UITP ADVANCING PUBLIC TRANSPORT

KNOWLEDGE BRIEF

SHEDDING A LIGHT ON DEMAND-RESPONSIVE TRANSPORT (DRT)

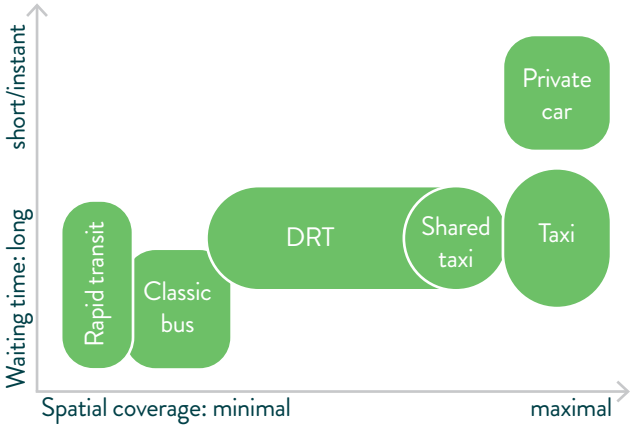
HOW DRT CAN HELP YOU ADDRESS A VARIETY OF PUBLIC TRANSPORT CHALLENGES

JUNE | 2025

INTRODUCTION

Successful examples of demand-responsive transport (DRT) services, different use cases, operating models, legislative requirements, benefits to society and the environment: readers will find this and more in this brief. Guidelines are provided on how to successfully plan and implement DRT services, along with a look ahead at future trends and recommendations for external stakeholders. Interested authorities, operators, or other parties wanting to learn more about DRT services ahead of their project start find a solid foundation to answer their most relevant questions.

Figure 1. DRT positioned between buses and taxis in relation to time and space



Autonomous Holon vehicle, tested by Hamburger HOCHBAHN in 2025

WHAT IS DRT?

DRT is an umbrella term for flexible types of public transport (PT), where flexibility, in terms of spatial, temporal, and operational aspects, meets efficiency thanks to the bundling or pooling of different passengers' requests with similar routes. It typically fits between a bus and a taxi or ride-hailing service in terms of its offering. It enables seat reservations and reduces waiting and travel times by offering more direct connections, thus significantly improving accessibility to opportunities, especially in unserved or underserved areas and/or times. It can also be used to increase the service level in urban areas during peak demand or to supplement night traffic.

A DRT system is typically operated by:

- public transport authorities (PTAs)/operators (PTO);
- private companies, independently or in collaboration with PTAs.

1 In this brief, 'DRT' or 'demand-responsive transport' refers to flexible, technology-driven PT services with dynamically adapted routes, schedules, and stops based on real-time demand. This brief focuses on DRT, a service type included in UITP's broader 'On-demand Mobility' concept, as explained here: www.uitp.org/topics/on-demand-mobility/

Table 1: Different characteristics of existing DRT services

SERVICE ZONE DENSITY		SERVICE TYPE		VEHICLE/ENGINE TYPE	
RURAL	FlexiBus (Krumbach) Hin&Wech (Neumünster)	**FIRST MILE/ LAST MILE**	RTA Bus on Demand (Dubai) sprinti (Hanover)	**VAN**	RésaTao (Orléans) sprinti (Hanover)
SUBURBAN	Keoride (Northern Beaches, Sydney) sprinti (Hanover)	**ZONAL**	NAHSHUTTLE (Schleswig-Holstein) Arlington On-Demand (Arlington)	**MINIBUS**	FlexiBus (Krumbach) RTA Bus on Demand (Dubai)
URBAN	RTA Bus on Demand (Dubai) Via Rideshare (West Sacramento)	**CORPORATE SHUTTLES**	Mercedes Werkshuttle (Bremen) BASF Werkshuttle (Ludwigshafen)	**BUS**	BusGo (Singapore) Newcastle Transport On Demand (Newcastle)
SERVICE ZONE SIZE		**FLEET SIZE**		**BOOKING TYPE**	
<10km²	BASF Werkshuttle (Ludwigshafen) Pikmi (Zürich)	**2-4**	Anton (Bielefeld) Hin&Wech (Neumünster)	**PRE-BOOKING**	EB Ride (Singapore)
40-60km²	Anton (Bielefeld) Hin&Wech (Neumünster)	**10-20**	BASF Werkshuttle (Ludwigshafen) KE'OP (Bordeaux)	**ON-DEMAND**	Anton (Bielefeld)
>175km²	Hanover (sprinti) Arlington On-Demand (Arlington) WirMobil (Berlin)	**>100**	sprinti (Hanover) MOIA (Hamburg)	**MULTI-BOOKING**	WirMobil (Berlin) sprinti (Hanover)

