SMACKER (ex) Maribor Scientific event
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Level of service and policies in relation to DRT

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MAIN TOPICS

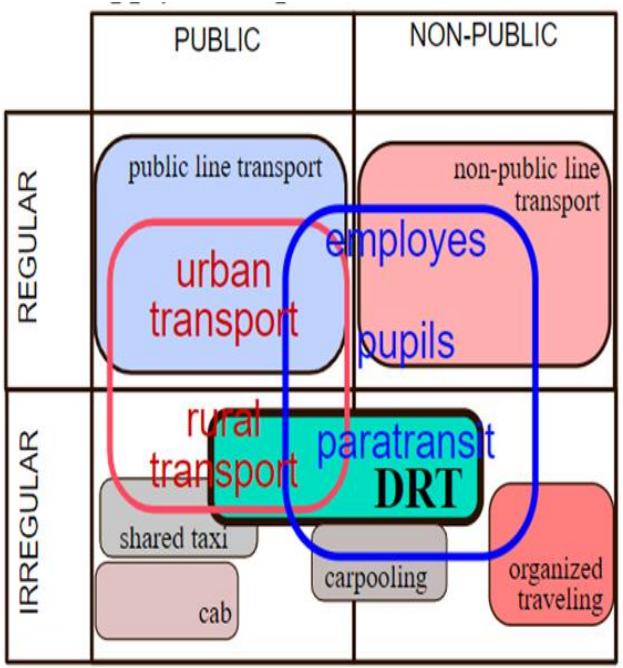
- Demand responsive transport (DRT) definition(s);
- Analysis of the scientific literature on rural and peripheral demand responsive transport solutions;
- EU projects on DRT services in rural and peripheral areas. Best and bad practices evidences from EU DRT pilots;
- Conclusions and lessons learned.

DRT DEFINITION(S)

1. DEMAND RESPONSIVE TRANSPORT (DRT) DEFINITION (I)

Operative definition: Demand responsive transport (DRT) is defined as "*a form of transport where vehicles alter their routes based on particular transport demand rather than using a fixed route or timetable*" [Community Transport Association CTA, 2017].

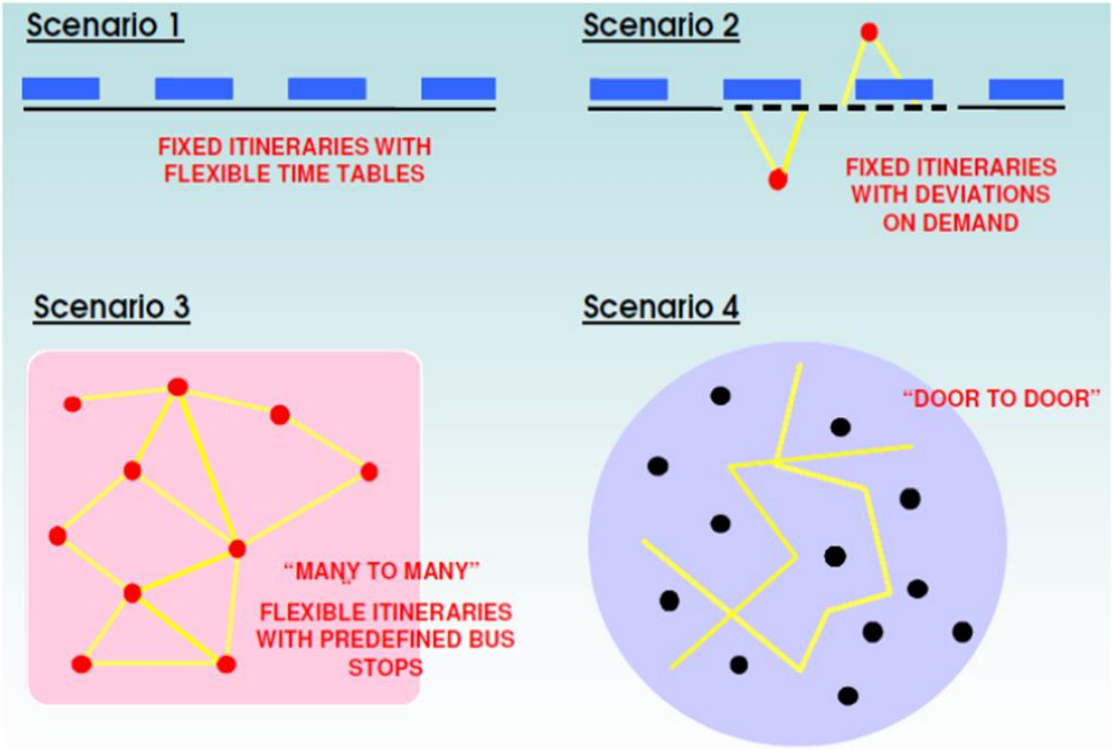
It is not easy to define in details which kind of transport solutions are included into the definition of Demand Responsive Transport.



