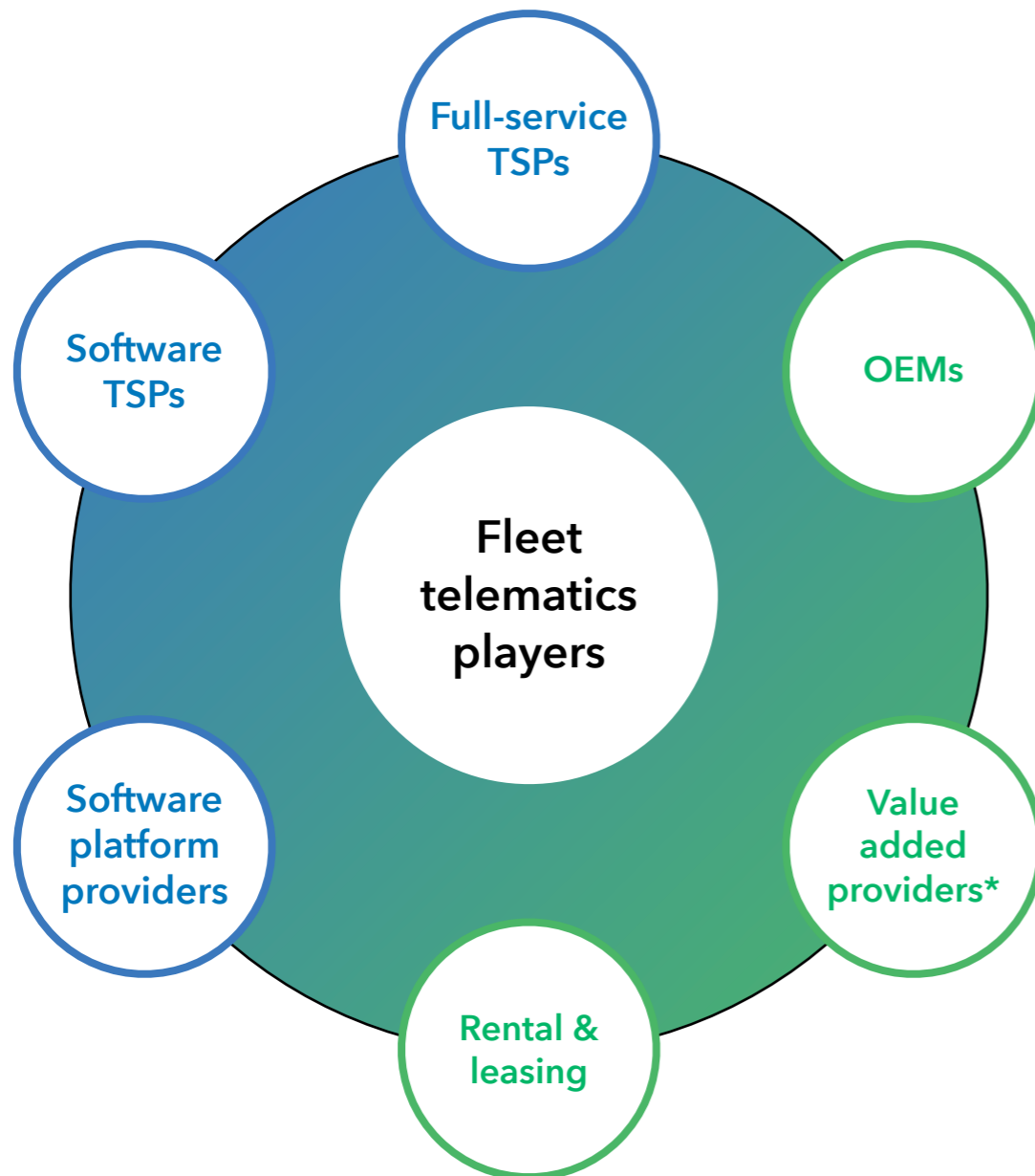
Summary of key changes in telematics market



The telematics market is led by two groups of players: "dedicated providers" and "secondary providers"

The six categories of the fleet telematics market

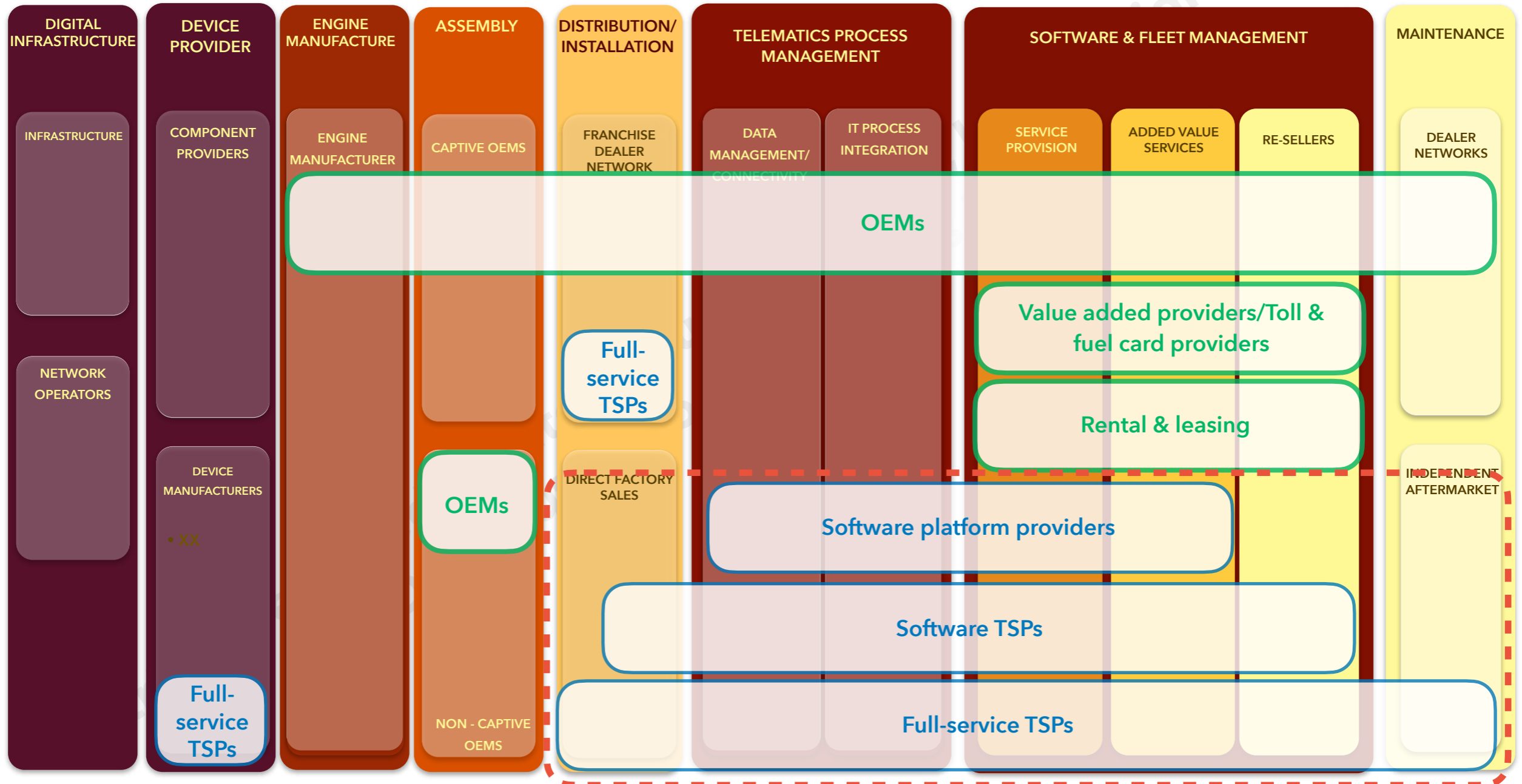
○ Dedicated providers ○ Secondary providers



