



# POLICY BRIEF

## AUTONOMOUS VEHICLES: A POTENTIAL GAME CHANGER FOR URBAN MOBILITY

### INTRODUCTION

*Imagine providing affordable, sustainable and convenient mobility options to all citizens including less mobile persons, the elderly, children and people living in suburban or rural areas. Autonomous vehicles (AVs) can help to build that future.*

### A NEW CHANCE FOR AN EVER-PRESENT PUBLIC TRANSPORT SYSTEM

Cities play a crucial role as engines of the economy, as places of connectivity, creativity and innovation. The arrival of driverless autonomous vehicles represents a unique opportunity for a fundamental change in urban mobility and could lead to healthier, more competitive and greener cities - but only if public authorities and public transport companies take an active role now and integrate AVs into an effective public transport network. **If employed as shared 'robo-taxis' and mini-buses as well as used to reduce car**

ownership through more effective car-sharing schemes, driverless AVs could dramatically enhance public transport. This paper details the challenges ahead and outlines a way forward for the introduction of autonomous vehicles in our cities.

Indeed, a future with autonomous and connected vehicles can have various outcomes depending on how they are to be regulated and used. Will they lead to even more cars on the road, more urban sprawl and more congestion? Or will they contribute to shaping sustainable and liveable cities, the regaining of urban space, less vehicles on the road and a higher quality of life?

Imagine providing affordable, sustainable and convenient mobility options to all citizens including less mobile persons, the elderly, children and people living in suburban or rural areas. Imagine these mobility solutions opening the way for decarbonisation, to enable your city to regain valuable urban space to be reallocated to green zones, economic activities or affordable housing and to provide flexible, around the clock on-demand transport that is safe and cost-efficient. Autonomous vehicles can help to build that future.



► Which future will you choose?

## LESS TRAFFIC, 80% FEWER CARS

Recent studies by MIT (New York), ITF (Lisbon) and the VDV (Stuttgart) have shown that it would be possible to take every citizen to their destination with at least 80% fewer cars!

Removing four out of every five cars would have a significant positive impact for cities and affects not only the environment, traffic efficiency, and parking but also frees up a lot of urban space. In many cities, on-street parking accounts for a vast amount of land, which could be freed for other uses. Fewer cars would also lower the cost of building and maintaining roads and generate less noise whilst having a smaller environmental impact.

