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SBD has prepared this report to understand at a regional level the differences in penetration for various types of ADAS and the technologies supporting these features.

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GI OBAI

Our forecasts provide a deeper understanding by estimating the technology and feature penetrations at an OEM level.

#### #815



Autonomous Vehicles

# L4 Autonomous Forecast

When it rolls out, the automotive landscape at large will already be greatly impacted by level 4 autonomy. This impact can be already felt across multiple sectors – with autonomous services being piloted, or launched, in different regions and more OEMs fitting more L4 features and systems onto their latest vehicles. Likewise, this level of autonomy will pave the way for new players while providing new opportunities for additional industry sectors – such as mobility and trucking.

Despite the prosperity of L4 autonomy, its evolution and eventual release relies heavily on a number of factors. For instance, any OEM, supplier, or company wishing to benefit from it will face a series of legal and regulatory challenges across several regions to ensure their systems are safe for use on public roads. At the same time, these players must also consider the best commercial practices for these systems to secure and maintain revenue as the ecosystem becomes more competitive.

The L4 Autonomy Forecast delivers comprehensive insights into the expected growth of fully autonomous vehicles and services across different regions and segments. It assesses which segments within L4 autonomy will generate the most opportunities over time, while understanding how it is expected to be deployed over the next decade.

POWERPOINT

PDF

COVERAGE FREQ

FREQUENCY

ANNUALLY

PUBLICATION FORMAT

EXCEL



120+



SBD

## Key questions answered

- > How many L4 vehicles will be deployed across different cities and regions in the next 10 years?
- > Which segments (robotaxi, shuttles, last mile delivery, trucks, etc.) will lead the way in L4 adoption?
- > How much revenue will the L4 market generate as a proportion of all transportation revenues?
- > Which L4 autonomy segments will generate the highest opportunities?





Product Planners





Q

C-Suite



Do I have access?



## **View Excel Data Sheet Sample**

14 Autonomous Forecast

delivers comprehensive insights into the expected growth of fully autonomous vehicles and services





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Data Deep Dive View and analyze deep data in your own way





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## Introduction

## Introduction

Ever since Alfred Vacheron invented the steering wheel in 1894, the steering wheel is one of the indispensable components in vehicles. However, it is being challenged today as L4 autonon vehicle services are deploying, and humans are now being prepared to give up control.

Although the transformation to automation has some promised socioeconomic merits such enhancing safety, efficiency, etc. in the long term. In the recent past there has also been a general recognition in the industry that the journey to delivering L4 is longer than anticipat

The purpose of the report is to evaluate the affecting factors in the way to deploy L4 autonomous vehicles in different regions and forecast the future market based on grounded analysis, and answer the following questions:

- How many L4 vehicles will be deployed across different regions by 2031?
- Which segments (robotaxi, shuttles, last-mile delivery, trucks, etc.) will lead the way in adoption?
- Which region will lead the way to deploying L4 vehicles and why?

This report mainly focuses on three regions which are dominating this sector (USA, Europe China), analysing the technical, regulatory, user acceptance and commercial factors for ma segments. Some other notable regions and technology trends are also included in the repo

This report identifies the major drivers and barriers for the six key motivations for the Autonomous Vehicle.



#### SAE Level 4 (the focus of this report) refers to autonomous vehicles that can operate without any driver interaction but within pre-defined parameters (geographical, weather conditions, etc). Full L5responsible Automation









LO

Automation

L2

Driver Assistance

automation

responsible

Driver



## We Listened and Invested In Our L4 Report to Align to Your Goals



"I sometimes struggle to relate conclusions from research reports to the Outcomes and KPIs that we are working towards..."

"I would like to see what has recently changed within a forecast or domain to help decide if any changes to strategy need to be made..."

"I can find it difficult to take actionable next steps on Guides without assessing the future direction of the industry..."

"It would be helpful to identify disruptive companies and startups to keep an eye for partnerships in the future..."

"I would like the topics to be more 'forward looking' to help with future planning and take advantage of enabling technologies."



Added an Autonomy **BIRDS-EYE VIEW** chapter with a high-level overview of all our Autonomous reports.

Added dedicated **ANALYSIS** section to provide an insight to the future of the industry

More **DATA-DRIVEN ANALYSIS** through our segment analysis and Executive Summary.

Pushed boundaries to launch the disruptive **NEW TITLE** L4 Autonomy Forecast



# Example slides from the report



## L4 autonomy to support four key segments in transportation networks

Autonomous	s Trucks	Aut	tonomous Public Transpo	rt
Autonomous trucks are those conducting journeys between freight hubs along pre-defined and pre-mapped routes, including freight yard automation (private operating area), truck platooning and automated semi-trucks		Autonomous pub large groups of p on the first/last-r includes campus bus and AV rapid	lic transport are those which r eople between transportation nile leg of their journey via Av microtransit, last mile microtr bus	moving hubs or /s, it ransit, AV
DriversBar• Cost savings• R• Driver shortages• C• High efficiency• I• Fewer accidents• V	rriers Road network Crossing borders Insurance/liability Vehicle approval	<ul> <li>Drivers</li> <li>Cost savings</li> <li>More coverage</li> <li>Less congestio</li> <li>Less emissions</li> </ul>	<ul> <li>Barriers</li> <li>Vulnerable use</li> <li>Managing liabil</li> <li>Low city budge</li> <li>Infrastructure</li> </ul>	rs ity ets
Goods			F	People*
Goods Autonomous Las	st-Mile Delivery	RC RC	pbotaxis	People*
Goods Autonomous last-mile delivery are from central hubs to homes and bu micro delivery robots and AV deliver	st-Mile Delivery those Delivering goods usinesses, including ery vans	Robotaxis are those their destination in segments like Mice robotaxis and pres	F <b>Dotaxis</b> se transporting individuals dire n automated taxis, it includes ro robotaxis, City robotaxis, la mium robotaxis with different	People* ectly to different arge