- **Fleet telematics services are offered by a variety of players** involved in different roles and positions along the value chain:
 - There are **six main categories** across the two groups
 - **Dedicated telematics providers include**, companies offering telematics services and/or FMS as the main asset in their value proposition
 - **Secondary telematics providers**, (such as OEMs) include telematics as an additional service in their value proposition

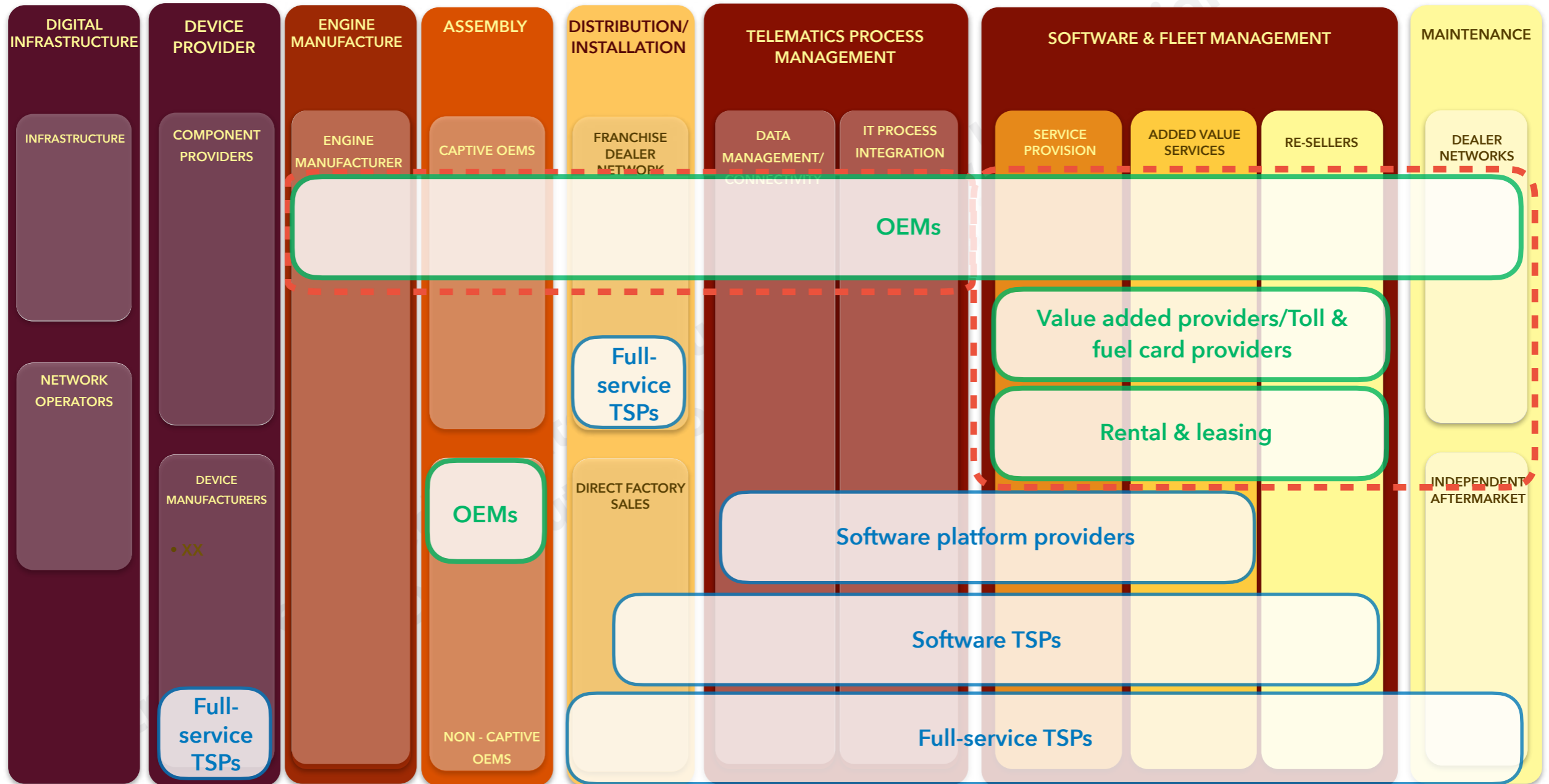
Dedicated telematics providers typically focus on providing downstream services in the value chain...

Industrial telematics value chain segments (OEM & aftermarket)