1. DEMAND RESPONSIVE TRANSPORT (DRT) DEFINITION (II)

There are several DRT typologies:

- With fixed itineraries and flexible time tables;
- With fixed itineraries with deviation on demand;
- With flexible itineraries;
- With predefined bus stops;
- With flexible itineraries and flexible stops (door-to-door service, very similar to a taxi).



1. DEMAND RESPONSIVE TRANSPORT (DRT) DEFINITION (III)

A DRT system integrates the traditional public transport offer by [ATTAC Project, 2011]:

- **Replacing normal public transport offer in specific areas or hours** of the day with **low demand**;
- **Integrating traditional public transport services** in smaller towns with low population density, population sprawl (mountain areas, rural locations, etc.) or areas not served by traditional public transport services;
- Offering a **high quality service**, closer to the need of users, thanks to the **customization**, **comfort** and the **duration** of the trip that must not be greater than 30 minutes and that could be performed with small vehicles,
- Offering services and dedicated equipment for transporting **disabled people**.

ANALYSIS OF THE SCIENTIFIC LITERATURE

Authors	Year	Document title
OECD. International Transport Forum (ITF)	2015	OECD (2015), International Experiences on Public Transport Provision in Rural Areas
ENEA, UITP	2004	ENEA, UITP (2004), Demand Responsive Transport Services: Towards the Flexible Mobility Agency
TRANSPORTATION RESEARCH BOARD (TRB)	2010	TRB (2010), A Guide for Planning and Operating Flexible Public Transportation Services
ESPON	2015	ESPON (2015), TRACC. Transport Accessibility at Regional/Local Scale and Patterns in Europe
Interreg Europe	2018	Interreg Europe (2018), Demand Responsive Transport. Policy Learning Platform on Low-carbon economy
Community Transport Association (CTA)	2017	CTA (2017), The Future of Demand Responsive Transport
Interreg Europe, Lastmile project	2017	Interreg Europe, Lastmile project (2017), State-of-the-Art of regional public transport systems and flexible systems
TRANSPORTATION RESEARCH BOARD (TRB)	2007	TRB (2007), Why do demand responsive transport systems fail?

2. ANALYSIS OF THE SCIENTIFIC LITERATURE ON RURAL AND PERIPHERAL DEMAND RESPONSIVE TRANSPORT SOLUTIONS

Document title	Why read these reports?
OECD (2015), International Experiences on Public Transport Provision in Rural Areas	• **Success factors** of DRT case studies • **Design** of a successful urban DRT service • **Economic sustainability** of a DRT service • Role of **Big data** in promoting effective DRT services
ENEA, UITP (2004), Demand Responsive Transport Services: Towards the Flexible Mobility Agency	• DRT **technical architecture** • **Preliminary analysis** for the launch of a new DRT services • Technical aspects to be considered for the **implementation** of an effective DRT platform
TRB (2010), A Guide for Planning and Operating Flexible Public Transportation Services	• Criteria for the definition of the DRT **flexibility levels** • **Urban planning** parameters for the selection of the areas where a DRT service can be successfully activated
ESPON (2015), TRACC. Transport Accessibility at Regional/Local Scale and Patterns in Europe	• How to identify **peripheral areas** (both urban and rural)
Interreg Europe (2018), Demand Responsive Transport. Policy Learning Platform on Low-carbon economy	• **DRT Pre-feasibility study**. Main development parameters • **Decision support** guidelines for DRT development
CTA (2017), The Future of Demand Responsive Transport	• **Key actors** to be involved for the development of a successful DRT service
Interreg Europe, Lastmile project (2017), State-of-the-Art of regional public transport systems and flexible systems	• **SWOT** analysis models for the assessment of DRT services
TRB (2007), Why do demand responsive transport systems fail?	• Analysis of the DRT services **failure factors**