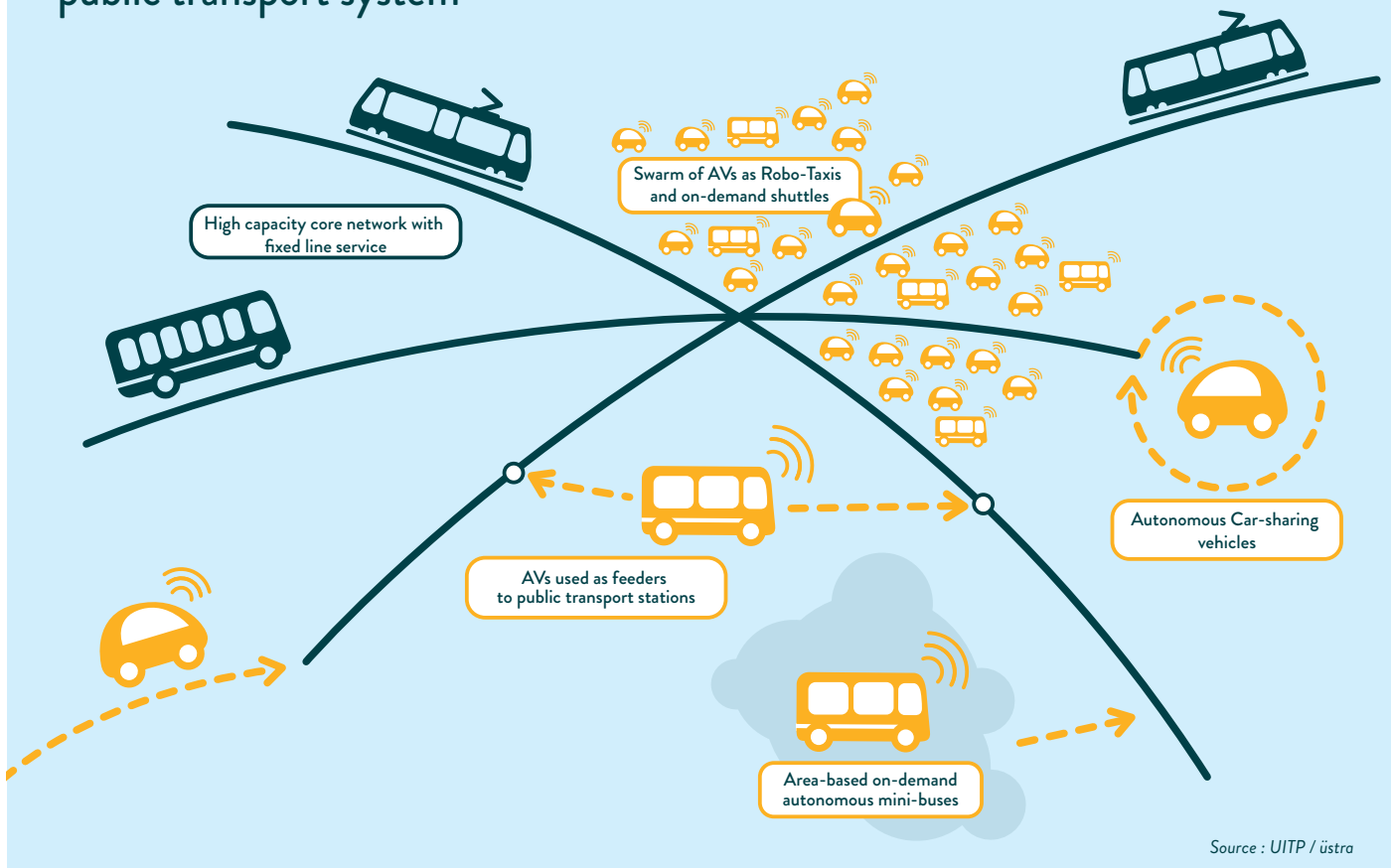
Driving patterns of vehicles could be algorithmically optimised, but most importantly: self-driving vehicles would also provide much

safer roads as today 1.2 million worldwide a year die in automobile-related deaths and 90% of the accidents are due to human error.

***BUT this will only happen if AVs are introduced in fleets of driverless shared autonomous vehicles of different sizes reinforcing an efficient high capacity public transport network supporting walking and cycling.***

Indeed, the above-mentioned studies clearly state that these results are only obtained if autonomous vehicles are shared and they complement an efficient high-capacity public transport system. Public transport is and remains the only solution able to fulfil the lion's share of trips by using a minimum amount of space in dense urban environments and enabling people to travel in a time-efficient manner.

