



Innovations for Better Rural Mobility

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The International Transport Forum

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Foreword

In the context of the rural mobility landscape in 2021, this report by the ITF is a landmark document that demands a strong legacy. It has involved 12 primary and 20 secondary contributors, covering all global regions. The work of the group has revealed over 80 case studies of rural mobility innovation across the globe covering the whole spectrum of mobility systems implemented or in pilot phases, from national or regional authority initiatives to projects by individual transport operators and local community groups.

Why is this report so important now? While the economic and social divides between urban and rural areas continue to grow in all countries, it is essential to introduce pro-active policies to stimulate the economies of rural areas in the post-Covid age. Rural societies are undergoing dynamic change – a new mix of locals, incomers, homecomers and visitors (be they tourists or seasonal workers), many have traditional roots in the rural area, whilst others bring with them urban values and mind-sets. There is a mix of those rural areas in decline due to outmigration, economies kept alive by money arriving from the growing diaspora working in other countries, and of those witnessing growth on their urban fringes as families move out of suburban areas in search of a more rural locations.

Mobility is the glue that binds together rural communities and helps rural economies survive and grow, and yet this report has found that when other sectors develop strategies for growth that could boost rural economies, mobility is the very area that is often forgotten. Urban-based planners generally consider rural mobility as an afterthought and this report shows that few countries have strategic policies for rural mobility. Indeed, in the rush to achieve a low carbon society, a new strong urban-based myopia is emerging, where there is a real danger that rural accessibility and mobility issues may be an even larger afterthought.

Ludwig Wittgenstein famously states that: “the limits of my language are the limits of my world”. The words used to describe rural areas – peripheral, outlying, marginal, etc. – are urban words. Rural areas may be “peripheral” to city dwellers, but to rural communities, these areas are the centre of their worlds. This report importantly underlines that we need rural-centric mobility policies, not adaptations of urban ideas.

This report provides intelligence on a whole range of rural mobility initiatives that can be adopted and fine-tuned to local circumstances. However, perhaps the strongest message from this report is more political. We need rural mobility planning that stems from people who live the rural experience and governance structures that can accommodate and support innovative mobility planning. There should be flexible forms of micro-finance from which rural communities can develop their own mobility initiatives, supported by specialist advisory bodies with initiatives feeding from core transport networks that are properly funded by governments – Sustainable Regional Mobility Plans (SRMP) – not an annex or afterthought to a Sustainable Urban Mobility Plan (SUMP). If there is political will to do this, then the 2020s may see the negative trends in rural accessibility and mobility reversed, but now is the time to act.

As chair of the working group, I would like to express my thanks to all those who contributed to this report, saving a special thank you to Lucie Kirstein of the ITF, who was the real engine behind the work of the group and the primary editor.

Professor Laurie Pickup, International Director Vectos/SLR, November 2021

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Executive summary

What we did

This report presents best practices and recommendations for transport provision in rural communities. It examines how sustainable accessibility for people without access to a car could be provided in cost-effective ways.

The report uses 80+ case studies from 20+ countries collected through questionnaires, workshops and interviews to capture and assess a wide range of innovative service delivery models, including new forms of partnerships and public, private and non-profit models.

What we found

There are long-standing deficits in rural transport. Policy, funding, institutional capacity, service provision, planning and research are not given the same attention as in urban areas. Very few jurisdictions have developed binding standards for the provision of basic transport services. This is reflected in a very heterogeneous provision of mobility, even under single jurisdictions. The lack of strategic rural mobility or accessibility policies results in piecemeal short-term, programme-specific funding, which is a major obstacle to delivering integrated and efficient services. A lack of co-ordination often precludes efficient use of subsidies across administrations.

Limited transport options in peripheral, rural and remote areas hinder access to basic services, jobs and social activities. Often just a few kilometres separate poorly served rural and peripheral areas from public transport networks. To improve access for these populations, a number of countries are developing novel ways to provide economically viable, affordable, inclusive and sustainable mobility where private and conventional public transport struggle to provide appropriate connections. Instead of playing catch-up with the innovations trialled in urban areas, there are great opportunities for rural mobility innovations to develop in their unique context. However, policy makers have yet to develop the right frameworks in which these mobility approaches can thrive and grow.

What we recommend

Formulate a countrywide accessibility policy and implement Sustainable Regional Mobility Plans (SRMP)

Countrywide strategic accessibility policy paired with Sustainable Regional Mobility Plans (SRMP) are key to improve equality of access to opportunities. This means policy makers must shift from programme-based support provided, for example, through rural transport funds, to broader policy-based approaches. Target-bound rural mobility policy at the national or provincial/state level should define minimum standards (“mobility guarantees”) for access to local service centres and connection to a core network of inter-urban trains and buses. In addition, alliances of municipalities, or larger “transport regions”, should be responsible for the development of SRMP and local area services to ensure the mix of schemes and approaches in each area takes into account unique population needs and funding contexts. Mobility hubs should act as the glue between the core network and local services, accompanied by initiatives to integrate

trip planning and booking on a regional or national level. A convenient and affordable transport offer does not only improve access, but also provides the basis for incentivising more sustainable mobility behaviours.

Adopt a whole-of-government approach for rural public services and the local economy

To ensure efficient use of resources, and to achieve broader societal and economic objectives, rural mobility policy needs to be linked with the provision of public services, regional economic development, land-use planning, digital connectivity and climate policies. Overarching objectives should include: improving access to basic services in rural areas, promoting transit-oriented development of larger rural settlements and extending access to broadband telecommunications networks.

Make regulations more flexible to allow for the development of innovative, cost-effective mobility solutions

Operators of a greater variety of mobility solutions should be given legal status as public transport service providers, in order to benefit equitably from subsidies or tax deductions. Specifically, tender and operator licensing requirements should be adapted to allow local taxi, demand-responsive and community transport providers to bid for public service contracts in rural areas.

Combine public mobility budgets to achieve cost savings

To achieve more efficient use of limited local resources there should be greater integration of transport services operating in the same rural areas, rather than providing separate services for the general public, students, non-emergency hospital patients and social care clients. Introducing common vehicle standards to all service contracts would remove many of the legal barriers to co-ordinated delivery across general public transport, education and health services.

Fund pilot schemes to test innovative mobility concepts

Time-limited funding should be reserved for genuine pilots and new initiatives. Such funding should be provided for sufficient periods to allow meaningful pilots to be carried out, monitored and evaluated, including through living labs or regulatory sandboxes. Implementation should follow a participatory approach to better address local needs and strengthen local awareness and support for new mobility approaches.

Prioritise financial support for innovative services according to higher impact levels rather than use of high tech

Many funding streams are currently geared towards high-tech innovation, while many low-tech but high-impact solutions, including different forms of private or non-profit demand-responsive services, face severe funding constraints. In central funding decisions, high-tech approaches should not overshadow other high-impact, cost-effective approaches.

Use innovative financing approaches to increase funding pools and viability of individual transport services

Increased overall funding for rural transport services, can be achieved through contributions from third-party financing (e.g. the “*versement mobilité*” levy on medium-sized and large employers in France). Cross-subsidisation from urban to rural areas (e.g. through larger tenders, including both urban and rural areas) and cross-sectoral funding involving education, health services and local businesses (e.g. local sponsorship for community transport, already common in Europe) are possible through such schemes. However, it is important to ensure that the use of funds from such specific mobility tax systems avoids over-subsidising urban mobility through tax levied in both urban and rural areas. Rural Mobility as a Service (MaaS), in

particular, requires the assessment of other local services that can be combined with mobility to achieve a sustainable business model (e.g. in Japan local businesses contribute to financing mobility apps).

Increase central government funding for shared and active travel in rural areas

A significant proportion of trips in rural areas are under eight kilometres (e.g. 60% in German small towns and villages) and can be made without a conventional motorised vehicle. The potential for shifting to bicycles, and particularly electrically assisted bicycles, for shorter distances has not yet been fully exploited. Rural mobility funds or Covid-19 recovery stimulus packages could be a way to fund rental and repair schemes and improve safe active mobility infrastructure outside cities, including within villages and to connect to mobility hubs.

Provide technical assistance for rural mobility at the national or regional level

Central government should develop a rural mobility technical assistance programme to build local capacity and provide access to centralised expertise, including legal and technical support, to accompany not only local authorities, but also community based, bottom-up initiatives. Examples include the legal, funding and operational guidance targeted to small communities in France (France Mobilités Aides) and Germany (Mobilkon repository), the United States DOT Rural Transit Assistance Program, as well as the US Shared-Use Mobility Centre Technical Assistance. Technical assistance can also be provided at the regional level, as for example in the German state of Baden-Württemberg, where community transport associations can receive technical and financial assistance, including for the digital integration of their mobility service offer.

Promote mobility hubs to connect local services to the core network

A core element of strategic rural transport policy is multimodal rural mobility co-ordination (e.g. at the regional level) for more sustainable, convenient and seamless travel. Mobility hubs are important to link the core network to local rural collective or shared services. Mobility hubs also offer possibilities to integrate local services and businesses to make waiting times more attractive. The scale and range of services offered through hubs will vary according to location and population density.

Support the development of national or regional Mobility as a Service (MaaS)

Digital integration for trip planning and ticketing purposes is important to better link local rural services and the core network. For MaaS, regional (e.g. Flanders) or national leadership (e.g. Denmark) is recommended to avoid multiple city-based apps overlapping in adjacent regions and creating interoperability issues.

Introduction

Rural areas are conceptualised in different ways

There is great diversity in how rural areas are conceptualised, as evidenced by widely differing value thresholds delineating rural and urban areas across jurisdictions (ITF, 2021a). This report does not attempt to apply a common definition, but rather acknowledges this diversity and leaves room for the exploration of mobility solutions that are tailored to the needs of many types of non-urban communities that share similar challenges of car dependency and low density of demand for public transport.

A geographical perspective

Specific distinctions between rural and urban areas vary between countries and are often based on population counts or densities. For example, Denmark considers “built-up area[s] with at least 200 inhabitants” to be urban, with rural communities being those with less than 200 inhabitants (Statistics Denmark, n.d.). Canada’s definition of rural areas has a similar population threshold (areas outside of settlements and with less than 1 000 inhabitants), but also incorporates a population density element (less than 400 inhabitants per square kilometre) (Statistics Canada, 2017). At the other end of the spectrum, the population threshold between rural and urban areas in Finland is 15 000 inhabitants (Statistics Finland, n.d.), and in Japan, settlements of up to 50 000 inhabitants are considered rural (MLIT, 2018).

Definitions of remote areas typically focus on proximity to other population centres, and often include value thresholds for variables such as travel time, distance or cost. For example, in Scotland, settlements that are a 30-60-minute drive from a community of at least 10 000 inhabitants are considered remote, while settlements that are more than a 60-minute drive away from such communities are considered very remote (Scottish Government, 2018). The OECD has a similar definition, classifying communities as remote if they are located more than a 60-minute drive from a functional urban area of at least 50 000 inhabitants (Fadic et al., 2019). Some countries, for example Australia and Canada, have developed indexes that measure levels of remoteness for communities. Both are based on a measure of proximity to population centres, referring to travel cost in Canada (Subedi et al., 2020) and road distance in Australia (University of Adelaide, 2020).

An accessibility perspective

Indicators of distance and driving time often obscure the actual ease of access for those unable to drive a car or those facing economic stress associated with car ownership. This is why some countries have conceptualised rurality or remoteness in terms of access to basic services, for example, health care, education and broadband connectivity (ITF, 2021a). Here, it becomes relevant to consider the availability and affordability of transportation infrastructure and services, for example, access to a highway network or to air, rail or bus services. These factors relate the accessibility of basic services to connectivity, or the ease with which other locations may be reached (Lekakou, Remoundos and Stefanidaki, 2021).

Accessing basic services, while important, is but one of many reasons why people choose to travel. Travel for social reasons (e.g. visiting friends and family or tourism) and economic reasons (e.g. accessing employment, business opportunities or shopping) supports many aspects of overall well-being, such as preventing social isolation and generating income. A 2019 report on linkages between transport and inequality, summarised evidence of the importance of high-quality, accessible and affordable transport

options for obtaining and maintaining employment (Gates et. al, 2019). The negative impacts of transport disadvantage on subjective well-being may be more pronounced for individuals living in rural areas, than those living in urban areas (Gates et. al, 2019). A strict focus on service accessibility would miss these important drivers of mobility.

A further accessibility aspect to consider is the growth of digital service provision, enhanced communications technologies and e-commerce, which may, in some instances, replace the need to travel. However, as the Covid-19 pandemic has illuminated, many jobs cannot be performed from home, not all services can be provided digitally, and people still value in-person social interaction (see the section on the Implications of Covid-19 for Rural Mobility). Mobility, therefore, will continue to have a role in meeting basic needs.

Rural areas are shaped by social, economic and political processes (Kühn, 2015). For example, labour market changes brought about by globalisation and technological change have resulted in many areas that could be considered peripheral from a geographical perspective also being “left behind” from a socio-economic perspective (Hendrickson, Muro and Galston, 2018; Iammarino Rodriguez-Pose and Storper, 2019). Socio-economic factors are important for understanding mobility, in particular, the extent to which they either limit or support the feasibility of private forms of mobility (e.g. access to a private car) or the pooling of demand that enables the provision of publicly available transportation services. Farrington (2007) asserts the importance of socio-economic circumstances on accessibility: “Accessibility is at least as much about people as places. A place is not just ‘more’ or ‘less’ accessible, but accessible relative to people in all their different circumstances: people experience more, or less, access to places.”

As a result, access to services, economic opportunities and social activities may be quite different from place to place and even between individuals in the same place.

Diverse factors shape individual mobility and transport provision

Territorial factors

Territorial factors play an important role for transport in rural areas. Island or mountain communities tend to have more limited choice when it comes to routes and modes of transport and these may be further limited by weather conditions (ITF, 2021a). In rural areas without these geographical constraints, the greater distances between places of interest, and lower population density, makes the provision of public transport more costly, which leads to lower public transport provision and higher private car use compared to urban areas. Residents in rural areas are also less likely to engage in active travel (e.g. walking and cycling) than their urban counterparts.

Socio-economic factors

People travel to and from peripheral and rural communities for work, education, shopping, medical care, professional services, tourism, leisure and social purposes (Rozenale, Randall and Briggs, 2020; Malatest, 2020). The ability to travel for any of these reasons is important for ensuring higher and stable incomes, better physical and mental health, and generally a better quality of life (Rozenale, Randall and Briggs, 2020).

At an individual level, access to mobility is shaped by a range of factors, such as, socio-economic status (Haustein and Nielsen, 2016; Lucas et al, 2016), age (Haustein and Siren, 2015; Haustein, 2012; Ahern and

Hine, 2015), gender and household composition (Bergstad et al., 2011; Miralles-Guasch, Martínez Melo and Marquet, 2016).

In rural areas where private car use is predominant, public buses and other shared mobility solutions often cater to a highly diverse audience, such as low-income individuals, seniors, students and people with reduced mobility (Haustein and Nielson, 2016; Malatest, 2020). Several studies (Liviņa et al., 2020; Rozentale, Randall and Briggs, 2020; Malatest, 2020; Brake and Nelson, 2007) have identified populations with a greater need for rural public transport services (Table 1).

Table 1. Rural public transport users

Low-income earners	Some people cannot afford to live in larger communities/cities or to own a vehicle, so they may choose to live further away, where goods and services are not as accessible, in exchange for affordable housing. Likewise, those living in rural communities may not have access to high-paying jobs, which results in lower-income households.
Persons with reduced mobility	Some people have difficulty driving or accessing transportation due to physical impairments or limitations (e.g. people using wheelchairs, those with sight impairments, etc.).
Seniors	While demographics in rural areas vary across the world, many rural communities are experiencing an ageing population (Liviņa et al., 2020). Seniors tend to fall into a variety of categories that can make them more vulnerable (e.g. low income, reduced mobility, decreased autonomy, unable to drive, etc.). Older populations also tend to have increased health needs, which may require them to visit medical centres more frequently (Liviņa et al., 2020; Rozentale, Randall and Briggs, 2020).
Youth	Young people are less likely to have stable or high-income jobs, less likely to have a vehicle, generally have less autonomy, and may have a higher need to travel for educational purposes.
Indigenous and “traditional” rural communities	Indigenous communities (for definitions see ILO Convention 169 [ILO, 1989]) differ widely across the world, but despite urbanisation trends, many still inhabit sparsely populated areas where goods and services are not easily accessible (e.g. Australia and Canada). ¹ Whilst these communities may consist of people from all of the populations described above, some may face additional economic stress and structural discrimination. Living in rural or remote areas is often framed as a lifestyle choice that implies the need to trade-off certain expectations and is used as a justification, in various countries, to rationalise public services in low density areas. However, there is also increasing recognition of the historical context and the strong ties that such communities may have with the region they inhabit, and with this comes greater political will to improve the living conditions for these groups.
Anyone who cannot/does not drive	Beyond the populations described above, anyone who cannot or does not drive could be considered more likely to rely on public transportation. For example, some rural residents may not feel comfortable driving in the winter time or because of poor road conditions.

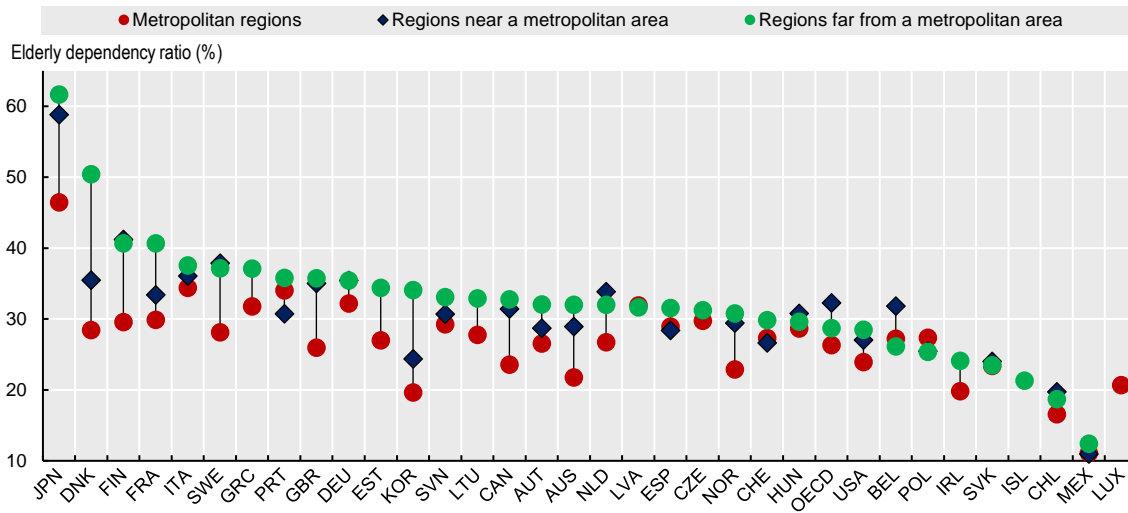
Demographic factors

From a demographic perspective, people living in regions far from metropolitan areas tend to be older than people living in metropolitan areas (see Figure 1). Further, the proportion of the population over the age of 65 years is predicted to grow more quickly in rural areas in many countries. For example, in the United Kingdom the group aged 65+ years is predicted to grow by approximately 50% in rural areas between 2018 and 2043, while virtually no increase is predicted among the younger population aged 16-24 years (information provided by the UK Department for Transport). The global trend towards urbanisation is resulting in slower growth, or even population decline, in many remote areas as young people out-migrate to a small number of urban centres (Figure 2).

Population ageing is a challenge for communities as it leads to increases in local expenditure, such as (special) transport and community services for the elderly. In addition, population ageing also reduces local direct tax revenues as a result of the decrease in the number of formal labour market participants (Kim and Dougherty, 2020).

Figure 1. Elderly Dependency Ratio, 2019

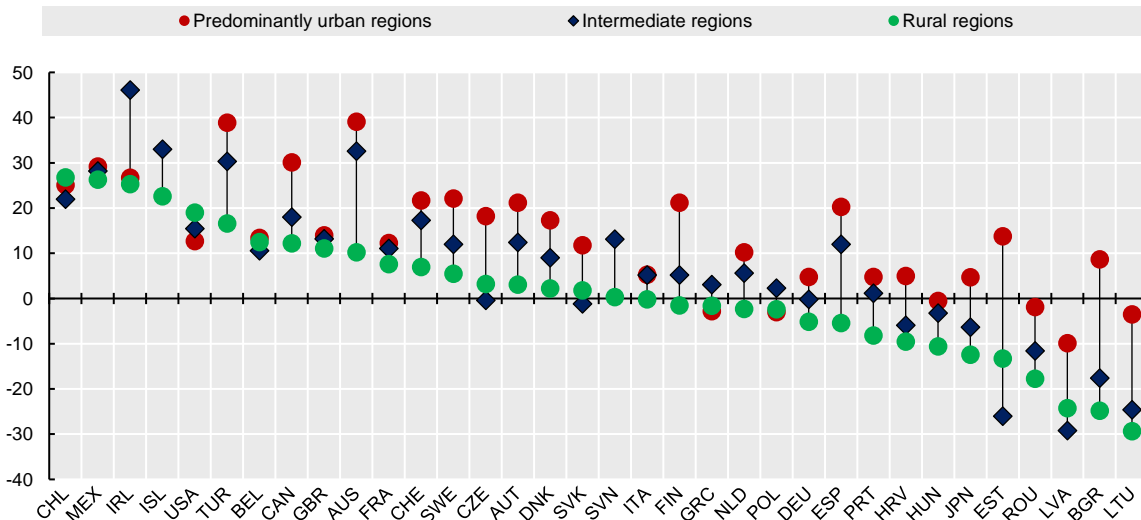
Percentage of population aged 65+ divided by population aged 15-64



Note: Weighted averages of small regions (TL3).

Source: OECD Regional Statistics (database), <http://dx.doi.org/10.1787/region-data-en>.