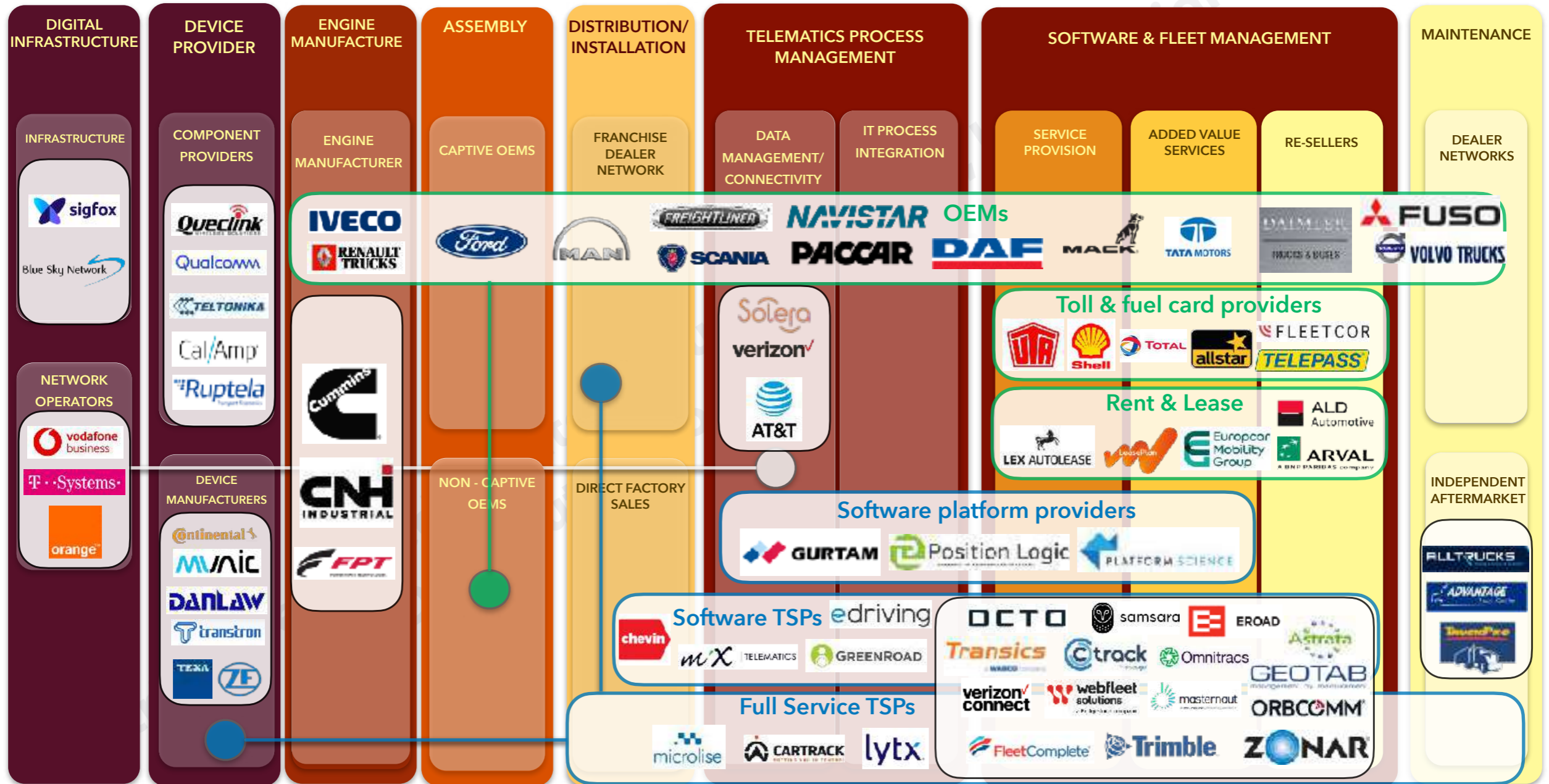
...whilst secondary telematics providers offer services across the value chain to compliment their existing business areas

Industrial telematics value chain segments (OEM & aftermarket)



However the market is highly fragmented, with many players active in each of the six key categories

Industrial telematics value chain segments (OEM & aftermarket)



...and in recent years, acquisition and consolidation have been rife, with TSPs bought by larger automotive groups

Main consolidation in the last five years

June/August 2016



October 2016



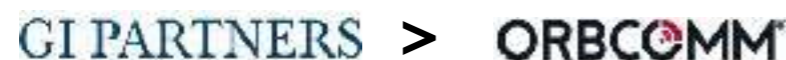
January 2019



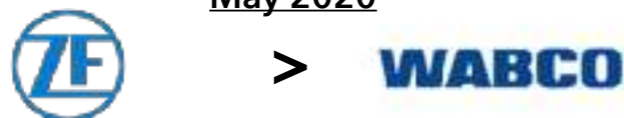
May 2019



April 2020



May 2020



May/June 2021



- Initially, the telematics industry was highly fragmented and regional based, with mainly local and regional providers
- However, in the **last five years, the telematics market has experienced rapid consolidation:**
 - This consolidation is being witnessed in almost every major geographical market
- **Two consolidation processes were identified in the telematics market:**
 - **Many large TSPs acquired smaller competitors, in order to increase volumes and expand via acquisition into new markets**
 - For example, Michelin has acquired:
 - ✓ Sascar in Brazil;
 - ✓ Copiloto Satelital in Mexico, and;
 - ✓ Nextraq in US
 - Second, **the market witnessed an increasing number of acquisitions of much larger TSPs by Tier-1 suppliers, such as Continental, Bridgestone, Michelin and ZF**

Leasing companies have developed partnerships both with TSPs and OEMs in order to monitor their fleets

Partnerships with OEMs

- These partnerships merge the **product expertise and connected vehicles capability** provided by the OEMs with the **know-how in fleet management** by leasing companies:
 - The aim is to **provide "one-stop" solution**
 - OEMs will offer a full service with fleet management solution to the customers who prefer leasing a vehicle than purchasing it
 - Leasing companies will avoid the installation of additional telematics devices
- In 2020, Ford and ALD Automotive launched a new integrated fleet leasing and management solution across Europe, called **Ford Fleet Management**:
 - The companies launched the service in the UK first with the intention to expand it to EU in the future



Partnerships with TSPs

- Through these partnerships, fleet and rental companies have **access to the engine data, driving behaviour and GPS location for a better knowledge about their fleet**:
 - Data record of distances travelled, mileage, speed, acceleration, fuel level, accident detection,...
- **Europcar mobility group signed an agreement with Telefónica and Geotab** at the end of 2020 to provide real-time telematics monitoring to its fleet:
 - The fleet company will connect its entire fleet by 2023
 - Access to engine data, driving behaviour and GPS location
 - The company will use telematics features to optimise internal processes such as fleet inventory management, vehicle delivery, vehicle maintenance and vehicle return



OEMs such as Volvo, Scania, MAN and Daimler have built-up strong global coverage for their turn-key solutions

Regional coverage of OEMs' telematics services

- OEMs provide telematics services at a global level, and Europe remains the first region in term of coverage by OEMs' telematics services thanks to an early presence of the HGVs industry
- US truck manufacturers are oriented towards the open model due to the **presence of large independent workshop networks**:
 - In Europe, truck manufacturers have often their **own dealership and workshop networks**
 - However, it will not allow third-party providers to resell data externally