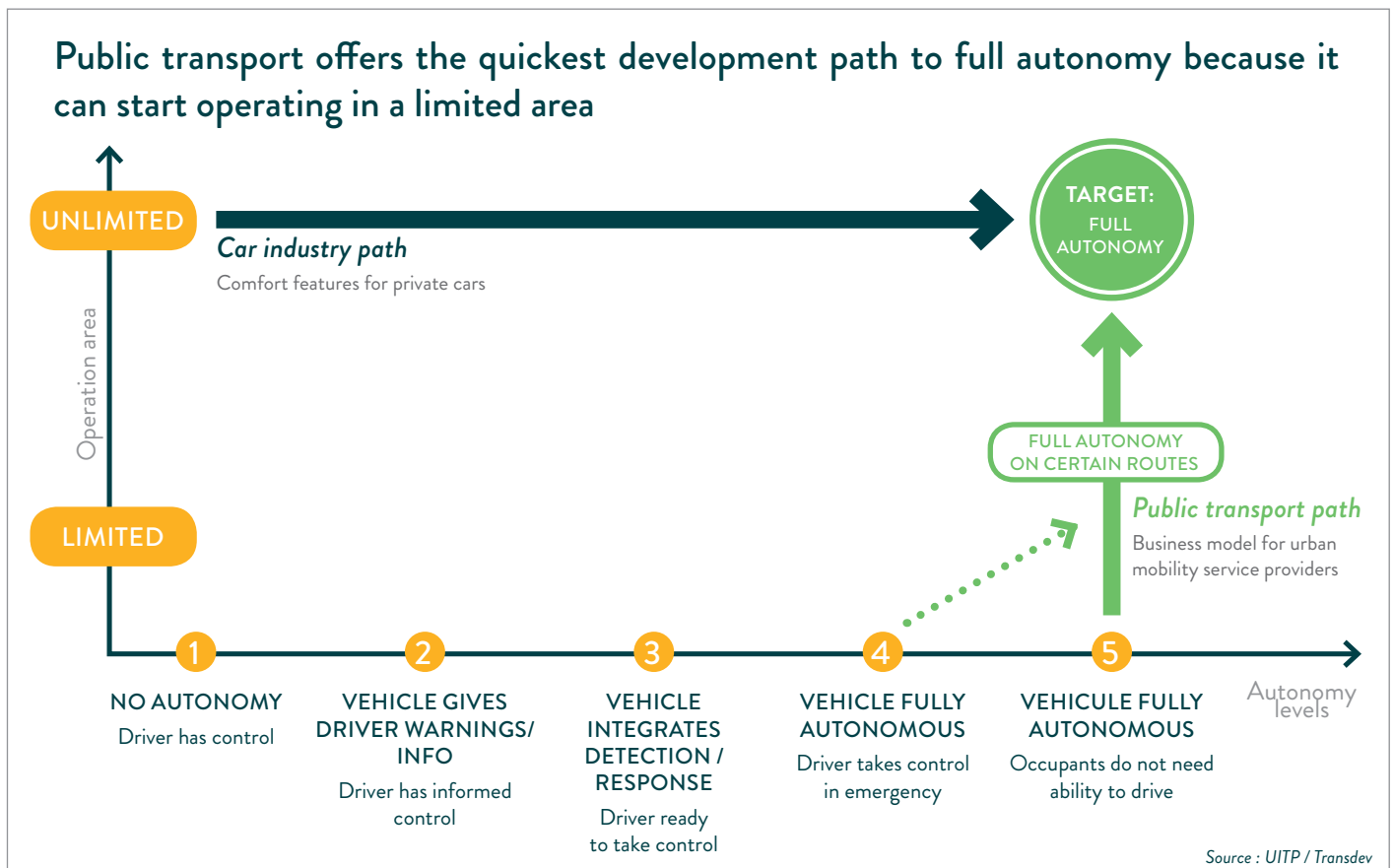
## Possible applications of autonomous vehicles (AVs) as part of a diversified public transport system



The decisive factors that will determine the realisation of the above vision are the shared usage of AVs in fleets and the use of fully driverless operation. If fully automated operation cannot be accomplished, AVs will NOT be able to form a new mode of transport and thus could NOT enhance existing public transport. Therefore cities and countries must actively shape the introduction of AVs now to prepare the authorisation of driverless operation. An integrated effort of all authorities concerned (mobility, road safety, urban planning, traffic control, etc.) must be put in place. Otherwise we will miss the chance for a fundamental change in urban

mobility and end up in a scenario where vehicle automation will even further increase the amount of private car and vehicle miles travelled with all the associated negative externalities.

2016 has seen many trials of autonomous vehicles of different sizes and things are moving very fast as – according to various estimations - fully autonomous cars are predicted to become available in the early 2020s.



Since June 2016, Swiss operator Carpostal – Postauto operates two electric autonomous shuttles for passengers in the city centre of Sion on a 1.5km circuit. Carpostal-Postauto aims to test the public acceptance, the integration of autonomous shuttles in pedestrian zones as well as offering additional services where no public transport services existed before.



For Keolis, AVs are a groundbreaking innovation, transforming the city. In Lyon, an autonomous shuttle service has been running on the banks of the river Saône since September 2016, providing easy access to businesses, as well as dining, entertainment, and shopping areas. Designed with intermodality in mind, the shuttle service is situated just a few metres from the tram stops serving the Confluence eco-district.

