A global shift from pilots to implementation:

Autonomous mobility 2025

Contents

Foreword

‘Cities are evolving from building “smart” infrastructure to developing urban cognitive ecosystems that learn, adapt and earn public trust. As autonomous mobility implementation scales up from limited pilots to city-wide services, user acceptance is a fundamental design parameter—not an afterthought—established through building trust, proactive communication and transparent governance to offer everyday safe and convenient operations.’

—Hazem Galal, Partner, Global Cities and Local Government Leader, and Global Smart Mobility Co-Leader, PwC Middle East

‘Autonomous mobility has moved decisively beyond the pilot phase. The coming years will be defined by a survival battle among technology companies, where only those who deliver scalable, reliable solutions will thrive. For business operators, the window to act is now—early movers will secure operational expertise, shape industry standards and define the future of mobility.’

— Yuji Fujita, Director, PwC Japan

Executive summary

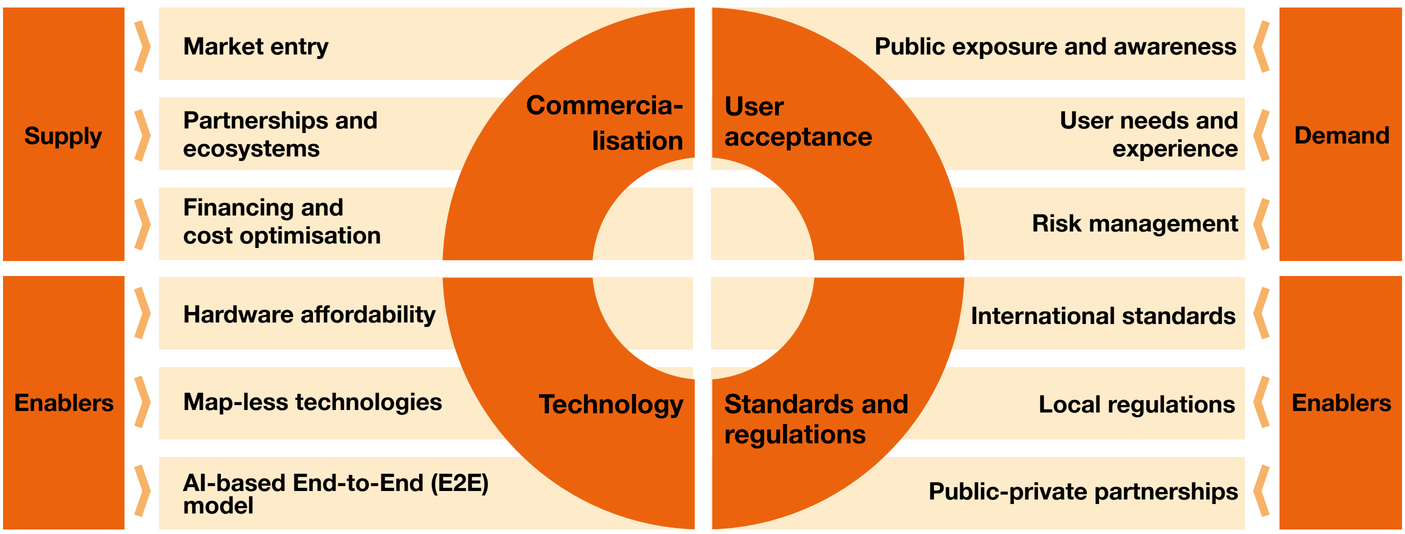
Autonomous mobility is shifting gears, evolving from experimental pilots to everyday reality, ushering in a new era where autonomous vehicles are no longer a distant promise but an emerging force on the streets.

To capture the magnitude of this progression, the starting point is an understanding of the five SAE-defined levels of driving automation, which outline the degree of automation and who remains responsible for driving tasks:

- Level 1: Driver Assistance
  - Either acceleration/braking or steering is partially automated. The driver is responsible for all driving tasks.
- Level 2: Partial Automation
  - Both acceleration/braking and steering are partially automated. The driver must supervise and remain responsible.
- Level 3: Conditional Automation
  - In specific environments (e.g., highways), the system handles all driving tasks. The driver must intervene if the system requests.
- Level 4: High Automation
  - In certain environments, the system performs all driving tasks without driver intervention.
- Level 5: Full Automation
  - The system handles all driving tasks in all environments—no driver needed.

To assess the advancement of autonomous mobility, we examine four elements that define the core drivers : commercialisation (market entry, partnerships, financing and cost optimisation), user acceptance (public awareness, user experience, risk management), technology (sensor affordability, map-less, AI), and standards and regulations (international standards, local adaptation, public-private coordination). Together, they shape the evolution and adoption of autonomous mobility.

Figure 1: Building blocks for autonomous mobility



- **Commercialisation of autonomous mobility is no longer theoretical.** Leading companies—particularly in the US and China—are taking technologies to market, establishing operating models for autonomous taxis, shuttles and, increasingly, freight. Other regions such as Japan and Europe are progressing, but regulatory timetables and cost structures still shape the pace. Early movers are accumulating the practical know-how that becomes hard to copy: route selection, fleet orchestration, remote operations, user experience and cost discipline.
- **User acceptance is the hinge on which scale turns.** Where citizens have firsthand exposure to autonomous services, willingness to ride and pay rises. Without proactive engagement—clear communication, ride opportunities, transparent safety reporting—operators risk backlash or retreat after incidents. Successful programmes bake public trust into service design, not as an afterthought but as a condition for growth.
- **Technology** is advancing on several fronts at once. Sensor costs are falling while capabilities improve, and AI driven End-to-End (E2E) approaches promise broader operational domains and faster development cycles. The signal is visible in growing autonomous driving distance and reduced intervention rates; yet edge-case performance and safety validation remain differentiators, favouring those with rich operational data and robust redundancy.
- **Standards and regulations are catching up with technological innovation.** UNECE WP29 is finalising Level 4 frameworks, and countries are aligning certification, permit and monitoring regimes. Where rules are clear, deployment accelerates; where they are nascent, operators must collaborate early with authorities to smooth irregular cases and build compliant services.
- Unlocking the full potential of autonomous mobility also demands coordinated action from every player in the ecosystem. Automotive OEMs, technology providers, transportation operators and government authorities each bring unique expertise and resources, but only through partnerships can the industry overcome challenges like cost, regulation and public trust. When these stakeholders work together, by sharing data, harmonising standards, piloting new services and engaging the public, they create the foundation for safe, scalable and sustainable autonomous mobility.

Introduction

Autonomous mobility is no longer a distant vision—it is rapidly becoming a reality on public roads around the world. This report offers forward-looking insights for industry leaders, policymakers and innovators who are shaping the next era of mobility by spotlighting the commercialisation, user acceptance, technologies and regulatory aspects that are reshaping how people and goods move.

While this report references global trends and includes figures from countries around the world, many of the case studies, cost analyses and operational insights are based on Japan-specific data and regulatory contexts. Readers should note that certain aspects—such as the estimation of autonomous driving service costs—may differ significantly in other countries due to variations in labour costs, regulatory frameworks and market maturity. Additionally, this report concentrates on autonomous mobility for service vehicles (such as buses, taxis and trucks) and private vehicles, with an emphasis on their deployment for passenger and freight transport on public roads. Off-road applications and sectors such as agriculture or mining are outside the scope of this analysis.

Transition from technical pilots to full-scale commercialisation is underway across all major markets.

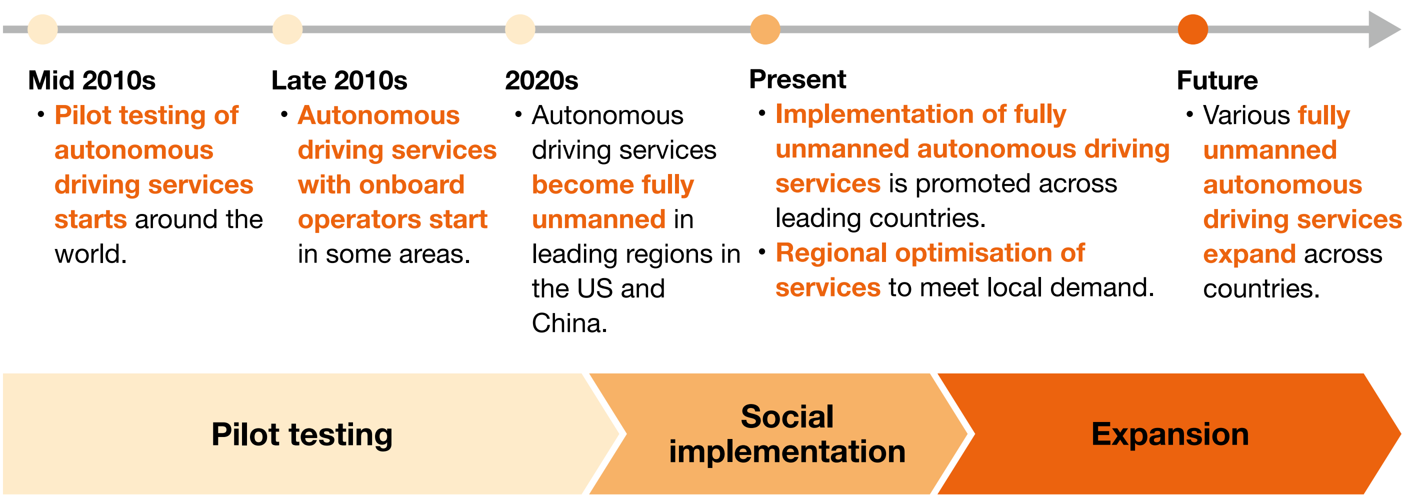
The global shift towards autonomous driving has been accelerating in recent years. Leading countries are transitioning Level 4 autonomous transport services for passengers and freight from ‘pilot’ to ‘implementation’. As services localise to meet regional demands, companies in the US and China are currently at the forefront of the industry.

Since 2018, autonomous driving has continued to advance in both technology and commercialisation through autonomous mobility services in cities across the US and China. The above service was initially provided with a driver on board; however, it has transitioned into a fully autonomous, driverless operation.

- Localised autonomous mobility services are becoming more established to cater to local traffic conditions and user needs, as described below.
  - The US: Autonomous taxis are leading the expansion
  - China: Autonomous taxis, buses and shuttles are expanding in parallel
  - Japan and Europe: Autonomous buses and shuttles are leading the expansion
- Autonomous driving is already transitioning from the ‘pilot’ phase, focused on technical verification, to the ‘implementation’ phase, which targets full-scale commercialisation.
- It is forecasted that the proportion of autonomous vehicles (level 3 or higher) among new car sales of small vehicles (passenger cars + commercial vehicles with a gross vehicle weight under 6 tons) will increase in all of the major markets (Europe, the US, China and Japan) (Figure 2).
- While the growth in Europe, the US and Japan is relatively moderate, it is anticipated that China will see rapid growth around the year 2030.
- Amid this transition, leading companies from the US and China are already leveraging their technological strengths to expand into countries such as Europe, the Middle East and Japan.

Figure 2: Transition from ‘pilot testing’ to ‘advanced implementation’

Autonomous driving services have been tested extensively across countries, and social implementation cases are emerging in the US, China and other leading countries.