2. ANALYSIS OF THE SCIENTIFIC LITERATURE. RELEVANT DRT TOPICS ANALYSED

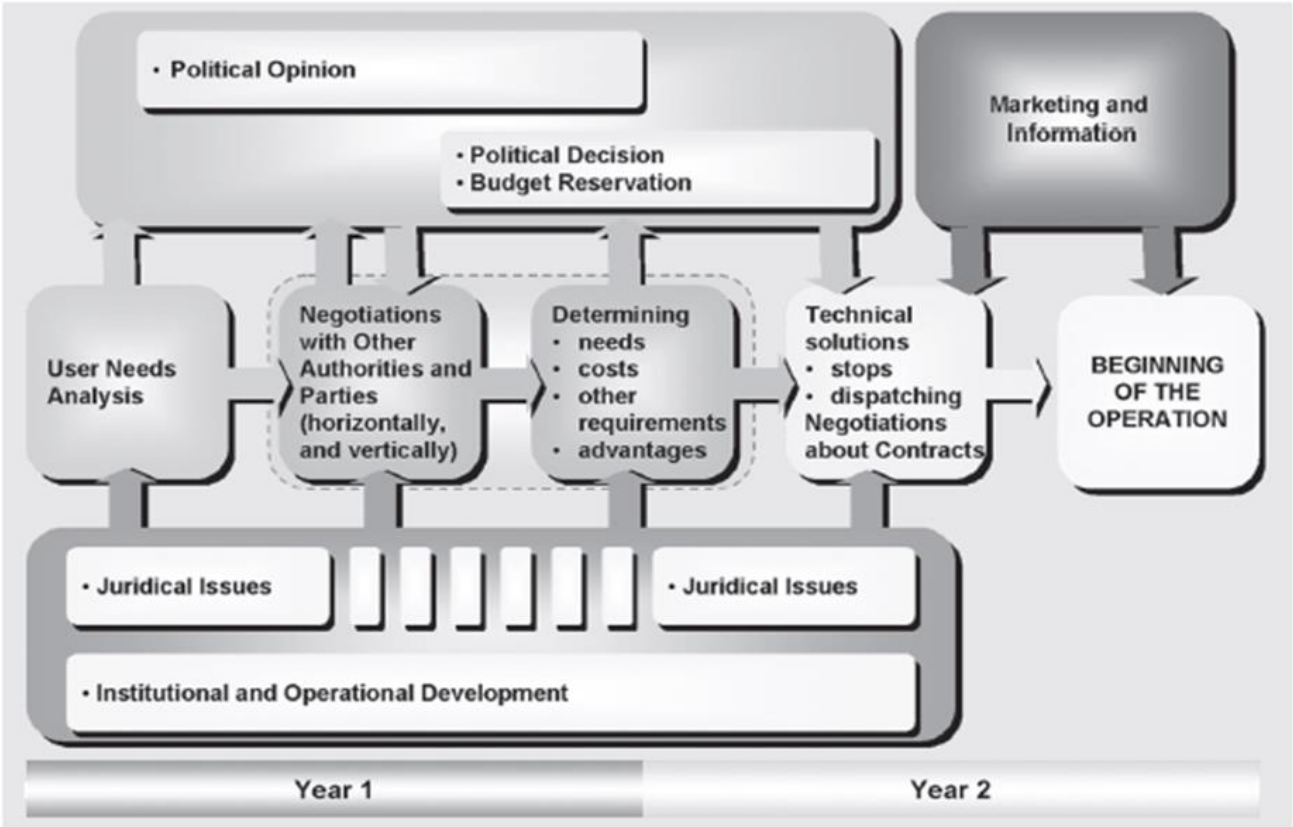
DRT SERVICES AND ECONOMIC SUSTAINABILITY (OECD)

"*Most schemes were dependent on financial sponsorship/support from the Government and once the initial funding was removed they soon disappeared*".