Although it seems clear that AVs are coming, we do not know yet how they will be rolled out as this also largely depends on how they will be regulated. The following SWOT analysis shows the strengths, weaknesses, opportunities and threats that shared AVs represent for the future of our cities:

## STRENGTHS

- Provide additional efficient public transport services (high frequency or on demand) during extended operating hours at lower cost
- Social inclusion: more mobility options for all (elderly people, disadvantaged communities, children, less populated areas)
- Solutions for Last-Mile, Door-2-Door, neighbourhood- and feeder services,
- Chance for decarbonisation: introduction of e-mobility
- A chance to re-frame how public transport is used and viewed by the public
- AVs as car- and ride-sharing will reduce parking pressure and car traffic

## WEAKNESSES

- Ability of the public sector to invest in new technologies, lack of speed for innovation and lack of skilled workforce
- Direct services with smaller vehicles could weaken mainline public transport services, walking, cycling
- Significant change only through higher vehicle occupancy
- Special vehicle equipment and development needed for public ride-sharing services (wide doors, room for luggage, communication eg. vehicle to passenger, passenger to control center...)
- Most car-owners are not used to car- and ridesharing and will not accept these forms of car-use naturally
- So far, low speed, low capacity and very “cautious” driving behaviour

## OPPORTUNITIES

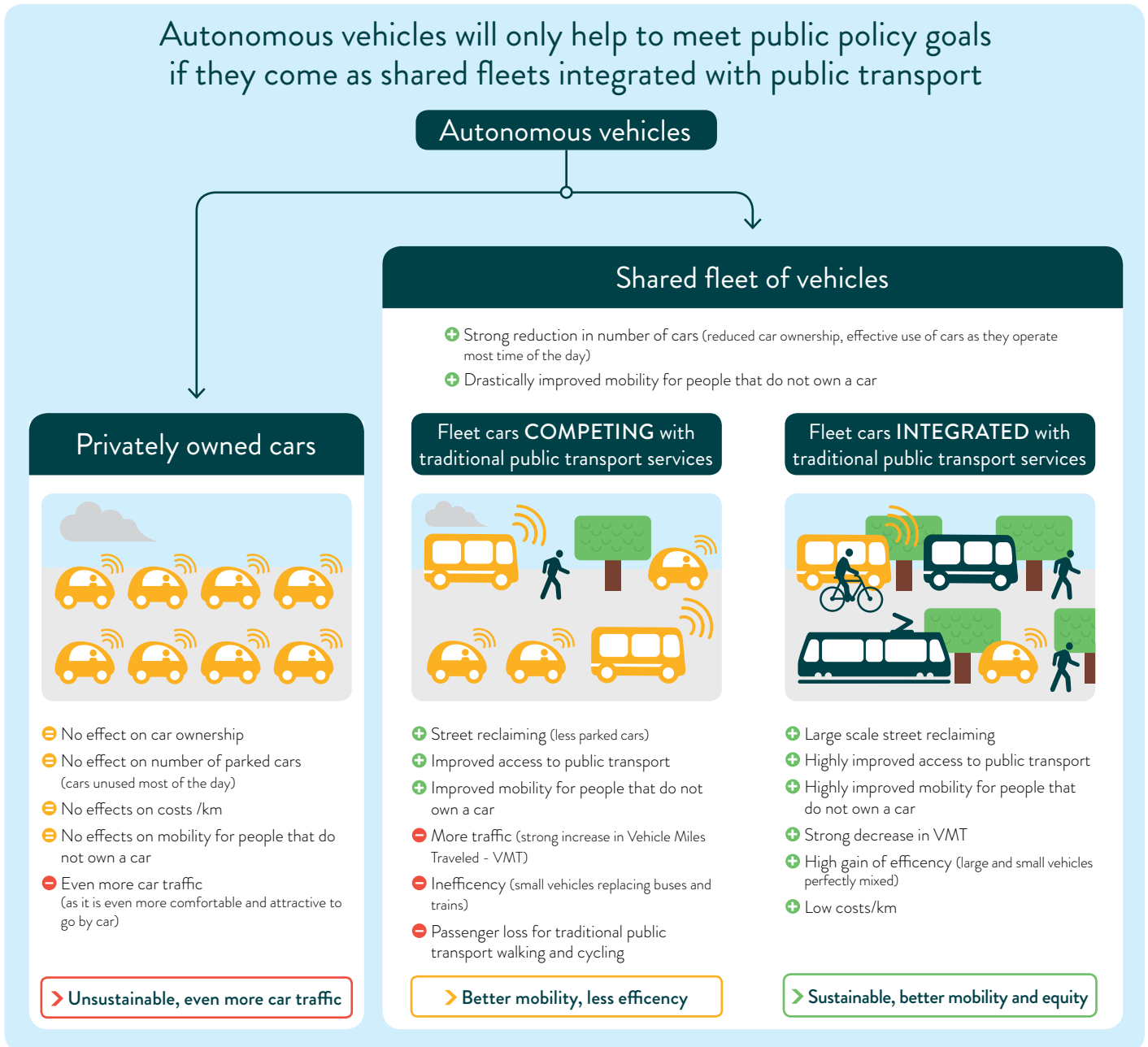
- Chance for public transport to become a real mobility provider and the digital integrator with all the opportunities of the value of data, CRM & traffic control
- Enhanced planning of mobility infrastructure
- Chance for new business model for urban mobility, for instance through time-sensitive pricing instead of flat rate
- Increase in jobs with more customer-oriented functions (proactive mobility assistant instead of invisible bus driver?)
- Chance to implement Mobility as a Service Platforms
- AVs as carsharing-cars as a door-opener to increase the number of shared trips
- Regaining urban space through reduced parking needs and shared use of AVs

