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CONSULTING



P3 Autonomous Driving Market Insights

We analyze global autonomous driving ecosystems in Mobility-as-a-Service, Privately Owned Vehicles and Goods Transport.

Created by:

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P3 autonomous mobility



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P3 & P3 autonomous mobility.

General Introduction



At home in the outside world.

Europe

Germany	Stuttgart	Serbia	Belgrad
	München		Subotica
	Wolfsburg	Romania	Cluj-Napoca
	Düsseldorf	Greece	Athen
	Berlin	Czech Republic	Prag
	Hamburg	Bulgaria	Sofia
	Osnabrück		Gabrovo
France	Paris		
	Toulouse		
Denmark	Kopenhagen		
Polen	Breslau		

Asia

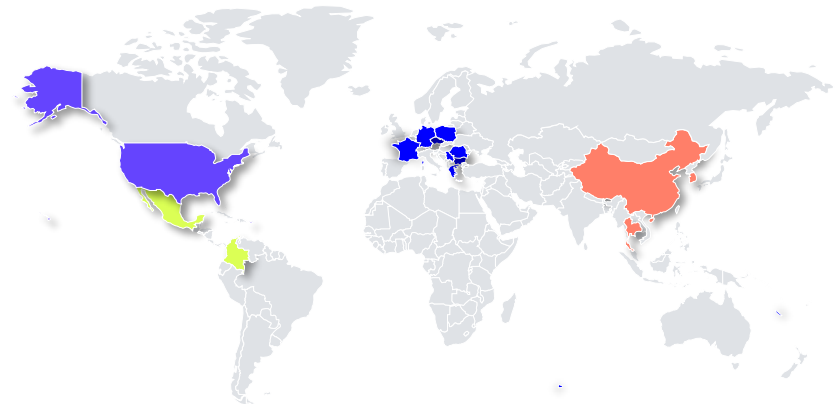
China	Peking	Korea	Seoul
	Shanghai	Thailand	Bangkok
	Shenzhen		

South America

Mexico	Mexico City
	Puebla
	Querétaro
	San Luis Potosi
Colombia	Cali

North America

USA	Charleston
	Detroit
	Greenville
	Dallas



Portfolio as unusual.

SOFTWARE

Android Automotive

Business Intelligence

Cloud Migration

Cyber Security

Data Analytics

Enterprise Solutions

Financial Systems

IT-Architecture

Certifications

TECHNOLOGY

Autonomous Driving

Battery Technology

Electric Powertrain

Energy Solutions

Industrialization

Charging Infrastructure

Operations Excellence

Task Force Management

Testing & Engineering

CONSULTING

Agile Transformation

Artificial Intelligence

M&A Strategy

Marketing & Design

Sustainability

Project Management

"Organizational Strategy"

Quality & Compliance

Systems Engineering

UX/UI Design

Transformation

P3 advises leading international OEMs, suppliers, technology and insurance companies in the field of autonomous driving and autonomous mobility.



AUTONOMOUS MOBILITY
/AS UNUSUAL

>9

years of international
experience in autonomous
driving consulting

>100

customers worldwide and
more than 300 successful
AD projects

>50

employees around the
globe in the autonomous
driving space

75%

of the employees are
engineers and software
developers

We approach autonomous driving from many different perspectives. We understand the markets, know the players, but also have the technological know-how and the necessary software expertise.

Market & Strategy

- Go-to-market strategy
- Global market and competitive analysis for AD MaaS, TaaS & ownership
- MaaS & TaaS business model development incl. business case & TCO
- Competence analysis, assessment of “best-fit” partners
- (SDS) partnerships models and joint venture agreements
- AD shuttle / robotaxi and ADAS in-field testing & benchmarking

Technology & Regulation

- End-to-end architecture assessment and customization
- Cybersecurity, Functional Safety & SOTIF
- Regulation Implementation (AD SMS, SUMS & CSMS for SAE L3 & L4)
- Test Strategies & Management & Tool Confidence
- Sensor set evaluation and platform fortification strategies
- Support for Homologation (Type approval ODD and operation area)

Operations & Scaling

- AD Program Management incl. strategic setup, operations strategy, organizational build-up, project conduction & benchmarking
- Scaled Pilots: setup and management of runup schemes for AD pilot projects
- AD Product Lifecycle Management AD Logistics Concepts - Conceptualization of market-ready TaaS products

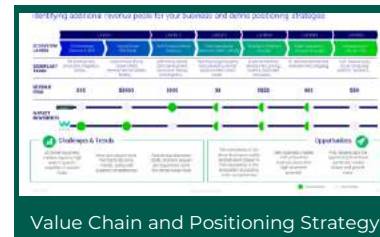
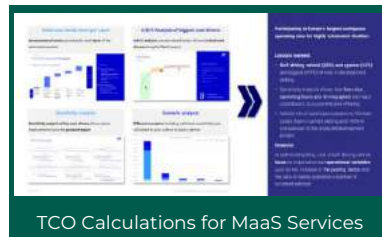
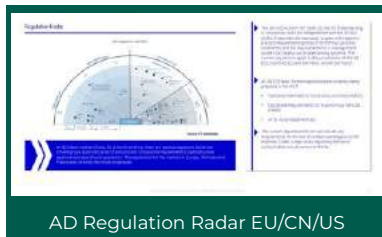
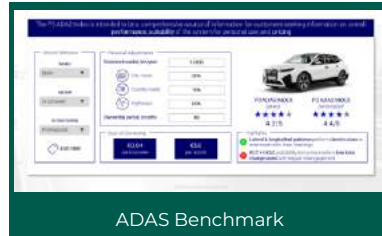
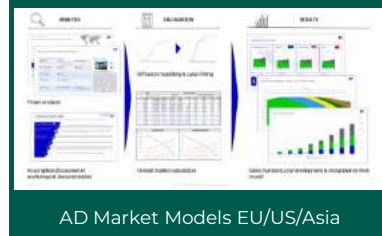
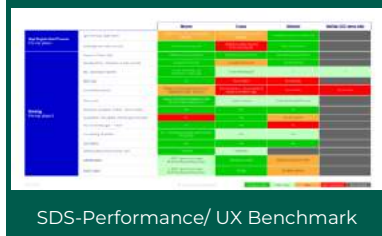


P3 autonomous mobility. **Market & Strategy.**

Introduction



Overview | Our market, strategy, and technology intelligence portfolio.



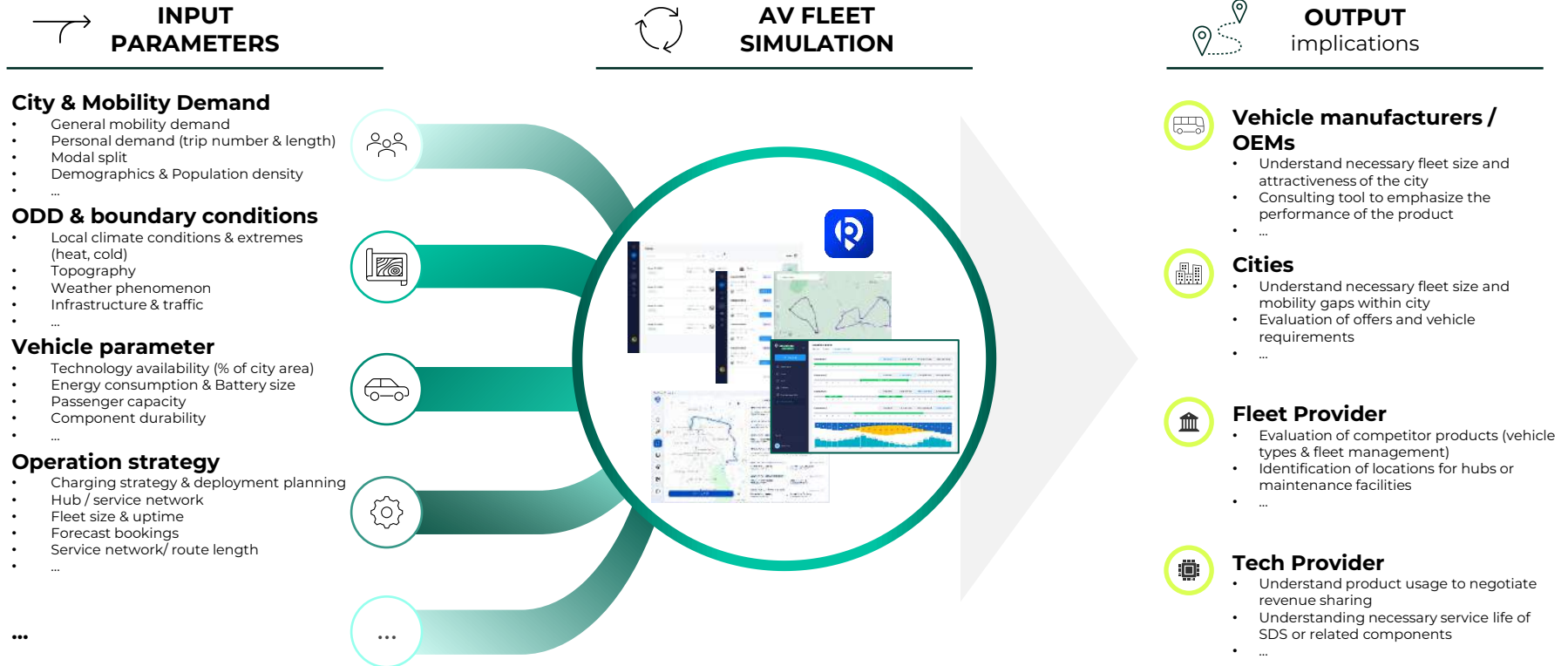
P3 AD market, strategy, and technology intelligence portfolio

Working closely with our Technology & Regulation and Operations & Scaling teams, we provide holistic market, competitor, and technology intelligence for your specific needs

We help our customers to master challenges and complexity and enter new or expand existing markets - with a clear guideline for a successful Go-to-market.



Our AV Fleet Simulation Tool enables companies to select the most promising G2M cities and understand business related KPIs by simulating future AV fleets.



From a holistic demand analysis to your individual tailor-made strategy: we are the right partner for your market entry and expansion.



360° Demand Analysis

In a first step, we jointly analyze and define your status quo, pain points and needs and sketch your future positioning and target picture in the AV ecosystem or specific market.



P3 AD Market & Strategy Portfolio

You have the needs; we have the solutions. We draw on our unique Market, Competitor, Customer, and Tech Intelligence portfolio as well as innovative software-solutions.