Source: PwC

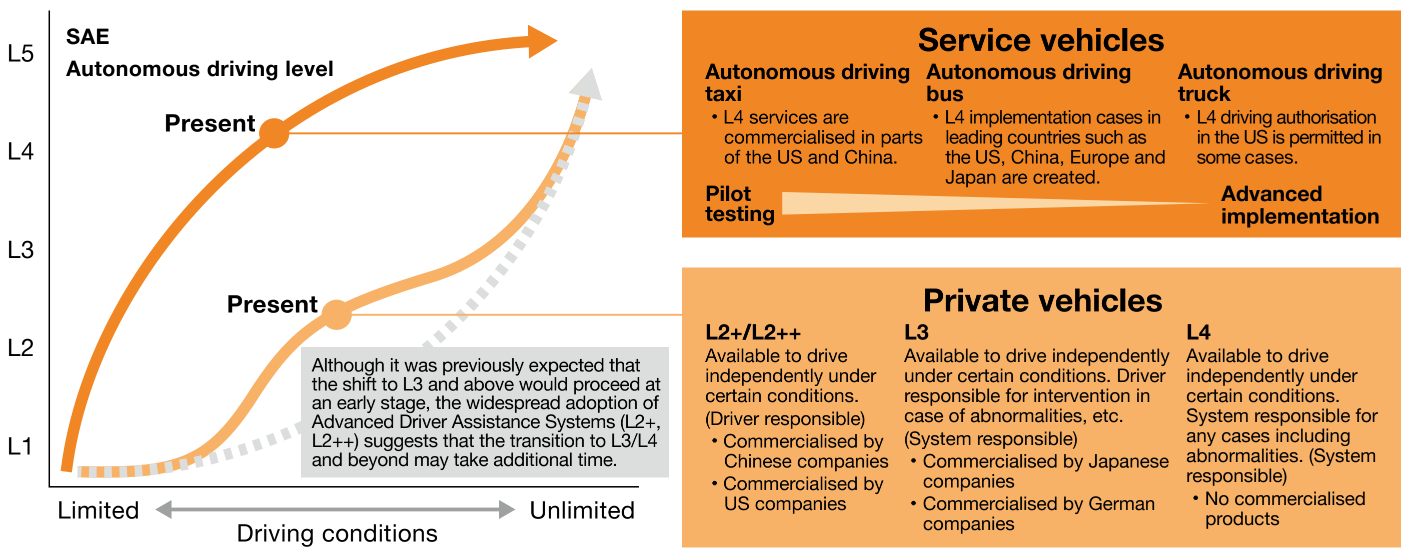
Distinct development paths exist as service vehicles are rapidly advancing towards Level 4 autonomy, while private vehicles are progressing more gradually.

While the social deployment of Level 4 autonomous driving is progressing in commercial applications such as passenger and freight transportation, advancements are also being made in private vehicles through Advanced Driver Assistance Systems (ADAS), such as Level 2+ and Level 2++, which build upon Level 2 autonomy.

- The approaches to autonomous driving are different for service vehicles and private vehicles.
- For service vehicles, technological advances and social deployment of Level 4 autonomous driving are accelerating. However, the progress of social deployment varies by service type. While many examples of autonomous taxis and buses have been implemented, the service coverage areas for autonomous trucks, which have been approved for Level 4 implementation in the US and China, are limited. It is expected that it will take some time before they can replace conventional services.
- Meanwhile, although automakers have released Level 3 autonomous vehicles for private use, their adoption remains limited due to the small number of models, high prices and the restricted conditions under which autonomous driving functions can be used. On the other hand, ADAS (Level 2+, Level 2++) are becoming increasingly widespread. These enhanced Level 2 systems appear to be temporarily satisfying consumer demand for higher levels of automation, suggesting that the transition to Level 3 and beyond may take additional time. Furthermore, certain US companies and emerging Chinese manufacturers are leading the development of Level 2+ and Level 2++ technology for private vehicles.

Figure 3: A leading shift towards autonomous driving of service vehicles

Autonomous driving in service vehicles is rapidly advancing towards Level 4, whereas in private vehicles, Advanced Driver Assistance Systems (ADAS) such as L2+ and L2++ are advancing.



*L2+/L2++ differ from SAE autonomous driving levels and are definitions of driving assistance system levels used independently by automotive OEMs in China. The driver is responsible for driving. L2+: Autonomous driving on highways, L2++: Autonomous driving on highways/general roads. The driver is responsible for intervening in the case of an abnormality.

Source: Created by PwC based on publicly available information

Commercialisation

Is commercialisation of autonomous mobility a fact or an aspiration? In leading markets, it is rapidly becoming a reality, as early deployments shift from pilots to operational services focused on efficiency, cost control and regulatory alignment.

High initial and operational costs—especially for vehicles, infrastructure and labour—are key challenges, with cost structures evolving as services scale from pilot to maturity phases.

Level 4 autonomous buses and taxis are being commercialised in leading countries, and service models are already being established. However, the high cost remains a barrier to wider implementation.

- The commercialisation status varies across the three main service types—buses/shuttles, taxis and trucks—depending on the country and service model. Buses and shuttles have already reached the implementation phase in the US, China, Japan and major European countries. For taxis and trucks, the US and China have already reached the implementation phase, while Japan and Europe are still at the pilot phase. In the US and China, it is common for domestic autonomous driving technology companies to lead implementation efforts within their own countries. In contrast, Japan and Europe often adopt a mixed approach, utilising both domestic and foreign vendors for pilot testing and implementation activities.

Figure 4: Global commercialisation situation

	Bus/shuttle	Taxi	Truck	Remarks
Japan	Commercialisation	Pilot	Pilot	-The shortage of bus drivers in public transport is a societal issue, leading to the government prioritising commercialisation of autonomous buses first. -Mainly domestic vendors are involved, with some international vendors planning to enter the market.
US	Pilot	Commercialisation	Pilot	-Federal AV policy is fragmented, with states setting their own rules; however, ongoing NHTSA engagement might shape safety frameworks. -Robotaxis have been commercialised in a few urban markets (Phoenix, SF), driven by mature tech platforms & supportive local policies. -Public perception & trust are mixed, especially around robotaxis, though shuttles & long-haul trucking have gained relative acceptance.
China	Commercialisation	Commercialisation	Commercialisation	-Through scenario-based support, multiple cities have launched commercial autonomous buses to reduce costs and improve efficiency. -Thanks to policy, infrastructure and tech advances, some enterprises have begun commercial Robotaxi operations. -Unmanned truck operations are limited to certain routes/scenarios without large-scale commercialisation.
Germany	Pilot	Pilot	Pilot	-Public transport is pushing ahead with the introduction of robot buses and robot shuttles.Schedules and implementation scenarios for after 2030 are already in place. Various manufacturers are working on this. -The Robotaxi business is being tested on the roads as a pilot application. -Autonomous trucking is also in the pilot phase for hub-to-hub concepts.

	Bus/shuttle	Taxi	Truck	Remarks
Switzerland	Pilot	Pilot	Pilot	-The new Ordinance on Automated Driving (AFV), effective from spring 2025, enables selected use cases to move towards regular operation. -The AFV allows for driverless vehicles on pre-approved routes, monitored remotely, which is a step towards commercialisation.
Norway	Pilot/ commercialisation*	N/A	Pilot	-Public Transit Authorities are leading the way in testing autonomous technology–Ruter has come the longest way. -Currently no autonomous taxi services are active. -Ruter's self-driving service is progressing towards commercialisation, with active public testing underway, but it has not yet achieved full commercial deployment.
UAE	Pilot	Pilot	N/A	-Dubai (regulatory & licensing authority RTA) and Abu Dhabi (DMT, SAVI - regulatory authorities) are in the pilot phases with WeRide, Uber and Cruise. -In Abu Dhabi, the Smart & Autonomous Vehicle Industry (SAVI) cluster at Masdar City, along with Abu Dhabi Mobility, are key entities involved in regulating and supporting the development of autonomous vehicles (AVs).
Saudi Arabia	Pilot	Pilot	N/A	-AVs are governed under the regulatory sandbox of the Transport General Authority. -Several pilot programmes have been carried out since 2023.

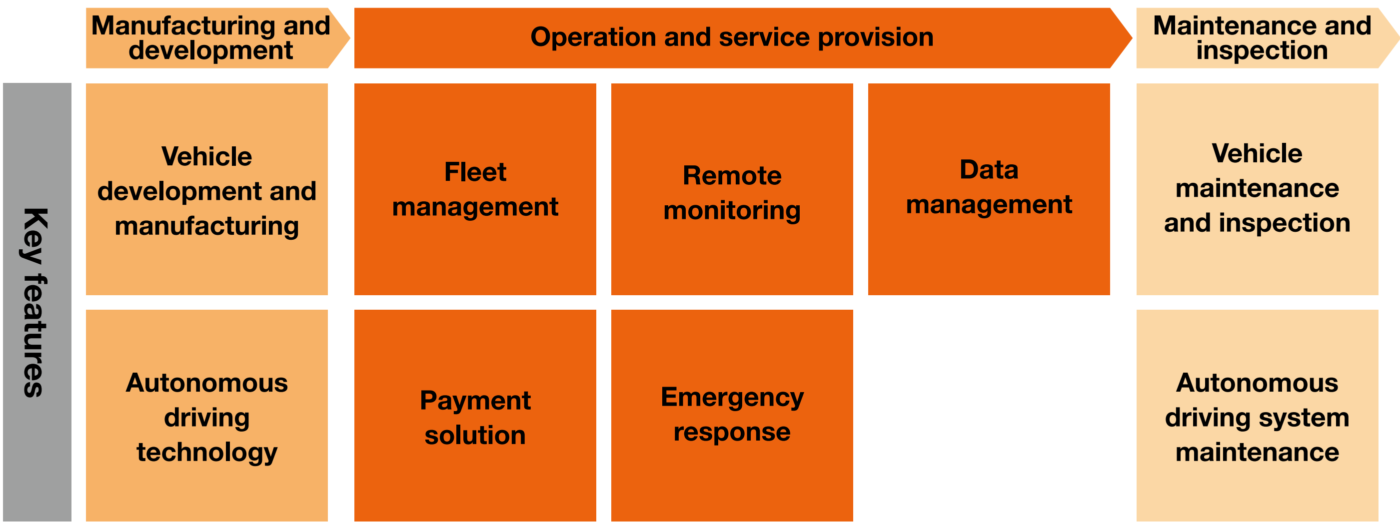
Pilot phase: Operating on public roads and providing services only for a specific period.
Commercialisation phase: Operating on public roads, targeting public and businesses, being a paid service and providing service 365 days a year.