Moreover, the OECD report shows several solutions to be integrated in order to plan a more economic effective DRT scheme:

- Experiences indicate a willingness for both car users and existing bus users to use DRT services at a **higher fare** than existing bus fares. There is a potential new market for DRT in workplaces outside the urban areas;
- Innovative solutions could be related to the **combination of freight and passengers transport systems** in rural areas. In some countries the postal service operator is also a major bus operator (UK for example);
- **Volunteer-driven minibuses** have also been emerging as a solution for rural areas but they are not necessarily comprehensive in their coverage (popular in Japan).

DRT DEVELOPMENT PROCESS (ENEA)



Developing an effective and working DRT service can be a **lengthy process**, usually taking no less than **two years.**

MATRIX OF THE DRT POTENTIALS BASES ON USERS TYPOLOGY AND TRAVEL REASONS (ENEA)

<table>
<tr><th>Demographics/Trip Purpose</th><th>Youth
< 18</th><th>Adult
18–64</th><th>Elderly
65 and over</th><th>Persons with Disabilities</th><th>Low-Income Persons</th></tr>
<tr><td>Work</td><td colspan="5" rowspan="2">Low Potential for Flexible Public Transportation</td></tr>
<tr><td>School</td></tr>
<tr><td>Non-Emergency Medical</td><td>High</td><td>Medium Potential</td><td colspan="3" rowspan="4">High Potential for Flexible Public Transportation</td></tr>
<tr><td>Shopping/Groceries</td><td colspan="2">Low</td></tr>
<tr><td>Shopping/ Other</td><td rowspan="2">High</td><td rowspan="2">Low</td></tr>
<tr><td>Social</td></tr>
</table>

Only knowing in deep **users' needs** it is possible to define attractive and effective DRT services.

DRT main users in rural areas are mainly users not time sensitive.

DRT MAIN DEVELOPMENT PARAMETERS (INTERREG EUROPE)

Parameters	
How does the user book their journey?	• Telephone call • Internet (website/app)
When is booking required?	• On the day/when required • In advance • Repeating booking
How frequently should the service run?	• Only when requested • Set number of journeys per day
How flexible is the route?	• Fully set, but only runs when there is demand • Deviations possible within a set corridor • Fully flexible
Where are users picked-up or dropped-off?	• Many-to-many • One-to-many / many-to-one • One-to-one
What area is the service covering?	• Rural • Suburbs • Mixed
Who are the main users?	• All public • Disadvantaged groups • Private groups
What size of vehicle should be used?	• Car • Minibus • Bus
What is the price for the user?	• Free • Paid
How is the DRT system financed?	• Subsidised • Partly-subsidised • Commercial
What competition is there with other transport solutions?	• High • Low

DRT. ANALYSIS ON 1,100 INTERNATIONAL DRT SERVICES (ENEA)

- **Route deviation** is the most common type of flexible public transportation service.
- **Senior citizens** and **persons with disabilities** are the most frequent rider types.
- Productivity as measured by passengers per hour averaged **4 passengers per hour**;
- Most agencies **limit the distance** that buses can deviate from the route for flexible public transportation trips.
- Most agencies do **not charge a premium fare** for flexible public transportation;
- Flexible public transportation **drivers** do **not receive additional skills training**;
- Most agencies require **previous-day, advance notice** to arrange flexible public transportation service pick-ups.

DRT MAIN FAILURE REASONS (LAST MILE PROJECT)

Environment	*Stakeholder/Forces*	*Common failure reason*
Internal	Employment, equipment, finance, functional responsibilities	• Technical and technological problems • Lack of planning • Poor marketing • Disenchantment of bus operator • Too ambitious a service planned • Inflexible operator • Fares too low • Insufficient stakeholders commitment • Area too large to serve • Too complex market • Market niche too small and irregular • Reliability problems • Uncertain rules of use • Lack of concentrated demand
Micro environment	• Customers • Competitors • Intermediaries • Suppliers	• Competition restriction • Inter-authority rivalry • insufficient resources from Government • Lack of coordination between councils • Withdrawal of stakeholder support • Confusion over licensing regime • Inflexible funding arrangements
Macro environment	Economics, technological, social, cultural, political, legal forces	• Dispersed low density land use • Dispersed low density patchy land use development and cul-de-sacs • Cultural aversion to sharing taxis/services