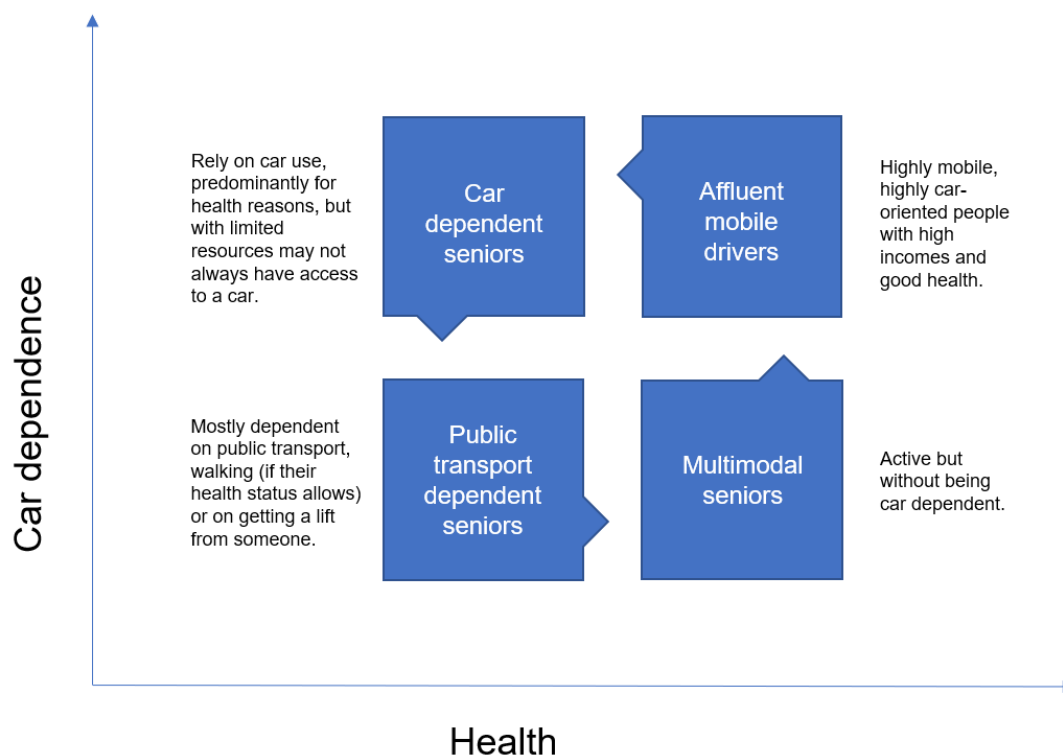
Figure 2. Positive/negative growth index of the total population, 2001-20 (2001=0)



Source: OECD Regional Statistics (database), <http://dx.doi.org/10.1787/region-data-en>.

At the same time, increases in life expectancy and improved health into older age in many countries is greatly increasing the diversity of mobility behaviour among those aged over 65 years (Figure 3).

Figure 3. Mobility patterns among those aged 65+ years



Source: Developed by the authors based on Haustein and Siren (2015).

Effective rural transport provision beyond the core network

Recognising the geographic, socio-economic and demographic challenges discussed above, many countries aim to improve public transport provision to revitalise rural areas. However, only a few regions defined a legal right to a minimum level of service locally (e.g. several districts in Germany and Switzerland). In a number of countries, transport provision is largely left to the open market, which results in operators cherry-picking the few core profitable routes and neglecting less profitable, but nonetheless important, local networks.

Although rural areas, under many conceptualisations, are expansive in a geographic sense and home to significant sectors of the population, overarching frameworks to guide rural transportation policy making are rare (see the later section on “Frameworks affecting innovative rural mobility”). The result is that rural mobility challenges are often addressed within policy frameworks that take urban areas as the starting point and are ill-equipped to respond to the unique circumstances in rural communities (Dick, Brand and Tovaas, 2020). Working Group experts have therefore argued that transport provision in rural or sparsely populated areas should be part of a broader strategy recognising local needs. This includes a coherent governance structure to provide connections across three hierarchical levels: (i) the core train and bus network, as a competence of the state, province or region; (ii) branch networks providing inter-village or feeder traffic, as a responsibility of the region or an alliance of smaller regions; and (iii) local tailor-made services that cover the last mile(s) provided or purchased by the municipality or a co-ordinated group of municipalities.

The role of innovative mobility

Given the diversity of rural circumstances, locally anchored, innovative types of mobility are often best equipped to provide critical links to conventional train and bus networks. Such local provision plays an important role to ensure complete and convenient travel:

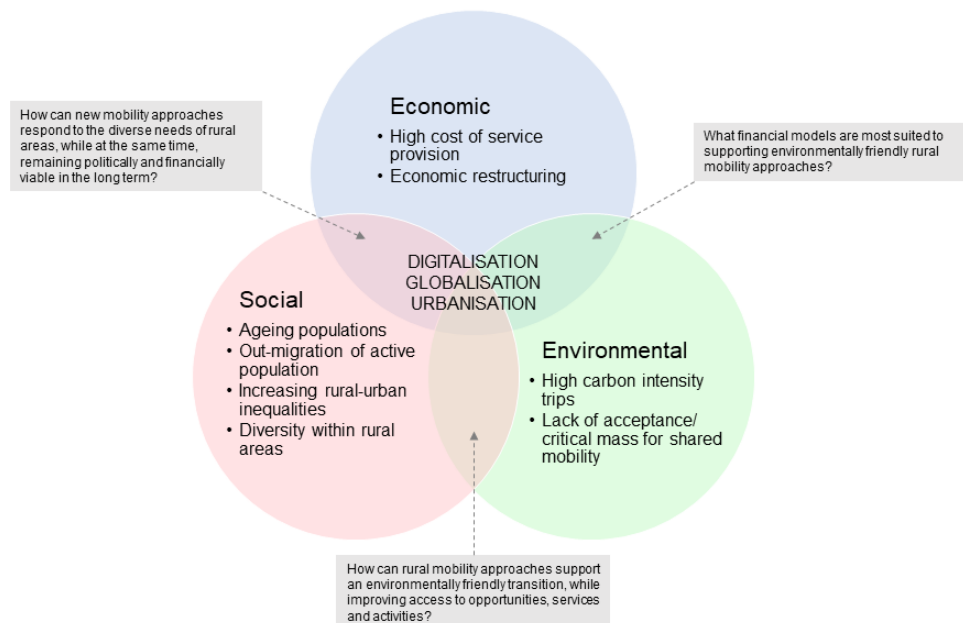
- from cities or towns to rural areas and vice versa
- within rural areas and between villages and settlements
- within a municipality with dispersed settlements or villages of a larger size.

Innovative mobility is not necessarily based on new technological approaches. This Working Group understands innovation as having three basic components. First, an innovation may be either a product, a process or a combination of the two (Edwards-Schachter and Wallace, 2017; Gault, 2020). It could be a new mobility offer (e.g. a new carsharing programme), a process change that increases the uptake of an existing solution (e.g. introduction of an online booking system), or a social or institutional process that results in the identification or application of a new mobility approach (e.g. a social innovation). Second, not every innovation needs to start from scratch. A well-established mobility solution may be considered innovative if it is novel in the particular context in which it is being applied. It is important to recognise that no single innovation provides all the answers and different approaches are suited to different territorial, demographic and governance contexts (Randall et al., 2020). Third, innovative mobility approaches should contribute to sustainable development from a social, environmental and economic standpoint (Edwards-Schachter and Wallace, 2017). Figure 4 illustrates the key challenges for rural mobility innovation from these three standpoints. Approaches that are prohibitively expensive for most people, or that dramatically increase the carbon footprint of a community, are not considered innovative by this definition. At the intersection, innovative approaches should acknowledge the way that global megatrends such as digitalisation, globalisation and urbanisation play out in different ways in different places.

From a social perspective, perhaps the most important aspect is the diverse nature of rural communities. As noted above, many rural and remote communities are dealing with challenges related to population ageing and out-migration of the working-age population. For some communities, new mobility approaches may be part of a strategy to turn this around, while for others, innovations may focus on finding ways to adapt to new conditions (Copus et al., 2020). It is also important to recognise that, despite an overall trend towards urbanisation, many peripheral communities are thriving (Kull et al., 2020). Responding to diversity is an important step in developing innovative approaches to mobility that cater effectively to community need.

From an economic perspective, the biggest challenge is how to develop mobility approaches that can be sustained in the long term. Demographic challenges, coupled with the sparsity and low density that characterises many peripheral communities, can make service-provision costs prohibitively high for the public sector and an unappealing business proposition for the private sector. In the face of this, some advocates argue for a targeted policy response that would guarantee the funding and support that rural communities need to provide mobility for all residents (Lorenzini, Ambrosino and Finn, 2021). The basic assumption here is that everyone has a right to a basic level of mobility, regardless of where they live.

Figure 4. Social, economic and environmental challenges to be addressed by rural mobility innovation



From an environmental and social perspective, it is important to recognise the importance of social justice in the green transition. Shared mobility approaches form an important part of the solution, particularly when it comes to supporting those who do not have private mobility options or for replacing the second car (Steger-Vonmetz and Steinwender, 2014). It is also important to bear in mind that, for many rural communities, eliminating the private car altogether may not be a viable option. Particularly in more sparsely populated areas, cars are likely to remain a vital means through which to access social and economic opportunity. As such, longer-term solutions may also play an important role. For example, financial models that increase the accessibility of electric vehicles, support the generation of clean energy, and mobility responsive approaches to community planning. This also involves promoting the shared use of cars through carpooling and carsharing initiatives, as well as integrating private modes with mobility hubs.

Three key questions arise at the intersection of the social, economic and environmental spheres. Addressing these questions is central for defining future rural mobility approaches:

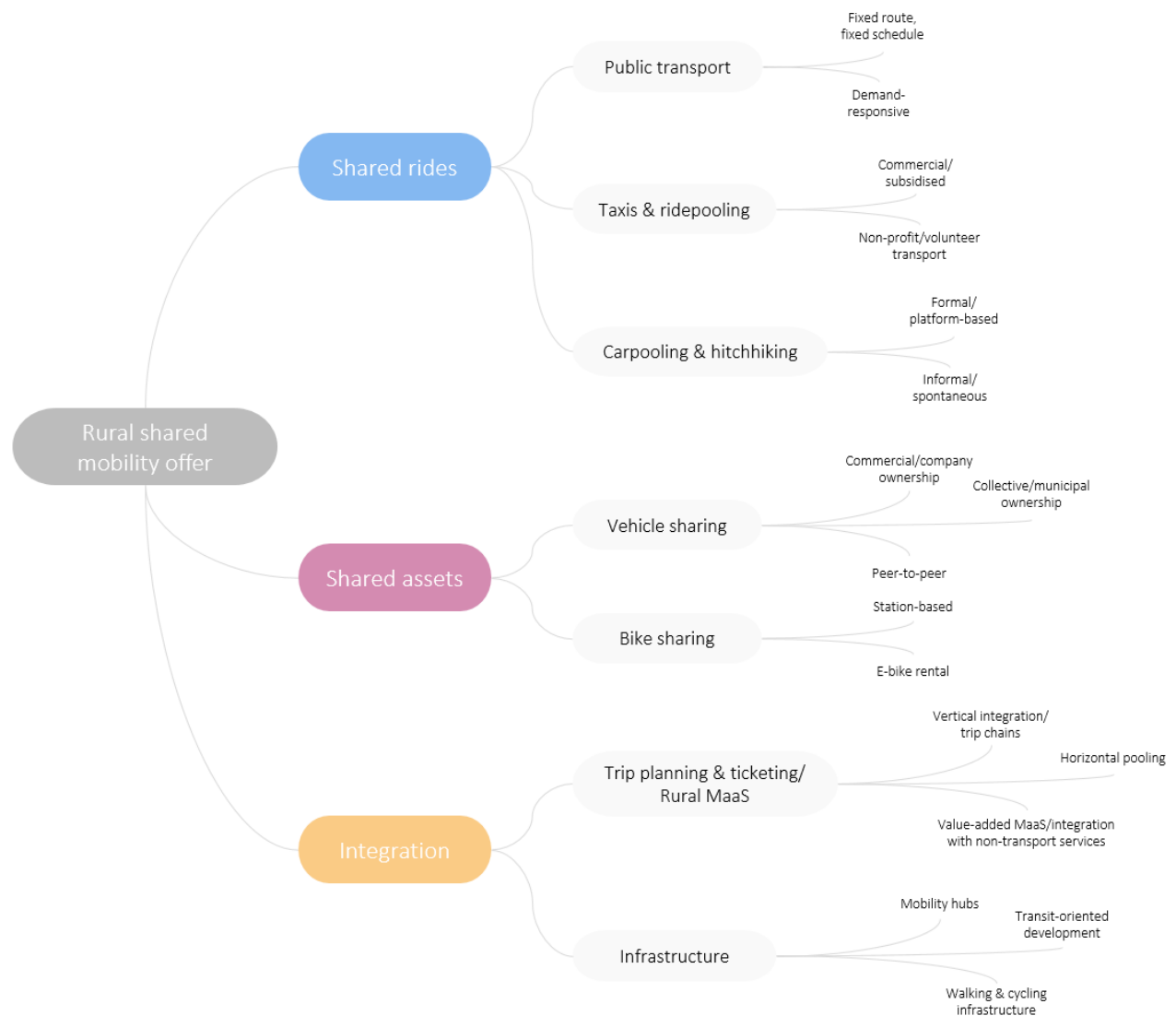
- How can new mobility approaches respond to the diverse needs of rural areas, while at the same time, remaining politically and financially viable in the long term?
- How can rural mobility approaches support an environmentally friendly transition, while improving access to opportunities, services and activities?
- What financial models are most suited to supporting environmentally friendly rural mobility approaches?

With these questions in mind, the report draws on a range of examples from across the participating ITF member countries to highlight innovative approaches to mobility on the periphery that are already taking place. Further, it considers the role of different policy frameworks and funding models in supporting the implementation of these approaches in a diverse range of settings. Finally, it considers the implications of the Covid-19 pandemic for rural areas and offers a new approach to rural mobility in a post-Covid world.

The innovative rural mobility landscape

Flexible and innovative mobility services that are adapted to the unique local circumstances are the best way of ensuring critical links to core public transport networks. This section looks at innovative services mode by mode and summarises recent experiences with non-conventional shared services, active mobility and the integration of different modes, including mobility hubs and rural Mobility as a Service (MaaS) (Figure 5). Integration through mobility hubs, trip planners and integrated ticketing represents the glue between different modes that ensures uninterrupted and convenient travel chains.

Figure 5. Rural shared-mobility offer



Despite increased interest from policy makers, new mobility approaches are rarely implemented on a large scale and lack integration with the wider transport network. One reason for this is the current policy, funding, legal and institutional environment, which is discussed further in the next section. Working Group

findings from over 80 case studies show that innovative mobility services have enormous difficulties competing with the private car and with very low uptake in comparison to urban areas. These findings are also reflected in previous studies. For example, the EU SMARTA project evaluation has shown that pilot services often attracted less than 1% of the population (unpublished evaluation report). Multimodal trip planners were used less than 10 times per day on average (e.g. Martin et al., 2021). Overall, services were rated positively by users, which may suggest that more time was required for knowledge about these services to disperse and uptake to gather momentum. Numerous pilot projects underestimated the time to properly set up a service and overestimated the speed of user behaviour changes. More effective marketing targeted at specific user groups and introductory offers and rewards, e.g. vouchers or temporary reductions and free tickets, could help attract ridership in the first phase (e.g. SaMBA, 2019).

Covid-19 has affected the implementation of many recent mobility pilots. This makes it challenging to draw meaningful conclusions on the potential success of these options. On the other hand, studies have also demonstrated the resilience of flexible transport services, with patronage recovering much more quickly than scheduled buses, possibly due to their ability to flexibly allocate resources and ensure social distancing due to pre-booking (see section on the “Implications of Covid-19 for (innovative) rural mobility”).

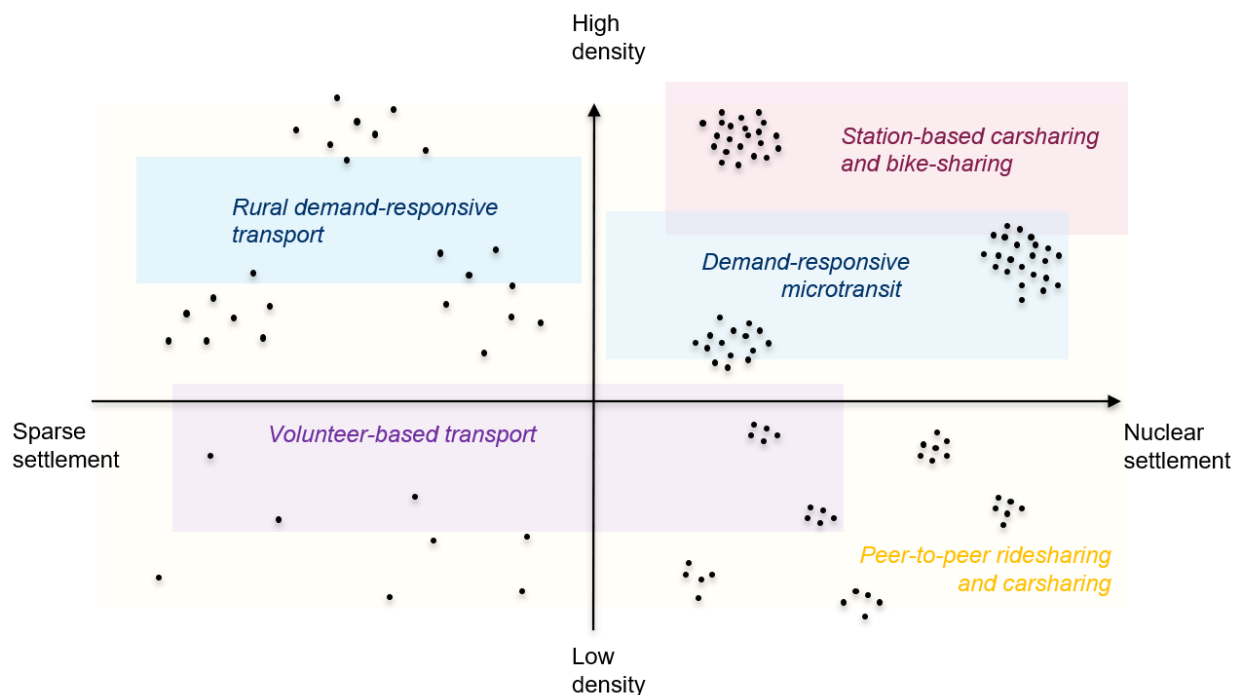
Shared mobility

The local shared mobility offer is an important building block to complement the existing core transport network. Different approaches, including rural demand-responsive transport (DRT), community or volunteer transport, ridesharing, carsharing and autonomous buses are explored in this section. Figure 6 provides an overview of the geographic contexts in which different service types tend to work best, depending on distances, settlement patterns and population densities.

The upper quadrants show service types that work best in more densely populated rural areas. For example, authorities are increasingly replacing regular bus services with DRT, in some cases combining subsidised transport, such as school and health transport, as well as services for people with special needs. These services often require pre-booking in sparsely populated areas, particularly where a small fleet may cover a wide geographical area. In contrast, demand-responsive microtransit or shared ridesourcing emerging in more densely populated areas outside of cities can operate with a much larger vehicle fleet covering similar distances to the previous example, but with the capability to enable an almost instant response to booking requests (Volinski and Raton, 2019; Lewis, 2019). Similarly, station-based carsharing and bikesharing both require a critical mass to function, and are therefore suited mainly for village or small-town centres, where residents live in close proximity to the services offered. Autonomous vehicles (AVs) as a public shared mobility option are primarily being tested in rural towns where distances are small, and infrastructure and settlements relatively dense.

On the lower part of the figure, in areas with very low and dispersed demand, peer-to-peer carsharing, ridesharing or hitch-hiking solutions are advantageous, as the services can harness existing assets and trips that would have been made anyway. This can also include the sharing of buses (e.g. a community pool of minibuses) where the vehicles are collectively owned (by the municipality, local company or community group) and made available for shared use by the municipality, members of certain local organisations or for members of the public.

Figure 6. Suitability of shared mobility types by population density and settlement type



Note: The shaded areas show where certain provision models are generally best suited. Some settlement structures lend themselves to more than one model.

Demand-responsive transport (DRT)

Rural DRT is a hybrid between bus and taxi services, involving flexible routing and scheduling of small- or medium-sized vehicles. DRT services utilise technology to integrate orders and optimise routes. Customers may pre-order the service through call-centres and/or mobile apps by placing trip requests, including information on the origin and destination of the trip, as well as the desired pick-up or drop-off time. Pick-ups and drop-offs are organised either door-to-door or based on pre-defined or virtual stops. New operational possibilities through improved routing algorithms and user, driver and management interfaces have sparked renewed interest in the use of DRT for public transport.

DRT can contribute to multiple societal goals and provide benefits including: increasing access for people with diverse mobility needs (accessibility), completing the travel chain (modal shift, environmental), service viability through flexible use of resources (economic), and improving rural livelihoods (social, economic and demographic).

An important benefit of DRT is its potential to increase accessibility for specific population groups. For example, an evaluation showed that demand for DRT services appeared to be higher in areas with low car ownership and population density, as well as high levels of social deprivation (Wang et al., 2014). In areas outside Melbourne (Australia), key parameters affecting the use of DRT included gender (higher DRT use by women), low income and workforce status (Jain et al., 2017). Several studies have found women to be dominant users of DRT (Mageean and Nelson, 2003; Nelson and Phonphitakchai, 2012; Bearse et al., 2004). Results from a DRT pilot in Vidzeme (Latvia) showed that 85% of users were women, and the average age was 60. Among the Flemish Belbus users, 74% are women and 66% of users are over 45 years

of age (De Lijn Centrale Diensten, 2014). The French La Saire DRT service caters mainly to users under the age of 18 (Padam Mobility, 2020).