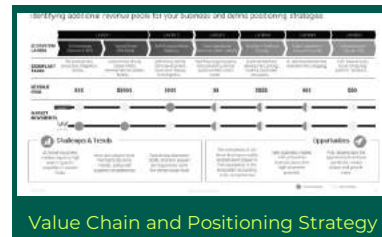
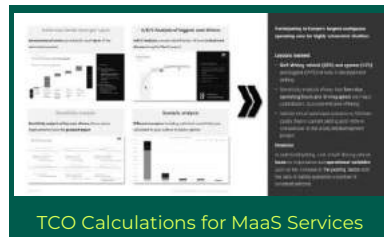
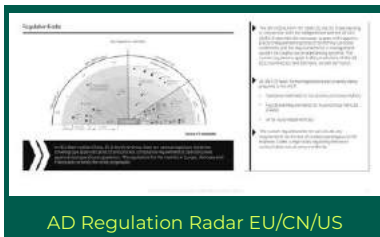
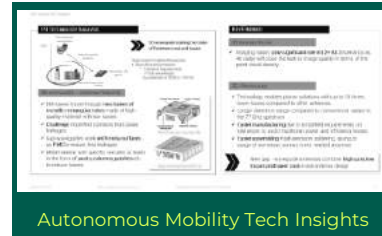
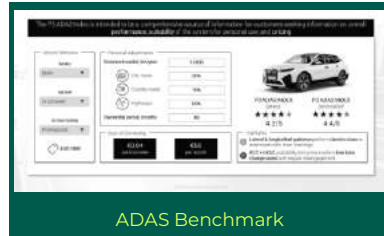
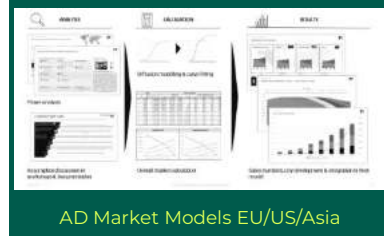
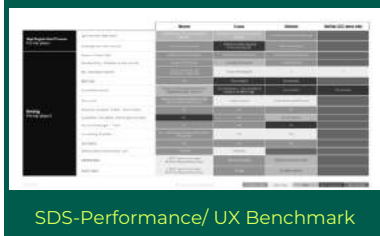


Tailor-made Strategy

We jointly develop your tailor-made go-to-market or market development strategy based on your capabilities and competencies and our long-term AV expertise.



Overview | Our market, strategy, and technology intelligence portfolio.



P3 AD market, strategy, and technology intelligence portfolio

Working closely with our Technology & Regulation and Operations & Scaling teams, we provide holistic market, competitor, and technology intelligence for your specific needs

P3 AD Market Insights.



Let's start: P3 AD Market Insights Introduction.

40

Companies focusing on
autonomous **MaaS**

36

Companies focusing on
privately owned vehicles

35

+1 since last report

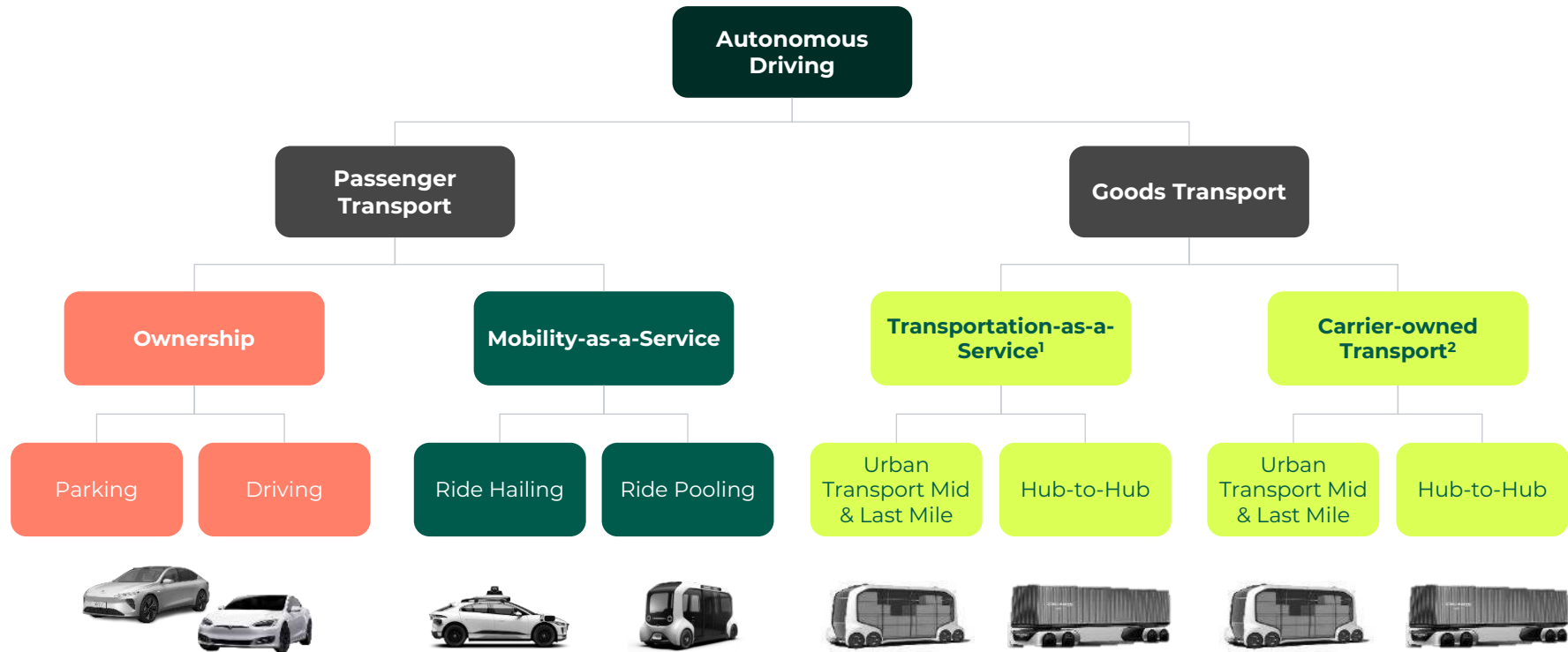
Companies focusing on **goods
transport and TaaS**

We **analyze** global Autonomous Driving **value creation networks and ecosystems** using **Layer Models** and **provide overviews** of **MaaS, ownership & goods transport use cases**

Based on their respective **core business**, we identify **(strategic) partnerships, investments** or **acquisitions** of **specific market players** and place them in the layer model. We focus on **North America, Asia** (China, Japan and Korea) and **Europe**

All **insights are based on publicly available sources**. Project knowledge or other **non-publicly available information is not considered**.
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Autonomous Driving Use Cases.



¹ Self-driving truck provider owns and operates the truck and offers transport / capacity on demand

² Customer / carrier owns and operates trucks and pays a per-mile fee to the SDS / truck provider

What you'll find in this report.

1 Mobility-as-a-Service (MaaS)

MaaS | **Intro**

MaaS | **NAR**

MaaS | **Asia**

MaaS | **Europe**

2 Privately Owned Vehicles (POV)

POV | **Intro**

POV | **NAR**

POV | **Asia**

POV | **Europe**

3 Goods Transport & Transport-as-a-Service (TaaS)

Goods Transport & TaaS | **Intro**

Goods Transport & TaaS | **NAR**

Goods Transport & TaaS | **Asia**

Goods Transport & TaaS | **Europe**



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Mobility-as-a-Service.

Intro | Use Cases & Layer Description



MaaS | Use Cases

			<div></div> <div>Gated Area</div> <div>Airport, factories, yards, harbors, ...</div>	<div></div> <div>Highway</div> <div>Highways, freeways, ...</div>	<div></div> <div>Urban</div> <div>City center, designated streets, ...</div>	<div></div> <div>Suburban</div> <div>Federal highway, residential areas, ...</div>	<div></div> <div>Rural</div> <div>Rural roads, gravel road, ...</div>
Ride Hailing	M		-	-	Robotaxi	Robotaxi	Robotaxi
	ML		low speed autonomous shuttle (<25km/h)	-	low speed autonomous shuttle (<25km/h)		
Ride Pooling	M		(private) robo shuttle	robo shuttle			
	L		(private) robo shuttle	robo shuttle			
	XL		(private) robo bus	robo bus			

MaaS | Layer Model Description



Self-Driving System (SDS) is the sum of all necessary systems to realize self driving level 4 (SAE).

Key functionalities are sensor data fusion, object detection, localization, prediction, environment interpretation, trajectory planning and actuator control.

The HW stack includes sensors, SoC and computing platforms, for example, while the SW stack covers the virtual driver, among others.

Self-Driving Vehicles are considered L4 ready vehicles with an integrated and homologated SDS (sensors, computing hardware and software), which operate in a specific ODD (Operational Design Domain).

Fleet Operators potentially own, operate and maintain a fleet of self-driving vehicles. It may be necessary that a fleet operator is responsible for fleet intelligence functions and technical supervision. Therefore, Layer 3 covers both physical and digital fleet operations.

The **Mobility Provider** owns the user frontend. It is point of sale and provider of the primary communication and interaction channel with the user. Thus, it is responsible for pricing, ride planning, ride execution and important for the overall brand experience.

The **Content Provider** for **Rider Experience** owns a software platform that acts as middleware to service partners. Digital content (e.g., media), digital products (e.g., productivity tools) and digital services are part of this platform.

The service area and its **infrastructure** are core elements to enable an AD service. Infrastructure includes the vehicles' IT infrastructure (especially cloud services and backend), V2X technology and takes into account human behavior prediction in that specific scenery.

MaaS | Layer Model Description







































































Exemplary tasks
















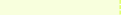


















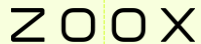




LAYER 1		LAYER 2	LAYER 3	LAYER 4	LAYER 5	LAYER 6
Sensor Set / SoC / Computing HW	SW-Stack / Virtual Driver	Self-Driving Ready Vehicle	Fleet Operations	Mobility & Platform Provider	Rider Experience / Content Provider	Infrastructure
HW development	SW development	Design & development	Fleet financing	Customer app	In-vehicle advertisement	Localization
HW production	Simulation	Redundant chassis	Insurance	API (Layer 1-4)	Shopping	3 rd party HD maps
Sensor integration	Prediction	SDS integration	Concessions	Rider authentication	Education	V2X
Automotive approval	SDS licensing	SDV testing	Charging	Pricing	Working	Data communication
Sensor testing & approval	SW testing & approval	After sales	Maintenance & cleaning	Booking	Multimodal connectivity	Cloud infrastructure
Sensor fusion	HD mapping	Production	Backend (Layer 1-4)	Dynamic routing	Gaming	Service area
...	Verification & validation	Logistics	Hub operations	Payment
	...	Sales channel	Fleet Control Center (fleet steering and monitoring)	Ticketing		
		Homologation	Driver sideline activities	Marketing & Sales		
		Pricing	Remote assistance	Customer support		
		...	Fleet intelligence (e.g., fleet & ride optimization)	Multimodal connectivity		
				
				
















































Mobility-as-a-Service. NAR.





Partnering & Value Chain, Level 4 Target & Latest News



LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5	LAYER 6		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider	Rider Experience/ Content Prov.	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3rd party HD Maps	Cloud	V2X & Others
 	 	 		    		   		   	        	Not announced		
  	 			 				 				
  				      		       	      			Not announced		

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5	LAYER 6		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider	Rider Experience/ Content Prov.	Infrastructure		
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LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5		LAYER 6				
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 	•			   	 	  	   	   	Not announced		Not announced			
  	• intel			 	    		    	Not announced		Not announced		verizon		
 	• 			ADASTEC		 		  	 	Not announced		aws AECOM		

LAYER 1		LAYER 2		LAYER 3		LAYER 4	LAYER 5	LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider	Rider Experience/ Content Prov.	Infrastructure		
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<div> Ouster</div> <div> LidarrTech</div>	<div> Horizon Robotics</div>	COAST		COAST		COAST		Not announced	Not announced			 dg: Cities

At a glance



Working **15+ years** towards **autonomous driving**, Waymo's virtual driver is the world's **most experienced one**. The fully driverless I-PACE fleet in Phoenix and SF impresses with a **terrific system performance**. In our view, Waymo is **currently ahead of competition** in the autonomous race.