Source: PwC

- When introducing autonomous driving services, additional functions such as remote monitoring and emergency response become necessary due to the absence of onboard drivers, in addition to vehicle maintenance and inspections that were essential during manual operation.
- Examples of key features
  - ◆Vehicle development and manufacturing: Development and manufacturing of vehicles with consideration for autonomous driving functions
  - ◆Autonomous driving technology development: Development of HW/SW necessary for autonomous driving, and development of HW/SW with durability and reliability that can withstand medium- to long-term service use
  - ◆Fleet management: Dispatch management system for autonomous vehicles based on the needs of transport operators and users, including integration with existing dispatch systems
  - ◆Payment solutions: Implementing payment methods such as QR codes and electronic payments that are compatible with unmanned vehicles
  - ◆Remote monitoring: Observing road conditions, vehicle status and detecting abnormalities inside and outside the vehicle while it is in motion
  - ◆Emergency response: Dispatching assistance during emergencies
  - ◆Data management: Aggregation and management of dynamic data such as accident information
  - ◆Vehicle maintenance and inspection: Regular and emergency inspections of autonomous vehicles
  - ◆Autonomous driving system maintenance: Regular maintenance and support for autonomous driving systems

Figure 5: Key features required for autonomous driving services

To implement autonomous driving services, it is essential to develop a comprehensive ecosystem that includes functions such as autonomous system development, operational management, remote monitoring and emergency response.



Source: PwC

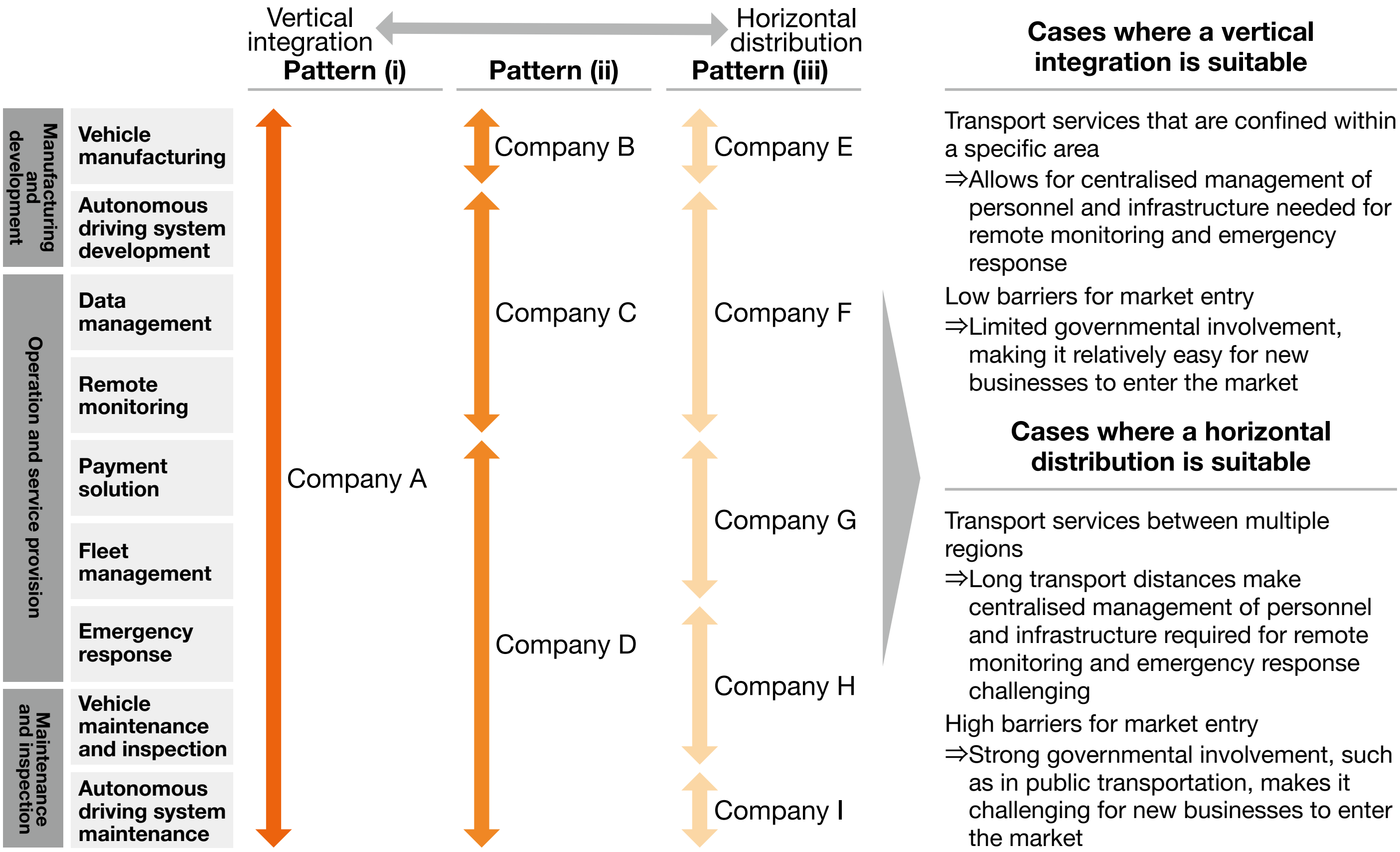
- As autonomous driving services move towards commercialisation, two business models are emerging: vertical integration, where a single company oversees all functions end-to-end, and horizontal distribution, where multiple companies share responsibilities across different functional domains. Different patterns can be seen in how tasks are divided in the horizontal distribution.
- The optimal business model should be selected based on regional factors such as local laws, traffic conditions and the presence of supporting service providers.

  ◆**Cases where a vertical integration is suitable**
  - When services are confined to a specific area, allowing for centralised management of personnel and infrastructure
  - When entry barriers are low due to limited government involvement or the absence of established players

  ◆**Cases where a horizontal distribution is suitable**
  - When services span multiple regions, making centralised management of personnel and infrastructure challenging
  - When entry barriers are high due to strong government involvement or the presence of leading players

Figure 6: Business models for autonomous driving services

As autonomous driving services move into the implementation phase, business models for these services are beginning to take shape. When entering the market, it is necessary to select a business model that aligns with the nature of the business.



Source: PwC

- One of the challenges in implementing autonomous driving services is the high cost. To identify and address cost-related barriers for implementation, it is important to define the major cost components associated with autonomous driving services and examine the revenue and cost structures for each service type. While automation may increase certain costs depending on the service model, these must be evaluated considering the benefits that autonomous driving can offer.
- Costs vary significantly based on the number of vehicles and the presence of drivers or crew. These expenses change across implementation phases. The ‘initial phase’ refers to Level 4 autonomous driving with few vehicles and onboard personnel, while the ‘maturity phase’ involves a large number of fully unmanned vehicles. This section also outlines income and expenditure structures for each service phase in the Japanese market.

◆Key costs in autonomous driving services

Initial cost

- Vehicle: Purchase of autonomous vehicles including the cost of developing autonomous driving systems
- Infrastructure: Installation of remote monitoring systems and related infrastructure equipment
- Other expenses: Risk assessments, mapping and related preparations

Operational costs

- System operation: Autonomous driving system license fees, cloud usage fees and server costs for simulations
- Insurance and fuel: Insurance premiums, fuel expenses and applicable taxes
- Inspection and maintenance: Regular inspections, maintenance and repairs
- Labour: Drivers, safety staff and remote operators
- Other expenses: Dispatch management system fees, highway tolls and miscellaneous fees

◆Shuttles and bus-type profit structure

Transition of profit structure with autonomous driving

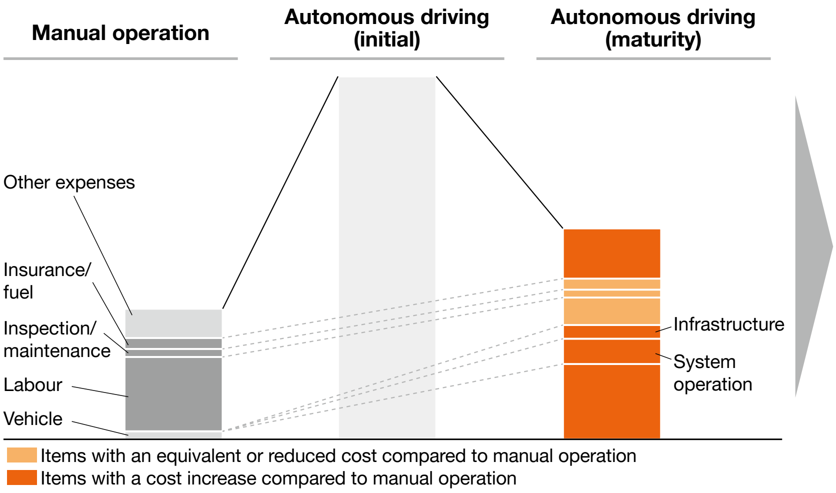
- In the initial phase, costs increase across all categories except for ‘inspection and maintenance’ and ‘insurance and fuel’ due to the transition to autonomous driving. In the maturity phase, labour costs will decrease as operations shift to unmanned driving. However, since the vehicles used are expensive and production volumes are low, significant reductions in vehicle costs are unlikely. As a result, overall costs are expected to be higher compared to manual operation.

Benefits of autonomous driving

- Bus and shuttle services are vital components of public transportation. Particularly in areas experiencing driver shortages, autonomous driving presents a viable solution to ensure the continuity of local mobility services. However, the additional costs associated with implementing autonomous driving cannot be managed solely by current transportation operators or through public support, such as subsidies from local governments. Therefore, collaboration involving private enterprises and local communities will be crucial to address these challenges effectively.

Figure 7: Cost of autonomous driving services [shuttles and buses]

High operating costs are undermining the business feasibility of autonomous driving services. Achieving sustainable service delivery will require aggressive cost optimisation, particularly in operations.



Transition of the shuttle and bus-type cost structure

Cost increase expected from automation

⇒Although labour costs will decrease with automation, the use of medium-to large-sized vehicles, along with the low production volume of buses limits scale benefits, meaning that reductions in vehicle costs and other expenses are not anticipated.

Benefits of autonomous driving

Public transportation service continuity in areas with labour shortages

⇒Bus and shuttle services are vital components of public transportation, particularly in areas experiencing driver shortages. In these regions, autonomous driving presents a viable solution to ensure the continuity of services.

Source: PwC

Figure 8: Cost reduction measures

- **Based on cost comparisons between the initial and maturity phases of shuttle and bus types**
- **Key factors contributing to per-unit cost reduction.**

Installation cost			Operational cost				
Vehicle	Infrastructure	Other expenses	System operation	Labour	Inspection/ maintenance	Insurance/ fuel	Other expenses
△ Cost reduction through sensor count optimisation	○ Cost reduction per-unit through increased equipment utilisation	○ Cost reduction per-unit through increased vehicles utilisation	△ Volume discounts through increased number of operating units	○ Optimisation of personnel allocation through increased number of operating units and advancements in remote monitoring technologies	△ Volume discounts through increased number of operating units	Lower insurance costs driven by decreased accident rates	△ Volume discounts through increased number of operating units

○ : High potential for cost reduction △ : Potential for cost reduction × : Low potential for cost reduction

Source: PwC

◆Taxi-type profit structure

Transition of profit structure with autonomous driving

– In the initial phase, costs increase across all categories due to high vehicle prices associated with the transition to autonomous driving. In the maturity phase, as technology advances and production scales up, vehicle costs are expected to decline. Additionally, automation will reduce labour costs, which constitute a large portion of manual driving expenses.