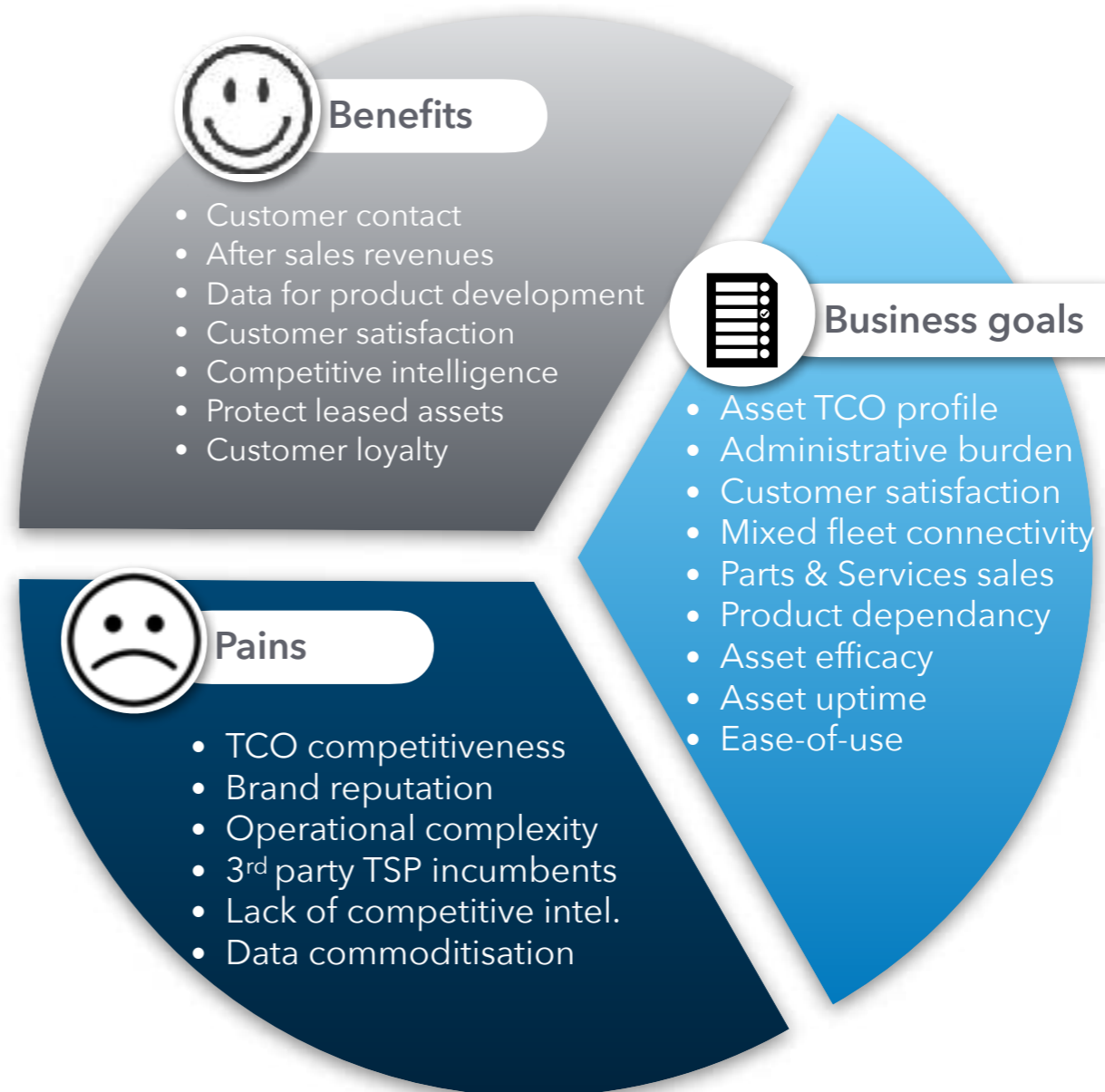
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OEMs use fleet telematics to improve product design, TCO estimations, and on open platforms, gain competitor insight



- **With telematics data OEMs are able to monitor the real (vs expected) performance of their vehicles**
- A key benefit to OEMs with the use of telematics is the ability to build metrics understanding how real-world usage affects the expected longevity of service or wear-and-tear parts
- By tracking such metrics it enables engineers and product managers to make adjustments to recommended service intervals (if required) and to improve future generations of vehicles or components
- Furthermore, on open telematics platforms, OEMs are able to conduct basic monitoring of competitor products, providing a valuable source of competitive intelligence