Cruise operated a **commercial robotaxi service** in **San Francisco**, which is currently not **available due to several incidents involving its robotaxis and both trust & acceptance issues and lost permits**. Recently, Cruise re-started supervised autonomous driving with safety drivers in Phoenix.



Mobileye is **testing its AV fleet in various locations around the globe**, including complex European traffic. First promising **pilot projects in Norway (Oslo) and Germany are to come** - these **will show what the system is capable of** and how well it performs compared to competitors.



While Aurora shifted its **focus primarily to self-driving trucks** some time ago, it has been **quiet about its robotaxis**. We believe: the **company needs a working business case**, otherwise it will become a victim of market consolidation. MaaS is therefore probably not part of the business for now.

Latest news

Waymo's robotaxis under investigation after crashes and traffic mishaps.

(14.05.2024)

[Update](#)
[Read](#)

Cruise resumes supervised autonomous driving with safety drivers.

(13.05.2024)

[Update](#)
[Read](#)

Volkswagen ADMT announces agreement with Mobileye for autonomous driving.

(20.03.2024)

[Update](#)
[Read](#)

Self-driving vehicle company Aurora cuts 3% of its workforce.

(24.01.2024)

[Read](#)

L4 target

L4 target achieved in Phoenix by **2020**.

L4 target achieved in SF by **2022**.

Not announced

Not announced

At a glance



JV of Hyundai and Aptiv, while the latter reduced its common equity interest from 50% to about 15% by end of March 2024. In this course, **Hyundai has agreed to invest nearly \$1 billion in Motional by 2024**. The demise of Motional has thus been averted for the time being.



Zoox is **meanwhile testing its SPV on public roads in the bay area**. Currently, only employees are eligible to take rides. Many people are waiting for the service to be opened up to the public - and so are we.



May's fleet is already **available to the general public** in many cities. The **SDS is designed for multiple vehicle platforms** and used in the Toyota Sienna Autono-MaaS vehicles, among others. The approach to enhance public transport instead of offering robotaxi services is pretty unique in the US



Perrone been **developing autonomous vehicle solutions since 2003**. Apart from its low-speed shuttles, Perrone claims to have **outfitted over 30 vehicles types with its retrofit kit**. Despite its experience, we don't believe Perrone will become a leading market player.

Latest news

Hyundai is spending close to \$1B to keep self-driving startup Motional alive.

(02.05.2024)

[Update](#)
[Read](#)

Zoox vehicle collisions investigated.

(13.05.2024)

[Update](#)
[Read](#)

Deepen AI's calibration suite brings speed and precision to May Mobility's fleet, enhancing AV safety.

(26.03.2024)

[Update](#)
[Read](#)

Perrone Robotics to deploy fleet of Autonomous Ford E-Transit vans for Detroit's 'Connect' program, a two-way 10-mile autonomous vehicle shuttle route.

(02.04.2024)

[Update](#)
[Read](#)

L4 target

2026

Not announced

Not announced

Not announced

At a glance



Unlike most MaaS providers, ADASTEC is not focusing on robotaxis but is developing the **SDS for transit buses**. Thus, they **currently have an USP** - whether the SDS is performant enough remains to be proven. ADASTEC has deployed buses in several locations including US and Europe.



The company provides MaaS solutions for cities, theme parks, campuses, airports, rail yards, and other private sites. In the meantime, **COAST seems to be focusing primarily on use cases other than passenger transport** (e.g., harvesting, ports). However, transport currently seems to be the primary use case.

Latest news

Karsan e-ATAK became Finland's first driverless bus.

(02.04.2024)

[Update](#)
[Read](#)

COAST Autonomous announces collaboration with the city of Winter Haven, Florida to explore deployment of autonomous transportation solutions.

(30.03.2022)

[Read](#)

L4 target



























































































Not announced



















































Not announced





























































Mobility-as-a-Service. Asia.











































Partnering & Value Chain, Level 4 Target & P3 Assessment





























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  robosense  	  	  		         		 		  	  	Not announced	 	   		
 robosense	   	 		      			   	   	Not announced		  			
  robosense  	  	 		     		   	   	   			Not announced			

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5		LAYER 6			
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider		Rider Experience/ Content Prov.		Infrastructure	
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LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5		LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider		Rider Experience/ Content Prov.		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others		
<div>robosense</div> <div></div>	<div></div> <div></div> <div></div> <div></div> <div></div> <div></div>	<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>	<div></div>	Not announced		Not announced		<div>UNTOUCH 未动科技</div>	<div></div> <div></div> <div></div>			
<div></div> <div>robosense</div> <div></div>	<div></div> <div></div> <div></div>	<div></div>		<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>	<div></div> <div>Aiol Himey Chawa Insurance</div>			<div></div> <div></div> <div>Momenta GO</div>	Not announced		<div></div> <div></div> <div></div>			
Core Business	 Partnership or supplier deal	 Investment	 Acquisition	 Parent / Subsidiary	 Update									

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5	LAYER 6		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider	Rider Experience/Content Prov.	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
 		    	 	  	 	Not announced		 	Not announced			 
    	 	   				Not announced		 	Not announced			 
		  		 		Not announced		Not announced	Not announced	Not announced		

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5		LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider		Rider Experience/Content Prov.		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others		
 				   				 	Not announced			Not announced		
 robosense 	 			  					Not announced	 				
								Not announced	Not announced			Not announced		



LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5		LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider		Rider Experience/ Content Prov.		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App		Entertainment & advertisement		3 rd party HD Maps	Cloud	V2X & Others
	 42dot	42dot		 42dot			42dot			Not announced	Not announced			
 robosense	 		 	 TOYOTA	 RIDECELL	 	Not announced	 	 					
 	 42dot 		 HYUNDAI MOTOR GROUP		 Not in service anymore	 AIRS 		Not announced						

At a glance



Baidu Apollo has accumulated **more than 100m km**, holds **permits for first fully driverless taxi service** in CN and **processed 3.3m autonomous ride orders** by September 2023. Baidu is an absolute heavyweight in the Chinese AD market and, in our view, the current leading company in China.



WeRide was the **first AD company in China** to operate a fleet with **>100 vehicles** for AD testing and was permitted to test **fully driverless cars** both in **China** and the **USA**. Considering >20mn autonomous kilometers, WeRide is among the strongest AD players. WeRide also offers L2+ solutions.



Pony.ai has driven **>30mn testing and operations kilometers on urban roads & highways**, holding **permits to offer driverless rides in China and test its AVs in the US**. Pony also offers L2+ solutions to OEMs. As the BC for AD MaaS will remain negative in the medium term, that's a reasonable move.



AutoX's **focus is on China and the Asia Pacific markets**. However, it also holds a permit to **transport passengers on public roads** in California. With a fleet of **more than 1000 vehicles in China**, AutoX is a **leading player** in this market.

Latest news

Baidu Apollo launches Apollo ADFM large model, sixth-gen unmanned Robotaxi at Apollo Day 2024.

(15.05.2024)

[Update](#)
[Read](#)

Driving into Beijing's core urban area! WeRide robotaxi approved for testing at Beijing South Railway Station.

(17.05.2024)

[Update](#)
[Read](#)

Pony.ai receives CSRC's approval for overseas listing.

(26.04.2024)

[Update](#)
[Read](#)

AutoX permitted to test RoboTaxi on Beijing's Third Ring Road.

(27.05.2024)

[Update](#)
[Read](#)

L4 target

L4 reached in
Guangzhou by
2021

L4 reached in
Guangzhou by
2022

L4 reached in
Beijing and
Guangzhou by
2023

L4 reached in
Shenzhen by
2021

At a glance



Following an 18-month suspension by the Chinese authorities, Didi was permitted to sign up new users by 2023. Its **active user base was 500mn** in 2020, receiving **>40 bn trip requests daily**. This means great market power - however, it has become **quiet around DiDi's AV division**.



DeepRoute claims to offer the most affordable SDS on the market. In the meantime, DeepRoute has covered **10 million autonomous kilometers** on public roads by 09/23 and holds permission to carry passengers in China. The current focus seems to be rather on L2+ ADAS than robotaxis.



Horizon Robotics now has **partnerships with many well-known OEMs and Tier1s** with whom they are **jointly developing autonomous driving functions based on their Journey chip**. It is therefore a very strong AI-chip market player, without focusing on deploying own robotaxi fleets.



Momenta **attracted attention** primarily due to **investments** (e.g., from Toyota, Mercedes-Benz, and Bosch). Although Momenta operates a robotaxi fleet in China, the **focus currently seems to be clearly on L2+ solutions for OEMs**, rather than on the MaaS use case.

Latest news

DiDi Autonomous Driving, GAC AION's joint venture to launch first L4 commercial Robotaxi in 2025.

(07.04.2024)

[Update](#)
[Read](#)

Vehicles powered by DeepRoute's end-to-end intelligent driving model to hit market in 2024.

(18.03.2024)

[Update](#)
[Read](#)

Horizon Robotics launches Horizon SuperDrive autonomous driving solution.

(24.04.2024)

[Update](#)
[Read](#)

Momenta launches advanced intelligent driving solution based on NVIDIA DRIVE Orin.

(26.04.2024)

[Update](#)
[Read](#)

L4 target

2025

2025

Not announced

Focus currently clearly on L2+ ADAS

At a glance



In 2021, **Geely and Waymo** teamed up to **integrate the Waymo Driver** into an autonomous ride-hailing Zeekr vehicle. This beauty was presented to the public by end of 2022. Geely **itself rather focuses on the POV business instead of MaaS**.



By August 2022, SAIC accumulated **400,000km of automated driving testing** in China. SAIC has **partnered with well-known SDS providers**, such as Momena and Pony.ai, to develop self-driving vehicles.



FAW's focus is primarily on privately owned vehicles. However, **its EV brand Hongqi** and its **3rd-generation robotaxi** rides on the same platform as its mass-produced vehicle to achieve economies of scale. FAW **co-developed the Hongqi robotaxi with Baidu** and also **invested in tech company Pony.ai**.



PIX Moving shares the vision of rebuilding the city with a special form of vehicles called **Moving Spaces**. These **multi-functional pods** can serve as moving working spaces or vending machines, among others. Great concept for technology-driven Asian markets and beyond.

Latest news

Geely, Foretellix Enhance AV Safety.

(07.05.2024)

[Update](#)
[Read](#)

SAIC-backed Xiangdao Chuxing kicks off Robotaxi pilot operation in Shenzhen.

(28.12.2022)

[Read](#)

3rd-Gen Hongqi L4 Robotaxi passes unmanned driving license test in Beijing.

(28.12.2023)

[Read](#)

Robobus is gearing up for mobility services in Europe: PIX Moving & Tecnocad form into partnership.

(06.05.2024)

[Update](#)
[Read](#)

L4 target

Not announced

2025

Not announced

Not announced



At a glance

Latest news

L4 target



QCraft holds a **permit to test robobuses** in Beijing. The company is meanwhile rather focusing on L2+ than L4 robotaxis to increase ROI. Therefore, we'll soon be moving the company to the POV chapter.