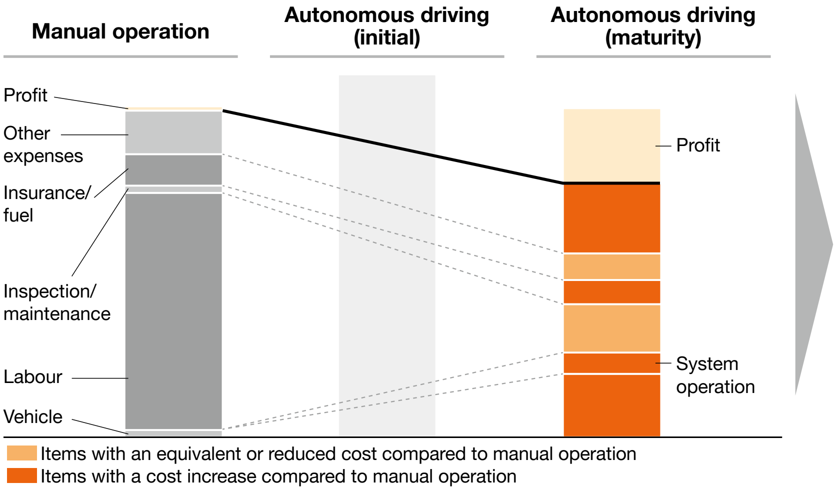
– As autonomous driving technology matures, the overall operational cost will decrease and lead to increased profitability.

Benefits of autonomous driving

– Considering the predicted labour shortage in some developed countries, autonomous driving could potentially maintain or even increase the number of vehicles in operation.

Figure 9: Cost of autonomous driving services [taxis]

High operating costs are undermining the business feasibility of autonomous driving services. Achieving sustainable service delivery will require aggressive cost optimisation, particularly in operations.



Transition of the taxi-type cost structure

Gradual cost decrease is expected from automation

⇒Autonomous driving may initially lead to increased cost. However, cost efficient operations will lead to lowering cost below current manual operations over time.

Benefits of autonomous driving

Increase of profitability

⇒Autonomous driving will increase the profitability by reducing labour costs, which constitute a large portion of manual driving expenses.

Sustained service in areas with labour shortages

⇒In areas facing a driver shortage in contrast to demand, autonomous driving allows for maintaining or increasing the number of vehicles in operation without the constraints of driver availability.

Source: PwC

Figure 10: Cost reduction measures

• Based on cost comparisons between the initial and maturity phases of the taxi type.
• Key factors contributing to per-unit cost reduction.

Installation cost			Operational cost				
Vehicle	Infrastructure	Other expenses	System operation	Labour	Inspection/ maintenance	Insurance/ fuel	Other expenses
○ Cost reduction through increased production volume and sensor count optimisation	○ Cost reduction per-unit through increased equipment utilisation	○ Cost reduction per-unit through increased vehicles utilisation	△ Volume discounts through increased number of operating units	○ Optimisation of personnel allocation through increased number of operating units and advancements in remote monitoring technologies	△ Volume discounts through increased number of operating units	△ Lower insurance costs driven by decreased accident rates	△ Volume discounts through increased number of operating units

○ : High potential for cost reduction △ : Potential for cost reduction × : Low potential for cost reduction

Source: PwC

◆Truck-type profit structure

Transition of profit structure with autonomous driving

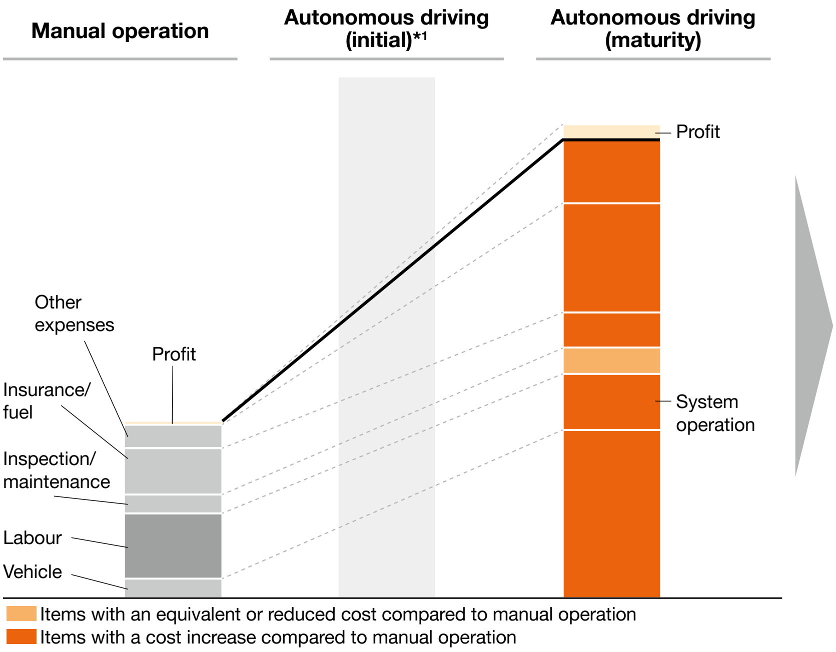
- In the initial phase, costs increase across all categories due to high vehicle prices associated with the transition to autonomous driving. In the maturity phase, as technology advances and production scales up, vehicle costs may decline moderately. However, due to extended operating hours enabled by full automation, total driving distance increases. As a result, costs such as insurance, fuel and tolls are unlikely to decrease, and overall expenses are expected to rise compared to manual operations.
- Conversely, operating around the clock enables increased transport volume, which is expected to boost the profitability of autonomous driving.

Benefits of autonomous driving

- In areas facing a driver shortage, it is possible to maintain or even increase the number of vehicles in operation.
- Continuous operation without being constrained by regulations on driver working hours or mandatory rest periods will be possible.

Figure 11: Cost of autonomous driving services [trucks]

Currently, high operating costs are undermining the business feasibility of autonomous driving services. Achieving sustainable service delivery will require aggressive cost optimisation, particularly in operations.



Source: PwC

Transition of the truck-type cost structure

Cost increase is expected from automation
⇒Autonomous driving is expected to increase costs compared to current manual operations. While labour cost savings are possible, their proportion within total costs is relatively small, making significant cost reductions unlikely.

Benefits of autonomous driving

Increase of profitability and transport capacity
⇒Autonomous driving enables around-the-clock operations, which is expected to boost freight transport demand and increase revenue. Profitability is expected to increase, even after accounting for the additional costs associated with automation.

Service continuity in areas with labour shortages
⇒In areas facing a driver shortage in contrast to demand, autonomous driving allows for maintaining or increasing the number of vehicles in operation without the constraints of driver availability.

Figure 12: Cost reduction measures

- **Based on cost comparisons between the initial and maturity phases of the truck type.**
- **Key factors contributing to per-unit cost reduction.**

Installation cost			Operational cost				
Vehicle	Infrastructure	Other expenses	System operation	Labour	Inspection/ maintenance	Insurance/ fuel	Other expenses
○ Cost reduction through increased production volume and sensor count optimisation	○ Cost reduction per-unit through increased equipment utilisation	○ Cost reduction per-unit through increased vehicles utilisation	△ Volume discounts through increased number of operating units	○ Optimisation of personnel allocation through increased number of operating units and advancements in remote monitoring technologies	× Faster wear and tear on vehicle components due to increase in total driving distance	× Increase in fuel consumption due to increase in total driving distance	× Increase in use of toll routes due to increase in total driving distance

○ : High potential for cost reduction △ : Potential for cost reduction × : Low potential for cost reduction

Source: PwC

Mass production and technological advances will lower initial costs for autonomous vehicles, but controlling operational costs is essential for sustainable growth.

In the future, mass production will bring down the price of autonomous vehicles and the cost of related services, which is expected to reduce implementation costs for the providers. However, to achieve sustainable services, it will also be necessary to control operational costs.

- As previously noted, the implementation of autonomous driving increases overall service operation costs, making cost reduction essential for broader deployment.
- The initial costs are anticipated to decline due to increased production volumes and technological advancements. In China, for example, cost reductions have been achieved through the production of relatively affordable autonomous vehicles designed with system integration in mind, as well as through improvements in algorithms and reductions in the number of onboard sensors.
- On the other hand, to promote broader deployment and long-term sustainability, it is also necessary to consider reducing operational costs.
- Of all operational costs, labour costs represent the most significant decrease associated with automation. However, by increasing the number of vehicles per operator through fleet expansion, reduced onboard staffing and optimised personnel allocation per vehicle, labour costs can be lowered. In China, improvements in communication technology and system design have enabled remote monitoring ratios of up to 1:20, contributing to reduced staffing requirements.
- Regarding other expenses, many are anticipated to decrease due to technological advancements and an increase in the number of vehicles in operation. To overcome the prolonged deficit period (often referred to as the 'Valley of Death') on the path to widespread adoption, it is critical to secure funding from national and local government subsidies, attract private sector investment and foster public collaboration.[1] (Refer to the column 'Autonomous driving of local public transport in smart cities: The importance of visualising and quantifying the social impact'.)

1 Reference: PwC, The importance of visualizing and quantifying social impact
https://www.pwc.com/jp/ja/knowledge/column/regional-public-transportation.html (only in Japanese)

Competitive advantage comes from superior technology, early customer acquisition and real-world operational expertise.

◆From a technological perspective, there remain significant differences between leading companies and followers in handling edge cases. Furthermore, in the UI/UX of service usage, the basic driving capabilities—such as moving, turning and stopping—are reaching a comparable level across the industry. On the business front, however, leading companies in the US and China are already advancing commercialisation. For companies considering entry into the autonomous driving market, it is advisable to enter early to accumulate operational expertise and expand their service networks in anticipation of broader service deployment.

- There are significant differences between leading companies that are advancing implementation and latecomers in the pilot phase. From a technological development standpoint, this gap is particularly evident in their ability to address edge cases and operate reliably across various conditions, including road environments and weather. From a service perspective, notable differences exist in UI/UX as well as in geographical service coverage.
- In the current implementation phase, the focus of competition among leading companies is on commercialisation. Leading companies in the US and China have already established service models and are promoting commercialisation across multiple regions. By providing services early on, they have achieved improved UI/UX and enhanced service quality for users.
- In autonomous driving services, competitive advantage and barriers to entry are expected to be established through the following mechanisms.

  ◇Gaining a competitive advantage

  1 Acquiring superior autonomous driving technology and services
    - Superior autonomous driving technology enables the company to cover a wide range of Operational Design Domains (ODD), contributing to enhanced safety, reliability and overall service quality.
    - For entities considering entry as a service provider, it is essential to partner with an autonomous driving technology company that possesses strong technological development capabilities.

  2 Establishing a customer base
    - By engaging in customer acquisition at an early stage, companies can build a solid foundation for future growth. This approach not only contributes to revenue expansion but also helps foster trust and gain a deeper understanding of customer needs.
    - In cases where direct engagement with potential end users is not feasible, it is important to collaborate with partner companies that have multiple points of contact with customers.

  3 Acquiring operational expertise for service deployment
    - By progressing through (1) and (2), companies can accumulate practical experiences in autonomous driving and acquire expertise related to operations and service delivery.