Manufacturers' benefits, pains and goals

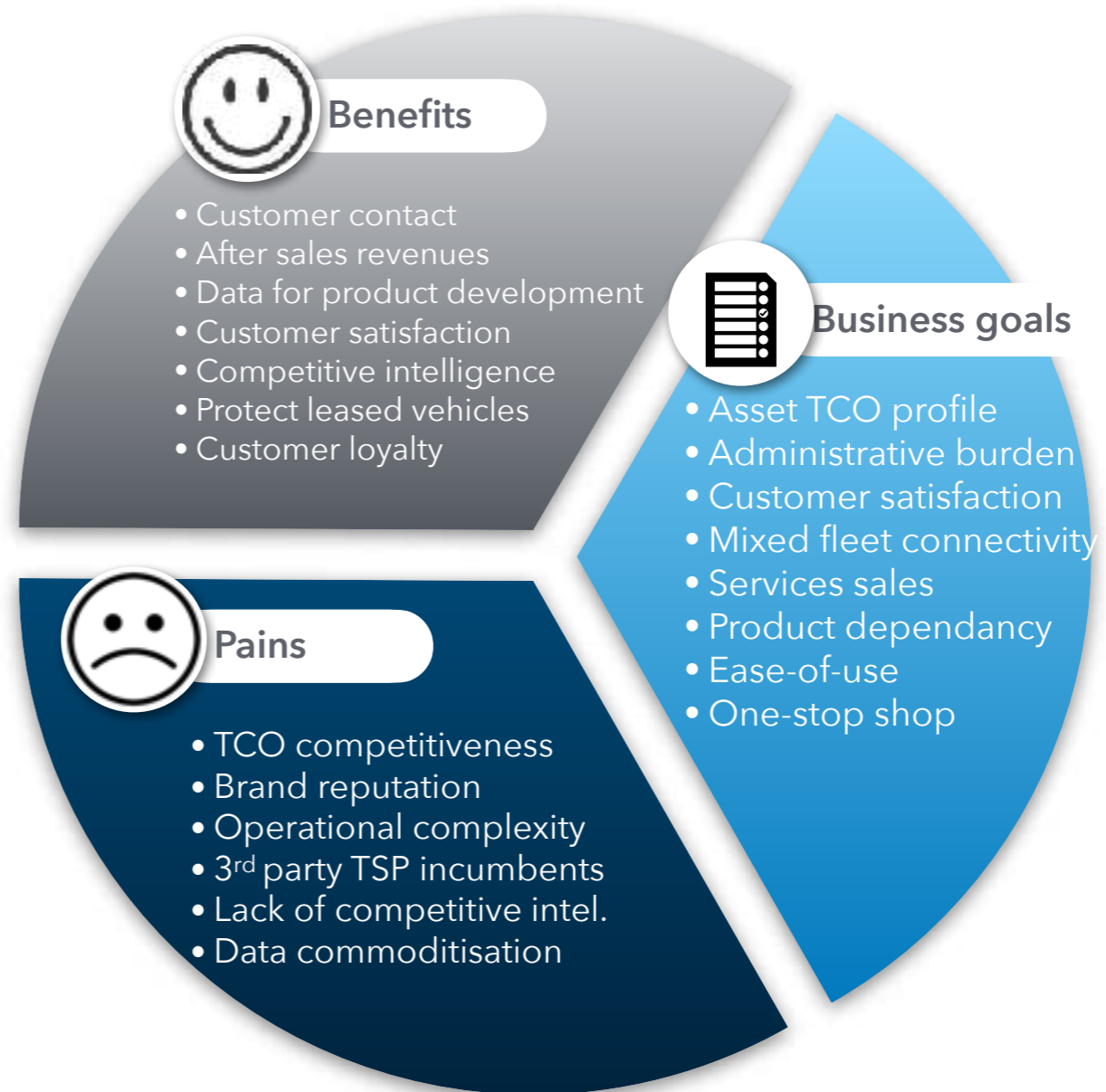


Dealers use telematics data to boost customer retention and after-sales revenues



- OEM dealerships can safeguard customer satisfaction and improve retention by using telematics to **pre-emptively address issues** regarding the vehicle's mechanical condition or age
- By advising when maintenance should occur, **a dealer can demonstrate proactive client support to end-users**, and potentially increase **after-sales of OE parts** by directing maintenance activities to dealer networks and repair centres
- Furthermore, for dealers, rental or leasing companies, responsible for vehicles subject to leasing agreements, they are able to **track their assets** and **reduce vehicle mistreatment** that could void the terms of the leasing agreement (i.e. non-compliance with contractual servicing schedules)

Dealerships' benefits, pains and goals

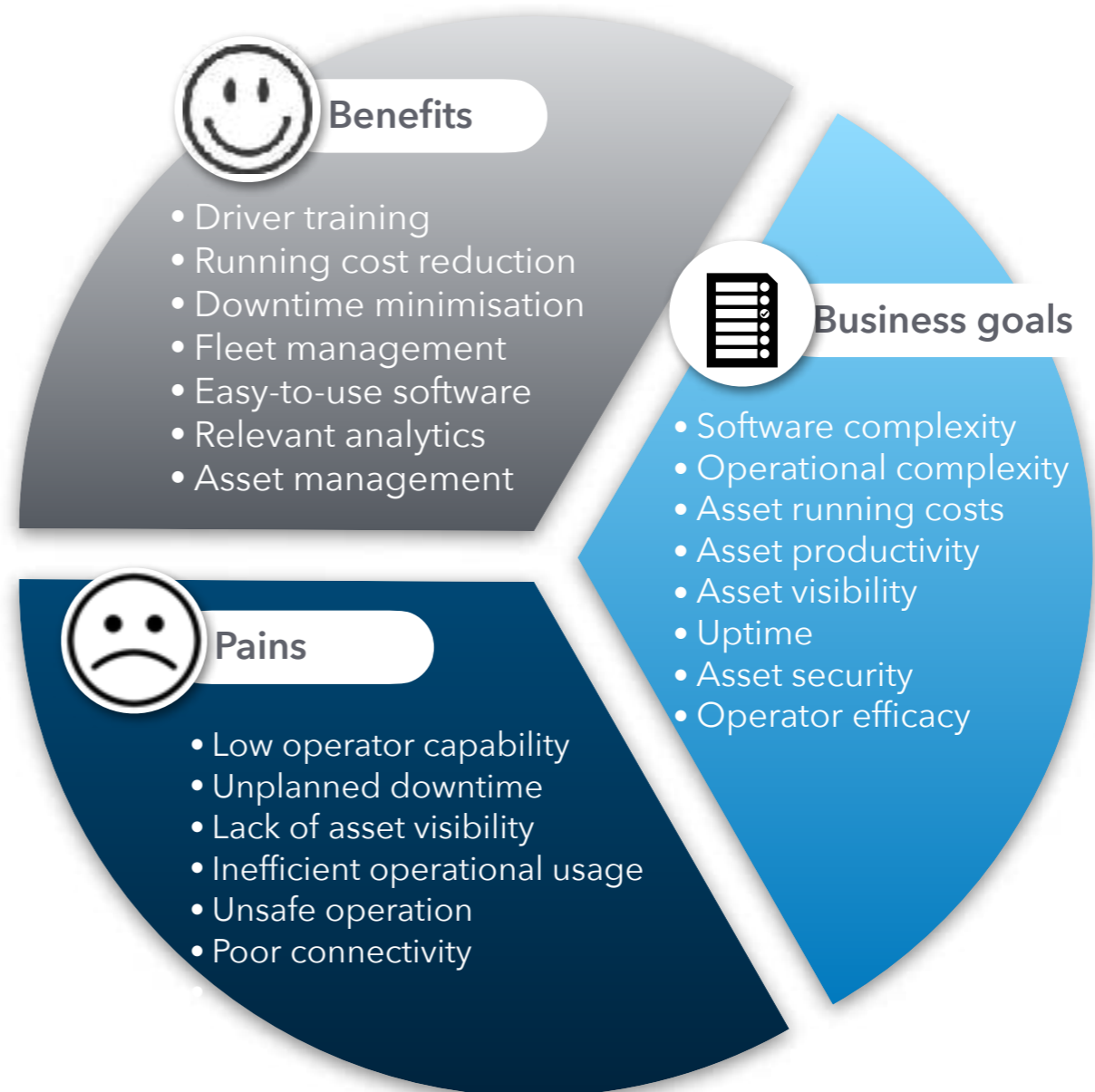


End-customers are interested in telematics solutions to optimise fleet operations and improve planning



- End-customers install telematics solutions in order to **reduce risk management** and **minimise consequences of unplanned downtime**
- Fleet operators use telematics to mitigate the lack of skilled truck drivers that is impacting the commercial road transport industry in both Europe and North America
- By using telematics, Fleet Managers are able to train and better assist less experienced drivers with respect to:
 - Driving behaviour, route selection, driving efficiency, safety issues, etc
- Overall, using FMS enables a fleet managers to increase **TCO reduction**, fleet **optimisation**, **safety conditions**, and ensure legislative **compliance**

End-customers' benefits, pains and goals



Key pain-points for end-users are the management of mixed fleets and the need to integrate multiple datasets

- **Commercial fleets typically operate with multiple brands of vehicles**, either by choice, or by virtue of sub-contracting or using grey fleets
- The key issue for fleets in this situation is the need to keep track of multiple vehicles, all of which could potentially be connected to alternative FMS, incompatible with the fleet operators FMS of choice or not capable of transmitting telematics data
- All of which create complications for a fleet operator's integration of telematics data and in many cases

forcing fleet managers to use multiple FMS platforms:

- In response to this issue, TSPs and OEMs are developing and deploying **agnostic solutions and connectivity, able to integrate with the fleet operator's FMS dashboard of choice**
- Historically some OEMs had adopted a **closed architecture model**, blocking third parties solutions, though whilst this approach is being gradually phased out
- For example, MAN, Scania, Volvo (incl. Renault Trucks), DAF and IVECO