QCraft launches Journey 6-based intelligent driving solution at Auto China 2024.

(29.04.2024)

[Update](#)
[Read](#)

Not announced



Yutong is China's top bus manufacturer and the world's largest one. For the AD MaaS Case, Yutong provides its **purpose-built electric robobus**, which is already operating driverless on public roads in cooperation with SDS provider WeRide. Yutong **will thus remain true to its core business**.

WiTricity and YuTong Bus revolutionize public Transportation with Wireless Charging for Autonomous E-Buses.

(10.02.2023)

[Read](#)

L4 reached by **2022** jointly with WeRide.



Acquired by Hyundai Motor Group in 2022, 42dot is the **groups' global software center**. 42dot and Hyundai showcased 'software-defined vehicle' (SDV) technologies under development to lead to a **'Software-defined Everything' (SDx) ecosystem beyond mobility** at CES 2024.

Samsung partners with self-driving tech company to develop AI-based smart vehicle platform.

(04.08.2023)

[Read](#)

Not announced



In the AD space, Toyota is **focusing primarily on partnerships, investments and acquisitions**. The extensive portfolio includes, for example, Lyft Level 5, Momenta, Pony.ai or May Mobility. Toyota and Pony.ai are developing a robotaxi fleet of about 1,000 vehicles.

Pony.ai teams up with Toyota China, GAC Toyota on Robotaxi development.

(04.08.2023)

[Read](#)

2024

At a glance



Hyundai and Aptiv jointly established **Motional** to develop robotaxis. Moreover, the **acquisition of 42dot** is **intended to strengthen capabilities**. We are curious to what extent Hyundai, apart from Motional, will therefore position itself in the AD business in the future.

Latest news

Hyundai Motor, Baidu join forces to co-advance in automotive intelligence development.

(28.04.2024)

[Update](#)[Read](#)







































L4 target





















































2026 (Motional)

Mobility-as-a-Service. Europe.




















Partnering & Value Chain, Level 4 Target & P3 Assessment







LAYER 1		LAYER 2		LAYER 3		LAYER 4	LAYER 5	LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider	Rider Experience/Content Prov.	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3rd party HD Maps	Cloud	V2X & Others
				 Commercial Vehicles								
 		  No further announcements  		 		Not announced				 		
				 	 	  		  				
Core Business		 Partnership or supplier deal		 Investment		 Acquisition		 Parent / Subsidiary		 Update		

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5		LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider		Rider Experience/ Content Prov.		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App		Entertainment & advertisement		3rd party HD Maps	Cloud	V2X & Others
<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div> <div></div> <div></div>	<div></div>	<div></div> <div></div>	<div></div> <div></div> <div></div>		<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>			Not announced		Not announced		
<div></div> <div></div> <div></div>	<div></div>	<div></div> <div><small>GAUSSIN MACNICA MOBILITY</small></div>		<div></div> <div></div> <div></div>	<div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div>			Not announced		Not announced		
<div></div> <div></div> <div></div>	<div></div>	<div></div> <div></div>	<div></div>	<div></div> <div></div> <div></div> <div></div>		<div></div> <div></div> <div></div>		<div></div> <div></div>			Not announced		<div></div> <div></div>	

LAYER 1		LAYER 2		LAYER 3		LAYER 4	LAYER 5	LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider	Rider Experience/ Content Prov.	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3rd party HD Maps	Cloud	V2X & Others
		 MAPLESS AUTONOMOUS DRIVING		Otokar 				Not announced	Not announced	Not announced		
									Not announced	Not announced		
		 auvetech					 APPLIED AUTONOMY  gudent 		Not announced			
Core Business		 Partnership or supplier deal	 Investment	 Acquisition	 Parent / Subsidiary	 Update						

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5		LAYER 6				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider		Rider Experience/Content Prov.		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others		
				 										
									Not announced			Not announced		
														
									Not announced	Not announced	Not announced	Not announced		
		 												
Not announced									Not announced	Not announced	Not announced	Not announced		
<div>Core Business</div> <div> Partnership or supplier deal</div> <div> Investment</div> <div> Acquisition</div> <div> Parent / Subsidiary</div> <div> Update</div>														

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5	LAYER 6		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet Operations		Mobility & Platform Provider	Rider Experience/ Content Prov.	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Passenger App	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
												
						Not announced		Not announced	Not announced			Not announced

At a glance



Of all the European OEMs in the AD MaaS space, VWCV is the most ambitious one and advanced. VW **collaborated** and **tested with SDS providers early on**. After **Argo's shutdown**, VW announced **Mobileye** technology to be integrated into the ID.Buzz AD. Promising collaboration!



There is **no clear strategy in the AD MaaS case**. Volvo has committed to **develop robotaxis with Waymo** - nothing has happened since. Volvo seems to be focusing instead on the development of self-driving trucks with its partners.



Benteler established **HOLON as its new AD business unit**, working closely with SDS supplier Mobileye, fleet operator Beep to develop autonomous shuttles services based on HOLON's mover. As a non-OEM, bringing the vehicle to series production will be challenging – but SPVs will be a USP in the AD space.



EasyMile has been deployed vehicles >30 countries and >300 locations. the **EZ10 is the most widely used autonomous shuttle**. **ODD** and **SDS capabilities must be enhanced** to remain competitive in autonomous MaaS. However, EasyMile also provides driverless goods transportation solutions.

Latest news

Volkswagen ADMT announces agreement with Mobileye for autonomous driving.

(20.03.2024)

[Update](#)
[Read](#)

Volvo Cars to debut autonomous driving Ride Pilot feature in California.

(06.01.2022)

[Read](#)

HOLON and Rhein-Main-Verkehrsverbund cooperate on autonomous mobility.

(08.04.2024)

[Update](#)
[Read](#)

MicroSys and EasyMile collaborate on the development of safety-critical technology for autonomous driving.

(02.04.2024)

[Update](#)
[Read](#)

L4 target

2026

Not announced

2026

L4 permission on one public road in France.

At a glance



GAMA acquired NAVYA in 2023. As the technology is limited to **fixed routes** and **low speed applications**, it will be quite challenging to compete with more mature AV players. Gated areas seem to be the only promising use case in the future.



Oxa is **one of the few remaining autonomous technology provider in Europe**. First roboshuttle deployments in the US have been accomplished. We believe, Oxa fleets will soon at least hit the roads in the UK after the government's Automated Vehicles Act became law by May 2024.



Imagry's technology relies on **multiple 360° cameras** and is based on a **deep neural network** that learns to drive by imitating human behavior. Imagry is quite present on European conferences. Therefore, we are eagerly awaiting first bus deployments in Europe.



MAN has not yet made an appearance in the bus segment in the context of autonomous driving. The **MINGA** project, in which MAN has a **strong partner at its side in SDS provider Mobileye**, is the first step. We see great added value in automated city buses and are excited about the project.

Latest news

Gaussin and Macnica have taken over Navya. New entity GAMA to showcase a driverless shuttle at Busworld.

(03.10.2023)

[Read](#)

Oxa deploys its commercial self-driving software for the first time as AV shuttles launch for passengers in Florida, US.

(27.02.2024)

[Read](#)

Imagry unveils safe Driver Overwatch™, an autonomous safety feature for young and elderly drivers, at CES 2024.

(09.01.2024)

[Read](#)

MAN Truck & Bus to make city buses autonomous with Mobileye.

(17.05.2023)

[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced

At a glance



The Estonian startup offers autonomous and sustainable last-mile solution and claims to develop the **first autonomous hydrogen vehicle** in the world. Although there are already pilot projects, it will be tough to prevail against the well-known shuttle providers.



P3 Mobility creates an AV ecosystem consisting of three pillars: an **autonomous electric vehicle** for ride hailing, specialized **infrastructure**, and a mobility **service platform**. The goal is to reshape future mobility and create a unique user experience. Let's see if cities are open for AV ride hailing.



Avride is the **rebranded, international division** of the robotaxi and delivery robot company **Yandex Self-Driving Group**. While international assets have been separated from Russian-owned Yandex assets, Avride said it's testing AVs in diverse ODDs across the globe, focusing on safety.



Renault teamed up with Waymo on autonomous driving back in 2019 – no further announcements yet. Also, **Renault is partnering with WeRide on self-driving public transit** in France. A first pilot is about to be implemented by 2024.

Latest news

Auve Tech extends reach to U.S. market & enhances strategic partnership with Guident Ltd.

(05.04.2024)

[Update](#)
[Read](#)

Project 3 Mobility and Mobileye announce collaboration for scalable urban autonomous mobility project.

(13.02.2024)

[Read](#)

Yandex self-driving group rebrands its international division as Avride.

(04.08.2023)

[Read](#)

Renault Joins Forces with WeRide for Low-Carbon Public Transit Practice in Europe.

(15.05.2024)

[Update](#)
[Read](#)

L4 target

Not announced

2026

Not announced

Not announced

At a glance



Schaeffler joined forces with VDL to build shuttles based on its rolling chassis and VDL's expertise in vehicle bodies. The shuttle will be **powered by Mobileye's SDS** while first road tests are to be expected earliest 2025. Now it's essential to bag first partnerships with fleet operators and PTAs.

Latest news

Schaeffler and VDL Groep to team up on self-driving shuttles.

(31.08.2023)

[Read](#)

L4 target








Not announced

Privately Owned Vehicles.

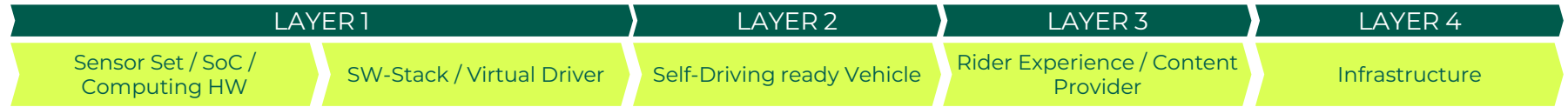
Intro | Use Cases & Layer Description



Privately Owned Vehicles | Use Cases

			 Private Ground	 Highway	 Urban	 Suburban	 Rural
			Airport, factories, yards, harbors, ...	Highways, freeways, ...	City center, designated streets, ...	Federal highway, residential areas, ...	Rural roads, gravel road, ...
POV	Parking		home yard parking (L4)	-	self parking pilot car park (L4), urban self parking (L5)	self parking pilot parking place (L4) [e.g., supermarket], self parking (L4)	
	Driving		-	pilot (L2+), pilot (L3), chauffeur (L4)	urban highway / ring roads pilot (L2+ - L3) , city chauffeur (L4)	commuter pilot (L3/L4) , chauffeur (L4)	

POV | Layer Model Description



Self-Driving System (SDS) is the sum of all necessary systems to realize self driving level 4 (SAE). Key functionalities are sensor data fusion, object detection, localization, prediction, environment interpretation, trajectory planning and actuator control. The HW stack includes sensors, SoC and computing platforms, for example, while the SW stack covers the virtual driver, among others.

Self-Driving Vehicles (SDV) are considered L4 ready vehicles with an integrated and homologated SDS (sensors, computing hardware and software), which operate in a specific ODD (Operational Design Domain).