DRT has the potential to encourage modal shift and reduce the need for a (second or third) car (Jokinen, Sihvola and Mladenovic, 2019). France Mobilités reports that DRT journeys are generally made in connection with journeys using regular public transport, and that by covering the last mile, DRT encouraged modal shift for the entire trip (France Mobilités, 2020). Reduced car dependence as a result of the introduction of a DRT service has been examined in Finland. The assessment of the Kyläkyty service in Porvoo showed that 67% of trips made with the new service would otherwise have been made by car, while 27% would not have made the trip at all. As a result of the trial, driven kilometres were reduced by 12.6%, thus a reduction of 10 923 km and saving 2.6 tonnes of CO₂.² Of the total kilometres saved, 36% would ordinarily have been undertaken as taxi rides (Eckhardt, Lauhkonen and Aapaoja, 2020).

DRT usually plays two different roles in the transport system:

- “interchange DRT” plays the role of a last-/first-mile service that acts as a feeder for scheduled fixed-route transport (Enoch et al., 2004).
- “substitute DRT” where DRT replaces a fixed-route service, or “network DRT” when the DRT service enhances public transport in a particular place or at certain times. Used in these ways DRT can step in where public transport with fixed routes and schedules are inefficient and costly due to long distances, sparse population and varying mobility needs (Enoch et al., 2004). DRT is also used to bundle fixed-route services and other subsidised minibus or taxi services, such as paratransit, school and elderly transport.

A number of DRT services are specifically conceived as feeder services, helping to secure the viability of the core transport network. The Dutch Hubtaxi is a DRT system in the provinces of Groningen and Drenthe that brings passengers to the closest public transport or mobility/multipurpose hubs (Reisviahub, 2020a). Other examples are Flex’Hop in rural areas outside Strasbourg (France) and Lincolnshire’s CallConnect DRT service (United Kingdom), which guarantees connections to the core network by offering a substitute taxi ride as a last resort. In New South Wales (Australia), the Opal Connect App allows DRT users to earn AUD 2 travel credit whenever they use DRT as a feeder to a fixed-route service (although this facility has yet to be rolled out to rural and regional locations).

Complementarity requires careful design and co-ordination to avoid competition with regular public transport. In Catalonia, co-ordination and operation within the regular service network is mandatory (Generalitat de Catalunya, 2020). The Swedish Närtrafik services allow trips only when there is no public transport alternative, e.g. between certain hours and in certain areas (Kirsimaa and Suik, 2019). If a regional bus departs within 30 minutes before or after the requested departure time, ILSE, a flexible service in the German district of Vorpommern-Greifswald, does not take passengers directly to their destination, but to a stop on the regional line.³ The JustGo DRT service in North Lincolnshire (United Kingdom) promotes the fixed-route service through its app, to limit competition and generate capacity for those travelling where a regular bus service is not an option (Liftango, 2021).

There are numerous examples where DRT has replaced regular public transport. As one of the largest contemporary trials, in New South Wales (Australia), on-demand services are implemented to replace fixed-route buses in some regional centres and rural areas to deliver better value-for-money services and increasing patronage (Transport for New South Wales, 2021; Franco, Bell and Galatioto, 2012). Other examples are the Italian Prontobus and the Flemish Belbus, which replaced only parts of the scheduled off-peak services to guarantee mobility in regions with a very low transport demand at specific times. FlexDanmark, initially used for specific user groups, is a well-established nationwide on-demand service

open to all citizens that provides an average of 15 000 trips per day. It is currently the world's largest, most co-ordinated and centralised DRT system. Cost savings for the public sector are estimated at 20-40% (Lynott, 2019a). Important savings result from the integration of various subsidised services (regular buses, transport for health, school transport, etc.) into a single DRT service, as discussed in the next section on policy, funding and legal frameworks.

Setting up a DRT service can involve high costs and there have been doubts as to whether DRT can be generalised due to the high subsidies (up to EUR 20-25 per trip in France, CERRE, 2021) and comparably low patronage in some contexts (Coutinho et al., 2020). In the first year of operation, an average cost per trip of USD 80 (June 2018) and farebox recovery of 3%, compared to 24% for fixed-route services, was reported for DRT services in rural New South Wales (Nelson and Wright, 2021, forthcoming). In areas with low and dispersed demand, there is a risk that the DRT service could become a (possibly heavily subsidised) individual taxi service. Nevertheless, there are examples, as with CallConnect in Lincolnshire or the Vidzeme region in Latvia, where the subsidy required for DRT is approximately the same as that required for the former, much less effective, fixed-route services. This has been achieved by the lower costs of operating smaller eight-seater buses, making this type of operation much more affordable for the level of service provided than conventional services, although the low volume of passengers in a deeply rural area means that the subsidy per passenger is always going to be high. For these sparsely populated areas, lower cost solutions, such as those involving volunteers could be considered (see the next section on community transport).

DRT does not always fit the specific operational context and users' preferences. Frequent reasons for people not using DRT include uncertainty about travel and arrival times, waiting times at the (virtual) bus stop, as well as the risk that additional ad-hoc passengers disrupt some pre-booked passenger's journeys. Some services require pre-booking, meaning less flexibility and more effort from users – although this provided DRT with an advantage over conventional public transport during the Covid-19 pandemic, allowing for better social distancing. In many cases, bookings are subject to availability (some rides can be declined) and cannot be made through regular public transport apps. Inadequate operation times or limited geographical coverage can also deter users. In Ajoie, a rural district in Switzerland, a community has switched back to hourly buses to achieve higher cost-efficiency and ridership. The change had a strong effect on demand (from 371 000 passengers in 2011 to 760 000 in 2015) and hence a positive impact on cost recovery levels. Other reasons for low uptake of DRT are issues in attracting competent and reliable operators, as well as insufficient marketing and consideration of user needs.

Where implementation of DRT has been difficult, careful analysis of demand and use of advanced technology, including improved dispatch algorithms and careful planning and marketing, could change the results (e.g. Connected Places Catapult, 2020). Attention should therefore be directed towards better knowledge of local needs and an operational design that best caters to diverse user demands. The Good Practice Guide for DRT services by Brake, Mulley and Nelson (2006) provides a comprehensive overview of planning and operational considerations, which remains relevant in today's marketplace.

Policy takeaways: Demand-responsive transport

- The experience with DRT is mixed, despite wide agreement that DRT is generally the most suitable means to cater for the diverse and dispersed demand in rural areas. Finding the right operational model can hugely influence the success of the service. DRT services should be implemented based on careful consideration of the operational environment, funding arrangements and user needs.

- The role of DRT in the overall rural mobility landscape needs to be clarified on a case-by-case basis: Are they feeders or stand-alone mobility solutions? Do they complement or replace traditional public transport services? Are fees and ticketing part of the public transport system or are they structured and paid for separately? Should they be open to the general public or limited to certain user groups?
- Where possible, consolidate less financially viable regular public transport operations with various types of small-scale local transport, such as Dial-a-Ride, non-emergency patient travel, elderly and paratransit, small deliveries and school services into a single service to achieve savings for the public sector.
- Ensure that the DRT service is co-ordinated with public transport, e.g. automatic interaction between the DRT and timetables of regular public transport. Ensure flexible bus services connect to a hub or feed into main transport links.
- Promote DRT integration into trip planning tools, as well as local or national ticketing systems.
- Design effective strategies to inform and onboard users. Involve users with diverse profiles and backgrounds directly in the design of the services to strengthen community ownership, awareness and acceptance, e.g. through local schools, employers, religious institutions, associations, etc.

Community transport

Community transport (CT) services are usually not-for-profit local transport solutions organised in a “bottom-up” manner by local residents according to the specific needs of their community. For example, In Ireland, a Community Transport Service, as defined under the Taxi Regulation Act 2013, as “a transport service provided by persons concerned for the social and welfare needs of one or more communities, without financial gain for the person providing the service or another (volunteering), and where the payment for a journey or in respect of passengers using the service does not exceed the cost of providing the services in respect of the journey”.

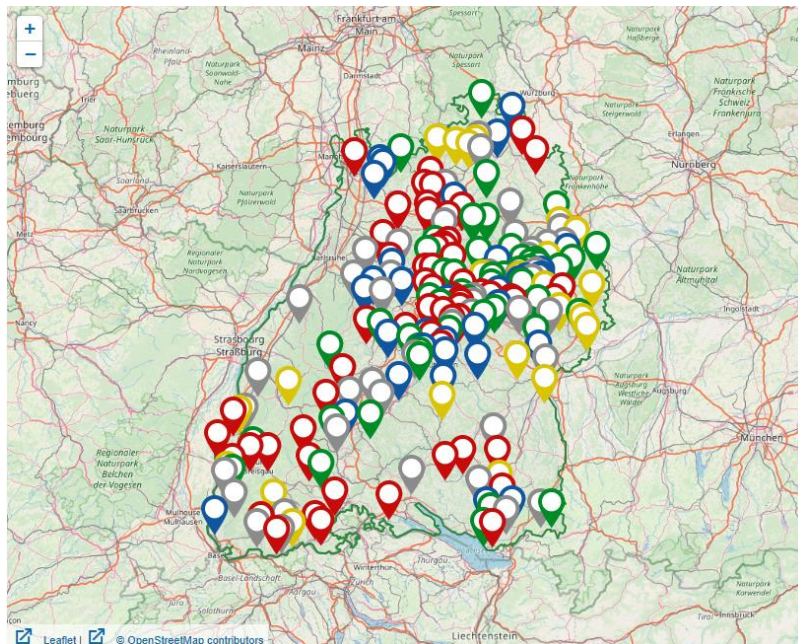
While all types of CT share a similar approach in terms of implementation and organisation, the types of solutions can differ. The services can be divided into fixed-schedule and DRT services, most of which are based on the involvement of volunteers. Buses owned or hired by an association tend to be the most frequent application, however some services are also provided by mobility companies or with private cars. A great variety of volunteer services can be found in the German state of Baden-Württemberg (Figure 7). Other types of non-profit initiatives, such as ridesharing, carpooling and carsharing are discussed further below.

The most important benefits of CT are the low-cost transport coverage improvements through the involvement of volunteers, and associated social cohesion effects. They often have a high level of efficiency and effectiveness, as they are designed by and targeted to the specific needs of the citizens of their area. CT services originate mostly in rural areas where public transport is difficult to maintain financially, thus fuelling the need for other models. However, in regions where some form of public transport exists, CT can effectively bridge gaps by providing users with a last-mile connection to public transport and in this way, CT projects have contributed to the development of the existing bus service networks.⁴

CT also brings with it social co-benefits (Canning et al., 2015; ECT Charity, 2020). While volunteer drivers in Germany or the United Kingdom are often younger pensioners, in Luxemburg, the need for additional transport services was combined with the need to offer job opportunities for low-skilled workers and

resulted in the dial-a-ride service Bummelbus, which combines rural mobility services with a professional work reinsertion project (SMARTA, 2019a). While many associations advertise the need for drivers on their website, the rural Mobility as a Service (MaaS) app developed in Tompkins County (New York) has integrated a feature for volunteer driver recruitment, which supports the idea of “prosumers” – an individual who is both a consumer and a producer – being an integral part of rural MaaS (Eckhardt, 2020). It has been shown that the bottom-up organisation of CT often leads to a stronger integration of citizens from the communities where such services are implemented, thus significantly improving social life in rural municipalities.

Figure 7. Community transport initiatives in Baden-Württemberg, Germany



Note: Red = community bus, blue = citizens’ car (volunteer-based DRT), green = bus services for special user groups, yellow = car services for special user groups, grey = other community transport.

Source: Nahverkehrsgesellschaft Baden-Württemberg, NVBW (n.d.).

CT still faces several constraints, ranging from a lack of know-how, funding, legal recognition (see section on legal frameworks below), co-ordinated support at a higher level, as well as recruitment of personnel, exemplified by the challenges for the English CT sector (Box 1). Although CT is a low-cost alternative to conventional services, some CT provision may be less resilient due to uncertain status, sponsorship and operational models relying on volunteers. Additionally, despite its manifold benefits, the possibilities of CT are often overlooked by national and regional transport authorities as it is misperceived as a “niche” service.

Communities often lack knowledge about where and how to start a CT project and where to go for information, support and guidance on the implementation of their own CT service. Basic information, such as how to start a community bus scheme, a demand-responsive dial-a-ride service or community health transport, is often difficult to obtain. CT services are often technology-light, with highly manual scheduling and operating systems, making them costly to run and unattractive to younger user groups. Many CT services still sit entirely in isolation from the rest of the public transportation network.

Box 1. Challenges for the community transport sector in England

Innovation funding for rural areas

The UK Government tends to channel rural funding and resources towards private initiatives. As rural mobility will never be profitable, commercial organisations withdraw their service after the funding period, leaving community transport (CT) to pick up the demand, often without the required funding to support them. Where funding is provided, it is often in the form of short-term grants or partnerships that leave CTs financially insecure and unable to plan for the long term, repeatedly having to use their limited resources to bid for new funding.

Community leadership

Each organisation operates uniquely, according to their local community's specific needs and resources and this may create challenges, including:

- a. difficulty replicating successful models in other areas – successes in one area may not translate directly into another area where there are differing resources and needs
- b. differing levels of support – local authorities differ in their budgets, expertise and willingness to support and fund CT
- c. lack of public awareness – smaller grassroots organisations often lack the exposure and financial resources to advertise their services
- d. varying levels of organisation – differing levels of co-ordination can create difficulties in building networks to share good practice and expertise.

High proportion of older staff and passengers

People with mobility issues and who require more accessible forms of transport, such as CT, tend to fall into the older age category. Meanwhile, only drivers who passed their driving test before 1997 are able to drive a minibus without restrictions; while those who passed their test after 1997 must undergo further training to receive additional qualifications and certifications (PCV D1 and Driver CPC) to enable them to operate a minibus. Training is expensive, so many CT organisations rely on older drivers who do not need to undergo training.

This combination of factors means that CT suffers from a number of hurdles:

- a. The pool of available drivers is dwindling – ageing drivers with a pre-1997 licence are gradually retiring from driving/volunteering. CT organisations have to weigh-up the long-term costs, risks and benefits of training drivers. In particular, there is a risk that CT operators may fork out considerable sums to train younger drivers who later leave the organisation.
- b. Reliance on unpaid labour requires CT operators to be more flexible in the demands placed on volunteers. For example, more leeway might need to be given if a volunteer wanted to drop out of a certain shift at the last minute, than if they were a paid member of staff.

- c. CT suffers from social stigma as it is often seen as a service exclusively for certain user groups, predominantly older people who are excluded from less accessible forms of transport, as well as those with disabilities. This leads to further challenges in the perception of CT:
- decision makers in governments, local authorities and transport bodies often overlook CT and its benefits as it is seen as a “niche” service that is not relevant to wider needs
 - misconceived perceptions of CT create difficulties in reaching other user groups who may also suffer from transport exclusion, but who do not feel comfortable to use CT as it is seen as a service that is “not for them.”

Source: Statement provided by the UK Community Transport Association (unpublished).

Some countries are beginning to address these challenges. In the United Kingdom, for example, the Community Transport Organisation provides CT services an established network structure to build upon. In Germany, the state of Baden-Württemberg has introduced several programmes to support CT initiatives, including digitalisation and integration. The state mobility agency (Nahverkehrsgesellschaft Baden-Württemberg, NVBW) has its own competence centre for “unconventional” forms of public transport, which supports local authorities, municipalities and residents in developing and operating CT. Furthermore, manuals and IT tools are available to support route-planning, operation and management.

This support, however, is not generally available across the rest of the country. To go further, an in-depth evaluation of volunteer-provided transport in Germany recommends support on all administrative levels (Kommunen Innovativ, 2020):

- communal level – platforms for information exchange among citizens, contact points for advice, co-ordination and networking among different initiatives, (co-)funding of services
- state/provincial level – co-ordination and networking, stable dedicated funding programmes, short and easy application procedures, information on eligibility for further funding, knowledge transfer, support for regional or communal advisors
- central/federal level – legal clarification and distinction from taxi and commercial DRT operators, clarification of licensing and insurance requirements.

Policy takeaways: Community transport

- Offer easy-to-access information about how to start up and finance a community bus or taxi scheme, demand-responsive dial-a-ride service or community health transport.
- Shorten and simplify funding application procedures.
- Assistance by experienced personnel on federal, state or regional level helps to integrate and connect CT with existing transport networks (e.g. Local Link in Ireland, KOMOBIL35 recommendations for Germany) and improve levels of professionalism in CT service models. This support should take place without endangering unique CT operating models, which are often adapted to local circumstances and needs.

Ridesharing

Peer-to-peer ridesharing or carpooling and formalised hitchhiking have a high potential in rural areas by tapping into an existing pool of vehicles and drivers. Ridesharing among private individuals has particularly high economic and environmental benefits, as this can be implemented with relatively low effort, possibly linking into existing informal or social ridesharing networks, especially in less densely populated areas and simply adds passengers to rides that would have taken place in any case. There are different types of formal ridesharing services:

- arranged carpooling – commute-share or long-distance
- closed network carpooling – trips to and from the same workplace, school or other location organised on a closed platform
- flexible or ad-hoc carpooling, including hitchhiking.

Key components are a registration platform for drivers and passengers, and a marketing campaign to achieve the desired network effect. In some cases, a network among commuters working for one or several employers makes the service work (e.g. Liftshare in Scotland). Registration can be completed via app, website or personally through a local administrator. Once registered, users can request rides or be picked up at a designated hitchhiking stop. To increase the level of trust, it is usually possible for passengers to check the drivers' affiliation and identity through identification cards or stickers on the vehicle.

Carpooling can be provided for free or by charging a fare for the passenger that covers part of the driving expenses. Offering rides does not require a commercial transportation permit and damages are usually covered by the driver's or passenger's liability insurance. While carpooling itself can only be carried out on a non-profit basis, the platform provider may charge extra fees for matching drivers and passengers (e.g. BlablaCar). The statutory Regional Transport Partnership for the South East of Scotland (SEStran), offers carpooling for each area on its website through an add-in by Liftshare. In Germany, the Mitfahrbänkle carpooling ad forum is provided on the municipality's website. In Japan, some municipalities offer carpooling, however this option is seen as a "last resort" as people often favour more traditional forms of public transport, rather than travelling with private individuals. Although carpooling is generally offered separately to the public transport provision, targeted subsidies for drivers have been tested (e.g. in France, see Box 2).

Formal hitchhiking is constructed as a free or low-cost voluntary service, where passengers wait at officially designated spots for passing private drivers to take them on their journey. Since the mid-2010s, local authorities in rural areas in Austria, Belgium, France, Germany and Switzerland have started to formally support hitchhiking. This support has taken the form of hitchhiking stops (e.g. Mitfahrbänkle⁵) and hitchhiking networks, such as RezoPouce in France.

Another possible option is the introduction of co-operatively owned ridesharing services, such as Eva Coop ridesharing in Montreal, a model that is also applicable in low density areas, since individual co-operatives handle their own local governance, but a single platform supplies standardised technology and a brand name federating the members (The Reboot, 2021).

Box 2. Rural carpooling in France

In France, 40% of the population lives in areas that are not connected to public transport (AcoTÉ, 2020). In predominantly rural areas, 54% of the population does not have access to a bus stop within

10 minutes walking distance of their home (Orfeuil/Observatoire des Inégalités, 2017). At the same time, many arterial roads between cities and surrounding rural areas face high congestion levels at peak times. Carpooling is one of the solutions promoted in France to address both a lack of public transport accessibility and high traffic levels.

A spontaneous carpooling model is being developed in France by Ecov. Passengers can use dedicated carpooling stops and enter their destination via a pushbutton panel, SMS, or mobile application. This information is sent to drivers who use the application and is displayed on illuminated signs located above the carpool stop. A few minutes later, a driver alerted to the presence of the passenger by the app and/or the light panels stops to pick up the passenger and drop them off at the desired stop. When the car stops, passenger and driver can identify each other with a carpool membership card or a code, which makes it possible to organise cost sharing and activate safety features (Ecov, 2021). Some schemes guarantee the waiting time (Greater Lyon, Grenoble and Rennes) – if no driver appears within 10 minutes, a departure guarantee is triggered by the Ecov telephone assistance (e.g. taxi pick-up). The carpooling service is sometimes integrated into multimodal trip planners and the transport pass. For example, actions under the new Mobility Orientations Law (LOM) included the establishment of a consolidated national database referencing more than 2 300 carpooling locations in the National Access Point for mobility data (Ministry for the Ecological Transition, 2020). Digital carpooling providers, such as PIM Mobility (<https://pim-mobility.com/>), aggregate public transport timetables, self-service electric bicycle services and other complementary carpooling services.

In some cases, the schemes include financial incentives for drivers.⁶ Trips between the Pays Voironnais and Grenoble are currently free for passengers, and drivers are compensated for providing seats (EUR 1 per journey made during peak hours) and for each passenger transported (EUR 2 per person) (M’Covoit – Lignes+, 2020). At the beginning of 2020, the spontaneous carpooling solution Synchro set up in Grand Chambéry and Les Bauges reached 200 carpooling trips per week with an average waiting time of 3 to 6 minutes (Ecov, 2020).

Figure 8. Carpooling stop in the Grenoble and Vercors Regional Natural Park region



Source: Ecov (n.d.).

As with Ecov, other operators provide technical assistance in building local carpooling lines, such as La Roue Verte and Fleetme. Programmes such as LiCov and AcoTÉ are public-private consortia financed by tradable Energy Savings Certificates (ESC)⁷ that support regional carpooling schemes financially and through co-creation processes with municipalities and the local population.

Constraints for ridesharing in rural areas include low awareness and trust by residents, as well as the lack of sufficient offers and requests to make the service work (Lygnerud and Nilsson, 2020). When matching

becomes a challenge, enthusiasm for the idea often fades and initiatives stop. To be effective, these solutions require support from local municipalities and cultural acceptance, ideally covering users of an entire area beyond single neighbourhoods and small communities. Design Thinking and other iterative processes that involve communities directly can also help to secure demand and help onboarding riders and drivers (Simmons, 2021).

Policy takeaways: Ridesharing

- Provide local political and administrative support to help carpooling services reach a critical size and achieve a network effect. Communicate about local opportunities in order to encourage people to adopt the practice, targeting a mind-set change and making the services as attractive as possible.
- Evaluate possibilities to subsidise drivers per kilometre driven to increase the pool of drivers (along the lines of initiatives tested in France).
- Develop dedicated infrastructure that includes carpooling parking and hitchhiking benches, ideally integrated with public transport and multipurpose mobility hubs.