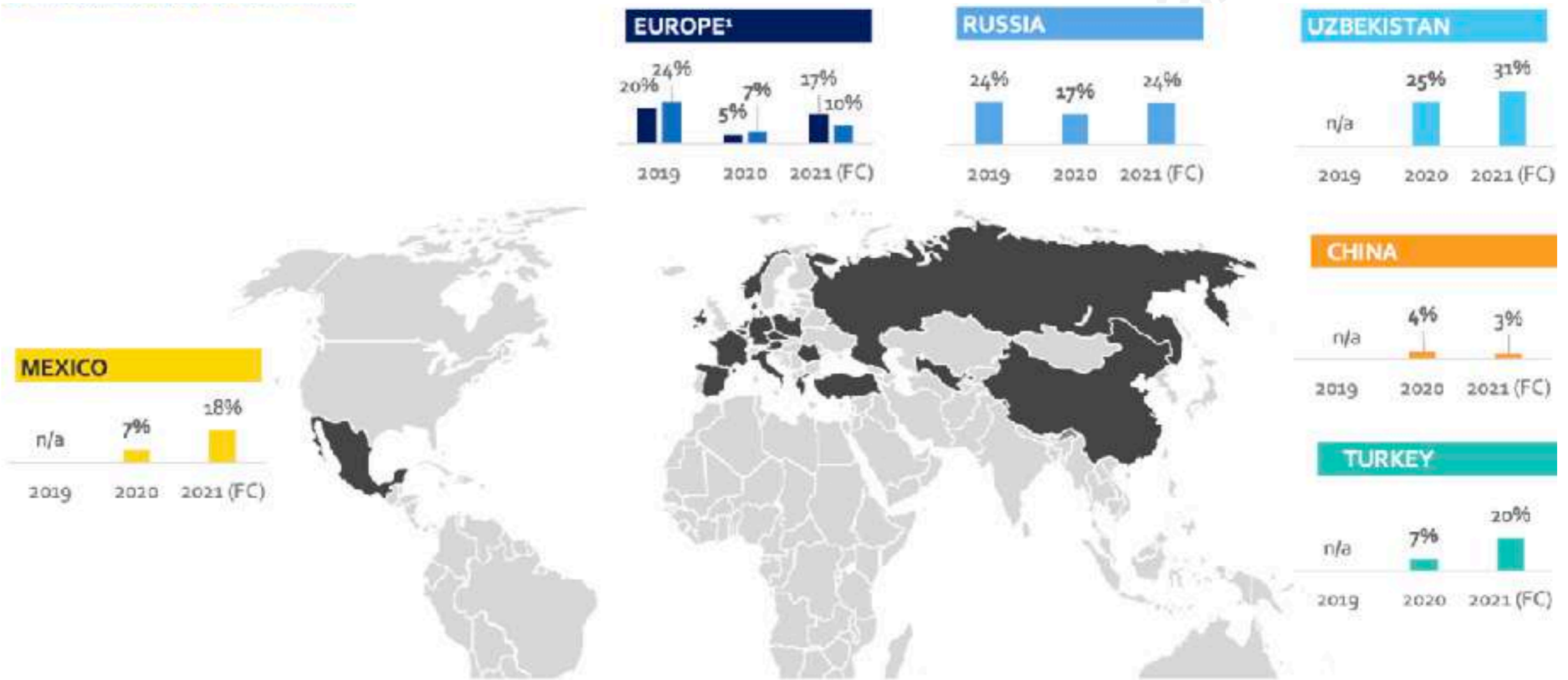
agreed in 2002 to create the 'FMS standard', enabling all participating brands (and sub-brands) to share data in a common data standard so that fleet operators could more easily collect data in a mixed fleet scenario

- However not all brands are aligned with the rFMS standard, hence **integrating multiple vehicle brands into the same platform will, in some regions such as North America, still require third-party hardware compatible with the fleet operators management software of choice**



The IRU's annual driver shortage survey established that driver shortages is a global issue and is getting worse

IRU driver shortage survey 2021, infographic



Results of question "How many drivers do you currently employ?" and "How many unfilled driver positions do you currently have?"; 1. EUROPE: EU-27 + Norway, Switzerland, UK.

TSPs and OEMs are addressing customisation demands of fleets, by developing their FMS to include app marketplaces

- The marketplace concept has been growing in popularity for large TSPs and OEMs, with leading brands now providing hundreds of **apps from third-party software developers**:
 - **Geotab** provides apps via its **Geotab marketplace**
 - Similarly, **Trimble** provides third-party applications via its '**Trimble!**' store
- Likewise, **Daimler** also now provides third-party apps via a marketplace embedded in its **Fleetboard FMS**
- By providing a marketplace to **end-users, it enables the TSP to focus on developing broad application functions that will can benefit all customers**, whilst smaller specialist developers can focus on creating highly specialised applications via TSP/OEM provided SDKs:
 - Providers such as **Geotab, Gurtam, Trimble** and **Samsara** have created their own marketplaces
 - Similarly OEMs are developing their own marketplaces too. Fleetboard customers can install apps from the **Fleetboard Store** on individual vehicles or all vehicles of the fleet. Subsequently, they are available to the drivers on the in-vehicle display built into the vehicle's dashboard

Apps available on marketplaces*

Integration	Tracking & Diagnostic	Driver	Fleet management	Fuel&Logistic	Video&Security
 	 	 	 	 	 
 	 	 	 	 	 
 	 	 	 	 	 
 	 	 	 	 	 

Europe and North America share many common needs and challenges, whilst Asia Pacific is still a developing region

Geographic market-specific needs and challenges

	North America	Europe	Asia Pacific
Specific needs	<ul style="list-style-type: none"> • Increased uptime • Management of large fleets • Services adapted to LV fleets • One-stop-shop approach • Reduced TCO • Important independent workshop network • Driver shortage 	<ul style="list-style-type: none"> • Increased uptime • Services adapted to LV fleets • One-stop-shop approach • Reduced TCO • Large share of grey fleets • Low cost offers for small fleets • Driver-friendly solution • Driver shortage 	<ul style="list-style-type: none"> • Connected services delivered by OEMs • Route planning to avoid growing congestion • Understanding of fleet management benefits and functionality • Slower renewal of fleet
Specific challenges	<ul style="list-style-type: none"> • Increasing TCO including labor cost, tolls, etc. • California Consumer Privacy Act (CCPA) compliance • High & rising insurance costs • Costs related to workers compensation and litigations • ELD approval in Canada • Sharing vehicle data for independent worksop 	<ul style="list-style-type: none"> • CO₂ emissions compliance (EU) • Duty of care compliance (UK) • eCall introduction for HGVs • Move toward logistic services integrated in telematics • Costs related to workers compensation • Powerful trade unions in some markets (e.g. public sectors) • Microchip shortage 	<ul style="list-style-type: none"> • Fleet management as a function is still new • Lower level of network connectivity, particularly in SE Asia • Large discrepancy between countries due to a regional and legislative fragmentation