◆Building barriers to entry

Initiative to control prices and services

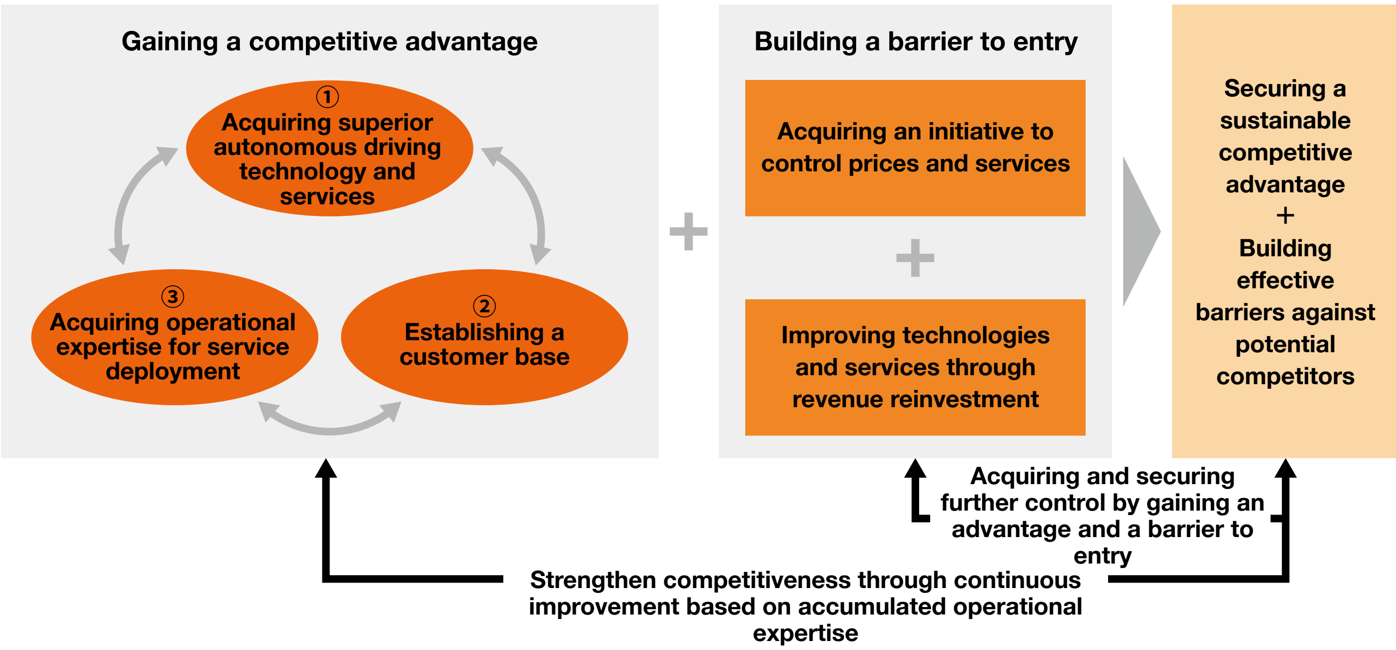
- As the scale of the business expands, the burden per unit and the procurement costs of autonomous vehicles and components will decrease.
- Reinvestment will enable further enhancement of operational capabilities and development of advanced network infrastructure.

Improving technologies and services through revenue reinvestment

- Revenue generated through the expansion of service volume and accumulated operational experience can be reinvested to further mature and enhance operational capabilities.
- By gaining strong negotiating power with affiliated service providers, organisations will be able to consistently deliver optimal services.

Figure 13: Gaining a competitive advantage and building a barrier to entry

Acquiring superior technology, services, customer base and operational expertise will secure a competitive advantage. It is possible to gain control of the market and build a barrier to entry by improving technology and services.



Source: PwC

Furthermore, in order to promote the broader adoption and expansion of autonomous driving services, coordinated efforts between the public and private sectors are essential. In addition to initiatives led by private players such as technological development and commercialisation, governments, municipalities and international organisations must contribute by establishing legal frameworks and standards related to autonomous driving. At the same time, efforts to build public trust and align services with user needs are crucial from the perspective of user acceptance.

User acceptance

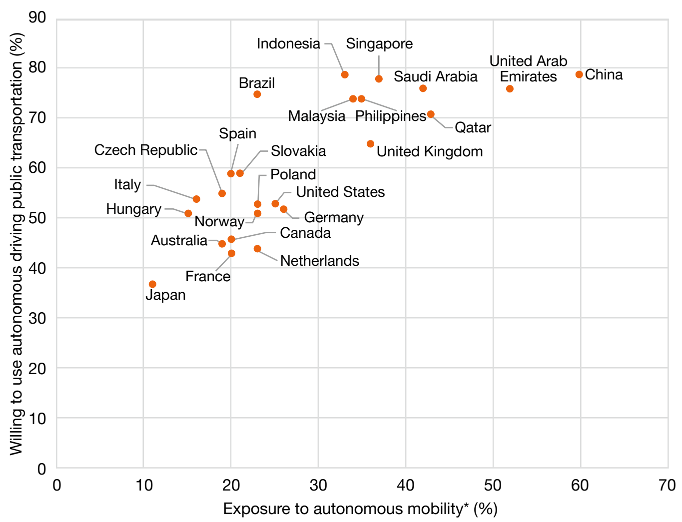
User acceptance is a key determinant of autonomous mobility adoption, yet public trust and willingness to use self-driving vehicles remain uneven and continue to evolve across markets.

Greater exposure to autonomous vehicles is linked to higher willingness to pay and adopt

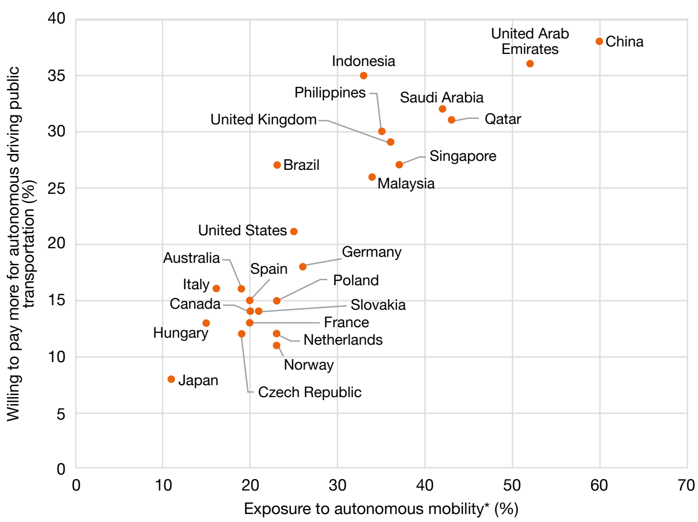
- There is a correlation between exposure to autonomous vehicles and both willingness to pay a premium and willingness to use autonomous public transportation. Countries with more real-world experience, such as China, show greater openness and are more likely to pay extra for self-driving services. This suggests that firsthand experience may help shape positive attitudes and boost consumer confidence in autonomous technology.
- Conversely, markets with less exposure, such as Japan and several EMEA countries, lag in both openness and willingness to pay. While the link between exposure and acceptance is clear, this does not prove causation. Other factors like culture, regulations and economics also play a role.
- It is important to recognise the limitations of the data. Exposure levels can vary significantly between regions—even within the same country. For example, cities like San Francisco have become hubs for autonomous mobility, with frequent public interaction and testing, whereas the United States as a whole still shows relatively low national exposure. This uneven distribution means that city-level familiarity may not reflect broader national sentiment, and conclusions drawn from localised data should be interpreted with caution.

Figure 14: Trends in countries with high exposure to autonomous mobility

Countries with high exposure to autonomous mobility tend to have higher willingness to use autonomous mobility



Countries with high exposure to autonomous mobility tend to have higher willingness to pay more** for autonomous mobility



*Percentage of people with experience using autonomous driving public transportation
**Compared to human driven autonomous mobility public transportation

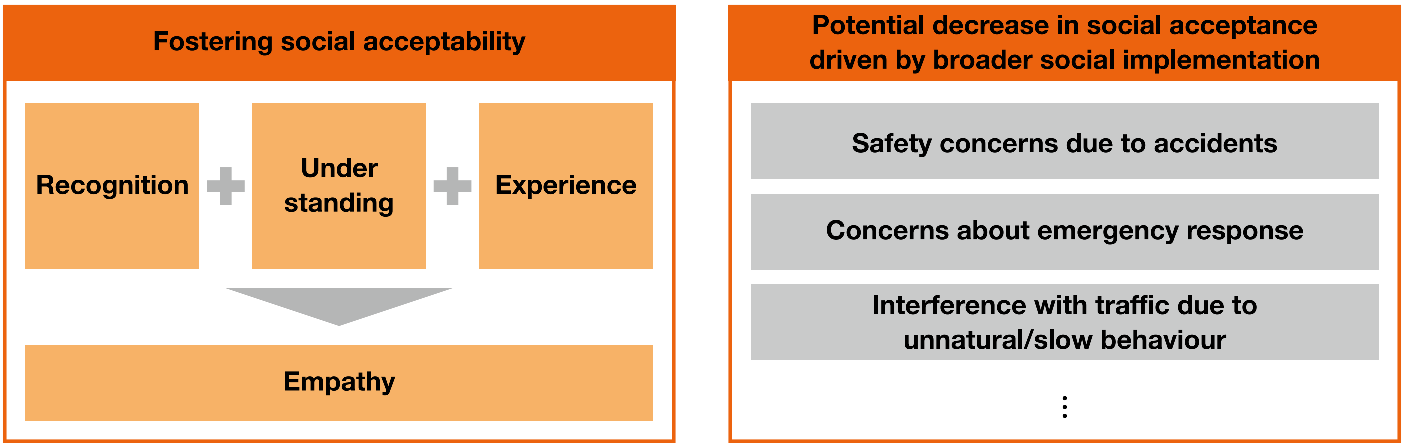
Source: PwC's eReadiness survey 2025

A well-balanced approach to technology and service rollout, combined with public engagement, is key to the sustainable adoption of autonomous mobility.

- While there are risks associated with expanding implementation without sufficient user acceptance, social deployment can also foster acceptance. Therefore, it is important to advance both in a well-balanced manner.
  - Implementing autonomous driving technologies while user acceptance remains low poses significant risks, such as potential citizen vandalism and the suspension or withdrawal of autonomous driving services due to serious accidents. Therefore, fostering user acceptance is essential for expanding implementation.
  - To cultivate user acceptance, it is crucial that autonomous driving becomes widely recognised, that future users understand the services and that they experience them firsthand. Through this process, users can empathise with the benefits offered by autonomous driving. Examples of initiatives aimed at improving user acceptance include:
    - ◇Recognition: Promoting awareness of autonomous driving services through newspapers and flyers for wider recognition
    - ◇Understanding: Explaining autonomous driving services using websites and seminars, and soliciting public comments
      - Why is an autonomous driving service necessary?
      - What are the advantages and disadvantages of autonomous driving services?
    - ◇Experience: Organising test rides, pilot operations and social deployments to allow users to experience autonomous driving
  - Conversely, during pilot or initial implementation phases, there is a risk that user acceptance may decline due to safety concerns arising from accidents or traffic disruptions caused by the unique behaviour of autonomous vehicles.
  - While expanding implementation without sufficient user acceptance entails risks, broader deployment itself can contribute to fostering acceptance, making it crucial to strike a balanced approach between implementation and public engagement.