NO ONE SIZE FITS ALL

DRT can play different roles in the mobility sector at different places and times, as detailed in the table below. It can also be tailored to the needs of specific populations, like low-income households, senior citizens, or people with disabilities. This last group is sometimes specifically targeted with 'closed' DRT systems or 'co-mingled' with existing DRT schemes, also called 'paratransit' in North America. Sometimes, taxis and ride-hailing are integrated into DRT and paratransit schemes.

Check out the case of DART Dallas, summarised in the Global taxi & ride-hailing benchmarking study 2019-2021: https://www.uitp.org/publications/global-taxi-ride-hailing-benchmarking-study-2019-21/

DRT service accessible via app

Table 2: DRT service role (complement/replace/provide) according to space and time

'Checked circle' means good fit, whereas 'empty circle' means the level of applicability depends on the situation and service goals.

GEOGRAPHY	PEAK	DAYTIME OFF-PEAK	NIGHTTIME	WEEKENDS AND HOLIDAYS
CITY CENTRE	○ Complement PT	○ Complement PT	✓ Complement/replace PT	○ Complement/replace PT
METROPOLITAN SUBURB	○ Complement PT	✓ Complement/replace PT	○ Complement/replace PT	○ Complement/replace PT
SUBURBAN AREA	✓ Complement/replace PT	✓ Complement/replace PT	○ Replace/provide PT	○ Replace/provide PT
RURAL AREA	✓ Complement/replace PT	✓ Complement/replace PT	○ Replace/provide PT	○ Replace/provide PT

Complementing existing public transport:

- to serve lower demand segments and specific needs that cannot be served with large capacity vehicles on fixed routes
- to increase the service level through better accessibility, lower waiting and travel times, comfortable vehicles, seamless route planning, and convenient booking and payment solutions, thereby increasing PT's modal shares

Replacing or providing PT in **'transit deserts'** currently underserved/not served:

- to provide better access to the PT network and better accessibility to jobs, education, and services
- with a more efficient and environmentally friendly solution than taxi and ride-hailing services or private cars

Figure 3. itravel vehicle
Get more info on rural mobility here: UITP Knowledge Brief: The rural mobility challenge for public transport: How combined mobility can help

A RURAL DRT CASE FROM THE UNITED KINGDOM (UK)

Rural areas face a particular challenge when it comes to expanding and improving PT service quality. The extensive operating areas and high penetration rate of private cars pose major challenges for traditional public transport. DRT ensures social participation in rural areas for people who do not have access to a car or cannot drive, e.g. teenagers or senior citizens. In the UK, two bus routes with four vehicles operated by Cheshire West and Chester Council were supposed to serve 47,258 people in an area of 150 square kilometres (km^2), leaving de facto the majority of the population without PT access. Two additional itravel minibuses, used as a DRT service, now cover over 80% of the population. Passenger numbers have increased to three trips per hour, exceeding initial targets. The close to £1.1 million funded service is a cost-effective solution, providing access at a cost of under £10 per resident per year.

Figure 4. RTA Bus On Demand

TACKLING ACCESS INEQUALITIES IN UNITED STATES SUBURBS

In some metropolitan areas in the United States, dynamics like gentrification pushed both senior citizens and low-income groups out of the city centre and into the suburbs. And since low-skilled jobs remained mostly in urban centres, this resulted in increased commute time for the low-income population, which is typically transit-reliant, and a greater disparity between car users and PT users in terms of job accessibility. In this context, as shown in a recent study on the suburbs of Minneapolis-St. Paul in Minnesota, DRT can address access inequity by enabling PT agencies to reach a larger number of vulnerable riders than fixed-route buses, particularly for commuting and trips to/from commercial areas (for both employment and consumption). DRT proved to be a valuable addition to the transport mix in suburban communities, particularly for vulnerable rider groups, namely, senior citizens, low-income individuals, and individuals with disabilities.

Source: Liezenga, A.M. et al., 2024, The first mile towards access equity: Is on-demand microtransit a valuable addition to the transport mix in suburban communities?

https://pure.tudelft.nl/ws/portalfiles/portal/182917375/1-s2.0-S2590198224000575-main.pdf

AN URBAN CASE FROM THE UNITED ARAB EMIRATES

Urban DRT services can play an important role as a first-/last-mile solution, as well as a high-quality PT alternative to using a private vehicle for passengers who are not currently using traditional PT solutions for various reasons, e.g. quality of service.