**Extract from:
Telematics service provider profiles**

On-road

Off-road

Cal/Amp[®]

CalAmp provides its own telematics solutions and connectivity for suppliers



Creation

1981



HQ

Irvine,
California, USA



Staff

1,080 (2020)



Revenues

\$89 million (2020)



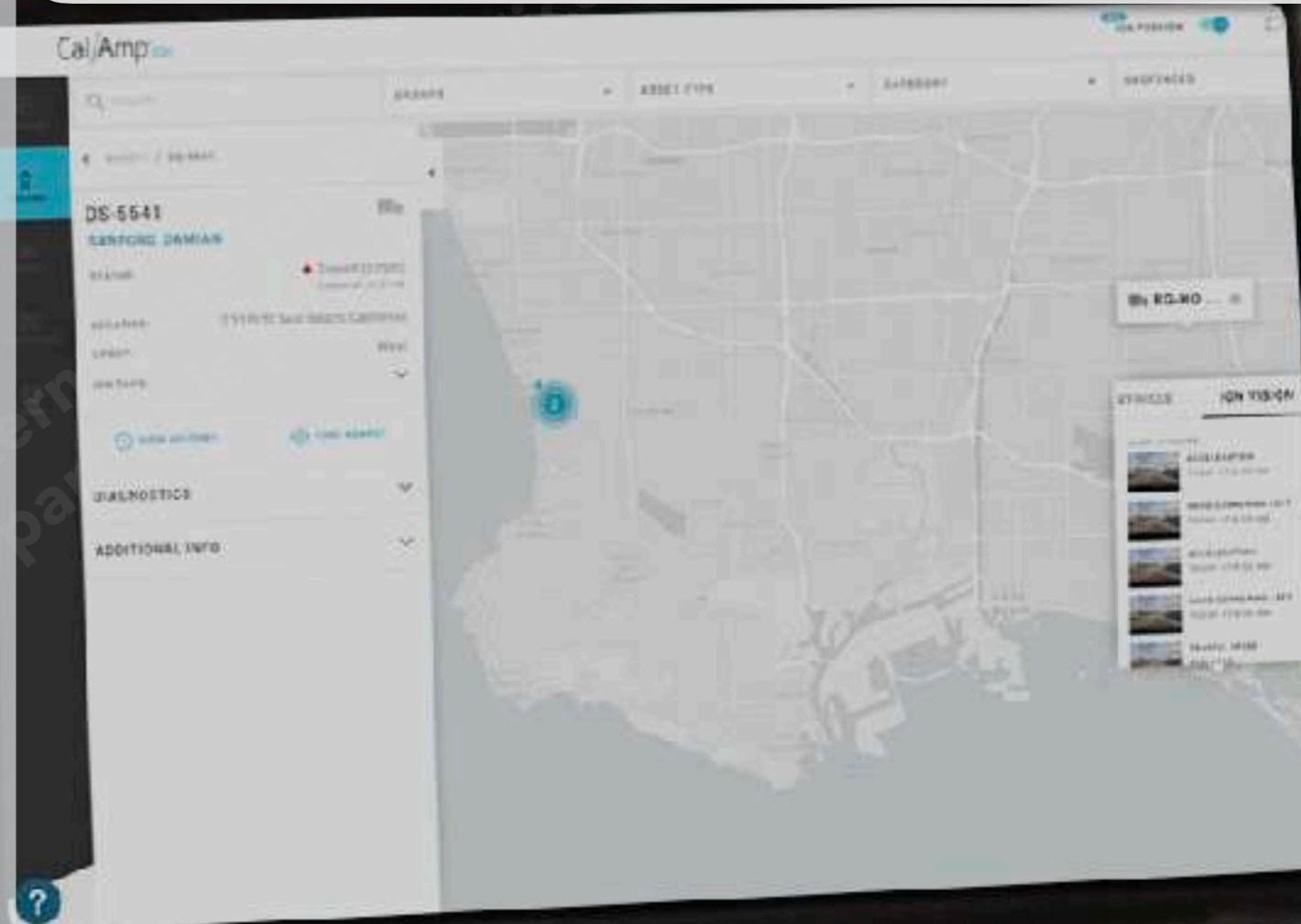
Vehicles


980,000



Telematics offering

7 programmes





Extract from: Conclusions

OEMs do not currently pose a major threat to aftermarket TSPs, but will become the industry's *de facto* data supplier

- The combined value of on-road telematics services from OEMs and aftermarket TSPs is estimated to be worth **nearly €18.5 billion** by 2030
- OEMs do not currently pose an immediate threat to aftermarket Telematics Service Providers, accounting for only 11% of active on-road subscription in 2020
- However, by 2030, it is forecast that OEMs will account for 26% of active subscriptions
 - This will be largely due to fleet electrification and vehicle automation, moving the balance of data control firmly into the OEMs' remit
- OEMs are a threat to **Telematics Technology Providers** as commercial vehicles now near ubiquitously come with **line-fit connectivity**:
 - Ford is the latest OEM to provide ALL commercial products with a basic free telematics service (irrespective of vehicle type, it includes all Ford commercial vehicles)
- However, as fleet operators commonly use **mixed fleets**, there is an inherent market requirement for brand-agnostic telematics
- This means that **OEMs are relatively constrained** to the provision of vehicle data only, as the barrier to entry against third-party TSPs that support mixed fleet services is relatively high (insofar as it would be a "me too" product)
- Nonetheless, OEMs have a **key advantage**:
 - OEMs are ideally positioned to integrate service, maintenance and repair (SMR) into their product offerings
- OEMs are also leveraging their relationships with fleet operators in an attempt to circumvent TSPs and offer/provide telematics services as part of a buyers package with new vehicle sales
- Tech providers are supplying micro services to be available in TSPs' marketplaces:
 - E.g. fuel management, driver scoring, ELD information, etc



PTOLEMUS Consulting Group

About PTOLEMUS



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 RUC	UBI / PAYD Vehicle rental Vehicle leasing
Vehicle data & analytics	AI CAN-bus Crowd-sourcing Data protection	Driver safety 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