Figure 15: Shift in social acceptance due to accidents

While expanding implementation without sufficient social acceptance entails risks, broader deployment itself can contribute to fostering acceptance, making it crucial to strike a balanced approach between implementation and public engagement.



Source: PwC

- Based on past driving records, there are cases that demonstrate that autonomous driving is safer than human driving, indicating that the level of technology is improving in terms of safety.
  - One of the key societal benefits of autonomous driving is the potential to reduce traffic accidents.
  - Recent advances in AI and sensing technology, as well as infrastructure coordination, have made safe driving possible in diverse environments. It is widely acknowledged that human error is responsible for approximately 90% of traffic accidents [4], and autonomous driving is expected to contribute to a reduction in such accidents. A comparative study between actual insurance claim data from autonomous vehicles developed in the US and vehicles operated by human drivers equipped with Advanced Driver Assistance Systems (ADAS) from a Swiss insurance company revealed that autonomous vehicles had an '88% reduction in property damage claims' and a '92% reduction in personal injury claims' compared to vehicles driven by human drivers. The validation results suggest that the technological level is advancing in terms of safety.

Figure 16: Reducing accidents through autonomous driving

Company A, which is developing autonomous driving, has announced a significant reduction in accident rates compared to human drivers.

Perspectives from various organisations on the safety benefits of autonomous vehicles

Automated vehicles are safer than those driven by humans in many driving situations, although accident rates are higher in certain situations, such as at dawn and dusk.

- University of Central Florida, US

It is estimated that 89.5% of fatal and injury accidents in 2018 could have been prevented if the vehicles involved had been autonomous vehicles operating at 100% system functionality.

- Japan Ministry of Land, Infrastructure, Transport and Tourism

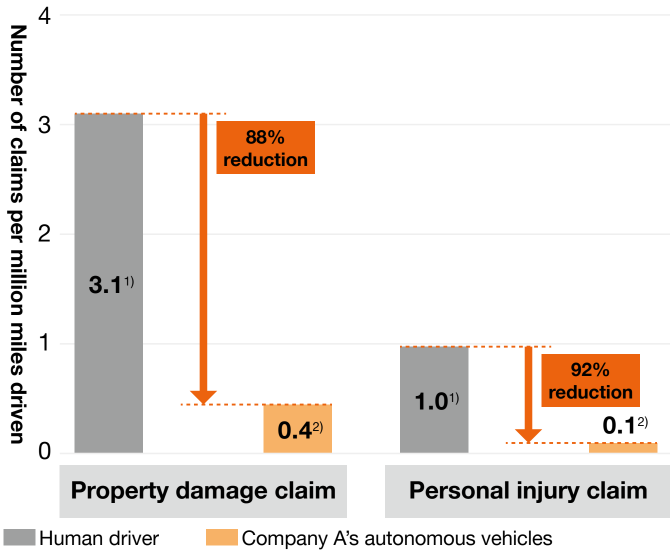
An analysis of data on road accidents that occurred in the USA between July 2005 and December 2007 showed that approximately 94% of the causes of accidents were attributable to human error.

- NHTSA, US

In more than a few million automated taxi journeys, the actual accident rate was 1/14th that of humans. Automated driving has great potential to reduce road traffic fatalities.

- CEO of a company developing automated driving systems

Comparison of compensation claim rates between human drivers and autonomous vehicles



1) Calculated based on damage claim data for non-autonomous vehicles held by Company B, a Swiss reinsurance firm.
2) Calculated based on actual damage claim data from vehicles operated by Company A, a US autonomous driving technology developer.

Source: Luigi Di Lillo, 'Do Autonomous Vehicles Outperform Latest-Generation Human-Driven Vehicles? A Comparison to Waymo's Auto Liability Insurance Claims at 25 Million Miles'

Technology

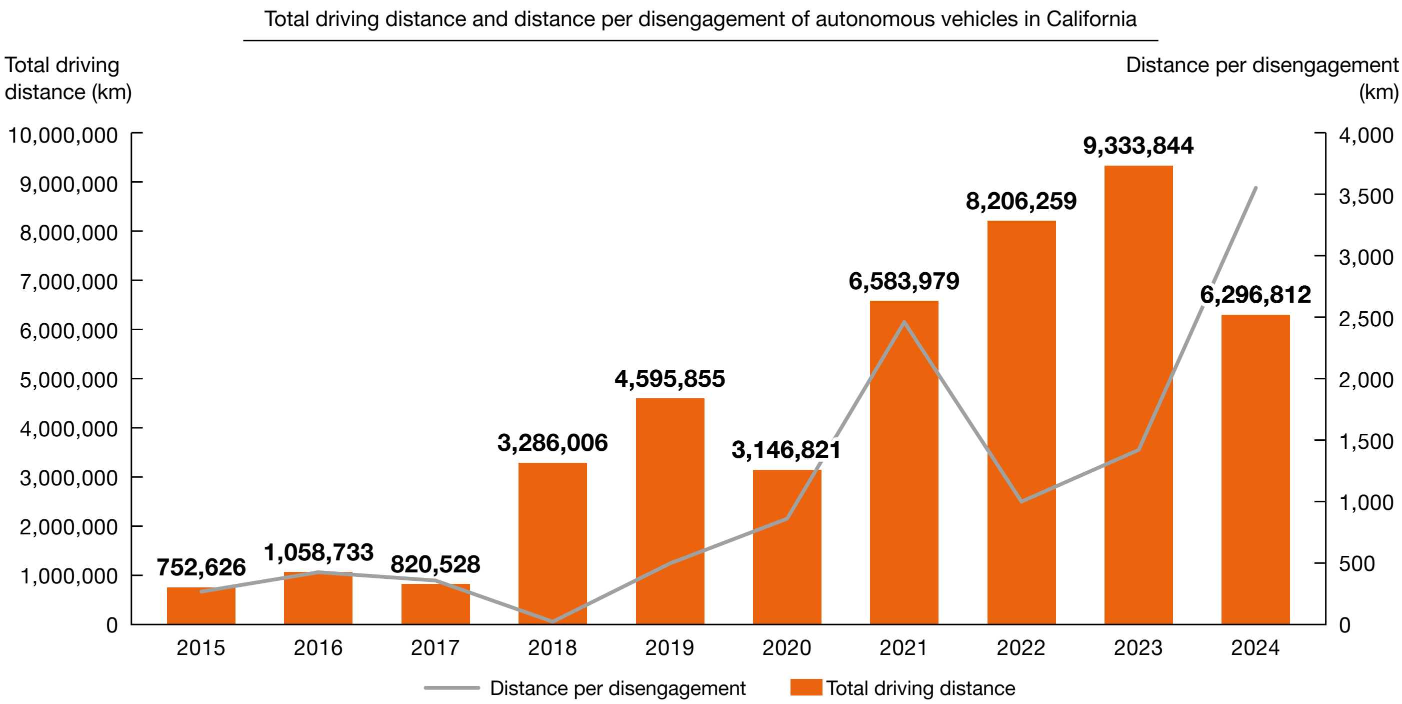
Rapid advances in autonomous driving technology, especially in sensors, AI and the integration of different approaches, are accelerating the commercialisation of self-driving vehicles and expanding their real-world capabilities.

Autonomous vehicles are travelling greater distances each year, reflecting steady technological advancement and growing maturity.

- Based on publicly available driving record data from a US government agency, the total distance travelled by autonomous vehicles is increasing, indicating that autonomous driving technology is advancing each year.
  - Global companies are actively developing autonomous driving systems. Indicators used to assess overall progress include 'total driving distance' and 'distance per disengagement' (calculated by dividing the total driving distance by the number of times human interventions are required). In California, US, where autonomous vehicles from various countries are in operation, both indicators show a gradual upward trend. This suggests that technologies across companies are maturing and progressing towards broader social deployment.

Figure 17: Advancement of driving technology

Both the total driving distance and distance per disengagement, which indicate the level of technological maturity, continue to show a gradual upward trend. This suggests that technologies across companies are maturing and progressing towards broader social implementation.



Source: DMV, Autonomous vehicles report, created by PwC

The data presented reflects autonomous vehicle operations in California and is based on reports from a small number of operators. While it shows promising trends, it represents localised testing—primarily in cities like San Francisco—and should not be interpreted as indicative of national exposure or readiness.

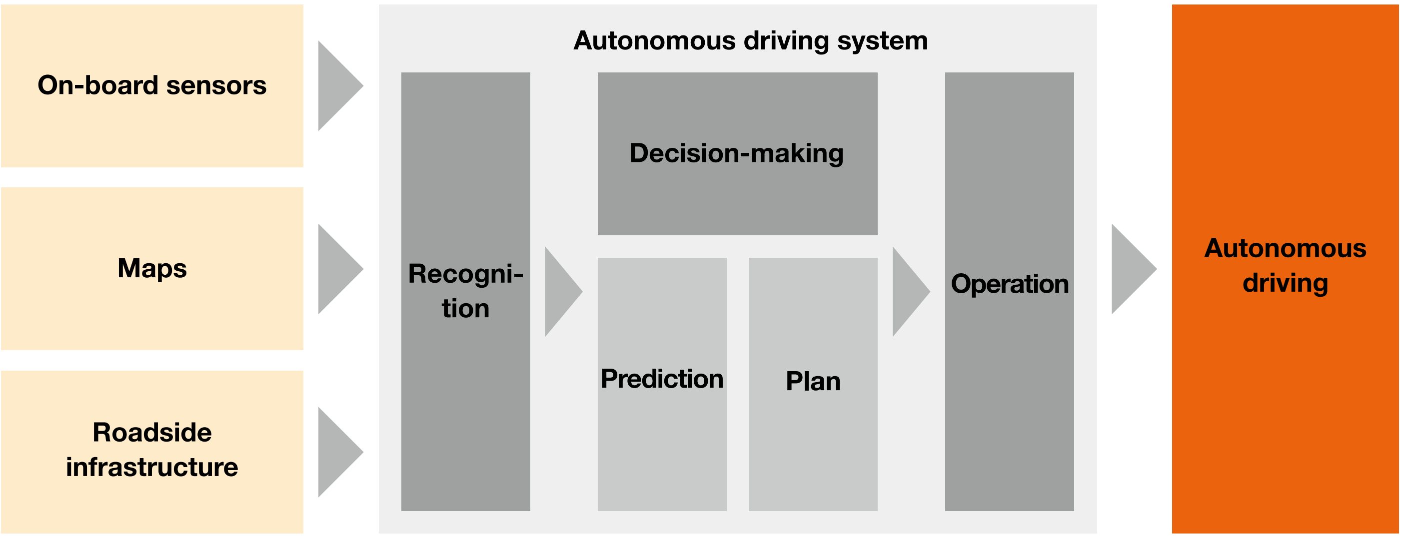
Affordable, high-performance sensors and AI-driven End-to-End (E2E) systems are accelerating the evolution of autonomous driving.

As in-vehicle sensors become more affordable, new AI-driven autonomous driving systems such as End-to-End (E2E) models are emerging. Once commercialised, these systems will contribute to expanding the Operational Design Domain (ODD), reducing development time and enabling improved service levels and cost reductions.