## THREATS

- Limits in technology or lack of public acceptance could prevent driverless operation within the foreseeable future
- Traffic volume increase through empty AV cars
- Private cars being replaced by private AVs, making congestion more bearable leading to additional car ownership and urban sprawl
- Reduction in number of driver/chauffeur jobs
- AVs as robo-taxis are a business opportunity for private firms (Uber, Google, Amazon, car-manufacturers). This could lead to the privatisation of urban transport services with a loss of influence for public authorities
- Uncertainty on Life Cycle Costs (LCC), providers, monopolistic or competitive markets, etc.

Now is the time to start preparing the right regulatory framework for AVs to ensure they will serve cities' policy objectives. With current traffic rules, AVs will be seen as comfortable private cars that could well drive around empty to avoid paying parking

charges, increasing car traffic and urban sprawl. Public transport, walking and cycling would lose market share and doing nothing is therefore not an option.





In February 2016, üstra launched its *Mobility Shop* that offers multimodal registration, routing, booking and invoicing in Hannover, Germany. It is a major step towards becoming a true multimodal provider that offers Mobility as a Service (MaaS) to its customers now and in the future.



In spring 2017 in Vienna, the mobility app WienMobil will offer simple and convenient access via the Wiener Linien app not only to bus, tram and metro services but to all publicly available mobility services such as e-loading stations, parking garages, taxis, City-bike, car sharing, car rental and many more. The result is a one-stop mobility shop that, in addition to accessing real-time information, enables the user not only to buy tickets, but also to book, reserve and pay for other combined transport.

Obviously there are still many questions related to liability, insurance and technology that need to be solved but the introduction of driverless autonomous vehicles has a huge impact on the planning and the investment needed for sustainable urban mobility in the future and this calls for action now to ensure the right decisions are taken.

## ENCOURAGING SHARED MOBILITY

The first point is to ensure autonomous vehicles are shared and that people are ready for this idea of sharing and switching between different modes of transport. Therefore, **all forms of shared mobility, mainly car- and ride-sharing, need to be actively promoted and incentivised as of today.** Tax incentives for shared rides or shared ownership of vehicles, shared vehicle zones, promotional campaigns, priority parking places, promotion of pilot projects...: preparing our citizens for shared autonomous vehicles in the future goes hand in hand with more car- and ride-sharing today. Measures to limit single car occupancy need to be taken as well as measures to avoid having empty private autonomous cars on the roads.

## CREATING A BALANCED INTEGRATED MULTIMODAL MOBILITY OFFER

The second point is to ensure that these fleets of shared AVs are integrated into a complete mobility solution with high capacity public transport as a backbone in densely utilised areas to fulfil the lion's share of trips complemented by walking and cycling.

In order to become really attractive and form a credible alternative to (autonomous) car ownership, the different sustainable modes need to be coordinated, planned and delivered in an integrated way. From a physical perspective (coordinated network planning, stations, urban planning, and algorithmic optimisation of autonomous fleets) but also from an information perspective: a one-stop-mobility shop acting as a personal mobility assistant offering travel information, booking and ticketing.

*The creation of multimodal mobility platforms offering Mobility as a Service is the way to connect urban mobility services now and in the future.*

Public transport authorities and operators are experts in organising urban mobility solutions: allow them to lead the transition and take the lead in the coordination of tomorrow's mobility. Moreover, public transport already has experience in the automation of transport services thanks to the automation of metro lines. Indeed, in 2016 there were 803km of automated metro in operation in 37 cities worldwide. This trend is growing as by 2025, automated metro lines are expected to total over 2,300km globally.