#### Learn more 📀

## nomy Forecast ovides an overview of the ments for L4 autonomy n this report as well as the parriers to deployment. The

t considers these segments, parriers and provides a ne USA, Europe and China

#### 9

## The question to be answered: what's in it for customers?



12 Demand

Stage

<u>1.0</u>

Gradually cultivate the customer awareness

**Testing** 



Improved customers acceptance within the operation zones



Large-scale operations, L4 autonomy become the favorable option for mobility demand

#### The automation of vehicles can give people:

Safer journey	Human mistakes are still one of the biggest reasons behind accidents and the autonomous vehicles will operate at speed limits
Lower cost	Once the business model is clearer, the cost of L4 AV services should be lower than manual services
Higher coverage	Some places that cannot be covered by conventional services (e.g. remote places) can be potentially covered by L4 AVs
More efficient service	L4 AV can provide more efficient service, including 24/7 services, etc.
New experience	New types of vehicle experiences and interiors, making travel more enjoyable

#### Without adequate development/deployment, some hurdles include...

Safety concern	While road fatalities are high now, every death in an AV will face added scrutiny, and removing human drivers will make some people feel less secure
Less accessibility	Some people with disability may find that using L4 AV services is harder, as no human drivers will offer help
Constrained route	In the early stage, autonomous vehicles are more constrained in terms of drop-off and pick-up
Less efficient service	Without human drivers, some inconvenient experiences may occur. For example, AV delivery services will require people to collect goods by themselves from the vehicles
Failure to achieve human- like trajectory	Not making autonomous vehicles human-like has mainly two drawbacks: 1) uncomfortable journeys for passengers 2) making the AV unpredictable to other human drivers.

## The journey of Robotaxis to achieve full deployment



regions

11

## Barriers in deploying autonomous public transport



#### Commercialization

Many campuses offer limited or no transit – so costs would be incremental if they choose to deploy autonomous transit. Also, The update of the current public transport infrastructure requires huge investment, e.g. bus stops, dedicated bus lanes, V2X RSUs, etc.

To deliver the longer-term success of autonomous public transport there needs to be greater levels of integration across government, operators, OEMs and technology companies, which is a complex task

#### Consumer demand

Operators currently depend on drivers to assist passengers with special needs or manage any situations that may occur between passengers, such as conflicts. The removal of drivers may result in a lack of support for these passengers, potentially causing them to feel more vulnerable and unsupported.

Due to the outbreak of pandemic, people would rely on the public transport less frequently, because of the mixture of health concerns and a trend towards work from home



#### Technology

The deployment of autonomous public transport requires cooperation with intelligent infrastructure, such as traffic management systems, which brings difficulties in data security, communication, etc.

#### Regulation

Today the liability for accidents can be placed on human drivers, and that include bus or shuttle drivers. Operators of AV public transport will need to consider carefully how to handle liability, particularly if they are partnering with 3<sup>rd</sup> party tech players.

In addition, there is a concern that the sensors and cameras equipped on autonomous buses may gather personal data of passengers and pedestrians, potentially leading to the use of such data for purposes beyond those originally intended. As such, there may be a need for regulatory frameworks to safeguard the privacy of individuals while utilizing autonomous buses

## China – Analysis/overview







#### Key pattern

- Commercial operations in some of the places
- Led by commercial vehicle OEMs

#### 32,436 Autonomous public transport vehicles Parc in 2031 10,226 Autonomous public transport new vehicles sales in 2031 2 Autonomous public transport pilots in China

Readiness forecast (to achieve "Full deployment level")

Commercializa	tion			
Dem	and			
Regula	tion			
Technol	ogy			

#### **SBD Viewpoint**

China is one of the leading countries in terms of deploying autonomous buses and started the fee-paying service back in 2021. The industry in China is strongly supported by China government from regulatory support to financial investment. One clear advantage China has in deploying autonomous public transport services is that China is still building infrastructure at a rapid speed and expanding the tech zones. In addition, the public transport market size is considerably larger in China than in other countries, which provides great potential to scale up the fleet.



## AV last-mile delivery technology trend

(1)

## Cheaper lidars bring bigger opportunity for the mass production of autonomous delivery vehicle

Lidars, Chassis and CPU are the three most expensive components of autonomous delivery vehicles, accounting for up to 70%+ of the total cost. Compared with other segments, the vehicles in autonomous delivery are more cost-sensitive, one example is that the GWM-backed HAOMO.AI announced the autonomous delivery vehicle "Xiao Moto 2.0" with the price of \$18K. The price of lidars have reduced significantly in the past few years, and it is expected as the widespread of autonomous vehicles in the future, the price of short-range lidars (less sensing requirement than other segments) might reach \$500 in the future.



#### Teleoperations remains important for corner cases

Although safety drivers are not normally required in autonomous delivery services, teleoperations keep playing a vital role in the operation of autonomous delivery vehicles to deal with corner cases in cities. The teleoperation centre must be considered in expanding the service and the cost will also be increased as the fleet expands.

## Sensor technology count required for high robustness levels: Each circle represents an instance of sensor required **AV Delivery Van Micro Delivery Robot** Cameras Ultrasonics Radars Lidars V2X HD maps Enhanced GNSS



# Request the price





### Do you have any questions?

If you have any questions or feedback about this research report or SBD Automotive's consulting services, you can email us at info@sbdautomotive.com or discuss with your local account manager below.



info@sbdautomotive.com

<b>P</b>	99		0	
UK	Germany	India	China	Japan

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