Carsharing

Carsharing schemes (or car clubs) are based on an organisational set-up providing individual motorised mobility within a (collective) sharing scheme, where the ownership of the vehicles (cars, vans, transporters, etc.) is legally separated from the use. Both station-based and peer-to-peer carsharing can be suitable in rural areas. The station-based form operates with fixed stations in publicly accessible spaces, car parks or garages, whereas the peer-to-peer model relies on individuals renting their car through a platform.

Carsharing is differentiated from the traditional car-rental concept by immediate or short-term availability and accessibility, cost-structure and convenience. Users register once with the carsharing service provider, identifying and checking the validity of their driving licence, and can subsequently use the operator's fleet as required. In its most contemporary form, registered users can book the vehicles in advance through a mobile app, using a smart card or PIN number to unlock and operate the vehicle. Cars are pre-booked for a set amount of time, which can be adjusted during usage, depending on the availability of the vehicle. Prices are usually based on a per minute or per hour basis, which in most cases includes all related costs (lease, maintenance, insurance, taxes, gasoline, etc.) up to a specific time or mileage threshold. Some providers offer daily rates.

The common model of choice for rural carsharing initiatives is the station-based model. While the free-floating model provides a higher degree of flexibility, it is not sustainably operable in low density rural and peripheral areas. Large distances and a widespread customer base would prevent the vehicles being located in proximity to the users and "floated" back to denser pick-up locations. The stationary model has lower time-bound prices and is usually used for longer trips — particularly suitable in rural areas. The stations are usually established in central high frequency locations such as town halls, community centres or other service clusters (e.g. market squares, banks).

Another model is peer-to-peer (P2P) carsharing, where individuals rent their car to private users. The service operator only provides the marketplace (usually via app), booking, payment and insurance services (e.g. Getaround, Turo, Snappcar). This type of model allows for longer distances than traditional carsharing schemes, and often serves as an alternative to short-term rental.

Unlike in big cities, carsharing in rural areas is not usually a viable business model. The services are often provided by voluntary associations or co-financed by municipalities. Rural carsharing schemes have only recently started to emerge. In Germany, for instance, there are now 446 rural municipalities and small towns with a carsharing offer, which represents only 4.6% of all communities with less than 20 000 inhabitants (Bundesverband Carsharing, 2021).

A carsharing station can require a significant investment, especially if it is connected to modern e-mobility fleets, which require charging infrastructure on site as well as within the service territory of approximately 200-300 kilometres. Vehicle investment and maintenance costs are high, which can be offset by a large consistent membership and secure utilisation of vehicles. Booking, dispatching and payment systems, related ICT infrastructure and the operational costs are further expenses to be considered. E-Wald, a Bavarian carsharing provider, is one of the few successful commercial operators whose business model is based on rural carsharing (Kirchhahn, 2019).

The business model of carsharing in small towns and rural areas is therefore largely socially oriented, with greater involvement of local municipalities and associations (Rotaris and Danielis, 2018). Many rural carsharing schemes offer volunteer driving services which transport vulnerable users (e.g. elderly, youth, disabled), combining carsharing with social ridepooling elements (e.g. Cozycar in Belgium, E-Wald throughout Germany, and mobine in the German county of Cuxhaven).⁸ These non-profit co-operative structures often operate based on cost-based fees, requiring subsidies as well as voluntary contributions. As the customer base is generally low, prudent planning, co-development and needs assessment with the local residents is required to provide the optimum fleet size to cover the related costs. Some schemes are co-financed through sponsorship and co-branding by local employers, including banks and energy providers. Carsharing can work best in rural areas in a complementary way to other shared mobility options.

The Needles Carshare Program in rural California, is an example of a subsidised public-private carsharing undertaking. Around 70% of the programme cost is covered by utilisation revenue. The Victor Valley Transit Authority (VVTa) subsidises the programme, which means there is no membership cost or sign-up fee. Bookings can be made online or through a carshare kiosk for users without access to the Internet. Unbanked residents can use payroll debit cards specifically created for the carshare programme in partnership with a financial technology company (Godavarthy and Hough, 2019).

In Finland and Germany, hybrid carsharing allows individuals to book cars from municipal fleets when they are not otherwise being used. Municipalities have made vehicles they manage available to the public, referred to as “community-initiated hybrid carsharing” (Peltomaa and Tuominen, 2020; E-Wald, 2020). This model makes more efficient use of underutilised assets and increases viability in areas where there is usually not enough demand for conventional market-based carsharing. Depending on the scheme, vehicles are either available at all times for users or their use can be limited to administrative use during business hours and only available to private users outside of these hours. In the case of E-Wald, operational matters, insurance and maintenance are organised by the provider and 50% of revenues for a booking go back to the municipality. E-Wald also offers this scheme to local employers and housing providers. Besides conventional vehicles, many rural carsharing initiatives have a focus on e-mobility, thereby contributing to fleet electrification and charging infrastructure outside of cities.⁹ The project “shared e-fleet” uses corporate fleets in rural areas and makes them available through carsharing on weekends and after work hours (Fraunhofer IAO, 2016).

Applications of vehicle sharing can also include buses (e.g. a community pool of minibuses) where the vehicles are collectively owned by the municipality, local company or community group (e.g. mobine and Dörpsmobil). Such vehicles may then be made available for shared use by municipality departments for

transporting their clients, by organisations providing a service for their members or for members of the public, often for social assistance purposes.

When integrated with the wider public transit network and local tourist infrastructure, carsharing schemes can contribute to making peripheral destinations more attractive and ease the pressure of excessive car influx on local communities.¹⁰ National or regional authorities, local communities, research and innovation institutes and civil society can work collaboratively to scale-up successful local services.¹¹

Although carsharing can contribute positively to environmental objectives and accessibility in peripheral and rural areas, barriers remain for non-drivers, i.e. the young, elderly and people with disabilities. Carsharing is not always affordable for low-income populations, with prices often higher than public transport (e.g. EUR 8 per hour and EUR 50 per day in a Finnish example).

When carsharing does not effectively complement the local public transport provision, but instead such schemes realise (partial) substitute effects, there is a risk that carsharing can lead to lower public transit ridership and a subsequent reduction in service. Residents who are dependent on accessible and affordable mobility options would disproportionately suffer from such squeeze-out effects. A well-balanced, well planned and inclusive carsharing offering is paramount to avoid exclusionary repercussions of such sharing schemes. Instead of treating carsharing as a standalone, supplementary offer, carsharing schemes need to be integrated and aligned with the wider transport system and relevant sustainability targets.

Cultural acceptance of carsharing services plays an important role in generating sufficient demand. For those driving and owning a car, a switch to carsharing may break current social norms and may be associated with a certain degree of dependence, uncertainty or insecurity. Lack of public awareness and familiarity also affects acceptance and use, as people often do not fully understand the function and benefits of carsharing. In Austria, success relied on leadership by local mayors using the service themselves and thus setting a positive example. High-level political support from the city council or mayor was also considered a crucial aspect for the success of hybrid carsharing schemes in Finland (Peltomaa and Tuominen, 2020).

Policy takeaways: Carsharing

- Focus on carsharing in smaller rural and peri-urban communities. In dense urban environments the risk that carsharing may develop as a competitor for public transport is higher than in more sparsely populated rural areas, however it is still important to align carsharing schemes with the wider transport system to avoid substitution effects.
- Build up socially oriented business models involving local associations and other non-profit actors.
- Make municipal fleets available to carsharing users through hybrid public-private carsharing schemes.

Autonomous buses

The use of autonomous vehicles (AVs) could make rural transit cheaper to operate in the future – an appealing opportunity, especially for structurally weak regions facing staff shortages (e.g. Japan). Three types of services could benefit from AVs: fixed-route transit, DRT and ridesourcing.

Japan is one of the first countries to test autonomous driving as part of the public transport offer in regional towns. The acute shortage of drivers, high driver cost (often around 60% of the operating cost) and the

increasing accessibility needs of an ageing population, have led some rural towns to adopt autonomous buses. Boldly, a Softbank company, is running autonomous buses in the rural town of Sakai, Ibaraki. The self-driving vehicles, constructed by the French company Navya, can carry 11 passengers at speeds of up to 20 km/h. While the incumbent bus company, Asahi, has reduced operations and is limiting operations to the main axes, the AVs are being deployed as a feeder service on smaller predefined routes that are not served by the larger buses. A staff member must be on board for safety and legal reasons. The service is currently provided for free to passengers. Co-funding by the municipality is secured until 2025. Digibus (Austria), the feeder service to the Ecosite Val de Drôme (France) and the autonomous shuttle in Bad Birnbach (Germany), are further examples of autonomous public transport applications.

Despite several promising trials, challenges related to complexity, cost and user acceptance remain. It is currently difficult to significantly reduce staff costs and to operate autonomous shuttles without the presence of staff on board to ensure safety, provide information, resolve technical issues or assist people with reduced mobility. Remote control of the vehicle might reduce staff costs, but could face some initial acceptance issues with users, especially regarding the feeling of safety in isolated areas where immediate personal assistance cannot be guaranteed.

Autonomous driving technology has several important operational requirements that may be more difficult to meet in rural areas (Bosworth et al., 2020), particularly relating to:

- Digital connectivity – underdeveloped telecommunications networks and the lack of a reliable support structure may be a significant obstacle to the uptake of AVs. They are heavily dependent on uninterrupted connectivity to surrounding infrastructure, such as 4G and 5G networks, as well as sensors and devices placed around operating areas.
- Variable landscapes and infrastructure – rural areas may contain more unexpected obstacles, as well as more challenging natural environments and infrastructure. There is often little or no road surface markings and natural surroundings can change significantly from one season to another.
- Distance – the rural “first mile” may be significantly longer than the urban “first mile”, especially in villages or small towns with a large and dispersed hinterland. It would be necessary to cover a larger distance at a higher speed in order to adapt services for passengers in sparsely populated areas.

The potential of autonomous shuttles is currently limited to very predictable rural environments and small town centres. In several countries, the first step has been to create a legislative framework that allows the testing of autonomous cars on public roads. However, many jurisdictions do not yet allow regular operation without a driver or support staff on board. Several countries restrict trials in terms of time and location and require official authorisation.

Policy takeaways: Autonomous buses

- Conduct further AV trials to overcome technical challenges linked to rural environments. To provide an effective service in rural areas, the distances covered will need to be extended, requiring higher speeds. In addition, full technical autonomy needs to be reached and manufacturing and user processes standardised to bring costs down.

Active mobility

Cycling in rural areas is valuable as a standalone mode of transport or to bridge the last mile(s) to access branch services and the core transport network. Cycling is suitable for short journeys of up to 5-10 kilometres (e.g. paths between municipalities or from a small settlement to the neighbouring village) and for accessing stations and mobility hubs. Common obstacles to bicycle use in rural areas are the lack of safe cycling routes, longer distances and uphill stretches. Long distances are the main obstacle for walking, as well as missing or unsafe walking routes in villages. There are a number of measures that can address these issues, such as the provision of quality rural pedestrian and bicycle infrastructure (e.g. Germany, the United Kingdom and the United States). Other promising approaches include (e-)bike rental schemes, user education and government or employer incentives.

Infrastructure

Providing safe infrastructure is key for making active mobility more attractive in rural areas. Policy measures include road-space reallocation, improving infrastructure, restricting car access or reducing speed limits on routes into towns to protect and enable cycling (Philips, Anable and Chatterton, 2021 forthcoming). While these adjustments may involve significant investments in rural areas (in the order of EUR 500-1 000 per metre, Coldefy, 2020), the environmental, health and social benefits compared to private vehicle infrastructure is undeniable. Mobility survey data show that safety, the amount of car traffic and the lack of separated lanes are key reasons why people do not travel by bike in rural areas.¹²

In the past, funding has been typically focused on infrastructure for motorised vehicles and there has been little investment for active mobility. Consequently, few tools are available for the prediction of demand and active mobility infrastructure planning in rural areas. There may be important suppressed demand for more active mobility in rural areas, specifically for short trips to school or local shops. Analysis of origin-destination data, as well as trip distance and topographical features, could inform where new cycling infrastructures may have the most potential. For example, the Propensity to Cycle Tool (PCT) for England and Wales provides an evidence base to inform cycling investment.¹³ The mapping tool also informs where gender differences in cycling are largest.

Pedestrian and bicycle planning has traditionally been analysed from an urban design perspective, rather than a rural or regional planning perspective (Aytur et al., 2011). Many national cycling plans do not include objectives and targets for rural cycling. However, there is a need and desire in many rural areas and small towns to make active travel safer. In 2021, Ireland put in place its first ever major active travel investment programme dedicated to rural areas (EUR 72.8 million), which exceeded the entire 2019 national funding for walking and cycling (National Transport Authority, 2021). The German national cycling plan released in April 2021 recommends doubling annual investment by 2030 compared to 2020, to reach an average expenditure of around EUR 30 per person per year, although actual spending commitments have not yet matched this recommendation (Federal Ministry of Transport and Digital Infrastructure, 2021).

Only complete, or almost seamless, networks create a perception of sufficient safety, comfort and accessibility that will motivate residents of all ages and abilities to use these networks to reach services, shops or a neighbouring community (Federal Highway Administration, 2016). Although, regions and districts often lack the co-ordinating competence needed to set up comprehensive cycling networks between different municipalities. For this reason, Germany plans to establish cycling competence centres at the state level and a central co-ordination office for the national cycling network.

Spatial integration of active mobility with other transport modes is important to allow for intermodal travel between rural areas and cities. Connections to mobility hubs, as well as bicycle parking and storage

facilities at bus and train stations are effective tools to support first-/last-mile cycling (e.g. Flanders, Belgium and Groningen-Drenthe, Netherlands). The National Cycling Strategy in Germany puts emphasis on integrating cycling needs in regional planning, planning law and building regulations.

Integration into a broader national or international cycling network (e.g. Eurovelo or the United States Bicycle Route System) can be an important stimulator for tourism and regional economic development, especially as travel preferences and restrictions due to Covid-19 have shifted tourism demand towards local sustainable leisure activities. The tourism promotion potential of cycling routes was examined in some areas of Germany. In areas where cycling infrastructure was considerably improved, turnover growth of up to 40% was observed for hotels and restaurants, while tax revenues, employment rates and the regional image also improved (Federal Ministry of Transport and Digital Infrastructure, 2021). In addition, the availability of cycle racks should be considered in tenders for public transport vehicles in tourist areas. (Temporary) free transport on public buses or trains can also support bicycle use.

Where technical capacity and knowledge are in short supply, some governments are proposing guidance and design resources for setting up rural and small town interconnected networks of cycling and walking facilities, complete with implementation examples (e.g. Federal Highway Administration, 2016). Cerema in France, proposes special guidance and technical training to develop local cycling policy (Cerema, 2021a). The German Transport Ministry is developing a simple toolbox for bicycle traffic planning, targeted to small communities in rural areas.

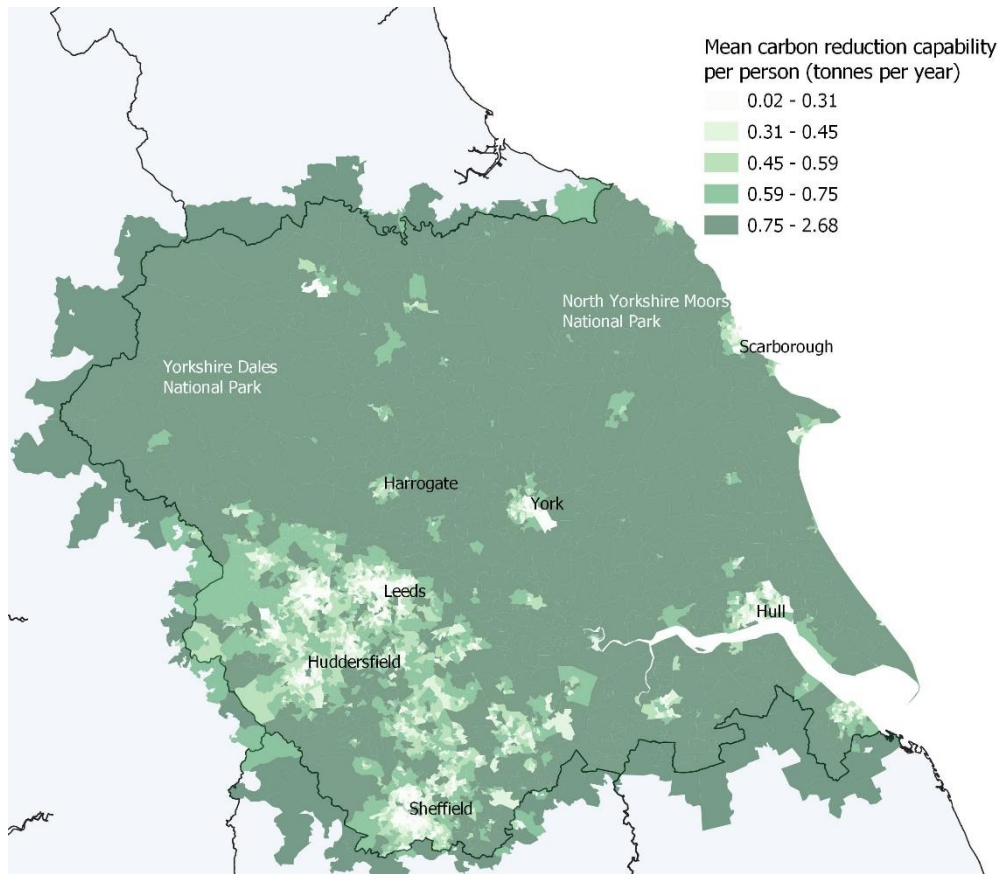
E-bikes and other forms of micromobility

In areas made up of sparse settlements, the use of e-bikes can significantly lower the physical effort required to cross longer distances and hilly areas. E-cargo-bikes or e-trikes, open tricycles or tricycles protected by an aerodynamic body and e-scooters are solutions that are being used more frequently in cities, but could also be adapted to the needs of rural areas, provided that safe infrastructure is in place.

The electrical propulsion used by these types of micromobility allows for much higher average speeds than their manually powered counterparts and, accordingly, they are effective alternatives for shopping trips and local deliveries where distances are relatively short. For example, in German small towns and villages, over 60% of trips are less than eight kilometres and many people could potentially cover these distances without a motorised vehicle (Öko-Institut, 2020). In the Netherlands, most rural trips fall between the range of 5-15 kilometres, making the e-bike a practical travel option.

E-bike users might find it more enjoyable to cycle in less densely populated areas. Through GPS tracking and surveys, Plazier, Weitkamp and van den Berg (2017) found that where safe infrastructure was available, assisted cycling in rural environments was experienced more positively by study participants, allowing for higher average speeds due to less interrupted flows. Modelling using spatial microsimulation in the United Kingdom shows that e-bike carbon reduction capability for rural areas tends to be higher than in large cities. Authors find that CO₂ saving capability per person are highest (over 750kg CO₂ per person per annum) for residents of rural areas and the rural urban fringe. For the highest impact, policy makers should therefore consider prioritising cycling schemes in areas outside of cities. Figure 9 shows which proportions of current car travel demand could be replaced by e-bike use in parts of northern England (Philips, Anable and Chatterton, 2021 forthcoming). The code to accompany this work was published on Github to allow others to produce similar analyses elsewhere.¹⁴

Figure 9. E-bike carbon reduction capability in northern England



Note: The authors conducted spatial microsimulation taking account of area type and geodemographic circumstances of the population to estimate the distance individuals in certain areas are capable of travelling by e-bike and the extent to which e-bikes could replace private car travel.

Source: Philips, Anable and Chatterton (2021 forthcoming).

Multimodal interchange is an important lever for increasing e-bike commuting (see also the section on mobility hubs below). Research to evaluate the feasibility of an e-bikesharing scheme in the Slovenian municipality of Velenje has focused on the modal interchange between both shared and private bikes, and fixed and demand-responsive bus lines in the form of shared (e-)bike stations and personal bike storage. A digital tool was developed to integrate registration, bookings, payments and information for its semi-flexible DRT and bikesharing schemes (Bruzzone, Scorrano and Nocera, 2021). In 2012, the regional mobility authority, Münsterland in Germany, started renting e-bikes in the rural municipality of Mettingen to improve users' access to public transport by adapting bus stops into small mobility hubs with bicycle storage. In 2012 alone, this led to a 20% increase in ridership of the fast bus line. The project was subsequently extended to neighbouring municipalities. Between 2012 and 2019, the number of public transport subscribers increased tenfold in Mettingen alone and doubled when counting in the neighbouring communities (Leistikow, 2019).

Only a small proportion of rural commuters use bicycles. Broader uptake of active mobility in rural areas often requires radical behaviour change. In Denmark, long-distance commuter cyclists (cycling more than 5 kilometres from home to work) tend to have greater incomes and higher education levels than other commuter cyclists (Hansen and Nielsen, 2014). Other user groups in rural, small regional towns and peri-

urban areas may need additional education and encouragement, as well as incentives to cycle longer distances.

Quality routing information and public awareness can increase bicycle usage. In-depth surveys in Hennef (Germany), identified a lack of information about the existing offers for cycling in peri-urban and rural areas, both with regard to the existence of individual routes and the quality or condition of those routes. An active mobility map was developed and led to a 5% increase in cycling trips among total households in the area of study. The scheme also included e-bike rental and evaluation indicated that over half of the trips by e-bike replaced trips by car and 13% were new cycling trips for leisure purposes (INCLUSION project, 2020a).