The **Content Provider** for **Rider Experience** owns a software platform that acts as middleware to service partners. Digital content (e.g., media), digital products (e.g., productivity tools) and digital services are part of this platform.

The service area and its **infrastructure** are core elements to enable an AD service. Infrastructure includes the vehicles' IT infrastructure (especially cloud services and backend), V2X technology and takes into account human behavior prediction in that specific scenery.

POV | Layer Model Description

Exemplary tasks

LAYER 1		LAYER 2	LAYER 3	LAYER 4
Sensor Set / SoC / Computing HW	SW-Stack / Virtual Driver	Self-Driving ready Vehicle	Rider Experience / Content Provider	Infrastructure
HW development	SW development	Design & development	TV & streaming	Localization
HW production	Simulation	Redundant chassis	Shopping	3 rd party HD maps
After sales	Prediction	SDS integration	Education	V2X (e.g., cellular, satellite, WIFI)
Automotive approval	SDS licensing	SDV testing	Working	Cloud infrastructure
Sensor testing & approval	SW testing & approval	After sales	Gaming	Teleoperations
...	HD mapping	Production	...	Human behavior prediction
	Verification & validation	Logistics		Service area
	...	Sales channel		...
		Homologation		
		Pricing		
		...		

Privately Owned Vehicles. **NAR.**

Partnering & Value Chain, Level 4 Target & Latest News





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
							Not announced		
						Not announced			
Core Business		Partnership or supplier deal	Investment	Acquisition	Parent / Subsidiary	Update			



LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
 	 			 		Not announced			



At a glance



Tesla **collects a huge amount of data** and build a unique ecosystem around the fleet. While there are still legitimate discussions about the robustness of vision-only approaches, the **performance of FSD in the US is already impressive**. Nevertheless, it is still an L2+ system.



GM has **combined its former Ultra Cruise system** (former goal to achieve hands-free driving for 95 percent of scenarios) **with its Super Cruise program**. May there also be a chance for struggling GM-backed Cruise to power GM vehicles? Also, in **China, GM has invested in Momenta**.



After getting off the robotaxi business with ArgoAI, Ford said to **focus on developing differentiated L2+ and L3 applications** for privately used cars. By 2023, Ford established Latitude to develop future automated driving technology.



Mobileye is the **leading supplier for camera-based driver assistance systems**. In addition to L4 technology for robotaxis, **SuperVision is its state-of-the-art L2+ (eyes on) system**. Also, first **OEMs teamed up with Mobileye to integrate its Chauffeur (eyes off) solution**. We are very much looking forward to testing it on European roads.

Latest news

Elon Musk says Tesla will reveal its robotaxi on August 8th.
(05.04.2024)

Update

Read

GM's hands-free Super Cruise expands to 750,000 miles.
(14.02.2024)

Read

Ford brings BlueCruise technology to Germany.
[German]
(28.08.2023)

Read

Mobileye EyeQ6 Lite launches to speed ADAS upgrades globally.
(17.04.2024)

Update

Read

L4 target

No binding roadmap for FSD

2025




































Not announced







































Not announced


























Privately Owned Vehicles. Asia.
































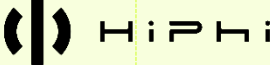


Partnering & Value Chain, Level 4 Target & Latest News


































































LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
   	 <div>RHINO Tech</div>			  	 	 			
   						 Not announced	 		
	 	 		 		 Not announced			

LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience / Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
robosense  	  	  				Not announced			
 robosense 	    	    				Not announced			 
robosense   	 	  				Not announced	 		

LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
       	        	    	  	Not announced		Not announced			
Not announced		Not announced		Not announced		Not announced			
Not announced		Not announced		Not announced		Not announced			





















LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience / Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
  	   	 	 	 		Not announced		 	
 	 	   		 		Not announced			
						Not announced			

LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
 	    	    		 		Not announced			
  	    	     		  				 	
  	  	 		 		Not announced			

LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience / Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
				 长安汽车 CHANGAN					
				 DONGFENG DONGFENG MOTOR CORPORATION		Not announced			
				 GEELY		Not announced	 		

Core Business
 Partnership or supplier deal
 Investment
 Acquisition
 Parent / Subsidiary
 Update

LAYER 1		LAYER 2		LAYER 3		LAYER 4				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/Content Provider		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement		3 rd party HD Maps	Cloud	V2X & Others
				           		Not announced				
	     			     		Not announced				
 	  			 		Not announced				

LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
  	  	  					  		
	 					Not announced			

At a glance

NIO



While NIO premium EVs are **hitting several markets outside China**, ADAS capabilities and functions of other competitors in China seem to be slightly more advanced and widely available.

XPENG



XPENG announced that its XNGP urban intelligent driving system has achieved **100% HD map-free operation** with the goal to achieve full coverage of XNGP functions in major urban road networks across China by the end of 2024.

ZEKR



Geely's EV brand **develops the SPV robotaxi for Waymo** while **incorporating Mobileye's SuperVision system for private owned cars**. Considering prices, technological specifications and functions, Zeekr vehicles can also be a real alternative to conventional manufacturers in Europe.

BYD



In December 2021, **BYD and Momena**, one of China's major SDS developers, formed a **joint venture for autonomous driving**. To date, ADAS functionalities and availability lag behind other competitors in China.

Latest news

NIO to produce own autonomous driving chips in 1-2 years, says company executive.

(17.08.2023)

[Read](#)

XPENG to adopt RoboSense's MX LiDAR for intelligent driving application.

(29.04.2024)

[Update](#)[Read](#)

Wave of EV makers choose NVIDIA DRIVE for automated driving.

(08.01.2024)

[Read](#)

BYD receives conditional L3 autonomous driving vehicle testing license in July 2023.

(27.12.2023)

[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced

At a glance



GWM aims to provide complete mobility ecosystems with dedicated brands for the European markets. **Regarding AD**, GWM has been working with companies such as **Mobileye, Qualcomm** or **Nullmax**. GWM is pursuing a strong partnership approach.



While BAIC teamed up with Baidu to develop robotaxis, its EV brand **Arcfox models are equipped with Huawei software and sensor suite**. Our regular ADAS benchmark drives in China showed: **Huawei system's performance is stunning**.



China's largest carmaker intends to equip premium electric vehicle models with **Momenta-developed intelligent driving technology**. SAIC may not seem as 'fancy' in its outward appearance as some startups from China – that's why they co-founded IM Motors in a JV with Alibaba.



Lucid's advanced luxury EVs are about to be equipped with its **DreamDrive ADAS systems**, consisting of **up to 32 sensors** and offering **more than 30 driver-assistance features**. Since hardly anything is known about partnerships, the **SW is apparently primarily developed in-house**.

Latest news

Hesai Technology, Great Wall Motor to step up cooperation in intelligent driving field.

(29.02.2024)

[Update](#)
[Read](#)

ARCFOX granted L3 highway autonomous driving vehicle testing license in Beijing.

(22.12.2023)

[Read](#)

SAIC Motor, DIAS, TTTech-Auto AG deepen partnership for ADAS technology development.

(13.11.2023)

[Read](#)

Driving on Air: Lucid Group builds intelligent EVs on NVIDIA DRIVE.

(22.03.2022)

[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced



At a glance

Latest news

L4 target

Li Auto



Li Auto is another EV company aiming for autonomous driving. While Li **claims** their **technology will soon be competitive with Tesla's Autopilot**, they have **yet to prove those capabilities**. Competition in China is strong.

Li Auto Selects Hesai as LiDAR Supplier for its Flagship MPV Li MEGA.

(07.03.2024)

[Update](#)
[Read](#)

Not announced

NETA



NETA Auto, a Hozon Auto brand, is one of several Chinese OEMs that has entered into **in-depth cooperation with Huawei**. Furthermore, teaming of with Hesai for future vehicle models shall further enhance automated driving capabilities.

NETA Auto, SenseAuto cement cooperation to boost next-gen intelligent driving, smart cockpit tech innovation, applications.

(26.04.2024)

[Update](#)
[Read](#)

Not announced

mi



Xiaomi sets sight on several autonomous electric vehicle brands by **substantially investing in smart car technology**. The unveiled **Xiaomi SU7 offers great user experience at lower cost** than Western OEMs – the ADAS has still some weaknesses but is about to catch up with competition.

Xiaomi rolls out OTA upgrade for SU7's smart cockpit, intelligent driving systems.

(17.05.2024)

[Update](#)
[Read](#)

Not announced

HiPhi



HiPhi, a **brand of Human Horizons** is developing the **'HiPhi Pilot'**, providing redundant and safe intelligent driving features aiming at both L3 and L4. At this point, too little is known about the AD capabilities to seriously assess the company. **Meanwhile, the company seems to face bankruptcy**.

Human Horizons, Huawei Cloud partner on dedicated intelligent driving cloud.

(25.07.2023)

[Read](#)

Not announced



At a glance



FAW planned to offer an L4-capable system as early as 2020 – which was not achieved. Now FAW aims to offer a **fully functional autonomous driving system by 2030** - this new timeline seems more realistic.



Through **various partnerships**, the company is driving the development of intelligent vehicles. **Chery plans to offer L4-capable vehicles in 2025**. Not much time left. Partnerships with iMotion, Nullmax or dji could boost the development.



GAC is the fifth largest car manufacturer in China and sells its vehicles under various brands. The company has always **worked closely with Huawei** and plans to produce L4 vehicles under its own AION brand from 2024 as a manufacturing partner of Huawei.



CHANGAN is **working closely with Huawei on Level 4 Autopilot**, 5G, and C-V2X, and plans to offer **L4 capabilities in 2025**. Recently, the company announced a strategic cooperation with Geely, among others, to combine strengths and share resources in the development of autonomous cars.

Latest news

FAW Group partners with DJI Automotive for intelligent driving tech development.

(19.04.2024)

[Update](#)
[Read](#)

iMotion to supply iDC series autonomous driving solutions to Chery's OMODA brand.

(07.05.2024)

[Update](#)
[Read](#)

GAC Group, HESAI forge partnership to co-build intelligent driving products.

(07.04.2024)

[Update](#)
[Read](#)

AVATR rolls out HD map-free intelligent driving feature to all AVATR 11 users nationwide.

(18.04.2024)

[Update](#)
[Read](#)

L4 target

Beyond **2025**

2025

Not announced

2025



At a glance



Dongfeng's **VOYAH brand vehicles** are about to be equipped with **Baidu's intelligent driving system**, offering features like Navigation on Autopilot, intelligent cruise control, automatic lane changes as well as various parking modes.



Ji YUE is a joint venture between Geely and Baidu. The first production model relies on solely visual perception algorithms and thus a **pure vision approach**. The company intends to cover 200 cities nationwide with its advanced urban intelligent driving functions by end of 2024.



During our benchmark drives in China, **Huawei's ADS 2.0 performance was stunning**. ADS 3.0 is about to be unveiled by the end of 2024 and promises another leap in performance. Also, the solution has been integrated in different EV models. Huawei had the goal to become China's Bosch – towards **SW capabilities, it's already much more advanced in China**.



Nullmax pursues a '**Machine Learning First**' approach and has **teamed up with several OEMs, chip suppliers and other companies**. While the depth of cooperation is often unclear, you should keep an eye on Nullmax and its **vision-based, multi-sensor fusion and perception technology** route.