ANALYSIS OF EU PROJECTS AND BEST/BAD PRACTICES

EU Programme	Project acronym	Main objective
Interreg Europe	Regio Mob	Tele-Bus on-demand transport
Interreg Europe	Last Mile	Sustainable mobility for the last mile in tourism regions
Interreg Med	LiMIT4WeDA	Light Mobility and Information Technology for Weak Demand Areas
Interreg Central Europe	Rumobil	Support the establishment of multilevel governance that is transparent, accountable and responsive to the need of the population
Interreg Central Europe	Peripheral Access	Accessibility of peripheral and rural areas by promoting innovative multi modal solution using new technologies and better cooperation schemes
H2020	Inclusion	Understand, assess and evaluate the accessibility and inclusiveness of transport solutions in European prioritised areas
H2020	Avenue	Design and carry out full-scale demonstrations of urban transport automation by deploying fleets of autonomous minibuses in low to medium demand areas of 4 European demonstrator cities
EU Commission	Smarta	Smart Rural Urban Areas
Interreg Baltic Sea	Mamba	Maximising mobility and accessibility of services in rural areas of the Baltic Sea Region
South East Europe	Access2Mountains	Achieve durable, environmentally friendly tourism, as well as to ensure accessibility and connection to, between and in sensitive regions of the Alps and the Carpathians.
FP5-IST	Fams	Implement and trial the concept of a Flexible Agency for collective, demand responsive mobility services
Interreg IV C	Move on Green	Improve the design and effectiveness of regional policies on sustainable transport in rural and mountain areas

3. EU PROJECTS ON DRT SERVICES IN RURAL AND PERIPHERAL AREAS

EU Projects	Case Studies and main pilots topics
Regio Mob	• Demand-Responsive Transport Service for Persons with Disabilities in Ljubljana Urban Region • Tele-bus (Krakow City). • Bus Real Time Passenger Information in Edinburgh, Scotland • Light Mobility for Weak Demand Areas (Lazio Region, Italy)
Interreg Europe LAST MILE project	• Train with stops on demand from Lleida to la Pobla (High Pyrenees) (Regional Government of Cataluña). • Nightrider, door-to-door night bus on request (Luxemburg).
Horizon 2020 INCLUSION	• Participation processes for the definition of a new DRT service in rural areas, Florence, Italy • DRT services supporting public events organizations, Barcelona. • DRT services for families with young children, Rhein-Sieg Region, Germany
AVENUE (H2020)	• Real time DRT bus monitoring system, Lyon • Autonomous shuttles, Luxembourg • Extension of an existing DRT service, Geneva • DRT autonomous mobility cloud, Copenhagen

3. EU PROJECTS PILOTS (I)

EU Projects	Case Studies and main pilots topics
MAMBA (Interreg Baltic Sea)	• Rural ride sharing and transport-on-demand. Bielsko-Biała Regional Development Agency and Bielsko District, Poland • Transport-on-demand. County of Plön, Germany • Transport-on-demand (ToD). Vidzeme Planning Region, Latvian Road Transport Administration • Bottom up DRT services. Mazsalaca county, Latvia
Access2Mountain (South East Europe)	• Integration of different transport flexible services in Alpine areas, Alpenregion National Park Gesäuse", Austria
FAMS (FP5-IST)	• Flexible Agency for Collective Demand Responsive Mobility Services, Florence Metropolitan Area, Italy • Flexible Agency for Collective Demand Responsive Mobility Services, Angus region, UK
Move on Green (Interreg IVC)	• DRT Virtual Transport Centre, Province of Burgos, Spain. • TPL and taxi integration. Central Doubs, France. • DRT for children at school. South Burgenland, Austria • DRT in low density areas. Regional Unit of Ioannina, Greece
DRT Bad practice	• The Innisfil experiment. The town that replaced public transit with Uber

3. EU PROJECTS PILOTS (II)

3. BAD PRACTICES. PRELIMINARY EVIDENCES

Although several experiences did not have success, it is not easy to identify bad practices in DRT services development and planning.

The main failures factors we found are:

- Many DRT pilots developed and tested in the past years all around Europe were strictly related and **dependent from national, regional or EU funds**. Thus, the main reason of stop of activities are related to the lack of public funds.
- **Unbalanced management schemes among private and public DRT operators**. The role of the public authority is to find a right balance among these two transport operators in order to avoid conflicts and integrate all the different mobility offers in the best way.