Promising approaches for electric micromobility in rural areas include financial incentives by employers or the government to support citizens in the purchase of their own e-bike, as well as offering low-cost rental subscriptions. Monthly or yearly subscriptions of e-bikes, with maintenance included in the lease, should be favoured over free-floating or station-based shared bikes. The latter can prove costly in rural areas, as there is less demand and assets need to be repositioned over larger distances. Outside of large agglomerations, successful e-bike rental schemes between private and public partners have been tested in the Cairngorm National Park (Scotland) and in the De l’Oust à Brocéliande community in Brittany (France), which operated jointly with a local infrastructure programme to improve bicycle safety (France Mobilités, 2019). A particularity of the Cairngorm e-bike rental was the partnership with local bike shops to generate a positive impact on the local economy (INCLUSION project, 2020b). Station-based bikesharing has been tested to connect rural parishes with the town centre and train station of Águeda (Portugal), a scheme that benefitted from the proximity of large bicycle manufacturers (SMARTA, 2019b).

Other rural active mobility approaches

Rural municipalities in France and the Netherlands have tested unconventional active mobility solutions, including the *pédibus* or *vélobus*, collective walking and cycling “school buses”. *Pédibus* is a form of school transport for children who, supervised by adults, walk to school in much the same way a school bus would drive them. A *vélobus* or *cyclobus* is a 10-seater bicycle used in several villages. As with a traditional bus, cycling and walking buses have a fixed route with designated bus stops and pick up times (ITF, 2015).

Policy takeaways: Active mobility

- Ensure that objectives for rural cycling are fixed in national cycling plans, including targets for investment and modal shares.
- Provide nationwide or regional active mobility support (e.g. through adequate transport infrastructure funding or tourism promotion schemes).
- Set up co-ordination units to achieve seamless regional and national cycling networks. Promote the integration of local cycling networks into a broader national or international cycling network (e.g. Eurovelo) to achieve side-benefits for local tourism.
- Collect data as a basis for cycling investment in rural areas. For example, the Propensity to Cycle Tool (PCT) for England and Wales provides an evidence base to inform cycling infrastructure investment.¹⁵ Such tools can also inform (e-)bike rental and promotion schemes. These should be focused on areas outside of cities, where topographic conditions are favourable and car use is high.
- Promote commuter cycling in rural areas outside cities and towns through better modal interchange and bicycle parking and storage at stations or mobility hubs. Integrate cycling

routes, travel times and information on bicycle transport into multimodal trip planning apps to inform commuters of cycling options and routes.

- Implement financial incentives to support citizens in the purchase of their own (e-)bike and offer low-cost long-term rental subscriptions.
- Encourage behavioural change through education and marketing of active mobility. For example, increased data on walking and cycling routes with digital mapping tools can help open active routes that can otherwise go unknown (UK DfT, 2021).

Integration of mobility services

Co-ordination between core train and bus lines and local branch networks, including regular bus services, flexible last-mile services, and other shared and active transport options are crucial to improve travel experiences and accessibility in rural areas. Often local last-mile services, such as DRT, are a lifeline for those unable to use or afford a car, while offering a sustainable alternative for those willing to substitute car trips. MaaS can help to orchestrate local and core network services and make sure innovative local services are deployed exactly where they complement existing public transport. Where MaaS is being rolled out, good integration requires both effective digital and physical infrastructure for convenient interchanges.

In rural areas, private transportation is still a key factor. Flexible last-mile services may be viable in some rural areas, but the car will remain an important component in more sparsely populated areas. Therefore, a balanced mobility mix is needed, combining the car with more sustainable modes of transport and promoting sharing models. On the digital side, carpooling, volunteer ridesharing and peer-to-peer carsharing are part of rural MaaS, and on the physical side, park and ride facilities and carpooling drop-off areas may be part of the future rural mobility hubs.

Mobility hubs

Rural mobility hubs can efficiently restructure transport networks by integrating private transport modes and feeder services to direct bus and rail lines. A mobility hub is a location for switching modes of transport, designed to improve inter-modality by locating different stops and services next to each other, or within a short walking distance. Mobility hubs tend to be organised around a regional train or bus station. Possible building blocks include park and ride for cars and bikes, pick-up and drop-off areas for feeder buses or DRT, taxis and carpooling, station-based shared vehicles and micromobility, charging infrastructure, bike services and repair shops, sheltered waiting areas, cafés, vending machines, package delivery lockers, Wi-Fi connection, office space, etc. depending on population size and local demand.

Figure 10. Example of a multipurpose mobility hub



Source: Copyright Mobipunt vzw. For more information see Mobipunt (2021).

Mobility hubs may also help to address social and economic needs. Often a key aim is to create liveable, safe and enjoyable locations that do more than just facilitating interchanges. In some cases, they may even revitalise villages or rural town centres that once functioned as “natural hubs” before car-centred development dislocated economic activity towards the fringes of many rural settlements. For example, the Groningen-Drenthe province in the Netherlands is experimenting with new multipurpose hubs that include cafés, co-working spaces, public libraries, general practitioners, childcare facilities, etc. (e.g. the multifunctional centre Siddeburen [Reisviahub, 2020b]). Comfortable and attractive walking links are also being developed between the hub and village centres (see e.g. video report by Mpact, 2020). These links can also increase the number of potential customers for surrounding businesses and allow new services to emerge. Building structures that fit into the local environment and culture are likely to increase acceptance and use. A co-creation approach in the spatial development process is important so that local businesses and users are included in the process, often leading to more ownership and acceptance of the project (Rath, 2020).

Promoting modal shift towards low-carbon mobility choices (shared and active mobility) is a frequently cited reason for developing hubs (SEStran, 2020). However, mobility hubs and convenient last-mile services alone will not reverse car related lock-in for rural areas. Alongside developing mobility hubs, there is often the necessity to (re-)activate surrounding areas. Housing, cultural and economic development play an important role and should be considered in a holistic rural development strategy (see e.g. KoDorf approach in Germany). Additional services, reallocation of space and a radical shift towards more transit-oriented development would also be needed.

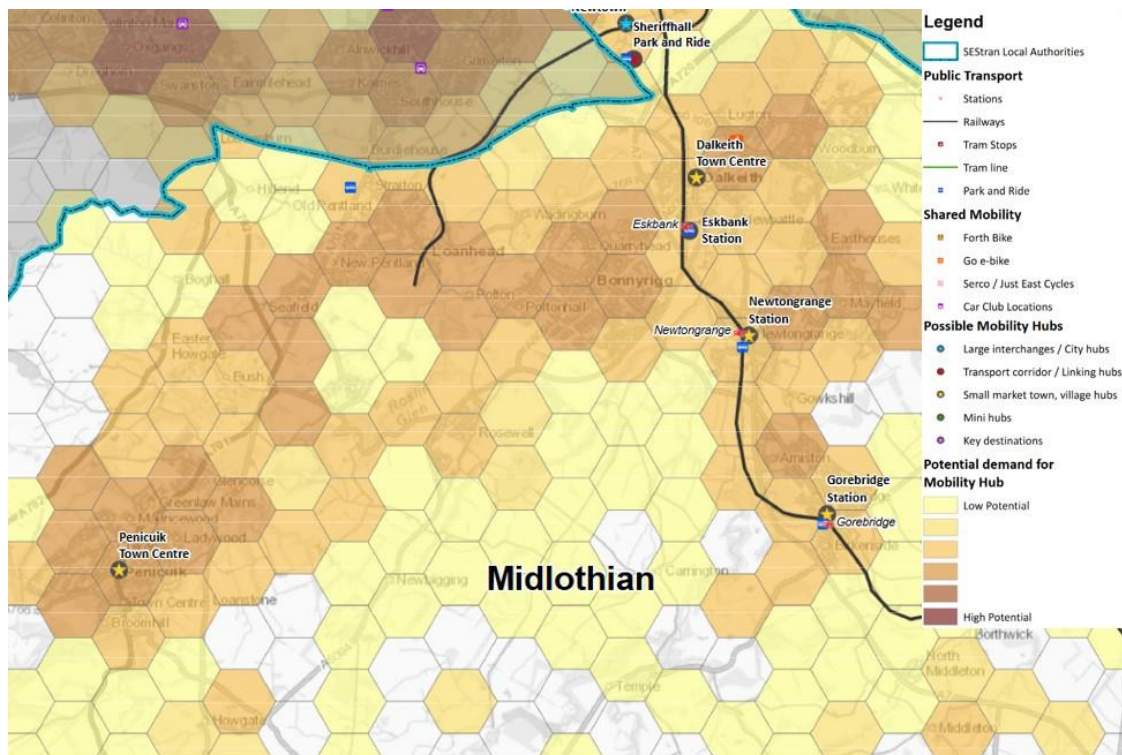
Where the car is predominant, encouraging multimodal travellers is challenging and requires sufficient incentives and support for switching to more sustainable modes. Initiatives to encourage rural dwellers to use hubs or associated mobility services for the first time, including vouchers and nudges in the built environment (e.g. design or gamification elements), could help attract users. Flanking policies that

discourage or restrict car use, albeit without reducing access, for example in nearby cities and regional towns, are also helpful.

Promoting new versions of hub-and-spoke travel involves redesign of transport networks that requires long-term funding and a ramp-up phase of several years (Rath, 2020). However, policy and funding support for non-urban mobility hubs is concentrated in just a few countries, notably in Belgium, Denmark, the Netherlands and the United Kingdom (primarily in Scotland). In the Netherlands, multimodal hubs for passengers are part of the National Policy Strategy for Infrastructure and Spatial Planning (2011-40)¹⁶ and are key components of the transport system in the provinces of Drenthe and Groningen. In Flanders, Belgium, mobipoints¹⁷ are part of the Basic Accessibility Decree. Municipalities can apply for a subsidy for the construction or redevelopment of a mobipoint (Hoppin point) along a municipal road from the Department for Mobility and Public Works (Government of Flanders, 2021). In some cases, local hubs are supported financially through partnerships with surrounding businesses or through park and ride fees.

Given the limited funding availability for hubs in rural areas, demand and needs assessments for mobility hubs are important to prioritise investments. The South East Scotland Transport Partnership (SEStran, 2020) mapped potential needs based on population data, jobs, drive time to services, public transport access to services, and other factors (an example of Midlothian is depicted in Figure 11). In a second step, SEStran also analysed where the social need for mobility services and hubs is likely to be greatest, based on the Scottish Index of Multiple Deprivation (SIMD)¹⁸. The map shows that stations, mobility hubs and shared mobility offers are not currently located in areas with the highest needs and demand potential.

Figure 11. Potential Demand for Mobility Hubs in Midlothian, Scotland, United Kingdom



Note: See p. 33 of the study (SEStran, 2020) for the indicators/data underlying the demand assessment.

Source: Prepared by Steer, SEStran (2020: 44), Crown copyright.

Mobility as a Service (MaaS)

In addition to the physical linking of various transport services, MaaS may improve integration for users of different mobility offers in rural areas. MaaS is a concept that builds on a single, digital, customer interface to federate and manage mobility-related services (ITF, 2021b). The core of MaaS is a digital “one-stop-shop” of different transport, information and payment services into a smooth customer interface, which aims to reduce the cognitive effort involved in mode choice and multimodal trip planning.

The main value proposition of urban MaaS is to provide “an efficient solution to congestion and sustainability, by enabling public transport to be supported by other traditional and innovative transport modes” (Pangbourne, 2020). MaaS presupposes a range of mobility options that can be integrated, but this choice is often limited in rural areas. Where choices have been put in place, even the most flexible offers seem to be unable to compete with the private car, despite strong onboarding support for local residents (e.g. KomlLand app, Sweden).

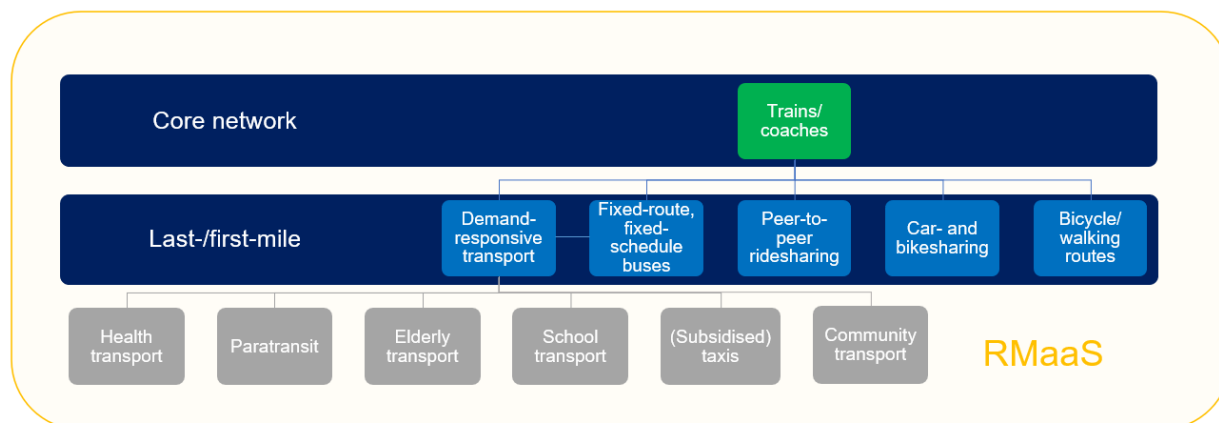
Local authorities usually face significant financial constraints and may not necessarily have the capacity to play the role of a MaaS co-ordinator. There is not usually any standard or framework (e.g. for data formats, disaggregation level, privacy management, etc.) targeted at rural areas that can help local authorities in setting up, supporting or regulating digital mobility offers. In the United Kingdom for example, the data collected at county or authority level is too aggregated to support integration of public transport with DRT services (Connected Places Catapult, 2020). The Bus Open Data Initiative is gradually opening data in England (UK DfT, 2020a), but more needs to be done in rural areas to allow for integration and schedule co-ordination between modes. Where mandatory mobility data sharing is being considered, support for small local operators to comply with specific data syntaxes may be needed on top of existing subsidies.

These challenges show that, when applied in rural contexts, MaaS needs to address specific challenges, including sparser transport networks, lower digital connectivity, and accessibility to key services or activities for those who are unable to drive or afford a car (Pangbourne, 2020). Therefore, the most promising rural MaaS approaches are those that combine different subsidised services to save resources, those that efficiently link branch services and the core network, and those that have successfully integrated non-transportation services, such as health and tourism, to improve the financial model of the service. Three main approaches to rural MaaS have emerged recently:

- Horizontal streamlining into a single, flexible transport service. In Nordic countries, the term rural MaaS has been used to describe the integration of different sources of demand and supply by streamlining mobility services, such as non-emergency medical transportation and paratransit, as well as combining passenger and freight transport (e.g. Finland and Denmark). A key objective is to achieve cost savings for the public sector and improvements for users despite a limited choice of mobility options and limited financial resources available in rural areas.
- Encourage users to become prosumers (“producing customers”), in order to help increase the supply of transport options in rural areas. Prosumers may contribute to the pool of drivers and/or available vehicles (e.g. United States). This involves the integration of already existing assets, through peer-to-peer ridesharing or carsharing, and harnesses existing community support networks by integrating their offers or requests into a single platform (e.g. Tompkins County, New York).
- Vertical integration through trip planning and ticketing integration can make travel more convenient by connecting local branch services and other non-conventional mobility solutions to the core transport network. Regional or national MaaS powered by an alliance of authorities (such as in Denmark) tend to be more effective than isolated local MaaS approaches, allowing for bigger

tenders and pooling of resources and capacities, that may not be available at the local level. This also avoids interoperability issues for residents located between different MaaS catchment areas. To improve the financial viability of the service, some platforms have integrated non-transport offers at destination, such as tourist attractions, retail, commercial and health services (e.g. “value-added MaaS” in Japan, see WEF [2021]) or combined delivery and passenger transport.

Figure 12. Regional MaaS (RMaaS): Combination of local services and their integration with the core network



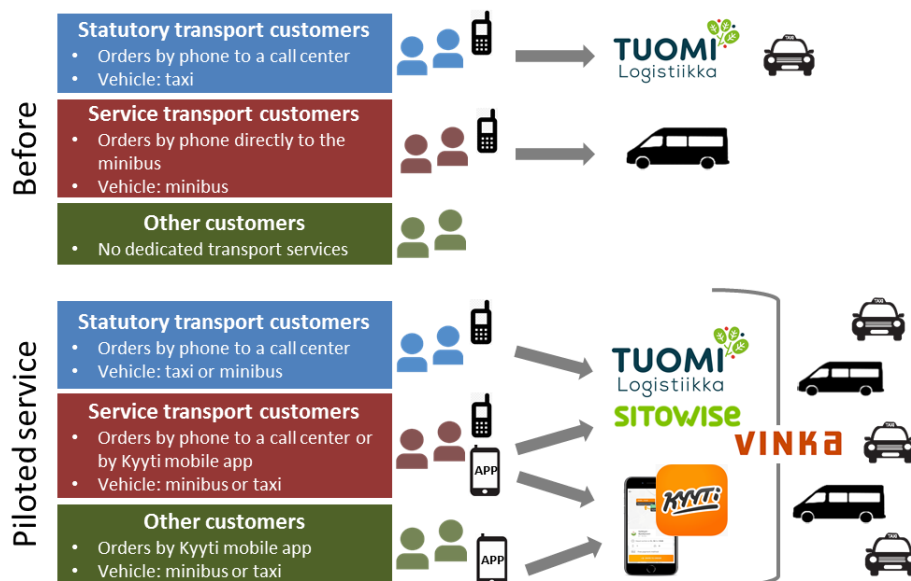
Horizontal integration of subsidised passenger trips

Integration of public and statutory transportation services in Denmark.¹⁹ Since procuring the FlexTrafik²⁰ service, Danish municipalities have been able to combine subsidised services and replace unviable fixed lines with a single DRT service, achieving cost savings of around 20-40% (Lynott, 2019b). The service is part of the national trip planner (Rejseplanen²¹) and Danish national public transport ticketing (Rejsekort²²).

Integration of public and statutory transportation services in Finland. The Finnish ALPIO project pooled different user groups and vehicles in the Tampere region of Finland between March and October 2019. The pilot took place in Kuru (city of Ylöjärvi) and Vammala (city of Sastamala), both comprising deep rural areas with very limited public transport. The service integrated statutory social and health service transport with transport targeted to the elderly and mobility impaired, and then opened these rides up to general users through a mobile app. A mixture of vehicles were integrated in the system, including taxis, to ensure a sufficient supply of vehicles for the statutory transport services and with minibuses being used on busier trips serving a mixture of user groups. The system did not allow general customers (i.e. self-paying non-statutory customers) to initiate a statutory taxi ride as this was considered too costly for the public sector.

Figure 13 shows how transport services operated before and during the Finnish ALPIO pilot. The pilot improved the accessibility of the region by offering a service in areas with very limited public transport. Since costly taxi rides were partly replaced with service transport minibuses by bringing various user groups together, the solution allowed for important cost savings for the public sector. As the pooling rate was improved driven kilometres and emissions decreased (Eckhardt, Lauhkonen and Aapaoja, 2020).

Figure 13. Transport services in the Tampere region of Finland before and during the ALPIO pilot, 2019



Note: Statutory and service transport customers refer to two categories of subsidised transport based on personal status (e.g. age, mobility impairment, etc.), usually provided by different public authorities in Finland.

Source: Eckhardt, Lauhkonen and Aapaoja (2020).

Vertical multimodal integration

Nationwide trip planning and ticketing in Denmark and integration of shared services. The idea of smart ticketing has been around for several decades, however, although many cities have managed to make integrated ticketing a reality, very few countries have applied this approach on a national scale. The Danish model is one of the most advanced in developing nationwide trip planning and ticketing covering rural areas. This avoids coverage or interoperability issues for residents living in between different catchment areas. Other systems in place are the Dutch OV-chipkaart and FAIRTIQ in Switzerland. Sweden plans to introduce a nationwide ticketing system in January 2022 (Ministry of Infrastructure, 2020). Pilots for a similar system are being carried out in Germany (e.g. “Mobility inside Platform”).

Since it is often too expensive for a single transport authority to develop these services, the six regional public transport operators in Denmark founded the company Rejsekort and Rejseplanen A/S, which owns and runs the system. MinRejseplan²³ was set up as a separate MaaS pilot app that ran in Copenhagen and Northern Jutland and offered broader services in addition to public passenger transport and DRT, including road traffic information, sharing services, taxis, bicycle and walking routes. After the successful trial, more mobility services were integrated into Rejseplanen.

The national trip planner and national transport card are currently separated. Danish public transport authorities are planning for a national MaaS app with integrated travel planning and ticketing. Roll out is expected in 2025. The platform will be open for integration with other (private) mobility operators. Public transport is the default choice and users will have to opt-in for alternative trips offered by private operators. In order to facilitate MaaS development in Denmark, the 2019 Act on Promoting MaaS requires public transport authorities to provide open access to their mobility data and enable third party resale of selected public transport tickets.

Local integration of public transport and flexible shared services through the Swedish KomLand app. An example for integration of innovative mobility and public transport, although at a much smaller scale, is

the Swedish rural MaaS concept, KomILand. As of March 2021, KomILand allows three rural towns with 800-900 inhabitants in Västra Götaland to use tailored services to pay for public transport, to book and pay for taxis, and to get access to different mobility services, including *byabussen* (the village bus), *grannbilen* (the neighbour car), *byatorget* (the village square) and e-bike rental (Region of Västra Götaland, 2021). Local residents can receive onboarding support from local civic associations and from mobility advisors employed by the project, however, despite this support, uptake has been limited. The results of interviews and surveys directed to the residents of the three rural towns showed that the low uptake of the services is largely explained by the Covid-19 pandemic, which reduced the need to travel and the willingness to share vehicles with others. Many also had no need for the services in a normal situation, even without a pandemic. The mobile app did not always work satisfactorily and several users also reported problems with registering on the app. The residents are positive about the idea of KomILand and it is in line with environmental goals to share resources. KomILand is also perceived as very positive for the development of the towns and for the private economy; one in four residents expected travel costs to decrease, according to the survey. Although the initial uptake has been low, the pilot project has contributed to other long-term gains. It has enabled an opportunity to put pressure on regional public transport authorities to act to improve accessibility in rural areas. It has also led to increased strategic conversations between various societal actors about sustainable travel and accessibility in rural areas. The trial will be extended to 2023 to substantiate the findings (Berg and Smith, 2021).