- Autonomous driving technology replicates the human driving process by replacing core tasks such as recognition, decision-making and operation. Recognition involves collecting data from onboard sensors (e.g. cameras, LiDAR, radar), roadside infrastructure (e.g. traffic signals, surveillance cameras) and high-definition 3D maps. Decision-making uses recognition data to predict environmental changes and generate driving plans. The operation executes these plans by issuing commands to the vehicle's driving and steering systems. In an autonomous driving system, these tasks are designed with redundancy, which enhances overall safety.

Figure 18: Technological components of autonomous driving

The following section outlines development trends in key components of autonomous driving, including onboard sensors, 3D maps and autonomous driving systems.



Source: PwC

- In recent years, these technologies have achieved significant advancements, particularly in in-vehicle sensors, which have seen improvements in performance and reductions in cost. Additionally, autonomous driving systems that do not rely on high-definition 3D maps, along with new AI-driven autonomous driving systems, are emerging. Once these systems are commercialised, they are expected to significantly contribute to the expansion of the ODD and the reduction of development man-hours.
- In-vehicle sensors
  - ◆ Detection capabilities have improved significantly in recent years, while costs have steadily declined. This trend is expected to continue, contributing to enhanced performance and reductions in overall vehicle pricing

Figure 19: Development status of key technologies | Sensors and maps

Sensors have advanced in both performance and affordability, reflecting steady development progress. In the mapping domain, NOA systems that enable autonomous driving without high-definition 3D maps are being implemented, particularly in the Chinese market.

	LiDAR	Camera	Radar
	Measures object shapes by reflecting light	**Recognises surroundings as 'images' using ambient light**	**Measures distance to objects by reflecting radio waves**
Technical features and trends	• The market is increasingly polarised between high-resolution, high-precision 3D sensing models and low-cost mass-production models that balance performance and price.	• Deployment of products with enhanced recognition range and nighttime detection is expanding, supporting ODD growth and improved autonomous vehicle services. • More products are shifting image processing from cameras to central ECUs to support SDV and centralised architectures.	• Development is focused on 'improving the accuracy of object detection', such as longer detection distances, larger viewing angles and finer angular resolution. • High-resolution imaging 4D radar capable of detecting dynamic and three-dimensional objects is being developed, mainly for L3 and above.
Use cases	• As L2+/L2++ become more widespread, LiDAR adoption in private vehicles is on the rise. Solid-state LiDAR is often chosen for these levels due to its balance of durability, reliability and cost-efficiency. • On the other hand, while rotating LiDAR was commonly used in L3+ vehicles, recent implementation has shifted preference towards solid-state LiDAR for better reliability and simpler operation.	• Even L2+/L2++ vehicles are now equipped with at least 10 cameras. • In contrast, L3+ vehicles are being designed for mass production, often consolidating multiple cameras into a single unit, preparing for social implementation.	• The adoption of 4D imaging radar is progressing, starting with high-end vehicles.

Source: PwC

- Map
  - ◆ In Level 2 autonomous driving, the implementation of Navigate on Autopilot (NOA), which does not use high-definition 3D maps, is progressing. NOA activates features to enable autonomous driving when a destination is set in the vehicle's navigation system. This technology utilises in-vehicle sensors and standard navigation map information to operate autonomous driving. Thus, it enables broader autonomous driving coverage across various environments.
  - ◆ China is currently leading in NOA deployment, with multiple automakers launching vehicles equipped with NOA under designations such as Level 2+ and Level 2++.
- Autonomous driving systems
  - ◆ Implementation of E2E systems in autonomous driving is steadily progressing.
  - ◆ Currently, most autonomous driving systems are developed using a rule-based approach, where engineers manually define driving rules. However, this method faces challenges in responding to unpredictable edge cases.
  - ◆ In contrast, the E2E model utilises generative AI models to handle a series of driving tasks, from recognition to operation. By training the model on diverse driving data, it can learn general driving principles, enabling autonomous responses even in edge cases without the need for manually defined rules, which also contributes to reducing development efforts.
  - ◆ Nevertheless, E2E systems present challenges, such as the difficulty of validating safety due to AI-based decision-making and increased power consumption at the edge. If these issues are resolved and full-scale implementation is achieved, E2E systems have the potential to be a game-changer in the field of autonomous driving. [2]
    (Refer to the column 'The emergence of autonomous driving 2.0 powered by generative AI'.)

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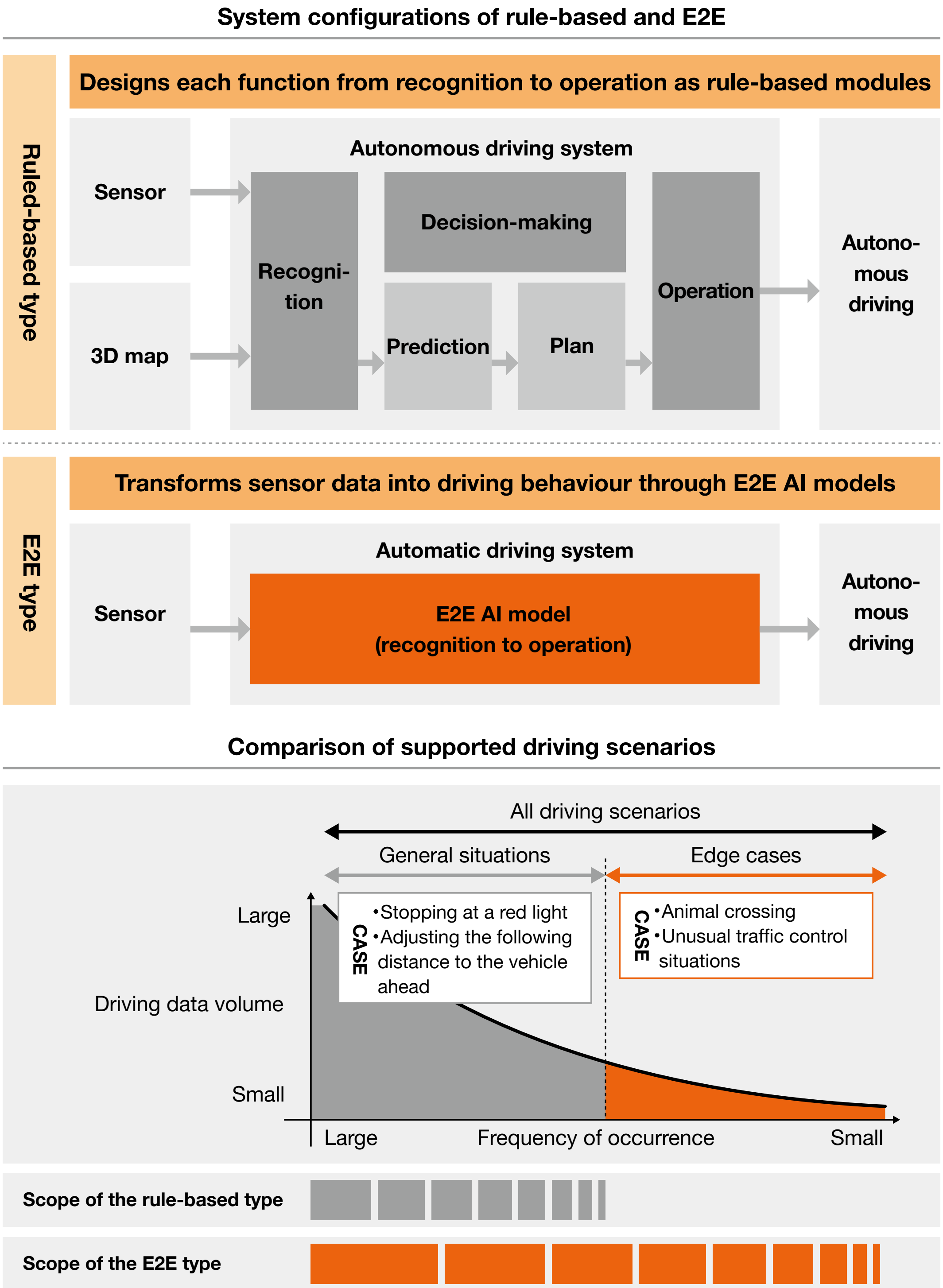
2 Reference: The Emergence of AV2.0 utilizing generative AI
https://www.pwc.com/jp/ja/knowledge/column/autonomous-vehicle-and-generative-ai.html (only in Japanese)

Figure 20: Development status of key technologies | Sensors and maps

In End-to-End (E2E) models, the use of AI enables a broader range of scenarios to be handled, allowing for wider autonomous driving coverage compared to traditional rule-based systems.



Source: PwC

Combining different technological approaches enhances autonomous driving safety through system redundancy and adaptability.

- Autonomous driving systems are evolving rapidly, with vehicles travelling greater distances each year and requiring fewer human interventions. This progress is driven by a variety of technologies, including high-performance sensors, rule-based algorithms and AI-driven End-to-End (E2E) models. Each method contributes uniquely to the system's ability to perceive, decide and act in complex environments. By integrating multiple approaches—such as combining sensor data with both rule-based logic and AI learning—developers can build systems with layered safeguards. This redundancy ensures that if one method fails or encounters an edge case, others can compensate, thereby enhancing overall safety and reliability.
- Moreover, while E2E systems powered by generative AI offer promising adaptability in unpredictable scenarios, they still face challenges in safety validation and energy efficiency. Rule-based systems, on the other hand, provide a stable foundation for predictable driving tasks and can serve as a training baseline for AI models. By leveraging both approaches, autonomous driving platforms can accelerate learning, reduce development time and maintain operational integrity across diverse conditions. This hybrid strategy not only improves fault tolerance but also supports broader deployment by balancing innovation with proven reliability.

Standards and regulations

As global standards for autonomous driving take shape, clear and coordinated regulations are becoming the launchpad for safe, scalable and accelerated commercial rollout worldwide.

Global standards for Level 4 autonomous driving are being finalised by WP29, with implementation expected to accelerate in markets that adopt these regulations.

WP29 is currently establishing international standards for Level 4 autonomous driving, which are scheduled to be formulated in June 2026. It is highly likely that laws and regulations reflecting these international standards will be established in each commercial area in the future. Automakers and autonomous driving system vendors will be required to comply with these standards. As these legal frameworks and standards provide a basis for development and service rollout, implementation is likely to advance more swiftly in commercial markets where such regulations are established ahead of others.

- Since 2015, the World Forum for Harmonization of Vehicle Regulations (WP29) under the United Nations Economic Commission for Europe (UNECE) has convened expert meetings on autonomous driving, with discussions aimed at formulating international standards.
- International standards for Level 2 were established in 2017, followed by Level 3 in 2020 (such as UNR157, the regulatory standards for automated lane keeping systems). Based on these standards, countries including Japan have issued approvals for Level 3 autonomous vehicles.
- As of April 2025, WP29 has agreed on the 'Safety Guidelines for Autonomous Driving Systems' applicable to Level 4 driving and plans to formulate international standards for Levels 3 and above, including Levels 4 and 5, by June 2026.
- Looking ahead, it is highly likely that laws and regulations reflecting international standards will be established in each country and commercial area. As a result, automakers and autonomous driving system vendors will be required to comply with region-specific regulatory frameworks. At the same time, these legal frameworks and standards provide a basis for development and service rollout, meaning that implementation is likely to advance more swiftly in commercial markets where such regulations are established early on.