A now 40+ vehicle DRT service in 10 areas of Dubai was implemented in 2020 to complement public transport in densely populated areas where fixed bus lines are limited or underused, to increase access to larger transit hubs, schools, and business centres. Over 2 million rides have been completed since with the 'RTA Bus On Demand' service and contributed to reducing operational expenses due to the flexible service schedules.

HOW TO PLAN AND IMPLEMENT DRT

Since there is no 'one size fits all' approach for developing a DRT service, each one should be tailored to the local context in order to make it successful. The planning and implementation phases of DRT interventions are both characterised by agile and iterative steps that allow the service to adjust and achieve the desired impact, if clear objectives and use cases are set.

PLANNING

- **1. Identify clear objectives.** This entails identifying and analysing the mobility challenge(s), developing a vision for DRT services, and prioritising DRT scenarios together with relevant stakeholders and decision-makers, as well as defining desired outcomes (e.g. social inclusion, closing transport gaps, or financial objectives), target customers, and their needs.
- **2. Choose the right operational boundaries.** What the service aims to achieve will determine where and when to operate. The shape of the service zone also plays a role.
- **3. Consider the quality of service metrics.** Such metrics could include utilisation rate, average wait time, average detour time, average walking distance, and offer (acceptance) rate, as well as accidents and carbon dioxide (CO_2) emission reduction.
- **4. Determine payment methods** such as credit cards, voucher payments, or a full integration with the transport system's native payment system.
- **5. Select a tech provider.** Powering a flexible service, with large numbers of trips and vehicles and specific local requirements, that is continuously optimised in real time, is a big technical challenge. Transport authorities should find a partner who not only offers an exceptional technology solution but also has the experience of delivering results in multiple markets.

OPERATIONAL PREPARATION

- **6. Choose the right vehicle.** Consider factors like capacity, accessibility needs, country-specific regulations, and electric and/or autonomous capabilities.
- **7. Choose the right drivers.** Consider using the company's own drivers and/or supervisors (generally more customer-oriented than subcontracted drivers) or subcontract.
- **8. Set the fares** to be integrated or not into the PT tariff system (with surcharges). Fares are one of the biggest levers that lead to service success or failure. They can be designed with a multitude of end goals (e.g. to maximise ridership) and can also influence customer behaviour. Fare promotions can be useful when building a customer base and to increase ridership.
- **9. Market the service.** A marketing strategy should be based on key practices such as lifecycle-based marketing, customer segmentation, and multichannel presence.
- **10. Monitor and calibrate the service** according to the metrics set for the service design & use case in the planning phase, especially in point 3.

EXAMPLES OF LARGE-SCALE IMPLEMENTATION

Politically, for most DRT services to be regarded as 'successful', in order to secure continuous funding and further expand, ridership and impact on modal share are core metrics. These numbers cannot be achieved with a five-vehicle service—hence, the most successful projects that grow further and demonstrate user behaviour change are large-scale implementations.

CASE STUDY: SPRINTI IN HANOVER, GERMANY

The Hanover Region is well-connected to the city centre by PT lines, but feeder and drop-off connections have posed a challenge in the past. In order to enable commuters to switch from private cars to public transport and to serve dispersed travel routes, the Hanover Region implemented a DRT service in 2021.

After a test run in three municipalities, sprinti was expanded to all 12 municipalities surrounding the city of Hanover. In the past few years, it has established itself as Germany's largest DRT PT service, with >100 accessible vehicles in service. It received the German Mobility Award in 2023. sprinti is available to over 360,000 people via the sprinti app and is constantly breaking records; the service recorded 1,250,000 completed journeys (as of March 2024), including more than 100,000 in March 2024 alone. Thanks to sprinti's deep integration into the existing PT service, passengers can book on-demand, pure PT, and intermodal journeys.

Sprint vehicle

CASE STUDY: ÎLE DE FRANCE MOBILITÉS IN PARIS, FRANCE

In the extensive areas of the so-called Grande Couronne, which cover 90% of the region's total area and are home to almost 44% of Île-de-France's total population, it is quite difficult to rely on PT alone. Here, more than 60% of commuters use private cars for their daily commute, and there is a lack of real alternatives.