Promotion and integration of informal ridesharing through the Mobility Coordination Center in Tompkins County, New York, United States. Tompkins County has been working on early multimodal mobility services since 2010. The Mobility Coordination Center offers mobility information and education, financial intermediation, customer service and provision of incentives and discounts. Several components, namely credits, have been put in place to incentivise and acknowledge the role of volunteers and the informal support network that are strong characteristics of rural mobility. The financial intermediation component allows for individual mobility subscription plans, co-ordinated fare payment among mobility operators and customers, volunteer driver mileage reimbursements, and direct crediting of employer subsidies to operators.

Open rural trip planner in Vermont, United States. Although integrated ticketing is not built into the Go! Vermont²⁴ model, it is an example of an open, single statewide platform that was intended to be of special use to residents who live in rural areas, residents with disabilities, and older adults. In 2018, the state of Vermont launched the Go! Vermont Trip Planner that includes itineraries for both fixed and flexible public transit modes in Vermont, including vehicles adapted to people with disabilities, carpooling and ridepooling services. The trip planner is owned and managed by VTrans, while the company Trillium developed the GTFS-flex data and the OpenTripPlanner software (Shared-Use Mobility Center, 2019). Private mobility partners, such as DRT and ridepooling providers, have agreed to integrate their data using this standard.

MaaS specifically targeting vulnerable users, California, United States. A MaaS concept specifically addressing the needs of economically disadvantaged communities is being tested in the San Joaquin Valley, California. A community-based planning process led by UC Davis initiated three pilot projects: a multimodal trip planner (Vamos), an electric vehicle carsharing service (Miocar) and a volunteer ridesharing service (VOGO) for areas with the lowest volume of transit services (Schweiger, 2020).

MaaS for tourist areas

MaaS in tourist areas can help attain two objectives: (a) maintaining declining transport networks by promoting their use by tourists and local residents; and (b) increasing the use of tourist attractions by making it easier to access them with improved transport services (WEF, 2021).

Izu Peninsula Tourism MaaS, Shizuoka Prefecture, Japan. The Izuko MaaS pilot project (2019-22) is an example for successful application of “value-added MaaS” with a tourism component. The Izu Peninsula is a major tourist destination. However, its 580 000 residents are scattered over 13 different municipalities, most of which face decreasing, as well as ageing, populations (30% are over the age of 65). Although four railway companies operate five lines and two bus companies operate 390 lines, public transport use is low: 80% of travel is by car. This has led to frequent road congestion. The value-added MaaS service, Izuko, was developed by several public transport companies and includes multimodal and cross-provider ticketing, as well as digital tickets for popular tourist spots and activities, and discount coupons for supermarkets. Izuko also provides real-time information on crowding at tourism facilities.

Evaluations of the project have been positive. Sales multiplied 500%, from around 1 000 tickets in Phase 1 to 5 000 tickets in Phase 2. The number of tickets sold during Phase 3 was slightly lower (around 3 600) due to Covid-19 related restrictions (JR EAST, 2021). An issue for the profitability of these services was the wide variety of services delivered by a large number of different providers. A major difficulty of service integration was the co-ordination of the consortium consisting of 16 different local stakeholders all pursuing different objectives and favouring different management decisions. The largest proportion of the cost of these services was the IT infrastructure, including apps, cloud-based systems and data conversion to navigate between different data formats. Standardising the dataset was challenging, with various operators using different data formats and some not using machine-readable data at all. These challenges have inspired the Japanese Ministry of Land, Infrastructure, Transport and Tourism to publish guidelines for MaaS-Related Data Linkages indicating system and data requirements for service providers when introducing cross-provider digital integration. A revised version was published in 2021 (MLIT, 2021).

Public MaaS for the Highlands and Islands region of Scotland. In June 2021, the Highlands and Islands Transport Partnership launched the Go-HI MaaS app for the entire region. The project’s main objectives are to tackle inaccessibility, limited mobility and inequality through improved information, convenient ticketing and booking access for passengers, with the aim to enable more people to access facilities and services in their local areas. It also seeks to promote uptake of sustainable travel options by residents and visitors.

The 12-month ongoing MaaS trial platform incorporates public transport modes of bus (including scheduled and private, commercial, DRT and CT), rail and ferry, as well as shared and hire car services, and active travel. The platform provides users (circa 500 000 residents and 600 000 tourists) with an online and app service for personalised journey planning, real-time travel information, travel disruption updates and dynamic trip adjustment, schedule integration, ticketing options, management of personal preferences and accessibility support.

The main challenges encountered related to the onboarding of incumbent service operators. An evaluation programme is being established as a key element of the pilot programme led by the Institute of Transport Studies at the University of Leeds.

Cairngorms Connected is based in Scotland in the Cairngorms National Park, the largest National Park in the United Kingdom. The area has 18 000 inhabitants living in an area of 4 500 square kilometres (which is larger than Luxembourg) with 2 million visitors annually and 1.2 million visitors to the town of Aviemore alone. The challenge is not only the complex civic structure, but the disconnect in public transport, increasing car dependence and economic stress. The vision is to develop new needs-based mobility services that connect people (residents and visitors) and organisations and open up new opportunities for the local economy (i.e. new services such as e-bike hire and maintenance, new vehicle services, new collaborations between businesses and service providers). Through co-design with the local population and visitors, including a series of workshops and surveys prior to the Covid-19 pandemic, researchers

identified the preconditions to be implemented during the last stage of the project for the development of successful rural MaaS (Milne, 2021).

Policy takeaways: Multimodal integration

- Advance the development of hub-and-spoke networks to better connect urban and rural areas by linking the core transport network with local services. The focus should be on:
 - Creation or refurbishment of mobility hubs that provide a range of transport services tailored to community needs and population density.
 - Multipurpose hubs connected to village centres that include different facilities for social interaction, shops, delivery lockers, health care, etc. The main objective is to create liveable spaces and make interchanges comfortable and practical for users.
- Aim for national (or regional) multimodal integration systems to avoid interoperability issues for residents living in between different MaaS catchment areas. Even with enabling legislation paving the way (e.g. Finland), it is clear that rural MaaS will require additional funding, expertise and an adequate governance structure to help MaaS projects develop and integrate different stakeholders and providers at all levels. This is best done through a trusted third party, for example by setting up a public company (ITF, 2021b). To rationalise costs, the system architecture should be applicable and workable in all territories, which requires an enormous concerted effort. The focus should be on:
 - Providing reliable information and planning services for the wider transport network.
 - Providing schedule co-ordination between different modes to improve better integration between core, branch network and last-mile services.
 - Advancing integration of last-mile and non-profit services into regional or national fare systems. This would allow ticketing for entire trip chains the purchase of tickets for individual parts of the trip through a single platform.
 - Setting standards, and providing guidance and processes that support local authorities in collecting and using new data sources. This can also include supporting small communities and operators with collecting machine-readable data.
- Provide funding for sufficient time to allow meaningful pilots to be carried out, monitored and evaluated. Allow for adaptation of the pilot after each phase to reflect and act on findings.
- Factor in significant communication and marketing efforts needed to encourage the use of more sustainable modes of transport, including incentives, vouchers and credits for replacing private car use. A co-design process may be needed from the start to put communities in the driver's seat and get them invested in the outcomes of the programme (Phillips, 2021).
- Implement marketing initiatives designed to encourage and incentivise sustainable travel. Assist users in making their first booking or taking their first journey. Different booking methods should exist, app only options will not work in rural areas where smartphone usage is low or where network coverage is intermittent. Marketing campaigns should target a variety of user groups at community level, for example, by involving local citizens' associations and employers.

Frameworks affecting innovative rural mobility

Policy frameworks that prioritise and support innovative and locally anchored approaches to mobility are vital in improving accessibility and well-being in rural areas. The previous section has shown that there are numerous opportunities to improve local connections and integration with the core transport network. A mix of levers are available to governments, regions and municipalities to harness these opportunities. Decision making related to transport provision sits within extensive frameworks, consisting of:

- policies
- funding streams and deployment programmes
- laws and regulations
- institutions and planning processes.

Unfortunately, the rise of new mobility solutions, including shared and active mobility forms and multimodal integration, currently happens within a context of long-standing deficits in rural transport provision. There is not currently the same political or institutional prioritisation or motivation to solve mobility issues for rural areas as there is for urban areas. Thus, considerations of rural mobility concerns are often absent in formal frameworks. Innovative mobility initiatives in rural areas are fragmented and communities are more likely to have to push for change, compared to urban areas where there is already a strong desire for new outcomes and an appetite for new solutions, including among policy makers.

It is not easy to implement change to frameworks, and this is often only achieved when the main stakeholders are convinced of the need and assured of the potential outcomes. While the wider social and economic impacts of rural mobility provision remain underexplored (ITF, 2021a), several countries have started to recognise the multiplier effect on other important outcomes in rural areas, such as access to jobs, education, services, social activities and networks (Lucas et al., 2016; Rozentale, Randall and Briggs, 2020). This section offers examples where frameworks have been altered to guarantee better access to public transport and provide the regulatory and financial space for rural (innovative) mobility to develop.

Rural transport policy frameworks

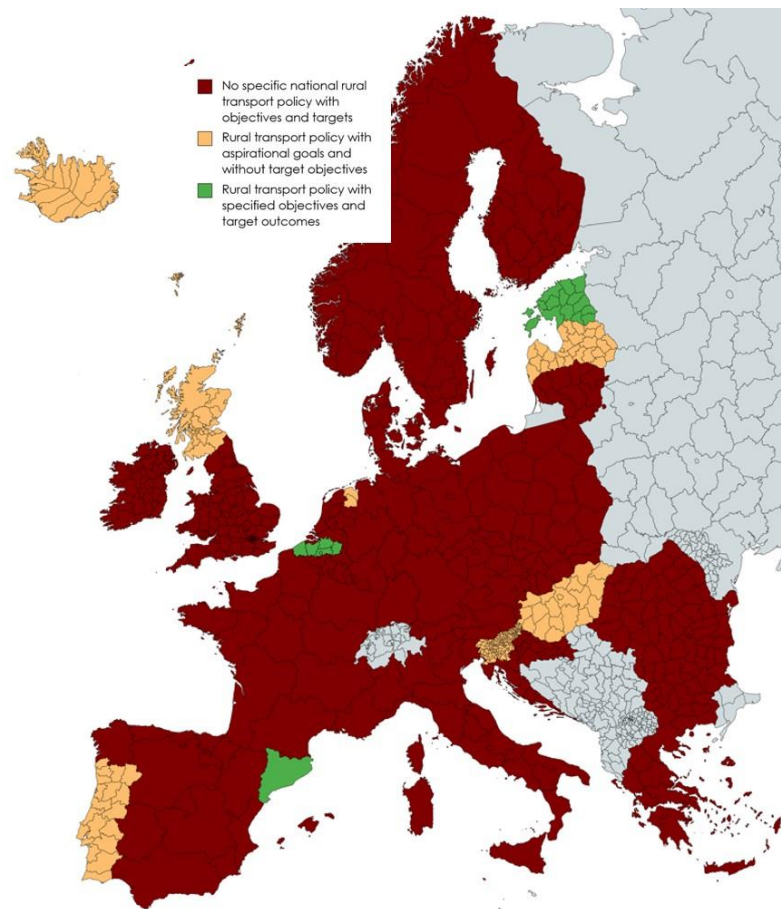
Policies are the fundamental driver of frameworks, since they articulate both the purpose of the framework and the outcomes that the frameworks seek to achieve. Policies should work by: highlighting priorities, showing where change or adaptation is needed, balancing public and private interests, and providing the basis for the financial mechanism and any public fiscal support. The stronger the commitment by a country or region to these objectives, the more proactive it will be in terms of programmes, actions, allocation of funding and monitoring achievement, and the more likely it is to accommodate or back innovations that can support these objectives. However, two major challenges arise when dealing with rural mobility:

- In most countries, there are neither mandated levels of service, nor assigned responsibility to ensure provision of mobility in rural areas. There are long-standing deficits in rural mobility, at multiple levels, including: policy, programmes, service provision, funding, institutional or organisational capacity and even a lack of understanding of needs. Thus, the implementation conditions and supporting mechanisms for innovative mobility are far weaker in rural areas than

in urban or metropolitan areas. For example, the SMART Rural Transport Areas Project identified that currently no EU Member State has a comprehensive rural mobility policy that sets clear goals and targets, assigns clear responsibilities and defines the funding mechanism that will enable the targets to be achieved (Figure 14). The EU LAST MILE project reported that provisions pertaining to sustainable mobility in member states' regional strategies were mainly general recommendations, but had no binding character (LAST MILE, 2018).

- Holistic accessibility frameworks and authorities have not emerged for rural areas as they have for urban and metropolitan areas in recent decades. Instead, there remain overlapping and intersecting frameworks, such as transportation, regional development, social services and protection, environment, innovation and enterprise. These may be further complicated by the de jure and de facto balances of authority and “soft power”.

Figure 14. Rural Transport Policies in Europe



Note: Some rural mobility policies exist at sub-national level, including in Catalonia, Flanders, Groningen/Drenthe and Scotland. Policies at district level, such as those in Germany or Switzerland, are not included here.

Source: Based on own research and findings from the SMARTA project (Lorenzini, Ambrosino and Finn, 2021).

Emerging rural transport policies and co-ordination frameworks

Despite the lack of national rural mobility policies, there are recent developments that show ways forward, including: (a) comprehensive rural mobility policies at sub-national level; (b) national policy frameworks

(although without financial mechanisms for implementation); (c) obligations to produce the rural equivalent of Sustainable Urban Mobility Plans (SRMP); and (d) organisational frameworks that provide national and regional coverage (although without assigning minimum service levels).

Comprehensive rural mobility policy and programmes at sub-national level

Flanders, Belgium. The basic mobility legislation has been one of the foundations of Flemish mobility policy since 2001, guaranteeing a minimum public transport provision based on priority residential areas, maximum distance to nearest stop, frequency of services (peak/off-peak, week/weekend). For example, the maximum walking distance to a bus stop in a rural area was fixed at 750 metres. The operator had to offer at least two trips per hour during peak hours, one trip per hour during off-peak times and at least one trip every two hours at weekends.

In June 2019, the Decree on Basic Accessibility came into effect in Flanders, which changed the previous Basic Mobility Policy (Government of Flanders, 2019). The objective was to transform public transport from a supply-oriented system into a more demand-oriented system. The emphasis is placed on “combimobility” and “synchromobility” facilitated by co-ordinated transport options and a dense network of multimodal hubs to improve connections between cities and less densely populated areas.

The decree provides a new layered public transport policy consisting of: (a) the core network, which falls into the competence of the Flemish government and which is complementary to the federal train network; (b) the supplementary network, which falls into the competence of the transport regions; and (c) “tailor-made transport”, which is also a responsibility of the transport regions and provides flexible first- and last-mile access (such as DRT and shared bicycles) for people who do not have access to the supplementary network (basic layer on Figure 15). The railway and bus stations are considered the core elements for multimodal spatial development (Government of Flanders, 2019). Local authorities can apply to the Flemish government for subsidies for the spatial implementation of the policy, including for example, mobility hubs, carpooling and carsharing facilities, and the construction of cycle route networks.

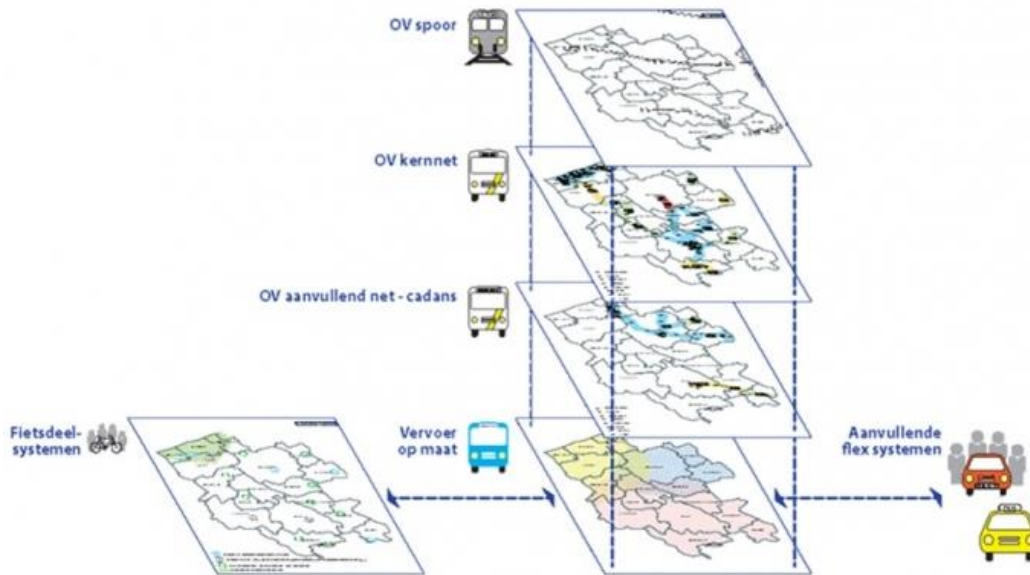
The decree establishes 15 transport regions covering the entire Flanders region. Each transport region has a council which ensures inter-administrative co-ordination. The transport region councils consist of various mobility stakeholders, such as the Flemish transport company De Lijn, the Agency for Roads and Traffic and the municipalities of the region concerned. The council is responsible for organising the supplementary and tailor-made networks in their regions. This includes planning, preparation, implementation, monitoring and evaluation of a mandatory regional mobility plan. A mobility plan is also established for Flanders as a whole. Optionally, one or more municipalities can establish local mobility plans. While the mobility plans do not have regulatory power, they provide the strategic direction and this cannot be deviated from at will. The decree also provides for the consultation of citizens and social partners.

The Mobility Centre, set up by the Flemish government, collects and provides information on all public transport services and acts as an intermediary between transport operators and users. It is responsible for the operational management of tailor-made transport, including booking, invoicing, monitoring and follow-up. It also manages the bundling platform, Hoppin²⁵.

The transport region chooses the transport offer and subsystems for tailor-made transport to cover the first- and last-mile services. These choices are recorded in their regional mobility plan and determine the budget and tariff policy. The mobility centre takes care of the practical organisation of “tailor-made transport”, from planning and information to reservation and follow-up. The Department of Mobility and Public Works manages the contracts with the mobility centre and the specific operators, monitors the

budget and manages access for target group travellers. By managing contracts at a central level, the Department of Mobility and Public Works has the possibility to negotiate better contracts for all regions.

Figure 15. Layers of the Flemish Basic Accessibility Policy



Note: Top layer: train network, second layer: core bus network, third layer: supplementary/connecting buses, fourth layer: tailor-made flexible first- and last-mile services, including bikesharing, DRT and additional shared offers.

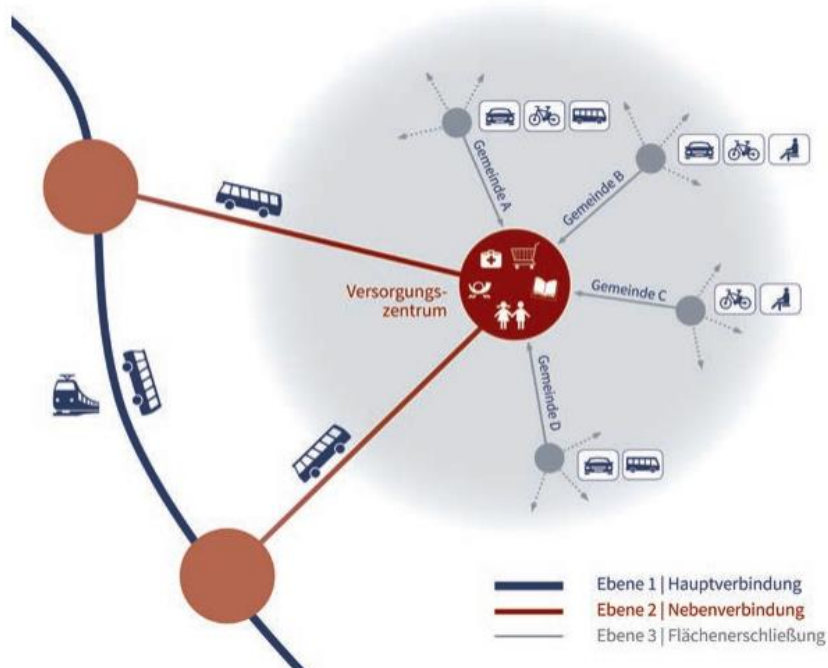
Source: Office of the Provincial Governor Vlaams-Brabant, <https://gouverneurvlaamsbrabant.be/nieuws/informatiesessie-over-basisbereikbaarheid-en-vervoersregio%e2%80%99s>.

Definition of local accessibility standards in selected districts of Germany. Several districts in Germany apply accessibility standards and a further 18 German pilot regions have developed minimum access standards for reaching local amenities, with districtwide target values. These standards are based on previous public and active transport accessibility analyses and a participatory process (Federal Ministry of Transport and Digital Infrastructure, 2018). The objectives are to:

- a) connect the districts within an area to the nearest basic supply centre without the need to change train or bus
- b) ensure transport connections between supply centres and the nearest population centres deemed to be of medium and high importance.

Standards were defined across three levels: main links, secondary links and local area services (Figure 16). The local area services considered were characterised by a wide variety of options, including hitchhiking benches, IT-supported ridesharing services, social driving services (especially for people with reduced physical abilities) and municipal shared vehicle fleets that can also be used by businesses, associations and citizens.

Figure 16. Three-level structure of rural mobility in the pilot district of Schleswig-Flensburg, Germany



Note: Blue = main connection, red = secondary connection, grey = local area services.

Source: Federal Ministry of Transport and Digital Infrastructure, 2018.

Minimum service frequency standards in the Swiss Cantons of Zurich and Bern. The Zurich canton has legally established three different levels of service frequency standards for communities of differing sizes. Villages of 300 people or more are entitled to at least an hourly bus service linking them to regional facilities for employment, education, training, shopping and leisure. On routes where multiple communities create stronger demand, the buses run at least every half an hour, and four times an hour for towns, with services operating 7 days a week from 6am to midnight (Hinchcliff and Taylor, 2021).