3. BAD PRACTICE: AN EXAMPLE (I)

- Innisfil is a Canadian city of **40,000 inhabitans**. It is a typical rural town with widely spaced houses on large lots that makes efficient public transit a logistical challenge.
- The town needed a public transport service but the option on the table (three bus routes) would cost to the municipality **nearly $1m**. So they tried to think creatively.
- In 2017, the town handed responsibility for public transit to the **ride-sharing app "Uber"**.
- Instead of buses plying regular routes, it is Uber's cars that function as the public transport fleet. When a rider opens the app, Innisfil Transit pops up as the cheapest option to travel between a network of popular areas (hubs).
- The costs per ride vary, but on average passengers pay an average of $5, with the city subsiding the rest. Trips outside subsidized areas receive a flat $6 discount.
- Two years later, the project is **a success**. Ridership is high and many residents have embraced the service.

3. BAD PRACTICE: AN EXAMPLE (II)

- The success has a cost for the town. Because Innisfil subsidises each ride, the more successful it is, the more the town pays to Uber.
- That figure reached $1.2m for 2019, more than the bus programme would have cost, and well above the $900'000 the city allocated. With ridership increasing each year, costs will only rise.
- In the meantime, the town has taken the extraordinary step of deterring people from using Uber too much, capping the number of rides a resident can take per month.

Lesson learnt: If you operate a regular bus system, you have a clear idea of the costs in a 5 to 10 years perspective. With this kind of flexible services it is more difficult.

CONCLUSIONS

4. CONCLUSIONS AND LESSONS LEARNED (I)

All the DRT successful cases are based on the coexistence of three fundamental pillars:

- **Fleets management ICT technologies** able to manage in an effective, coordinated and efficient way the planning and routing of the different vehicles involved in the DRT service;
- **Vehicles on-board unit** able to monitor in an accurate and precise way the position of every single vehicles involved in the development of the DRT solution;
- **Final users information tools** able to provide in a reliable and easy way the relevant information to final users and allowing an easy to booking service.

4. CONCLUSIONS AND LESSONS LEARNED (II)

Main lessons learnt:

- When they are **overly flexible** in terms of schedule and /or route (and their travel times thus become too variable), they can become unsuitable to serve as **feeder service** to public transport hubs in urban areas;
- The **routing decisions** for DRT are very complex to model and optimize. Some of these complexities arise from the difficulty to predict behavioral responses to late-running services or no-shows by the clients;
- DRT services in some case perform like a **taxi services at public transport prices**. As a result, they can be perceived as **unfair competitors** by traditional taxi services;

4. CONCLUSIONS AND LESSONS LEARNED (III)

Main lessons learnt:

- Despite the gradual extension of the scope of the services, there is a strong perception in some countries that DRT is **only for mobility of impaired people**. This hampers the inclusion of DRT in the standard public transport offer.
- Very few EU projects and pilots are related to the use of DRT services for **tourism**;
- DRT is usually not included in **transport planning apps**;
- When DRT is provided by public transport companies who are used to serve captive markets only, usually there is insufficient experience with **marketing to attract new clients**.

4. CONCLUSIONS AND LESSONS LEARNED (IV)

DRT service will continue to grow due to (MIND-SETS Knowledge Centre, 2019):

- An increasing feeling that **conventional public transport** is inflexible and unreliable;
- With increasing **urban sprawl**, conventional public transport can become unviable;
- Public authorities show an **increasing interest** in DRT as a means to address inclusion of some specific targets groups, but also to achieve modal shift;
- **On-line bookings** could make DRT more convenient for the general public, but not for the target audience of "socially motivated" DRT (such as elderly people or mobility impaired ones);

4. CONCLUSIONS AND LESSONS LEARNED (V)

- Some **niches** (such as airport shuttles) have already proved to be commercially viable;
- In Europe, there is potential to use DRT in **orbital journeys** in suburban and peri-urban areas while 'traditional' public transport is used for radial routes;
- DRT could expand into **goods delivery** (e.g. of library books, prescriptions and post/parcels) as an additional source of income. There may also be untapped potential for transport in the "night time economy";
- The most important component of variable costs are the wage costs of the drivers (at least, in the schemes that are not volunteer-based). With **autonomous mobility**, this issue will disappear, and this will increase the potential of DRT as a feeder mode for high capacity public transport".

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Thank you for your attention

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