Latest news

VOYAH plans to equip more models with Baidu Apollo's intelligent driving solution.

(27.10.2023)

[Read](#)

Ji Yue rolls out V1.4.0 OTA upgrade with enhanced intelligent capabilities.

(26.03.2024)

[Update](#)
[Read](#)

AITO rolls out HD map-free NCA smart driving function nationwide.

(20.03.2024)

[Update](#)
[Read](#)

Nullmax deepens collaboration with Black Sesame Technologies for integrated NOA solutions.

(15.01.2024)

[Read](#)

L4 target

Not announced

Not announced

2025

Not announced



At a glance



IM Motors, **co-founded by SAIC Motor, Zhangjiang Hi-Tech, and Alibaba** pushes its AD capabilities through **joint development with Momenta**. While urban NOA was implemented swiftly, IM also obtained the official AV testing license for highway/expressway in Shanghai for L3 testing.



While providing its own "SENSING" ADAS, Honda has attracted attention primarily through **investing in GM's Cruise for MaaS initiatives**. An **investment in Helm.ai**, however, is intended to benefit the company's own software and AI competencies.



Haomo.ai is **backed by GWM** and develops its urban navigation-assisted H-pilot for mass-production. By Feb 2024, it has been **integrated in over 20 vehicle models**, achieving >120 mn km of assisted driving. Gathering a huge amount of data may be beneficial towards L4 development.

Latest news

IM Motors kicks off presale of IM L6 model with price range of 230,000 to 330,000 yuan.

(09.04.2024)

[Update](#)
[Read](#)

Honda unveils SENSING 360+ system.

(28.11.2023)

[Read](#)

Haomo.ai nabs 300 million yuan in Series B2 financing round.

(23.04.2024)

[Update](#)
[Read](#)

L4 target

Not announced

2025

Not announced

Privately Owned Vehicles. Europe.

















































Partnering & Value Chain, Level 4 Target & Latest News





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
LUMINAR BOSCH Valeo veoneer	NVIDIA brainchip Qualcomm	NVIDIA Baidu Momenta				Mercedes me ZYNC	DEEPMAP here	Tencent	
INNOVIZ TECHNOLOGIES APTIV MAGNA veoneer Valeo	mobileye Qualcomm	Arriver Valeo AutoBrains Tencent STELLANTIS TATA TECHNOLOGIES	TTTech BlackBerry		Continental	BMW CONNECTED DRIVE AirConsole	here	aws	ottopia
mobileye INNOVIZ TECHNOLOGIES	NVIDIA Qualcomm CARIAD mobileye	VAIVA Safe Mobility Mobileye UAD INTENTA Horizon Robotics BOSCH	CARIAD BlackBerry Luxoft TTTech Applied Intuition	VOLKSWAGEN GROUP		Not announced	tomtom mobileye here 高德 NIRA	Microsoft verizon HUAWEI	



LAYER 1		LAYER 2		LAYER 3		LAYER 4				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience/ Content Provider		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement		3 rd party HD Maps	Cloud	V2X & Others
<div><div>  </div><div>  </div></div>	<div><div> </div><div></div></div>		<div></div>		Not announced		<div> </div>			
<div><div>   </div><div></div></div>	<div><div> </div><div> </div></div>		<div><div> </div><div></div></div>		Not announced					
<div><div>  </div><div>     </div></div>	<div><div>      </div><div></div></div>		<div><div> </div><div></div></div>		Not announced		<div>  </div>			
Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary		Update



LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Rider Experience / Content Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 rd party HD Maps	Cloud	V2X & Others
BOSCH WEBASTO Webasto	RECOGNI NVIDIA QVCC Ambarella BOSCH	UAD momenta WeRide FIVE AI RECOGNI CARIA D Microsoft			BOSCH NEXT	Not announced	tomtom DEEPMAP here atlatec	Microsoft	
LUMINAR	mobileye NVIDIA	mobileye		polestar		polestar Google	Google		
	NVIDIA	WAYVE		JAGUAR		Not announced		Microsoft	



At a glance



Drive Pilot is the world's first ADAS to gain type approval for a L3 system and available in Europe and the US. However, as the system's ODD is quite limited, there is currently only small added value for customers.



BMW seems to have greatly **reduced its own activities with regard to L3 and L4** and **instead focuses on partnerships** - most recently with Stellantis and Tata. In our regular ADAS benchmark drives, BMW's driver assistance systems show the strongest performance among all European OEMs.



CARIAD is primarily responsible for software development in the **private ownership** segment. There is also a development partnership (Automated Driving Alliance) with Bosch. We are watching the development of CARIAD and are curious to see whether they can live up to their great task.



Stellantis is working on **L3 and L4 solutions with technology partners** - especially **BMW and Waymo**. In 2023, Stellantis launched its L2 hands-free driver assistance system, which will be integrated into the 2024 Jeep Grand Cherokee.

Latest news

Automated driving revolution: Mercedes-Benz announces U.S. availability of DRIVE PILOT – the world's first certified SAE Level 3 system for the U.S. market.

(27.09.2023)

[Read](#)

BMW Group and Tata Technologies aim to collaborate for the development of Automotive Software and Business IT solutions.

(02.04.2024)

[Update](#)

[Read](#)

Volkswagen Group intensifies collaboration with Mobileye.

(20.03.2024)

[Update](#)

[Read](#)

Stellantis boosts LiDAR technology.

(20.03.2024)

[Update](#)

[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced



At a glance

• APTIV •



Aptiv is a leading company in the development of ADAS for and invested a huge amount of money in Motional, a JV with Hyundai, before reducing its common equity interest from 50% to about 15% by end of March 2024.

Aptiv has acquired or at least invested in software companies to strengthen in-house capabilities towards ADAS and AD.

Continental



Continental **spun off its own AD unit**. Traditional Tier 1 such as Conti compete with strong SW players as OEMs/ customers increasingly purchase HW and SW separately. However, partnerships and investments in AI companies show that Conti **is willing to keep up the race**.

BOSCH



Bosch **teamed up with CARIAD** to jointly develop automated driving functions and acquired AV company Five AI a couple of years ago to strengthen its AD capabilities. Traditional Tier 1 such as Bosch **compete with strong SW players** as OEMs/ customers increasingly purchase HW and SW separately

polestar



Polestar is a renowned EV player in the EU market. While ADAS of both Polestar 1 and 2 can't compete with many competitors, there is supposed to be a **significant leap with Polestar 3 and 4**. With **NVIDIA, Luminar and especially Mobileye**, they have strong technology partners at their side.

Latest news

Horizon Robotics, Aptiv join forces to develop localized intelligent driving solutions.

(03.07.2023)

[Read](#)

Continental technical collaboration with Qualcomm.

(13.05.2024)

[Update](#)
[Read](#)

For safer roads: Bosch teams up with Microsoft to explore new frontiers with generative AI.

(28.02.2024)

[Update](#)
[Read](#)

Polestar 4 to integrate Luminar LiDAR with Mobileye Chauffeur.

(09.11.2023)

[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced

At a glance



Wayve does **not rely on HD maps** and **hand-coded rules** but **focuses on its deep and self-learning AI technology** based on cameras. The company raised \$1bn in 2024 to take its Tesla-like technology for self-driving to many carmakers. This approach is different compared to Tesla.

Latest news

Wayve raises \$1B to take its Tesla-like technology for self-driving to many carmakers.

(07.05.2024)

[Read](#)

L4 target











Not announced

Goods Transport & TaaS.

Intro | Use Cases, Market Insights & Layer Description



Goods Transport & TaaS | Use Cases

						
		Gated Area	Highway	Urban	Suburban	Rural
		Airport, factories, yards, harbors, ...	Highways, freeways, ...	City center, designated streets, ...	Federal highway, residential areas, ...	Rural roads, gravel road, ...
Transport	S 	last mile delivery	-	last mile delivery	last mile delivery	last mile delivery
	ML 	automated yards, e.g., intralogistics trucks (L4)	-	hub-and-spoke robo transporter	hub-and-spoke robo transporter	robo transporter
	XL 	automated yards, e.g., intralogistics trucks (L4)	hub-to-hub self-driving truck	-	-	-
Platooning		automated yards, e.g., intralogistics trucks (L4)	hub-to-hub self-driving truck	-	-	-
Offroad		e. g. snow clearing (L4), rob harvesters	-	e. g., street sweeping machines (L4)	e. g., street sweeping machines (L4)	e.g., robo tractor

Automated Yards



Transportation within gated areas, yards, hub or similar confined areas

Hub-to-Hub



Hub-to-hub transportation between logistic hubs incl. drayage run

Hub-and-Spoke



Hub-and-spoke transportation from a hub to different spokes incl. drayage runs

Robo Transporter



Robotransporter
Free float autonomous transport vehicles & other use cases such as shuttles

Goods Transport & TaaS | Longlist

Transport	S										
	ML										
	XL										
Platooning											
Offroad											

Goods Transport & TaaS | Longlist

Transport	S				P 			P 			
	ML	P 		P 		P 		P 			
	XL		P 		P 	P 	P 	P 	P 	P 	P
Platooning					P 	P 	P 				
Offroad											

Goods Transport & TaaS | Longlist

		NEW									
		STARSHIP	AVRIDE	TORC	MARS	SAIC	NEOLIX	HYUNDAI MOTOR GROUP	DAF	CRUISE	阿里巴巴 Alibaba.com
Transport	S	C/P 	P 					P 			
	ML						P 			P 	G/P
	XL			P 	P 	G/P 					P Da Man Lv - No picture available yet
Platooning								P 	P 		
Offroad											

ActivitiesNo activitiesStopped activities

G=Gated Area

P=Public Area

Goods Transport & TaaS | Longlist

Transport	S							P 		P 	
	ML		P 	P 			P 	P 		P 	
	XL	G 			G 	P 					
Platooning											
Offroad			G/P 				P 				

Goods Transport & TaaS | Longlist

Transport	S		P 	P 			P 				
	ML				P 	P 		P 			
	XL								P 	P 	P
Platooning											
Offroad		P 									

Goods Transport & TaaS | Longlist

Transport	S	P 	P 						P 	P 	P
	ML					P 	P 				
	XL			P 	P 			P 			
Platooning											
Offroad				G 							

Goods Transport & TaaS | Longlist

		NEW			
Transport	S				
	ML		P	P	P
	XL	P			
Platooning					
Offroad					

Goods Transport & TaaS | Layer Model Description



Self-Driving System (SDS) is the sum of all necessary systems to realize self driving level 4 (SAE).

Key functionalities are sensor data fusion, object detection, localization, prediction, environment interpretation, trajectory planning and actuator control.

The HW stack includes sensors, SoC and computing platforms, for example, while the SW stack covers the virtual driver, among others.

Self-Driving Vehicles (SDV) are considered L4 ready vehicles with an integrated and homologated SDS (sensors, computing hardware and software), which operate in a specific ODD (Operational Design Domain).

Fleet Operators potentially own, operate and maintain a fleet of self-driving vehicles. It may be necessary that a fleet operator is responsible for fleet intelligence functions and technical supervision or **remote assistance**. In case of TaaS the fleet operator may also be responsible for **hub operations**. Therefore, Layer 3 covers both physical and digital fleet operations.