In order to ease the traffic situation, especially during commuting hours, and provide residents of the outer suburbs with attractive public mobility services, the local PTA, Île-de-France Mobilités, has been operating a DRT service since 2018 to connect the suburbs with the centre of Paris. The first pilot project quickly proved a success. A feeder service was set up for the Gally Mauldre municipal association, transporting over 23,000 residents from eleven municipalities to local train stations. Each of the areas is served according to its own parameters. In many cases, DRT is used to bridge the first- or last-mile gap between the origin/destination and the train or tram station. In some cases, DRT schedules are synchronised with train departure times at the local stations, so passengers can make their connections at peak times. Fares are analogous to local PT fares, and the Navigo mobility pass is also valid in DRT vehicles.

TAD IDFM vehicle

For more case studies, see the Report Transport On Demand from the Operators' Perspective (available only to UITP members) at https://www.uitp.org/publications/transport-on-demand-operators-perspective/

INTEGRATION WITH PT IS KEY TO SUCCESS

The success of DRT services is due, in no small part, to their thoughtful and thorough integration with the existing PT networks alongside which they work.

For example, in Hanover, sprinti primarily serves trips that directly connect to transport hubs or provide shared transport in areas where traditional PT is lacking. In contrast, in the Frankfurt Rhine-Main area, also in Germany, RMV OnDeMo integrates with the local transport agency's existing trip planning apps and shows multimodal trip options within its own app — but these examples are far from being the only ways in which DRT and legacy transport services can work together.

- **Integration of service design:** Avoidance of parallel transport alongside existing mobility offerings; choosing the right service zones, hours, and other parameters, i.e. serving first-/last-mile use cases or replacing underutilised fixed lines.

CASE STUDY: COOEE BUSWAYS, AUSTRALIA

Before the DRT service Cooee Busways was launched in a suburb of Sydney, New South Wales, 83% of commuters arrived at the Schofields metro station by car in trips that were overwhelmingly single-purpose, with no other destinations beyond the metro station. After only nine months of DRT service, 34% of people who had previously used private vehicles for these first- and last-mile trips had either already sold or were considering selling their cars.

© Busways

Cooee Busways vehicle

- **Integration of infrastructure:** Using the same fleets and drivers for fixed routes and DRT services when operating hours are complementary or traditional bus routes are being replaced; using advertisement space on fixed-route buses; creating 'virtual bus stops' at mobility hubs and other bus stops; utilising electric charging infrastructure at existing bus depots.
- **Digital integration:** Showing multi/intermodal routing options within the DRT app, as well as the DRT option in the PTA's/PT operator's (PTO's) own app; with payment and ticketing integration.

CASE STUDY: KING COUNTY METRO AND SOUND TRANSIT IN SEATTLE, WASHINGTON, UNITED STATES

King County Metro and Sound Transit fully integrated their DRT service with the PT system's ORCA Card, allowing customers to use a single payment method across the full King County transport network.

© King County Metro

Metro Flex vehicle

COMMON CHALLENGES

LEGAL CHALLENGES

Local law makers have the responsibility to create an adequate enabling regulatory environment for DRT. Since technology-driven solutions have rapidly evolved in the past few years, a lot of countries and regions are behind in adapting regulations, resulting in delayed adoption of DRT services due to a lack of security for providers.

THE CASE OF AUSTRIA

The public transport law (KflG §38 Abs. 3. Zi 1) was extended in 2024; DRT is a 'dial-a-ride' service (Anrufsammeltaxi in German) with virtual stops, digital booking interfaces, and integration of the service into the PT network, with an integrated fare system within a service zone/area. Vehicles are operated like taxis (= taxi licence plate) but do not have to install a taximeter.

THE CASE OF GERMANY

The public transport law (PBefG) was revised in 2021 and introduced a new type of PT under §44, i.e. a line-based DRT option (Linienbedarfsverkehr in German) that allows for flexible DRT services and transport mode pooling and does not mandate the return to the depot after a ride has been completed.

COMMON METRICS AND UNDERSTANDING OF IMPACTS

There are many studies and industry reports that demonstrate the benefits of DRT. However, there is not one clearly established, standardised way to measure DRT operations and efficiency or its impacts on society, the economy, and the environment.

The recently created UITP On-demand Mobility Committee will tackle this challenge, among others, to support the sector.