We serve over 300 clients across the mobility ecosystem

Analytics, maps & applications providers



Automotive manufacturers & suppliers



Telematics solution providers



Mobile telecom players



Fleet & fuel, ITS & regulators



Banks & private equity investors



Device & location suppliers

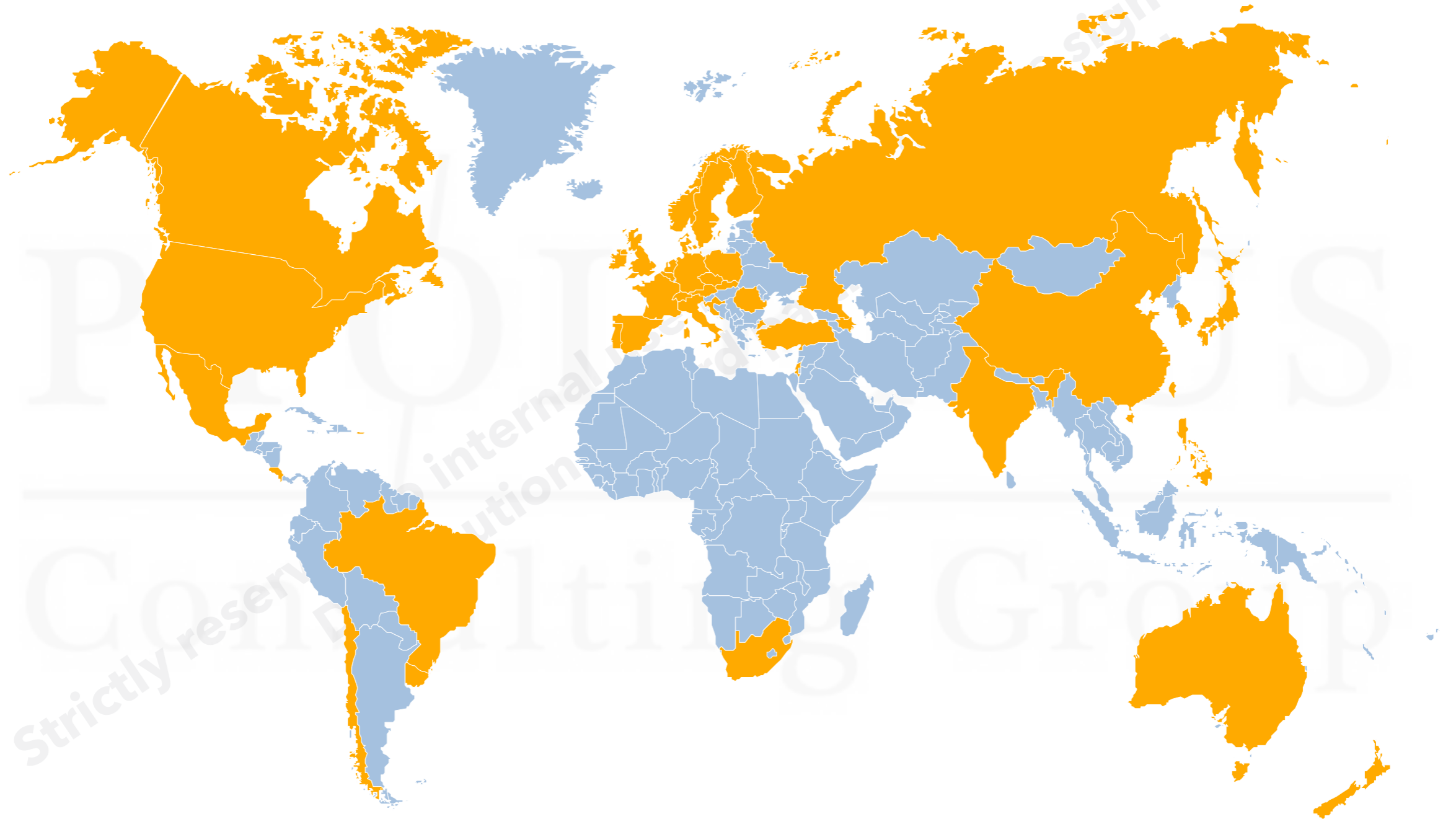


Insurers, aggregators & assistance providers



Our team of consultants, experts & analysts consisting of 16 nationalities helps our clients worldwide

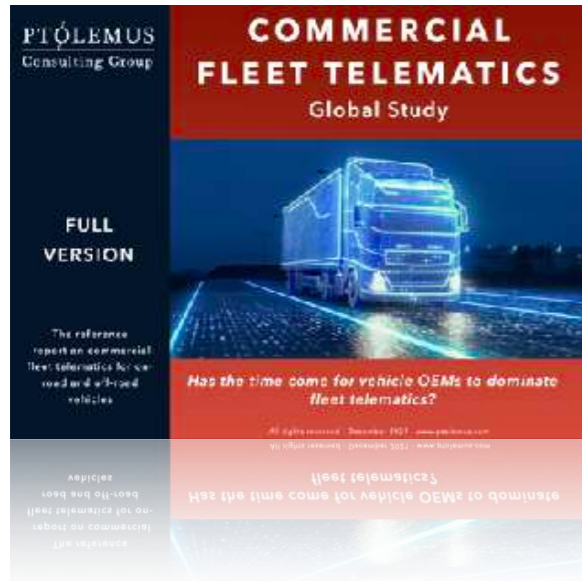
 Clients



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

- **Strategy definition**
 - Strategic plan
 - Market entry assistance
 - Data strategy and analysis
 - Connected vehicle / telematics strategy
 - Decarbonisation strategy
 - Strategy orientation workshops
- **Innovation strategy**
 - Fleet services convergence strategy
 - Telematics product definition
 - Consent management
 - Data analytics & monetisation strategy
- **Innovation delivery**
 - Proof of concept design & launch
 - Architecture definition
 - Project management
- **M&A advisory**
 - M&A strategy
 - Commercial due diligence
 - Technology due diligence
 - Feasibility studies
 - Fleet services market sizing
 - Business case development
 - Cost benefit analyses
 - Post-merger integration
- **Procurement**
 - Definition of EV migration strategy
 - Assistance with tenders
 - Selection and sourcing of fleet telematics, software, data, platform, etc.
- **Business development**
 - Partnership strategy definition
 - Assistance to tender response
- **Project management**
 - Assistance in management of decarbonisation plan
 - Congestion charge project management

The study comes with a single, worldwide company licence



The reference report on commercial fleet telematics for on-road and off-road vehicles

	Report ONLY		Market forecasts	FULL report & market forecasts
	Buy direct (Invoice)	Buy online (Visa or MasterCard)		
Contents	<ul style="list-style-type: none"> • A 635-page analysis of the global commercial fleet telematics landscape based on: <ul style="list-style-type: none"> - 11 years of constant market surveillance - 26 interviews with key stakeholders - Nine months of desk research • Granular analysis of telematics in on-road, construction and agriculture, including: <ul style="list-style-type: none"> - Cost structure, revenues and telematics needs of end-users - Supply and demand analysis of current telematic solutions • Major players in the telematics value chain and their strengths • An in-depth assessment of 39 companies engaged in commercial fleet telematics 		<ul style="list-style-type: none"> • Excel file with outputs and charts • 2020-2030 bottom-up market forecast encompassing: • The number of vehicles in use for both on-road fleet telematics and off-road fleet telematics • Subscriptions and revenues for the on-road telematics market, split by OEM and aftermarket • Subscriptions and revenues for the off-road telematics market, split by OEM and aftermarket • Regional projections for Europe, Americas, Asia Pacific, Africa and Middle East 	Includes all report and market forecast content as described
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