Walking, cycling and shared autonomous fleets are excellent options to provide door-to-door transport or act as feeders, but on their own they are not a substitute for public transport, primarily as they lack the capacity to cater for the sheer volumes required in densely utilised urban spaces.

In many cities, public transport companies are leading the transition to offer multimodal mobility to their citizens through partnerships with shared mobility providers such as car- and bike-sharing and they are testing new services with autonomous shuttles. They are

also providing Mobility as a Service-platforms to provide combined mobility to their customers and these platforms will also ensure the integration of shared AVs into a complete mobility solution in the future.

## AV STRATEGY OF A PUBLIC TRANSPORT OPERATOR: TRANSDEV

Transdev aims to offer innovative mobility solutions and excellent service to its customers. Autonomous vehicles hence were a natural choice since they are flexible in terms of timing and geographical coverage, economical, clean and offer many development opportunities.

“We’re convinced of the potential that autonomous vehicles have to extend our current range of services. We’re

aiming high, and thinking practically. This means going through a key initial stage, on which we are focusing all our energy right now: consolidating our expertise by capitalising on the success of the first operations such as Civaux with Navya and Ladoux with Easymile.” Yann Leriche, Chief Performance Officer, Transdev.



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## AV STRATEGY OF A PUBLIC TRANSPORT AUTHORITY: LTA

In Singapore, the Land Transport Authority (LTA) considers AV technology an opportunity to help achieve the 2013 Singapore Land Transport Masterplan that aims to promote public transport as the mode of choice. It will help address the challenge of the manpower crunch and AV fleet coordination and control infrastructure will facilitate efforts to improve the reliability of public transport services. On the service provision side, it will offer first-

and last-mile connectivity as well as on-demand services through a demand-responsive fleet of shared autonomous vehicles. A massive effort is underway to build up public transport, walking and cycling infrastructure and rally around a car-lite Singapore.

Therefore, Singapore is preparing itself through trials to integrate autonomous vehicles into the public transport network once they are ready.



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## RECOMMENDATIONS

### How to get from 0.5 % of shared mobility to 50-60%?

- Public authorities need to take an active role in the roll out of AVs so that they meet policy objectives:
  - Measures to limit single car occupancy: road pricing (to the advantage of high occupancy vehicles), parking management, shared vehicle zones...
  - Measures to avoid empty private AVs idling on the road
  - Urban planning measures:
    - regain urban space from parking facilities to be allocated to other uses
    - integrated urban & mobility planning
    - prevent urban sprawl, rethink urban planning with autonomous shuttles
  - Provide integrated mobility platforms (MaaS) as whoever controls the platform controls the travel behaviour and require all public mobility services to join
  - Regarding data, ensure the different urban mobility services can communicate and are not closed systems
  - Make tendering/concessions for shared AV fleets
  - Any new mobility service should be evaluated against modal split objectives and ensure a better quality of urban life before being supported
  - Promote shared vehicle use in all forms through promotion and tax incentives

- Allow the use of shared driverless autonomous vehicles on public roads, at least in trials to test how to best use them in the mobility eco-system
- Let public transport operators and shared-fleet mobility operators test AVs and take advantage of innovation – adapt regulation to allow testing of autonomous vehicles to be integrated into the public transport offer
- Enlarge the competences of public transport authorities to all urban mobility services
- Support research to understand citizens' acceptance of autonomous vehicles and contribute to create confidence
- Prepare for the consequences on jobs as some driver/chauffeur jobs could disappear and other jobs requiring specific skills will be needed. How will the transition be managed?
- Developments take time: start now because the future is coming
- Boost synergies between public transport & private shared mobility actors

*Encouraging shared mobility now will pave the way for the shared use of shared AVs in the future!*



This is an official **Policy Brief** of UITP, the International Association of Public Transport. UITP has over 1,400 members in 96 countries throughout the world and represents the interests of key players in this sector. Its membership includes transport authorities, operators, both private and public, in all modes of collective passenger transport, and the industry. UITP addresses the economic, technical, organisation and management aspects of passenger transport, as well as the development of policy for mobility and public transport world-wide.

This Policy Brief was prepared by the Combined Mobility Platform



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