If we take the example of the environment, whether a DRT service can have a positive impact on the environment—and, more specifically, on the mobility sector's carbon footprint—depends on various parameters, each one relying on a set of likely heterogeneous indicators:

- **The share of feeder and direct trips:** In the case of feeder trips, the positive environmental impact can be even greater than for direct trips.
- **Shift from private cars to DRT and PT:** This can lead to a reduction in accidents, noise pollution, urban space dedicated to motorised traffic, economic damage, and health issues.
- **Vehicle engine:** The use of electric vehicles powered by renewable energy-based electricity can significantly reduce emissions compared to driving internal combustion engine (ICE) vehicles.
- **Pooling/bundling rate/utilisation:** If the demand is too low, the utilisation of the system will also remain low, and it might be declared unsuccessful.

FINANCING AND FUNDING

What is unique about DRT services for PT professionals is that their costs are not fixed, as for fixed-route buses, because of their flexible supply/demand planning. This could represent an additional offer for the PT system, as well as an opportunity to cut costs for inefficient fixed routes. Thorough business model analysis and socio-economic case development should be done to justify permanent financing and funding of the service, beyond pilots. DRT, especially in rural areas, will rely on at least partial subsidies or procurement by a public authority. Possibilities to receive substantial community contributions should be explored, namely from employers and real estate developers that have a lot to gain from limiting parking space and ensuring better accessibility, branding, and employee well-being.

Check out the UITP Knowledge Brief: Business models for better integrated mobility: https://www.uitp.org/publications/using-business-models-for-better-integrated-mobility/

LOOKING AHEAD

CURRENT TRENDS

There are three main trends currently observed in DRT:

- Pursuing a **regional approach** for DRT services. Instead of creating individual island solutions per city, PTAs, counties, and associations are increasingly rolling out regional DRT systems to facilitate access for passengers travelling within a region, through unified booking platforms, tariffs, conditions, etc.
- Using the same/similar technology for other transport services, including **paratransit** — a service generally intended for persons with disabilities and reduced mobility, who are unable to utilise conventional PT, non-emergency medical transport **(NEMT),** and **school transport.**
- **Commingling** of different services–in other words, offering DRT and/or paratransit and/or NEMT in a single platform, using the same fleet, drivers, and technology but with different rules and permissions attached to each service—this generates benefits due to only needing one set of tools, with full visibility of all services by the dispatcher.

THE CASE OF GREEN BAY METRO, UNITED STATES

In the spring of 2020, Green Bay Metro in Wisconsin, United States replaced its legacy paratransit software with a new DRT system and saw widespread adoption — with a 2.5x increase in ridership in the last quarter of 2020 and more than 20% of bookings done via the newly available app or web portal.

FOCUS ON MOBILITY AS A SERVICE

Mobility as a Service (MaaS) unlocks the opportunity to provide seamless access to an integrated network of transport options — owned and operated by a variety of providers — through a single digital interface. In this way, MaaS leverages different first- and last-mile options to realise the potential of PT for all customers, regardless of their location and physical abilities.

RésaTao vehicle

CASE STUDY: RÉSATAO, ORLÉANS, FRANCE

RésaTao operates a feeder DRT service, connecting outlying areas to PT hubs across 21 municipalities in the Orléans metropolitan area.

In April 2024, the project achieved a significant milestone with the full integration of RésaTao into the TAO route planner app. This step integrated DRT with fixed-route PT services, allowing users to plan, book, and manage their journeys through a single app, simplifying access to multiple transport options, encouraging greater use of PT, and reducing dependence on private vehicles.

FOCUS ON AUTONOMOUS VEHICLES

Single-occupancy autonomous vehicles (AVs) could actually increase greenhouse gas emissions and congestion and, as expensive assets, be inaccessible to the average community member. However, DRT can unlock the AV promise to bring significant societal benefits if integrated into the PT system, as shown in the foundational UITP Policy Brief on AVs as a potential game changer for urban mobility. Many publicly funded projects like the European Union (EU)-funded projects SHOW and ULTIMO are pushing the sector forward. The figure below shows an example of a vision for the future of DRT, including its tech- and algorithm-enabled version (referred to as 'On-demand service' in the graph), along with classic PT and AVs.

See more on UITP activities in automated mobility here.