Transport providers (i.e., carriers) carry goods from shippers (e.g., grocery stores) to B2B or B2C customers using autonomous vehicles. Freight matching may be executed by **Platform providers** that connect shippers and carriers or transport demand and supply. They are responsible for order management or disposition planning based on data analysis and simulation.

The service area and its **infrastructure** are core elements to enable an AD service. Infrastructure includes the vehicles' IT infrastructure (especially cloud services and backend), V2X technology and considers human behavior prediction in that specific scenery.

Goods Transport & TaaS | Layer Model Description

Exemplary tasks
















































LAYER 1	LAYER 2	LAYER 3	LAYER 4	LAYER 5
Sensor Set / SoC / Computing HW	SW-Stack / Virtual Driver	Self-Driving ready Vehicle	Fleet, Hub & Tele Operations	Transport & Platform Provider
HW development	SW development	Design & development	Fleet financing	Logistics platform
HW production	Simulation	Redundant chassis	Insurance	Interface connection
After sales	Prediction	SDS integration	Fleet depot	Disposition planning
Automotive approval	SDS licensing	SDV testing	Cleaning	Fleet Intelligence (e.g., fleet & ride optimization)
Sensor testing & approval	SW testing & approval	After sales	Maintenance	Order management
...	HD Mapping	Production	Backend (Layer 1-4)	Booking
	Verification & validation	Logistics	Concessions	Routing
	...	Sales channel	Fleet Control Center	Pricing
		Homologation	Teleoperations	Payment
		Pricing	Hub Operations	Customer service
		...	Driver sideline activities	Authentication (delivery services)
				...

Goods Transport & TaaS. NAR.

Partnering & Value Chain, Level 4 Target & Latest News





























































Goods Transport & TaaS NAR


















































LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport		3 rd party HD Maps	Cloud	V2X & Others
 WAYMO	 	 WAYMO	 LATENT LOGIC	 JAGUAR	Note: trucking will not be considered here anymore	 AutoNation	 WAYMO	 Uber	Not announced			
 LUMINAR	 Aeva	 TORC	 TNO Innovation for life  Applied Intuition  ForetelliX  DeepScenario	 FREIGHTLINER		 PENSKE		 SCHNEIDER  C.R.England Uber Freight	 aws			
 Plus	 NVIDIA	 Plus	 BlackBerry	 PACCAR  TRATON  IVECO  SAIC  FAW GROUP  JAC  HYUNDAI	 VELOCITI  SCHAEFFLER  BOSCH	 GOODYEAR		 amazon  SF EXPRESS 顺丰速运  ZTO 中通快递 中通速递  DSV  dm  WORLDDEX	 ZTO 中通快递 中通速递  DSV  dm	 aws	 Transurban	
Core Business	Partnership or supplier deal	Investment	Acquisition	Parent / Subsidiary	Update							

Core Business Partnership or supplier deal Investment Acquisition Parent / Subsidiary Update







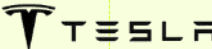
Goods Transport & TaaS NAR

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport	3 rd party HD Maps	Cloud	V2X & Others
  	 			  		   		     	    	Not announced	
	 			 		Not announced				Not announced	
   	 	 		    				     			







Goods Transport & TaaS NAR

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport		3 rd party HD Maps	Cloud	V2X & Others
		 		 	 	  		     		Not announced		
  	 	  		  			     	  				
 		 				Not announced		   		Not announced		

Goods Transport & TaaS NAR

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport		3 rd party HD Maps	Cloud	V2X & Others
 				 				    				
Not announced		 		  		Not announced						
 						Not announced		Not announced				
<div>Core Business</div> <div><div></div> Partnership or supplier deal</div> <div><div></div> Investment</div> <div><div></div> Acquisition</div> <div><div></div> Parent / Subsidiary</div> <div><div></div> Update</div>												

Goods Transport & TaaS NAR

	LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
	Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider	Infrastructure		
	Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport	3 rd party HD Maps	Cloud	V2X & Others
NEW	 Whale Dynamic AV stack consists of 3 rd party HW								 	Not announced		

Goods Transport & TaaS NAR

At a glance



The Waymo Driver has **over a decade of deep AD experience** including **millions of miles on public roads** and **billions of miles in simulation**. Waymo has **reduced trucking efforts to a minimum** in order to focus on the ride hailing case. Also, the existing fleet is used for food delivery via Uber Eats,



Torc is an independent **subsidiary of Daimler Truck AG** and the **first AV company to enter an integrated partnership** with a **truck OEM**. Torc and DT are ramping up development and testing in the US. Go-to-market is targeted for 2027.



PlusDrive follows an **evolutionary path from L2++ to L4**. **Global initiatives in cooperation with IVECO, TRATON Group, and Hyundai have been announced**. In contrast to competitors, Plus is already testing its self-driving and highly automated trucks on European roads.



Kodiak Robotics develops autonomous technology for long-haul trucking and carried the **first commercial freight just eight months after being founded**. After long considering Kodiak as an acquisition candidate, they meanwhile became **one of the strongest players in the market**.

Latest news

Phoenix residents can now experience Uber Eats delivery with the Waymo Driver.

(03.04.2024)

[Update](#)
[Read](#)

Daimler Truck and TORC Robotics select Aeva to supply advanced 4D LiDAR technology for series-production autonomous trucks.

(09.01.2024)

[Read](#)

Hyundai Motor and Plus announce collaboration to demonstrate first Level 4 autonomous fuel cell electric truck in the U.S..

(22.05.2024)

[Update](#)
[Read](#)

Kodiak's self-driving trucks join Martin Brower's fast-food supply chain.

(29.02.2024)

[Update](#)
[Read](#)

L4 target

Focus on ride hailing and urban delivery with I-PACE fleet

2027

Not announced

2025

Goods Transport & TaaS NAR

At a glance



Toronto-based Waabi is renowned for both its founder and its **closed-loop simulator**, Waabi World, which targets an **AI-first approach**. Waabi has entered promising partnerships with Volvo and Uber Freight. The company is worth observing.



Instead of deploying robotaxis, Aurora is **focusing primarily on TaaS** and has already entered into truck **collaborations with PACCAR, Volvo and Continental**. These **collaborations promise to scale their test fleet** to get their product ready for production.



Gatik focuses on **short-haul, B2B logistics** for the **retail industry**. More specifically, hub-and-spoke supply chain operations. The vehicles are restricted to **fixed, repeatable routes**. Gatik has found a niche that no other market player is dedicated to now.



Nuro is a **pioneer in last-mile deliveries** with a special purpose vehicle. Contrary to media reports and its own statements, however, it is very difficult to see a vehicle 'in the wild'. **Industrialization and scaling** thus **seems to prove difficult**.

Latest news

Waabi to bring the first generative AI-powered trucking solution, built on NVIDIA DRIVE Thor, to market.

(18.03.2024)

[Update](#)
[Read](#)

Self-driving vehicle company Aurora cuts 3% of its workforce.

(24.01.2024)

[Read](#)

Partnering with Isuzu to mass produce SAE Level 4 autonomous trucks.

(14.05.2024)

[Update](#)
[Read](#)

Nuro selects NVIDIA DRIVE Thor to power its Nuro Driver autonomous driving system.

(18.03.2024)

[Update](#)
[Read](#)

L4 target

Not announced

2027

L4 target reached in Arkansas by 2021

Not announced

Goods Transport & TaaS NAR

At a glance



After Argo's shutdown, it's unclear how Ford will proceed for urban delivery and trucking. Nevertheless, **Ford Otosan is cooperating with AVL** in this area. We believe they can't keep up with the leading self-driving truck companies.



Udelv has been doing **commercial deliveries for Walmart** for some time. With the **'Transporter'** they now have their own **versatile special purpose vehicle**, equipped with Mobileye's promising SDS. It's been quite around Udelv for a while – as other companies, Udelv seem to struggle towards industrialization of its vehicle.



Amazon has **invested in Aurora and conducted road tests with Embark, which later didn't survive market consolidation**. Amazon's vision could be to cover the entire logistics chain - in the future also with autonomous trucks, delivery vehicles and last mile delivery solutions.



Little is still known about Tesla's Semi Truck and targeted automated driving capabilities. According to the company, it will be the first vehicle to drive fully autonomously. The truck is to be equipped with **'enhanced' autopilot functionalities for automated highway driving**. At least we still have doubts.

Latest news

Ford, VW-backed Argo AI is shutting down.

(26.10.2022)

[Update](#)
[Read](#)

Ziegler orders autonomous and electric delivery vehicles from the company Udelv.

(05.01.2022)

[Read](#)

Amazon stops field tests of its delivery robot Scout.

(07.10.2022)

[Read](#)

Apple chip maker TSMC to manufacture Tesla's new FSD hardware.

(23.11.2022)

[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced

Goods Transport & TaaS **NAR**

At a glance



Robomart has teamed up with a couple of companies to establish the **Autonomous Retail Collective (ARC)**, an ecosystem aimed at developing and advancing self-driving shops. Collaboration is key in the autonomous mobility space – therefore, Robomart is worth to 'watch-out'.

Latest news

Robomart unveils autonomous retail collective to propel self-driving shops.
(08.04.2024)

[Update](#)[Read](#)

L4 target































Not announced

Goods Transport & TaaS. Asia.












































Partnering & Value Chain, Level 4 Target & Latest News





































































Goods Transport & TaaS ASIA

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport	3 rd party HD Maps	Cloud	V2X & Others
   				   				 	Not announced		
											
  				  				 		Not announced	

















Goods Transport & TaaS ASIA

LAYER 1				LAYER 2		LAYER 3		LAYER 4		LAYER 5			
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider		Infrastructure			
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  	 			  		Not announced		      	     				
		 				Not announced		Not announced		Not announced			
 	 	 				Not announced		    	  		 		

Goods Transport & TaaS ASIA

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider		Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport		3 rd party HD Maps	Cloud	V2X & Others
<div>                              </div>	<div></div>	<div></div>		<div></div>		Not announced		<div> </div>	<div> SD maps – probably consumer vehicles only</div>			
<div>                     </div>	<div></div>	<div></div>		<div></div>		Not announced		Not announced		Not announced		
Not announced		<div></div>		<div></div>		Not announced		<div> </div>			<div></div>	
<div><div>Core Business</div><div>Partnership or supplier deal</div><div>Investment</div><div>Acquisition</div><div>Parent / Subsidiary</div><div>Update</div></div>												

Goods Transport & TaaS ASIA

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
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<div></div>	<div></div>	<div></div>	<div></div>	<div></div>		<div></div>		Not announced		<div></div>		

Goods Transport & TaaS

At a glance



Pony.ai is a leading player in L2+ solutions for OEMs as well as L4 robotaxi deployments. However, Pony **will jointly develop premium autonomous heavy-duty truck with SANY and Sinotrans**. They are among the pioneers in the Chinese self-driving truck market.



WeRide, initially focusing on robotaxi business, unveiled **China's very first L4 self-driving cargo van** in September 2021. While WeRide is a leader in China in terms of robotaxis, we are curious to see if they will take this position in the logistics space as well. The company also has a robosweeper in its portfolio.



Investments from Bosch, Nio and BAIC made Trunk.Tech known outside China. It is without question **one of the most promising startups** in the Chinese self-driving truck / freight haulage space.