Figure 21: International standard

WP29 is currently establishing international standards for Level 2 and Level 3 autonomous driving, with standards for Level 4 scheduled to be formulated in June 2026.

Timeline for developing international standards

SAE Level 2	2015	Expert group on autonomous driving established in WP29
SAE Level 2	2017	International standards for lane keeping assist functions (SAE Level 2) approved
SAE Level 2	2019	International standards for lane change assist functions (SAE Level 2) approved
SAE Level 3	2020	International standard UN-R157 (SAE Level 3) for vehicle line maintenance systems passed
SAE Level 3	2021	Amendments to UN-R157 (expanding the scope to include heavy-duty vehicles)
SAE Level 3	2022	Amendments to UN-R157 (increase in maximum speed limit and lane change function)
SAE Level 3	2024	Safety guidelines for safety performance requirements and evaluation methods for autonomous driving systems agreed by WP29
SAE Level 3	Jun 2026	International standards for autonomous driving at SAE Level 3 and above to be formulated

Source: PwC

Safety assessments, public road permits and ongoing monitoring regulations vary by country, but all require coordination between companies and authorities.

In leading countries, regulations related to the certification of Level 4 autonomous driving are being established. For irregular cases associated with autonomous driving, leading companies are actively identifying challenges and engaging in close coordination with relevant authorities. In order to achieve safer autonomous driving services, it is important that companies and authorities work together to advance preparations.

- As international standards continue to take shape, the status of legal and regulatory frameworks varies across countries.
- In leading countries, although the formats differ, regulations related to certification are gradually being established.

◆Safety assessment

US: Manufacturers self-certify compliance with the Federal Motor Vehicle Safety Standards (FMVSS).

China: Nationally designated third-party organisations such as CATRAC/CQC inspect products to ensure they meet relevant standards and technical requirements.

Germany: The Federal Motor Vehicle Authority (KBA) reviews the technical requirements and issues type approval.

Japan: The Ministry of Land, Infrastructure, Transport and Tourism inspects vehicles for compliance with regulations and issues type approval.

- ◆Public road operation permit
  US: Permits are granted by state motor vehicle departments. For example, in California, requirements include pre-application road testing and submission of safety assurance methods.

  China: Permits are granted by individual cities. The requirements in Beijing include over 240 hours, or 1,000 km, of pilot testing within the designated area.

  Germany: Permits are granted by local municipalities. If the vehicle has received type approval, the municipality with jurisdiction over the operating area issues the permit.

  Japan: Permits are granted by Prefectural Public Safety Commissions, which inspect and approve compliance with the Road Traffic Act.

- ◆Post-permit monitoring/revocation of permits
  US: Governed by state laws. In California, manufacturers are required to regularly report driving records and accident data. Permits may be suspended or revoked in cases of legal violations or safety risks.

  China: Manufacturers must share real-time driving data with municipal transportation bureaus. If a city identifies risks, corrective actions are required.

  Germany: The Federal Motor Vehicle Agency (KBA) conducts regular monitoring of approved vehicles.

  Japan: Prefectural Public Safety Commissions may suspend or revoke licenses in cases of legal or regulatory violations.

- Leading companies have been steadily advancing the implementation of autonomous driving by conducting thorough simulations during pilot testing to identify potential legal challenges associated with irregular cases. These identified issues are then addressed through close communication with regulatory authorities, ensuring a well-coordinated and compliant rollout.
- When considering the introduction or participation in autonomous driving services, close collaboration between companies and regulatory bodies will be key to ensuring safe and successful deployment from pilot testing to full implementation.

Figure 22: Global regulation trends

	Japan	US	China	Germany
Safety evaluation of the vehicle	**Type approval from the government**	**Self-certification system by manufacturers**	**National standards require autonomous vehicles to pass functional certification and safety certification for their intended functions**	**Type approval from the government**
Public road permit	**Permission granted by the prefectural public safety commission**	**Permission granted by the state motor vehicle department**	**Permission issued by the Ministry of Public Security**	**Permission issued by local authorities**
Monitoring/ reporting after permission	No reporting obligations	Manufacturers regularly report driving performance and accident information (California)	Test entities must submit periodic reports to regulatory authorities	The Federal Motor Transport Authority (KBA) conducts routine monitoring
Permit revocation	In case of legal violations or similar issues, **the prefectural public safety commission can suspend/revoke permissions**	**If the state motor vehicle department determines there is a violation of state law or a risk,** they can suspend/revoke permissions	The MPS may revoke permits for traffic violations, **safety risks or other serious social impacts**	The type approval can be revoked if violations of laws are identified or **if it is determined that there is a risk to human life**

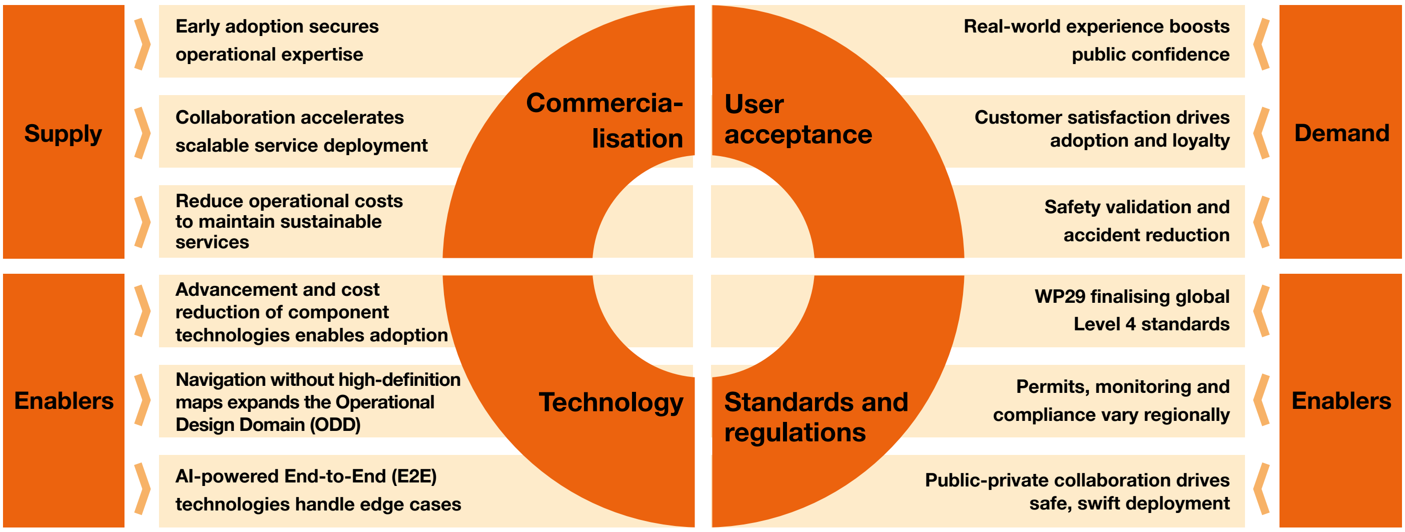
	Switzerland	Norway	UAE	Saudi Arabia
Safety evaluation of the vehicle	**Type approval based on international standards (UNECE/EU)**	**Type approval or exemption granted by the Norwegian Public Roads Administration (Statens vegvesen). A national approval scheme for testing autonomous vehicles is in place**	**Vehicles must be licensed by the Roads and Transport Authority (RTA), requiring the vehicle to pass the RTA's technical exams**	**Vehicles are certified by SASO (Saudi Standards, Metrology and Quality Organization)**
Public road permit	**Route-specific permit from the canton is granted. Detailed documentation of the operational domain and safety measures are required**	**Permission required from the Norwegian Public Roads Administration and local road authorities**	**Requires a special license from the RTA for any autonomous vehicle to operate on public roads, granted only after meeting strict safety and technical criteria**	**Autonomous vehicles on public roads are permitted only through regulated sandbox programmes under the Transport General Authority's oversight**
Monitoring/ reporting after permission	The AFV mandates that autonomous vehicles be supervised and reported by a Swiss-based operator	Regular reporting obligations exist. Operators must submit test reports and safety evaluations	The RTA monitors it through periodic performance assessments and can require the vehicle or operator to submit reports or undergo inspections	The pilot data must be shared with the regulator. The process for transitioning to commercial operations is not yet defined
Permit revocation	**Permits can be revoked by cantons** if safety or compliance risks arise	**Permits can be revoked by the NPRA** if safety risks or legal violations arise	**Non-compliance of the criteria** could lead to cancellation of the license	**Failing any of the sandbox requirements** can lead to permit revocation

Source: PwC

Conclusion

The global mobility landscape is undergoing a profound transformation as autonomous driving rapidly transitions from pilot projects to full-scale implementation. The global mobility landscape is being reshaped as autonomous driving moves from pilot projects to full-scale implementation, led by rapid advances in AI, sensors and operational expertise. Success depends on progress across four interconnected pillars—commercialisation, user acceptance, technology, and standards and regulations. Each is supported by supply and demand factors, and accelerated by enablers like cost reduction, expanded operational domains and public-private collaboration. Only by addressing these elements together can autonomous mobility achieve safe, scalable and sustainable deployment.

Figure 23: Autonomous mobility succeeds when commercialisation, social acceptance, technology and standards align



The way forward

Unlocking the full potential of autonomous mobility also demands coordinated action from every player in the ecosystem. Automotive OEMs, technology providers, transportation operators and government authorities each bring unique expertise and resources, but only through partnerships can the industry overcome challenges like cost, regulation and public trust. When these stakeholders work together by sharing data, harmonising standards, piloting new services and engaging the public, they create the foundation for safe, scalable and sustainable autonomous mobility.

Stakeholder	Actionable recommendations
Automotive OEMs	-Invest in scalable ADAS and by-wired platforms -Partner with tech providers for robust AI systems -Expand operational (service, maintenance, use cases) expertise through early deployment
Autonomous mobility technology provider	-Focus on interoperable, secure AI systems that can handle diverse operational domains -Accelerate development of End-to-End (E2E) autonomous driving models -Support open standards and data sharing for safety and efficiency -Develop and maintain collaborations with the automotive OEMs
Transportation operators	-Pilot integrated mobility services that combine autonomous vehicles with existing public transport -Optimise fleet management and remote monitoring capabilities -Collaborate with local authorities to address labour shortages and service continuity
National government	-Accelerate regulatory harmonisation in line with international standards (e.g., WP29 Level 4 guidelines) -Provide funding and incentives for pilot programmes and infrastructure -Foster public-private partnerships to drive innovation and user acceptance
Local government (transportation authorities)	-Support pilot programmes and public engagement initiatives -Facilitate permits and local regulatory alignment -Promote public awareness, education and firsthand experience with autonomous mobility

As autonomous mobility continues to evolve, the path forward will be shaped by the collective efforts of industry leaders, technology innovators, operators and policymakers. By embracing collaboration, investing in operational excellence and prioritising public trust, stakeholders can accelerate the transition from pilot projects to widespread, sustainable deployment. The journey is complex, but with shared vision and coordinated action, autonomous mobility can deliver safer, more efficient and more accessible transportation for all.

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