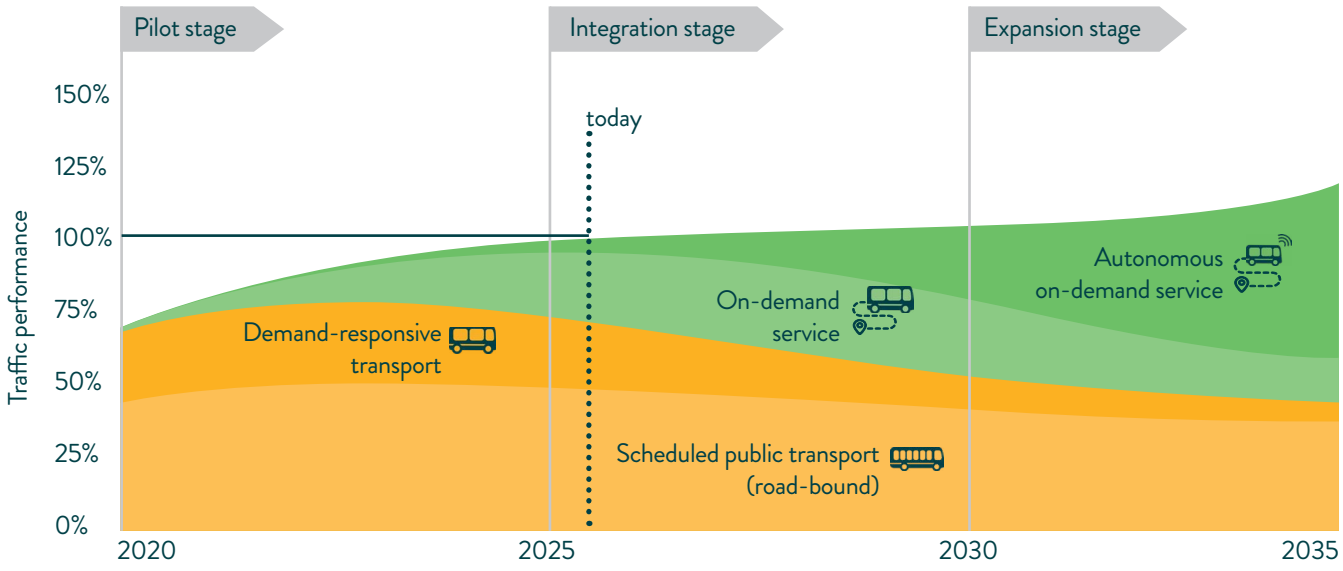


Figure 5. Vision for DRT development © rms

CASE STUDY: RAPID, UNITED STATES

Funded by a $1.7 million Federal Transit Administration grant in 2021, Arlington Rideshare, Automation, and Payment Integration Demonstration (RAPID) is the first service in the United States to fully integrate AVs provided by MayMobility into the existing PT network. The City of Arlington, Texas deployed AVs while simultaneously replacing its limited fixed-route transport with a citywide DRT service. Arlington DRT riders can choose between AVs or non-AVs within a single smartphone app interface—a first for the autonomous public transit space, positioning AV ridership to reach over 8,000 rides during the first year.

© Arlington, TX

Autonomous RAPID vehicle

CASE STUDY: ALIKE, GERMANY

The ALIKE project in Germany, which is funded by the Federal Ministry for Digital and Transport Affairs, aims to develop a globally unique ride pooling system for the provision, booking, and use of up to 20 AVs in PT in Hamburg. For this purpose, the Hamburg transport company HOCHBAHN has joined forces with DRT service provider MOIA and vehicle manufacturers HOLON and Volkswagen Commercial Vehicles. Other project partners include the Karlsruhe Institute of Technology (KIT), for research, and the Hamburg Transport and Mobility Transition Authority (BVM).

© MOIA

Autonomous MOIA vehicle

CONCLUSIONS

DRT services – enabled by new technology solutions – have proven to provide a meaningful mode of transport in a variety of different geographies and use cases. Where implemented successfully, pilot projects have quickly expanded to large-scale operations, contributing to a positive impact on society with a more accessible and equitable PT approach and usage of environmentally friendly transport solutions.

While DRT is challenging to operate profitably and therefore requires long-term subsidised funding, DRT services can pave the way for meaningful shared AV projects. In order to ensure these benefits, policy makers need to set the right goals, provide sustainable funding options, allow for changes within projects, pursue regional approaches, and, if necessary, adopt national passenger laws to create a legal framework to operate in.

Timely transfer between mass public transport and DRT

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This Knowledge Brief was prepared by the Combined Mobility Committee, with special acknowledgement to *Victoria Markewitz, Init, chair of the committee,* and *Andras Körizs, Wiener Linien.* For more information, you can contact lidia.signor@uitp.org.

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