Chinese startup with the **aim to build a nation-wide freight network** using autonomous trucks. Unlike other AV truck companies, **Inceptio initially focuses on L3**. However, Inceptio could possibly be a hidden champion among autonomous trucks with regard to full autonomy - at least in China.

Latest news

Pony.ai allowed to test Robotaxi, autonomous truck on Guangzhou's expressways.

(21.05.2024)

[Update](#)
[Read](#)

WeRide's Robovan permitted to conduct unmanned open-road test in Guangzhou.

(24.05.2024)

[Update](#)
[Read](#)

Autonomous truck solution developer Trunk.Tech bags hundreds of millions of yuan.

(07.05.2024)

[Update](#)
[Read](#)

Inceptio Technology delivers intelligent heavy-duty trucks to Huatai Logistics.

(06.05.2024)

[Update](#)
[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced

Goods Transport & TaaS ASIA

At a glance

SAIC



The **'intelligent driving control system'** is independently developed by SAIC. Beyond that, little is known about the trucks from one of China's largest automotive manufacturer.

NEOLIX



Nearly **1,000 Neolix delivery vehicles have been deployed** in nine countries and **over 40 cities worldwide**, with a cumulative mileage of more than 6 million kilometers by 2024. The shuttle may be compared with Nuro, which is currently focused exclusively on the US market.

DEEPRROUTE.AI



DeepRoute.ai **announced an autonomous medium-duty truck business line for urban logistics**. Having started a first commercialization project with Deppon Logistics, DeepRoute is **backed by Alibaba and its huge network** of ecommerce, logistics & community shopping, among others. Reads well.

KARGOBOT



KargoBot was launched during Auto Shanghai 2023 **by MaaS giant DiDi** and focuses on a pilot vehicle approach with a human driver onboard and multiple L4 trucks following its lead. We will closely trace KargoBot's development.

Latest news

Hesai Technology to deliver ADAS lidar for SAIC motor's new commercial vehicles.

(07.07.2023)

[Read](#)

Unmanned delivery vehicle developer NEOLIX bags 600 million yuan in Series C financing.

(27.03.2024)

[Update](#)
[Read](#)

DeepRoute.ai collaborates with DEPPON LOGISTICS Co., LTD to expedite commercialization.

(20.06.2022)

[Read](#)

KargoBot allowed to conduct L4 autonomous truck platooning tests in Beijing.

(24.05.2024)

[Update](#)
[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced

Goods Transport & TaaS ASIA

At a glance



DeepWay - a **subsidiary of Baidu** - plans to offer heavy Level-3-trucks by June 2023. The vehicles will have a range of 300 km, and in addition to a fast-charging function, it will also be possible to swap batteries in 6 minutes. The integration of fuel cells is targeted for the future.



After the **end of the Navistar partnership** and withdrawal of unprofitable routes from its autonomous freight network, TuSimple was eventually **left the US market by the end of 2023**. As a leading self-driving truck developer in the US, the focus will now be in the Asian market.

Latest news

DeepWay permitted to conduct cross-provincial autonomous heavy-duty truck pilot operations.

(08.03.2024)

[Update](#)
[Read](#)

TuSimple announces intention to delist from Nasdaq.

(05.12.2023)

[Read](#)

L4 target

2024-2026







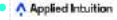









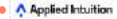


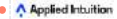



















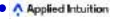

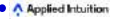

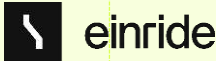

































Not announced

Goods Transport & TaaS. Europe.

Partnering & Value Chain, Level 4 Target & Latest News




























Goods Transport & TaaS EUROPE

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport	3 rd party HD Maps	Cloud	V2X & Others
 	 	 	  	DAIMLER TRUCK		Not announced		Not announced	  		
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Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary		Update	



















Goods Transport & TaaS EUROPE

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider	Infrastructure		
Sensors	Chips, SoC, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Physical & Administration	Virtual Fleet Management	Digital freight matching / Transport	3 rd party HD Maps	Cloud	V2X & Others
		 		 				  Uber Freight  			Not announced
						Not announced		Not announced			Not announced
 						Not announced		 			

Goods Transport & TaaS EUROPE

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		Self-Driving Ready Vehicle		Fleet, Hub & Tele Operations		Transport & Platform Provider		Infrastructure		
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Not announced		 WAYVE		 MAXUS				 ocado GROUP		 Microsoft		
								 dpd				
								 ASDA				
	 simple	 embotech*		CLEVON						 Microsoft		
		 STRADVISION										
		 driveblocks	 Applied Intuition		 pepper	Not announced		Not announced		Not announced		
		 Apex.AI			 SCHAEFFLER POWERTRAIN							
		 Tier IV										
												
<div>Core Business</div> <div><div></div> Partnership or supplier deal</div> <div><div></div> Investment</div> <div><div></div> Acquisition</div> <div><div></div> Parent / Subsidiary</div> <div><div></div> Update</div>												

Goods Transport & TaaS EUROPE

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										Not announced		
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						Not announced				Not announced		
												
												
												
<div>Core Business</div> <div><div></div> Partnership or supplier deal</div> <div><div></div> Investment</div> <div><div></div> Acquisition</div> <div><div></div> Parent / Subsidiary</div> <div><div></div> Update</div>												

Goods Transport & TaaS EUROPE

At a glance

Latest news

L4 target

DAIMLER TRUCK



DTNA's **Cascadia trucks with an integrated Torc AV stack** are already **hitting the roads in the US** with a targeted go-to-market by 2027. Currently, there is **no roadmap for the domestic market** yet.

Daimler Truck and TORC Robotics select Aeva to supply advanced 4D LiDAR technology for series-production autonomous trucks.

(09.01.2024)

[Read](#)

Not announced

TRATON



As TRATON's partnership with TuSimple came to an end, **Scania, MAN, and Navistar will now work together with Plus** to intensify the development of L4 self-driving trucks. The companies will focus on hub-to-hub operations – using the **same AV stack across all major TRATON brands** is a reasonable approach.

Plus and Scania, MAN, and Navistar partner to accelerate global commercial deployment of Level 4 autonomous trucks.

(12.03.2024)

[Update](#)
[Read](#)

Not announced

einride



The **Einride Pod** is unique from other self-driving trucks as there is **no driver's cab**. The pod currently operated in gated areas on fixed routes. Towards L4 with higher speeds on public roads there need to be leaps in development. However, Einride's ecosystem is unique.

DP World and Einride announce Middle East's largest deployment of electric, autonomous freight mobility, spearheading the region's sustainable transition.

(14.05.2024)

[Update](#)
[Read](#)

Target reached in gated areas only

VOLVO



The **"Volvo VNL Autonomous"** fully redundant truck was unveiled in 2024 and will be **powered by Aurora**. In addition, **Volvo invested in Waabi** and thus betting on a second horse. The approach seems to make sense in order not to be dependent on an SDS provider in its self-driving roadmap.

The Volvo VNL Autonomous — Proving the Way Forward.

(20.05.2024)

[Update](#)
[Read](#)

Not announced

Goods Transport & TaaS EUROPE

At a glance



Avride is the **rebranded, international division** of the robotaxi and delivery robot company **Yandex Self-Driving Group**. While international assets have been separated from Russian-owned Yandex assets, Avride said it's testing AVs (and probably the rover as well) in diverse ODDs across the globe, focusing on safety.



IVECO and Plus are jointly developing self-driving trucks and conducting **test drives on European highways**. **Pilot projects have already been announced** - so the two could be pioneers for autonomous trucks in Europe along TRATON.



Wayve does **not rely on HD maps** and **hand-coded rules** but **focuses on its deep and self-learning AI technology** based on cameras. The company raised \$1bn in 2024 to take its Tesla-like technology for self-driving to many carmakers. Let's see if delivery vehicles are still a targeted use case for Wayve.



ZF offers a **comprehensive portfolio for commercial vehicle automation** such as sensors and high-performance computers. While ZF has already **supplied L4 truck companies**, we are curious if ZF wants to become a full-stack provider with an own virtual driver - that would be ambitious as competition is strong.

Latest news

Yandex self-driving group rebrands its international division as Avride.

(04.08.2023)

[Read](#)

IVECO, Plus, dm-drogerie markt and DSV launch automated trucking pilot in Germany.

(15.11.2023)

[Read](#)

Asda and Wayve launch UK's largest self-driving grocery home delivery trial.

(17.04.2023)

[Read](#)

Clevon collaborates with ZF to orchestrate driverless last-mile delivery fleets.

(22.02.2023)

[Read](#)

L4 target

Not announced

Not announced

Not announced

Not announced

Goods Transport & TaaS EUROPE

At a glance



driveblocks develops a **modular; scalable AD software stack** for commercial vehicles. **It allows OEMs/Tier1 to integrate it with their vehicles and solutions in an open and flexible way.** The solution targets the EU market first and is a differentiating, but also ambitious approach compared to other players.



LOXO'S last mile delivery vehicle is reminiscent of some US and Chinese market players' solutions but is the **first vehicle of its kind made in Europe. Commercial success in Europe requires both a technically mature solution and a profitable business case.**



Goggo builds a European network for middle and last mile delivery services. Mobileye and Oxbotica have been signed up - concrete details on the delivery services (e.g., vehicle type) are not yet known. We are curious to see where Goggo will position itself in the future ecosystem.



Starship delivery robots completed **>6mn autonomous deliveries.** It is **unlikely that these robots will become widely accepted for last mile delivery.** However, there could certainly be use cases in gated areas. Being a pioneer in the robot delivery space, more and more new players have entered the market.

Latest news

TIER IV paves the way for highway trucking with innovative reference design.

(02.05.2024)

[Update](#)
[Read](#)

Innoviz and LOXO enhance strategic partnership, deploying LiDAR technology in zero-emission autonomous delivery vehicles.

(29.06.2023)

[Read](#)

Pascual makes the first delivery in Spain for hospitality with an autonomous robot by Goggo Network [ES only].

(31.05.2023)

[Read](#)

Tallinn-based Starship Technologies raises €83.6 million to make the robot delivery take over the streets.

(06.02.2024)

[Read](#)

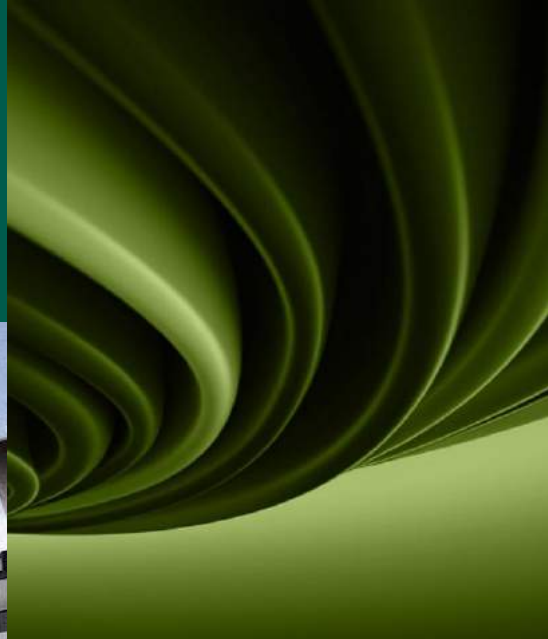
L4 target

Not announced

Not announced

Not announced

Reached at various locations



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SOFTWARE
CONSULTING