The less densely populated Bern canton provides small villages with between 4-15 return services per day. Larger villages and towns receive 16-25 return bus services per day. To qualify for minimum bus services, an area must have at least 300 residents, jobs and/or training positions, of which 100 must be filled by residents (Hinchcliff and Taylor, 2021).

Minimum transport access standards in Catalonia, Spain. Catalonia guarantees minimum standards of public transport access in small municipalities. In March 2017, the Catalan Government approved the Passenger Transport Plan in Catalonia (Pla de Transports de Viatgers de Catalunya, 2020: 7; Generalitat de Catalunya, 2020) with the aim to guarantee that:

- municipalities with more than 5 000 inhabitants and county capitals have, on weekdays, at least one long-distance service to connect to the capital of their region and another to return to their homes
- citizens of municipalities with less than 5 000 inhabitants can access a regular intercity public transport service to travel to the capital of their area and return to their home, at least once a day, or that they can do so through a public DRT service

- citizens of municipalities with more than 5 000 inhabitants and the county capitals enjoy a daily opportunity to travel to Barcelona by intercity public transport and return to their homes the same day.

Examples above show that there is wide variation in the level of service provided between Flanders, certain German and Swiss districts and Catalonia. For Flanders, the frequency of service provision defined in the minimum standards is adequate to provide access to destinations for a wide range of trip purposes. In Catalonia, one service a day to the regional or county capital may only be suitable for a small proportion of the population and for only specific trip purposes due to the timings of the service.

Policy that may be suitable in one geographical area may be unaffordable and difficult to deliver in other less populated rural areas. Flanders is a relatively small geographic area which is predominantly urbanised with limited rural population. The more rural an area, the more likely that services will rely on community involvement and use of cars, rather than buses. Similar mobility guarantees could be adopted in less densely populated areas where it is possible to integrate low-cost mobility solutions, such as volunteer community transport (CT), with the public transport offer, for example by allowing these actors to bid for public service contracts and by integrating their routes, schedules and booking systems.

National policy with specific targets, but lacking implementation mechanisms

Latvia. The Latvian Ministry of Transport publishes Transport Development Guidelines for 6-year periods, which contain objectives and targets for public transport services. The previous Guidelines (2014-20) contain objectives related to public transport access for all (Ministry of Transport, 2013). Under Goal 2 “Internal and external accessibility and high-quality mobility opportunities throughout the country are ensured”, Task 2.4. obliges the government to “organise public transport services, ensuring the minimum passenger transport needs guaranteed by the Public Transport Services Law (to get to educational institutions, medical institutions, workplaces, state and local government institutions during their generally accepted working hours).” This task includes two target indicators:

- in 100% of rural territories, at least two trips a day must connect rural territories and the municipality centre
- in 100% of municipalities, at least two trips a day must connect municipalities and the centre of the region or the capital.

To advance innovation in regional public transport, the current Guidelines (2021-27) foresee the introduction of a unified national ticketing system in 2021 and the creation of mobility points “to increase the popularity of public transport and create opportunities for people living in the regions” (Ministry of Transport, 2020). A National Mobility Data Access Point shall be established in the coming years. The document further states that “fast and accurate public transport services are essential for the mobility of citizens and to reduce economic disparities between regions, which at the same time help to achieve balanced country-wide development.”

Sustainable Regional Mobility Plans (SRMP)

Only few countries have developed and implemented Sustainable Regional Mobility Plans (SRMP). Like Sustainable Urban Mobility Plans (SUMP), the concept deserves far greater support from the EU and its member states. It may also be prove useful for countries outside the EU that are looking for coherent mobility governance and planning processes for non-urban areas.

Slovenia is currently leading the way in the use of SRMP. In Slovenia, mobility management is strongly dependent upon policies at the municipal level. In last few years, Slovenian municipalities have prepared local Integrated Transport Strategies that stem from SUMP, but are modified to suit Slovenian

circumstances. Integrated Transport Strategies also include policies and actions to improve public transport accessibility in rural areas.

France. The New Mobility Law of December 2019 (*Loi d'orientation des mobilités, LOM*) requires Mobility Organizing Authorities (*autorités organisatrices de la mobilité, AOMs*) of a certain size to produce sustainable mobility plans. AOMs covering mostly sparsely populated areas are exempted from this obligation, however, guidance is being developed for these communities to develop simplified mobility plans. The central government provides special guidance for AOMs in sparsely populated areas on what can be done according to their profile. The France Mobilités platform, via its regional support units, assists communities in the implementation of innovative solutions and partnerships with private actors.

In addition, the measures of the Agenda Rural²⁶ aim to strengthen rural mobility by renewing night trains, improving small railway lines and implementing innovative solutions within the framework of the AOMs. Objectives for mobility in mountainous areas are presented in the national plan Avenir Montagnes²⁷.

Although **Belgium** has no countrywide obligation to produce Sustainable Mobility Plans, the Flemish transport regions are obliged to produce regional mobility plans.

Ireland plans to develop and implement SRMP, which responds to the Irish Citizens' Assembly recommendation for better access to sustainable transport options in rural areas. Organisational frameworks that provide coverage for rural mobility, although without defined service or minimum accessibility levels.

Varying views on the organisation of transport, especially among different governance levels and between urban centres and the region, often hinder the creation of integrated transport systems and may result in very heterogeneous public transport organisation at the local level. Several countries have therefore reformed organisational frameworks to create a more coherent and unified structure for mobility provision in rural areas. This mainly involves countrywide reorganisation, however, without attributing minimum service levels.

AOMs in France. The New Mobility Law of December 2019 requires AOMs to cover the entire territory. The formation of the new AOMs was finalised in July 2021 (for results see France Mobilités, 2021). The transfer of competence for organising mobility follows a two-stage process. Municipalities can decide to cluster as an AOM and to exert the mobility competence ("*Communauté de communes*"); if they do not deliberate favourably, the region must set up an AOM within the municipalities' territorial jurisdiction.

One of the most significant changes brought about by the New Mobility Law is that an AOM is no longer obliged to organise specific services (i.e. conventional bus services), but can choose to organise those that it finds most appropriate according to local characteristics, such as on-demand transport, carsharing, carpooling, or solidarity ridesharing services, and it can play a stronger role in active mobility development.

Extending the coverage of AOMs to the entire territory is an important initiative which aims to prevent "white spots" in the institutional mobility landscape. However, the reform is unlikely to bring equality between and within regions in terms of transport accessibility. A structured public policy response on a broader scale would be needed, alongside adequate financial resources (Sénat de France, 2021). A revision of the economic model of AOMs is currently being analysed to facilitate rural inter-municipal clusters becoming AOMs.

Denmark's regional public transport authorities. The Danish national public transport system is characterised by a high level of institutional co-ordination among the main public transit authorities and 550+ private sector providers. A national public service company (DSB) operates and provides most rail services, while six regional public transport organisations operate and provide primarily bus and demand-

responsive transport (DRT) (Flextrafik). The region and municipalities jointly own the regional public transport authorities, however, municipalities have the majority on the board. A national board of appointed members from the municipalities, cities, regions and the six regional transport organisations has been established to facilitate collaboration on joint projects and procurements. For example, all regional transport organisations co-own the national trip planner, Rejseplanen (see section on Mobility as a Service [MaaS] above). A key advantage of regional public transport authorities is the possibility of larger tenders leading to up to 15% of cost savings (MAMBA, 2019).

Transport Coordination Units in Ireland. As part of the restructuring in 2014, the Irish National Transport Authority's rural transport programme set up 15 Transport Coordination Units (TCUs) throughout the country operating as Transport for Ireland Local Link. These offices manage requests and delivery of local regular bus and DRT services in their area. The majority of the Transport Coordination Units are independent non-profit entities managing rural transport services on behalf of the National Transport Authority through a grant agreement.

Recent analysis highlights that many communities in rural Ireland continue to be at risk of transport disadvantage, even when considering the provision of the Rural Transport Programme. The study identified hotspots of forced car ownership²⁸ and transport disadvantage using GIS tools, spatial datasets and census data. It hence suggests significant expansion of this community-based scheme to service disadvantaged areas and households in remote areas of rural Ireland (Carroll, Benevenuto and Caulfield, 2021).

Embedding rural mobility in wider regional development frameworks

In addition to adequate rural transport policy and governance frameworks, accessibility policy needs proactive joined-up thinking, particularly in areas where financial resources are sparse. Policy makers should therefore adopt holistic approaches to accessibility by connecting with broader policies and objectives beyond the provision of transport services. These include:

- Land-use planning and transit-oriented development, including mobility hubs for multimodal connections (e.g. integration of the Flemish spatial plan with the Basic Accessibility Policy).
- Better cross-sector co-ordination for the provision of public services for more cost-effective use of limited resources (see next section and ITF, 2021a).
- Regional and local economic, social and lifestyle development can affect commuting patterns and the need for motorised transportation. For example, policies to discourage travel may include encouraging more flexible work arrangements, allowing full or part-time teleworking and the development of the local economy and services, particularly at the municipal level, which would allow rural and peri-urban residents to continue to be anchored in their area of residence.
- A sufficient standard of digital connectivity should be provided to allow for the functioning of new mobility solutions, but also to reduce the travel needs of individuals and rural businesses (e.g. for e-health, online education, teleconferencing, etc.). However, there are issues relating to public acceptance of the need to engage with technology in order to access services, especially among the elderly.
- Climate change mitigation policies, including carbon pricing, may generate unwanted disproportionate impacts on low-income, car-dependent households. Policy provision will need to compensate those communities which experience income loss and diminished access to social and economic opportunities. Whereas many countries have defined transport decarbonisation

targets, no country has translated these into modal shift targets and funding mechanisms. To promote a more equitable transition, revenues from carbon or road transport pricing could be used to expand public transport in areas where forced car ownership is highest.

Ultimately, the successful deployment of innovative mobility may not necessarily require adjustment of the policy framework, but rather of the mindset of the institutions and/or interests that determine how the framework is applied.

Policy takeaways: Rural transport policy

- Develop target-bound rural mobility policy at national or provincial level that puts sustainable accessibility at the forefront. It should define minimum standards for access to local service centres that is built around a core network of inter-urban trains and buses connecting to larger rural settlements.
- Local authorities should be given sufficient mandate and resources to develop innovative mobility solutions that are most suitable for the rural environment in which they operate. Mobility hubs in larger villages or around train and bus stations should act as the “glue” between the core network and tailored local services.
- Involve communities in the development of transport services, including the use of volunteers and peer-to-peer services. Policy that may be suitable in one geography may be unaffordable or difficult to deliver in other less populated rural areas. Rural areas require a flexible approach to ensure the mix of schemes and approaches in each area takes into account specific population needs and context.
- Embed rural mobility within broader policies and objectives, including land-use planning, public service provision, regional economic development, digital connectivity and climate policies.
- Collect and use relevant data to ensure an evidence-based approach when considering future developments in rural transportation, including accessibility analyses, remoteness and rurality indexes.

Financial frameworks

The lower population densities and dispersed nature of demand in rural areas makes provision of commercially viable transport options very challenging. While certain inter-urban services, linking larger rural settlements with their closest urban areas, may be commercially viable, local rural services and those that provide local connection to the main inter-urban route network are rarely profitable. Other than some niche services catering for tourist or event transport, which generate short term high demand for specific destinations (e.g. Sala et al., 2021), local rural transport services require some form of public funding or subsidy to support their set-up and operation.

Funding for rural public transport typically comes from national, regional and local government. This is then allocated by local or regional public transport authorities in the form of grants and subsidised service contracts to transport providers. Usually, municipalities finance transport from their general funds, which are required to finance a variety of public services. Dedicated transport budgets are not the norm and securing funding is problematic for most of the innovative mobility cases examined by this Working Group. In Finland, the taxation discretion of municipalities is very large. As a result, municipalities often have a

larger financial capacity for spending on rural transport services. In countries such as Japan, municipality budgets are relatively small and it is challenging to finance rural transport services solely from general funds. National subsidies can be used for trunk lines in Japanese regions, but not for branch lines. In addition, many municipalities face shrinking funds due to out-migration and ageing populations.

In countries with a requirement to conduct cost-benefit analysis, small communities may lose out in the competition over transport funding with larger population centres that have specialised staff or resources to carry out the necessary tasks. Communities below a certain size should be able to benefit from additional guidance and resources for carrying out cost-benefit analysis. Dedicated small community mobility funds, such as in Canada and the United Kingdom, can reduce this risk, although resources available through these time-limited project-based funds are usually insufficient to meet the long-term demand for public transport in rural areas. Therefore, the lack of strategic rural mobility or accessibility policies results in piecemeal short-term funding causing severe difficulties in delivering integrated and efficient services.

Inefficient spending of limited budgets is an additional obstacle for achieving more cost-effective mobility for all. Public budgets are allocated to health, education and social services, who then allocate funding to meet statutory obligations to ensure those requiring access to their service are provided with transport. This fragmented and disjointed funding system results in a tendency towards silo-based thinking, and a lack of strategic joined-up planning. The result in rural areas is inefficient spending of limited budgets and often multiple transport services operating for small numbers of people in the same locality, providing separate services for the general public, students, non-emergency patients and adult social care clients.

The impacts from a lack of co-ordination and integration between public bodies is particularly acute in rural areas where there is a reliance on public subsidy for virtually all services, but where funds are limited and generally decreasing. There is therefore a need for more innovative mechanisms for raising finance, as well as innovative ways of funding services which are more co-ordinated, cost-effective and efficient. The following section highlights several examples where unconventional funding mechanisms have been applied to overcome the constraints of the limited and fragmented funding associated with rural areas.

Increasing the overall funding available for rural transport services

Cross-subsidisation on a geographic basis

Operating cost recovery of public transport services varies significantly by routes and areas. As sparsely populated areas tend to have lower cost recovery levels and require much higher subsidies, often provided by local authorities facing tight or decreasing budgets, there is a strong risk of services being cut. Geographical cross-subsidisation by enlarging areas of public transport procurement could be a potential remedy, with one operator serving a mix of higher density and low patronage routes. Joint procurement could be ensured by an entire region or a “transport region” composed of a number of municipalities. In some metropolitan areas, tenders for public transport contracts could stipulate the requirement to also supply adjacent low-density areas.

Cross-funding from high-demand areas to low-demand areas is a tool used in Germany to supply public transport in the periphery. Public transport contracts are handed out for the entire area and the supply for all existing public transport connections is mandatory. In Latvia, an equalisation fund covers all municipalities. In practice, the cities generate a surplus and contribute to the fund, which is then distributed to the other municipalities. The Treasury of the Republic of Latvia has a management and oversight role in the distribution process, but has no control over the use of funds and thereby over the decisions and activities of the receiving municipalities (Republic of Latvia, 2015).

Whole-of-government public service provision models

The integration of public services, such as mail, health, education, social services, into the public transport mobility concept provides potential for a more cost-efficient public transport system, as a part of a whole of government service provision model. Through the pooling of public services, higher levels of funding become available to subsidise transport for all, rather than fragmented client-focused provision. In Finland, pooling different subsidised services (e.g. regular public buses, school, health and disability transport) into a single DRT scheme, has demonstrated potential for large cost savings for the public sector (Eckhardt, Lauhkonen and Aapaoja, 2020; for additional examples see Mounce et al., 2018). In Ireland, the merging of health-related transport with regular public transport and delivery of non-emergency transport services by a number of Transport Co-ordination Units, has resulted in significant savings in transport costs for the Health Service Executive. Results from pilots testing the integration of school and regular transport services in sparsely populated areas were less promising: only limited efficiencies were achieved and two of the four integration projects did not prove viable (Transport for Ireland, 2018). The high number of health-related trips has motivated the Maebashi City MaaS pilot to introduce a fare system that will be linked with the Japanese Social Security Card.

Financing can also be optimised by setting up a public “multi-utility” company structure, such as those commonly used in Germany. The company integrates several divisions of a municipal enterprise (e.g. public transport, energy supply, water supply). Tax benefits can be achieved by offsetting the profits of financially lucrative sectors (e.g. energy) with losses from loss-making sectors (e.g. public transport) (Ellner, Schumacher and Hartwig, 2018).

Cross-sectoral funding

Cross-sectoral funding schemes based on integrating local businesses’ marketing strategies into rural transportation services, can support the financial stability of public transport. Integrating marketing concepts of private enterprises which are outside the transportation sector but benefit from transportation infrastructure, such as hotels, tourist activities, local shops, restaurants and other businesses, can generate additional revenue streams. This would allow local businesses to attract more customers and offer those customers sustainable alternatives to the private car.

Tourism can be leveraged to increase public transport patronage. Since 2010, overnight guests in the Bavarian Forest have been able to use public transport services free of charge with a transport card (Gästeservice-Umwelt-Ticket, GUTi). The municipalities pay 32 cents per overnight stay to the public transport companies. As a result of this initiative, around 40% more passengers use public transport services and an estimated 7.7 million car kilometres per year have been replaced by bus and train journeys (Nationalpark Bayerischer Wald, 2021). Cross-seasonal funding models are also used in some Alpine winter sport destinations. Higher ticket prices for tourist transport supports low-demand seasons to fund a continuous mobility service.

In France and the United Kingdom, tradable energy saving certificates, so-called “white certificates” contribute to sustainable mobility funding (e.g. Cerema, 2021b). They allow entities involved in sustainable mobility to sell white certificates to producers, suppliers or distributors of energy that do not meet mandated energy saving targets.

Third-party financing

France is seen as the European model for third-party financing. The “*versement transport*” (now “*versement mobilité*”) has been collected since 1973. As part of this instrument, municipalities have the option of levying an additional transport tax on companies with more than 11 employees (Cerema, 2021b). This tax currently covers around a third of the operating costs of transport companies in

France. This contribution allows significantly lower tariffs on local public transport. However, the revenues from the *versement mobilité* cannot be used for innovative solutions, such as DRT, ridesharing or carsharing. The transport tax will only be collected in communities that organise regular transport services. Around 950 rural communities in France will not be able to organise such services and will be deprived of the tax revenues (Maire Info, 2019).

More cost-effective use of limited funds

Where increasing the level of funding available to support rural transport services is not possible, it is important to spend the limited budgets available in the most-cost effective manner. This becomes even more pertinent in lower density rural areas where subsidies required are far more than the revenues from passenger fares. In such cases, many decisions around the type of service and category of operator need to be considered when assessing value for money. For example, if a subsidised fixed route bus service contract is being renewed, can this be provided with a demand-responsive minibus to reduce costs? If a commercial bus company is operating the service, can a CT provider be used instead, and can this include the use of volunteer drivers? Does the vehicle need to be a bus or minibus, or can a 7-seat vehicle be used, opening the service up to local taxi companies? These decisions can significantly reduce the cost of provision, although careful thought needs to be given to whether there will be any impact on service quality, and also whether European Union, national and local legislation allows for such changes (see next section on legal frameworks).

Public-private partnership funding

Public-private partnerships involve the joint delivery of services between the public and private sector to improve efficiency and cost effectiveness for the delivery of specific services. Partnership funding can be used to increase accessibility (e.g. accessible vehicle purchase) and availability (e.g. plug gaps or support integration) in a cost-effective manner. The purpose is usually to provide services more cheaply using private sector involvement in services that cannot be provided by the private sector alone.

There are two distinct applications of such partnerships. The first approach is where the private sector incorporates a new or enhanced service, supported by public sector funding, into their existing commercial activity. Examples include bus operators receiving public sector payments to extend their commercial peak period bus routes to also operate in evenings and weekends, or to increase frequency from the commercially viable two services per day to an hourly service. Other examples include instances where the public sector partners with selected private sector providers (e.g. taxi or ride hailing companies) by offering trip subsidies to that operator for certain types of trips. In this way, gaps in the public transport network can be bridged by providing access to key services (e.g. health appointments) where access is lacking, or to support integration with the mainline public transport network by providing services offering first- and last-mile connections. Furthermore, the services delivered through public-private partnerships are often planned with public bodies in other sectors, such as health, education or employment, with cross-sector funding made available to target the priorities of these sectors and/or address shortcomings in providing access to services provided by these sectors.

The second approach is where the public sector provides infrastructure or vehicles of a certain specification (but retains ownership) and with the private sector providing service delivery and maintenance. An example of this type is providing collective asset sharing as a non-profit add-on to existing commercial operations. In urban areas, these asset sharing schemes (bike or carshare) are predominantly operated by private sector providers on a commercial basis, however, in peri-urban and rural areas the demand from individuals for collective asset sharing services is insufficient for a commercially viable operation. As a result, financial support is required in some form or other to establish collective asset

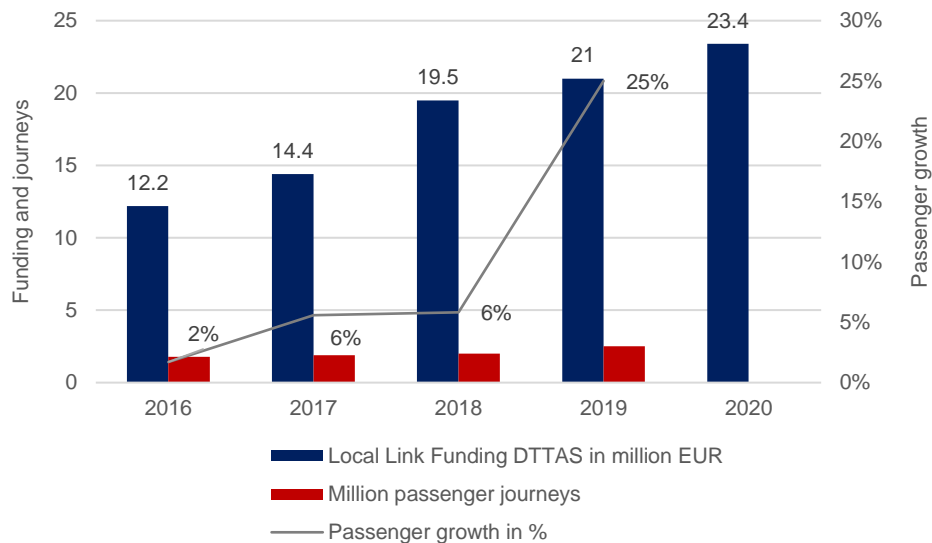
sharing services. For example, bikes or e-bikes are purchased or leased by the public sector and provided to commercial bike shops in rural areas for them to offer a hire service to the public. This form of partnership is most suited to rural areas where little to no competition exists and where commercially viable bike hire service delivery would not be possible without the partnership arrangement.

Utilising the non-profit or voluntary sector to reduce operating costs

CT is largely built around use of volunteers for service delivery, sometimes with a core of paid staff who manage the operations. This results in low-cost services where passenger fares, donations and sponsorship can cover much of the service delivery costs. However, the overhead costs associated with management and administration staff, upkeep of premises, maintenance and replacement of vehicles requires additional funding. Public sector grant funding is essential to retain and build capacity in the community sector and to support new vehicle purchase. For example, in Ontario, Canada, municipalities may apply for funding towards capital and operating costs of starting up CT services and operating the service for a maximum five years. In 2018, the Ontario provincial government committed over CAD 40 million (Canadian dollars) to CT initiatives over five years, with CAD 10 million earmarked for indigenous communities. Similar programmes exist in Germany, where the mobility agency of Baden-Württemberg (NVBW) provides grants to procure vehicles and contributions to administration costs.

In some jurisdictions, public grant funding may violate legislation. In the European Union, if funding is provided for certain aspects of the service provision (e.g. vehicle purchase) through public sector grants which enable a provider to operate a commercially profitable service, this is in conflict with European Union state aid rules. Generally, public sector grant funding can only be used for vehicle purchase when those vehicles only operate as non-commercial services, which effectively only applies to some community sector bus services (see next section on legal frameworks).

The Irish case is unique in the sense that CT associations are an integral part of the national transport network. Through Local Link the National Transport Authority provides rural community-based public transport services that are overseen by 15 Transport Co-ordination Units. Rural transport services are managed locally, either in-house with the community association's paid and volunteer staff acting on behalf of Local Link and using owned or hired vehicle assets, or using procurement procedures. After expansion of the network and retendering of all existing rural transport services, the number of passenger journeys increased by 25% between 2018 and 2019 (National Transport Authority, 2020). Local Link services are being increasingly included in the National Transport Authority's national multimodal travel information system and incorporation into the national integrated fare system (LEAP card) is ongoing. The government's Ireland 2040 plan makes a commitment to the future funding of Local Link to provide planning stability for operators and residents (Transport for Ireland, 2018).

Figure 17. Funding for the Irish Rural Transport programme and passenger growth, 2016-20

Note: DTTAS = Department of Transport, Ireland.

Source: Transport for Ireland (2018); National Transport Authority (2020); and Houses of the Oireachtas (2020).

Countering disincentives generated by subsidy

Without an appropriately designed subsidy scheme incentivising transport operators to optimise their services, there is a risk of moral hazard: the more losses bus operators suffer, the more subsidies they receive. Therefore, incentivising incumbent transport service providers to downsize or shift to flexibly routed DRT services should play a key role in the design of subsidy schemes. Ultimately, operator licence requirements determine whether companies can flexibly adapt or downsize local transport services through demand-responsive minibuses, shared taxis or the involvement of volunteers, and legislative changes might have to accompany these incentives.

Subsidies that favour the use of private vehicles should be reviewed and provided only when necessary (e.g. for low-income households dependent on the car). This can include revising policies such as the commuting bonuses (e.g. Germany) and company car benefits. However, phasing out such subsidies could lead to strong resistance, which would need to be accompanied by improvements in the delivery of convenient and affordable public transport alternatives, and potentially a mobility budget for lower-income households (e.g. Portland's Transportation Wallet).

Innovation funding

A current issue in programme-based innovation funding is the focus on urban mobility innovations. A lack of resources, technical planning skills, knowledge and networks often hinder local actors from applying for innovation funding. This leads to a paradox where innovation funding streams are geared towards high-tech urban innovations, while some low-tech but high-impact rural solutions face important funding barriers. As a result, most mobility innovations emerge in an urban context and are only adapted to rural contexts at a later stage, instead of developing innovations based on a local need from the outset.

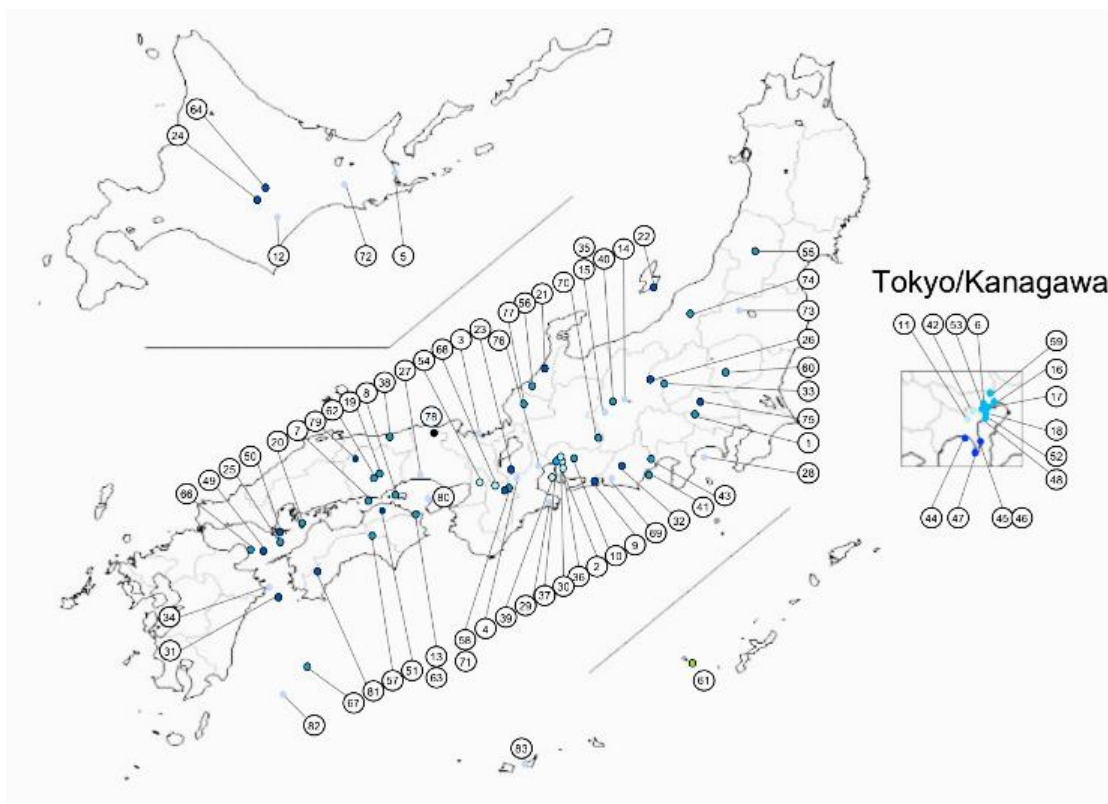
In programme funding, high-tech approaches should not crowd out high-impact, cost-effective approaches. These may include easy-to-implement technological solutions, such as better dispatch algorithms for community buses, and social innovations that involve the local population as co-creators,

volunteers or prosumers contributing to the pool of drivers and vehicles. These innovations may be novel in the context in which they are being applied, but based on ideas that have been implemented elsewhere. Key criteria for innovation funding should be based on sustainable development from a social, environmental, or economic standpoint.

An additional constraint is time-limited funding. Current average trial durations are insufficient to allow meaningful pilots to be carried out, monitored and evaluated, with many only receiving funding for 6-12 months. In addition, most rural mobility pilots are too small to demonstrate representative quantifiable benefits. In Germany, around 90% of ridepooling services launched by the public sector have a fleet of less than 15 vehicles (door2door, 2021). Many of the pilot projects examined in this Working Group were even smaller, sometimes providing less than five shared cars or e-bikes per community. While some projects have been thoroughly evaluated, the sample size from surveys is often low, with many featuring less than 20 responses (see e.g. Eckhardt, Lauhkonen and Aapaoja, 2020; Martin et al., 2021).

Regulatory sandboxes, living labs in test regions and larger-scale demonstration projects would allow the necessary evidence to be collected and the findings from small-scale demonstrations be substantiated, in order to convince decision makers of the benefits. The timeframe and geography should be broad enough that impacts on society, environment and local economy can be observed. Japan has taken the approach of rolling out a large MaaS programme, including 84 pilots covering a variety of geographical areas under the Future Investment Strategy (Figure 18). Of these MaaS projects, 20 are in areas facing depopulation and remote islands, 30 are in regional towns and 15 in suburban areas.

Figure 18. Japanese Mobility as a Service projects



Note: Light blue-grey spots show projects in sparsely populated remote areas, islands or areas affected by out-migration (20 projects).

Source: MLIT/World Economic Forum (2021).

Larger consortia across different countries are useful to allow for exchange and peer-learning between municipalities or regions. For example, European mobility trials, mainly through the EU Interreg funding mechanism aim to widely disseminate findings (Box 3).

Box 3. EU-funded innovative mobility projects in rural areas

- SMARTA (European Parliament), <https://ruralsharedmobility.eu/>
- H2020 INCLUSION, <http://h2020-inclusion.eu/>
- Interreg LAST MILE, www.interregeurope.eu/lastmile/
- Interreg MAMBA (Baltic Region), www.mambaproject.eu/database/
- Interreg Peripheral Access, www.interreg-central.eu/Content.Node/Peripheral-Access.html
- Interreg RUMOBIL (Central Europe), www.interreg-central.eu/Content.Node/rumobil.html
- Interreg SaMBA (Alpine Region), www.alpine-space.eu/projects/samba/en/home
- Interreg SHARE-North (North-Sea Region), <https://northsearegion.eu/share-north/output-library/>
- Interreg Stronger Combined (North-Sea Region), <https://northsearegion.eu/stronger-combined/>
- EUROMONTANA, European Association of Mountain Areas, www.euromontana.org/.

Note: All links accessed 19 November 2021.

Technical assistance

A common issue is the dependence on bottom-up initiative and the lack of financial and human resources at the local level. Responsibility for mobility often lies with municipalities, although local actors often do not have the necessary resources, technical planning skills and knowledge of how to set up or improve the efficiency of new or unconventional mobility services. Improving this situation requires the provision of resources and knowledge at a central level, such as legal, funding and operational guidance, as well as the exchange of knowledge and experiences between the relevant stakeholders on regional and local levels. Examples include Mobilikon and the sustainable mobility platform NaKoMo²⁹ in Germany, the France Mobilités support platform³⁰ or the Cerema guidance for implementation of the new mobility law in sparsely populated areas of France. In the United States, the federal government funds the national Rural Transit Assistance Program (RTAP) and dedicated web pages have been established to help rural transit providers navigate the period of Covid-19 and beyond (US Department of Transportation, 2021).

Micro-subsidies: Funding to users or targeted uses

Public transport provision is commonly ensured by providing block subsidies (a lump sum) to a transport operator to cover operating costs or through subsidised contracts for specific services. These subsidies are uniform and benefit all users. Additional subsidies are sometimes provided in a targeted way, e.g. to the elderly or students through fare discounts. Examples of this include concessionary fare schemes, where target groups are given discounted or free travel on certain types of service, where the provider is then reimbursed all or part of the discount given to the user. These concessionary fare reductions are usually

only applied to conventional bus services (of which there are relatively few in rural areas). Similar types of discount travel schemes exist for certain vulnerable groups for taxi travel (although these typically include a maximum spend per month, which provides relatively few trips in rural areas where distances are longer). Although these measures make certain types of journeys more affordable for these users, they do not broaden travel options for users or encourage innovative private sector solutions to emerge that more fully address rural users' needs.

As an alternative to these predominant models, micro-subsidies could offer a totally new approach to designing and implementing subsidy schemes. Micro-subsidies are targeted subsidies down to the level of very narrowly defined categories, or even individual users, that can be modulated according to categorical or personal characteristics (age, income, disability, socio-economic status, e.g. unemployed, etc.) and any relevant feature of the journey (location, mode of transport, etc). There are two different ways in which micro-subsidies can be allocated: incentive funding to providers and funding provided directly to users.

Incentive funding to providers

This approach provides micro-subsidy payments (incentives) to any operator that provides particular types of trips or transports particular types of users. This allows public sector decision makers to directly compensate providers for transporting specific user groups or compensate costs for trips that provide most benefits to society or save most costs in other public sector areas. Incentive funding potentially reduces the need for public sector grant funding and service contracts awarded to private sector or community organisations. Offering more rewards for carrying particular passengers or making certain trips (e.g. health trips or providing local connections to main public transport network) motivates the private sector to take the initiative to offer services which better cater for those needs and reduce the burden on the public sector to provide dedicated services for these purposes. Increasing income streams for community organisations potentially enables the use of paid drivers, which helps to remove reliability concerns associated with volunteers for services with greatest societal benefits, or to cross-subsidise services or passenger trips which generate a lower income. If this form of funding removes the need for community organisations to receive grant funding for new vehicles, then legal issues related to state aid (see next section) can be avoided.

Funding provided directly to users

This approach places the micro-subsidy funding directly in the hands of the users, sometimes known as a "person centred" funding approach. In this model, the authority has no control over how the funding is allocated to service providers and it is the user themselves who chooses and pays for the services out of a mobility budget they receive based on their personal circumstances. This reflects continuing moves in certain countries towards personalised budgets in social care, in place of centrally organised service provision. Service providers are motivated to design or adjust their services to meet the needs of the users who receive mobility budget funds in order to attract their business and the associated mobility payments.

The concept of awarding mobility budgets to (certain) rural users is compatible for use within MaaS systems where users purchase a monthly budget or subscription package, which entitles them access to different forms of transport. They then pick and choose the service provision on a trip-by-trip basis within the limits and conditions of their monthly budget. These types of mobility budgets, awarded to target users, are also being explored in other sectors such as employment and health, especially where cost is a significant barrier to access.

The possible implications of a micro-subsidy model of funding are that service provision will migrate from a small number of services that do not react or cater to differing user needs, towards a larger number of individual and dispersed providers that are more tailored to user need. The argument in favour of this

funding approach is that it is likely to result in new and innovative services or service improvements, initiated by private sector and non-conventional providers, including community and peer-to-peer transport, to address vulnerable and rural user needs. However, this is strongly dependent on a better understanding of user needs by the transport providers. There is also a risk that service providers may prioritise service availability and accessibility to only those passengers for which micro-subsidies apply, at the expense of other groups paying only standard fare. Service integration also becomes more difficult to influence.

Digital channels would open the door to managing micro-subsidies for narrowly defined user categories depending on their circumstances (income, disability, age, etc.) and other journey features (time, location, transport mode, trip purpose etc.). This could also open subsidy channels to transport modes other than conventional buses. In rural areas, a mobility guarantee could be in-built in the event of a missed connection or lack of return trip. This would require anonymised tracking and geo-localisation through an app (and possibly linked to a digital identity to control eligibility criteria).

Some experts have argued that micro-subsidies have a huge potential to improve the efficiency and equity of subsidies, optimising the resources spent on public transport (Nadal, 2021). This approach, however, is not sufficient in rural areas where start-up funding for operators would still be needed to ensure that transport options continue to develop and emerge in the first place. Block subsidies also provide for a certain degree of stability for operators during phases of low demand or before a new mobility solution is more widely used. Mechanisms triggering a subsidy within an app could, however, be a powerful tool to incentivise mode shift in areas where reliability issues are currently a strong argument against the use of shared transportation.

Policy takeaways: Funding

- Put in place stable rural mobility funding based on objective eligibility criteria, such as accessibility thresholds. Strategic policy should create the framework for core funding to establish certainty of the core transport network connecting the main rural settlements.
- Facilitate integration between sectors through the funding framework, including between public and private providers, local shared services and public transport, to avoid fragmented service delivery.
- Put in place dedicated grants to retain and build capacity in the community sector. Develop a Rural Mobility Technical Assistance Programme that goes beyond just funding local initiatives, but that builds local capacity and provides access to centralised expertise, including legal and technical support to assist not only public authorities, but also local community initiatives.
- Shift from mode-specific subsidy to accessibility subsidy. Transport subsidies should be reviewed to make sure they meet wider goals of improving accessibility, affordability and reducing private vehicle use. This can include revising policies such as commuting bonuses (e.g. Germany) and policies for company cars.
- Time-limited funding should be reserved for genuine pilots and new initiatives. Where time-limited funding is provided, it should be provided for sufficient time to allow meaningful pilots to be carried out, monitored and evaluated, such as through living labs or regulatory sandboxes.
- Within such a sandbox trial, measure the wider benefits that new services bring to the community, especially if a service is community led or of a special community interest. Wider

benefits can include environmental, social, mental and health benefits. These are not easy to capture and can take many years to materialise. Monitoring the changes in travel behaviour and benefits which improve the well-being for communities should be part of the impact and performance study of funding programmes and pilots.

- Consider micro-subsidies in addition to core funding to encourage a wider range of private sector, community and peer-to-peer provision in more sparsely populated settings. Targeted micro-subsidies in the form of an individual mobility budget based on personal circumstances could also be part of a mobility guarantee in rural areas.
- Put in place mobility guarantees for public transport and potentially extend these to new innovative mobility offers to provide more certainty for users in case of lack of availability, delay or cancellation of return trips. This guarantee can be paid directly to users or could be triggered in the form a micro-subsidy for a taxi ride via a digital application.

Legal frameworks

In rural, and to some lesser extent peri-urban areas, there are few conventional public transport service providers. Some intercity fixed-route bus and train services may bisect the area operating on a commercial basis. In addition to this, there is likely to be a limited number of fixed-route non-commercial bus services operating under a public service contract. These service contracts are open to bids from any operator, as long as they meet certain requirements, which often include the type of vehicles to be used and operator licence requirements. The result is limited competition among a few conventional bus services, leading to higher tender prices. In the worst case, due to limited budgets, some services get cut or less service contracts are awarded, provoking a downward spiral for public transport provision.

While more cost-effective innovative transport models may exist, their operations are often restricted by requirements on the type of providers allowed to bid for public service contracts. Their legal status and eligibility are defined both in passenger transport law and procurement law. Without legal status as a public transport provider, DRT operators, taxi and CT providers are unable to benefit from subsidies or tax benefits. Some countries use experimentation clauses which allow innovative services to operate, however, without legislative changes these operations cannot continue beyond the trial periods.

Licensing and procurement rules play a role in defining the purpose of different types of transport. In some cases, however, this role is not clearly defined, which can lead to competition between subsidised and commercial services, as well as between commercial and non-profit services. For example, in partly deregulated markets, such as the United Kingdom, lower-cost services based on cross-subsidisation or volunteers sometimes compete for subsidy with incumbent commercial bus services.³¹

Demand-responsive transport (DRT)

In low density rural areas, there is a clear need and benefit in developing service contracts for DRT services which aim to foster co-operation between sectors, reducing sector specific dedicated services, while also meeting many of the local travel needs of the general public. However, many countries do not have specific legislation for DRT making it difficult to establish such contracts and services. Actual or perceived competition between DRT and other modes of public transport offering flexible services, such as taxis, can create significant barriers to the introduction of services. Taxis are typically commercial operations and see DRT as a threat to their business, operating at public transport fares, but offering a taxi-like service. In

countries applying strict approval regimes, DRT still operates in legal grey areas or under experimentation clauses (e.g. Austria, the Czech Republic). In some cases, DRT falls under taxi regulation and as such faces excessive requirements (e.g. Latvia). Where legislation has been developed it is often overly complex as a result of competition considerations (e.g. United Kingdom, see Box 4).

Concessions with incumbent taxi companies are often excluded. Exceptions include the Netherlands and Denmark. On the Dutch island of Texel, the local taxi company operates the DRT service as a subcontractor of the public transport operator, which required a change in the legislative framework. In two years, public transport ridership on the island increased by 7-45% depending on the month (SMARTA, 2019c). In Denmark, single-source contracts with individual providers (e.g. taxi companies) were replaced by negotiated contracts with several providers that meet the FlexDanmark's standards for driver licencing, training and cost. When a trip request is received, FlexDanmark can schedule that trip with any of the providers (Lynott, 2019b).

Box 4. Flexible transport in the United Kingdom

By the early 2000s, in the United Kingdom there were no less than eight legislative routes to providing DRT, each with different rules regarding the passengers who could be carried and the grants or tax rebates which could be claimed by operators (Mulley et al., 2012). This effectively created barriers to entry for innovative lower-cost providers seeking to integrate different types of users travelling for different trip purposes (e.g. education, health, employment, shopping, social) as a way to reduce duplication and lower costs.

To reduce the legislative barriers to providing DRT, amendments to the legislation aimed to create a more level playing field by entitling CT and taxi operators to the same subsidies and opportunities as commercial bus operators (Halcrow Group, 2009). Specifically, this relaxed restrictions on the sizes of vehicles that may be used by CT providers (enabling the use of smaller vehicles, therefore permitting more volunteer drivers without the need for a minibus driving licence) and allowed drivers of community bus services to be paid (enabling them to compete with commercial bus operators for public service contracts). This also allowed taxi providers to bid for public service contracts using seven seater vehicles operating under taxi licences (taxi buses).

This opened the market for different types of provider bidding for service contracts, meaning more contracts could be filled at lower public cost. It also meant that more service contracts could be offered for DRT services, as an alternative to conventional fixed-route services, with the knowledge that there would be more bidders eligible and located in rural areas. The choice of most suitable provider and vehicle types for DRT services in different environments is considered by Wright (2013), who highlights the considerable savings which can be achieved by using taxi-sized vehicles in low density rural environments.

Relaxation of strict legislation on provider requirements for public transport services in rural areas is essential to build provider supply and reduce contract costs. However, in many cases, there remain competition policy and state aid rules that are limiting the ability of certain providers to bid for service contracts.

Another obstacle is that the procurement and contracting processes are often overly complex and take time to execute. Simplifying these procedures can encourage more innovative partnerships and enable

the authority or operator to move more quickly and concentrate on effective marketing and other important aspects of the service. Contracts for DRT services should also allow for adjustments (and even early termination), as services may evolve based on customer feedback or as findings emerge during pilots (L.E.K., 2019).

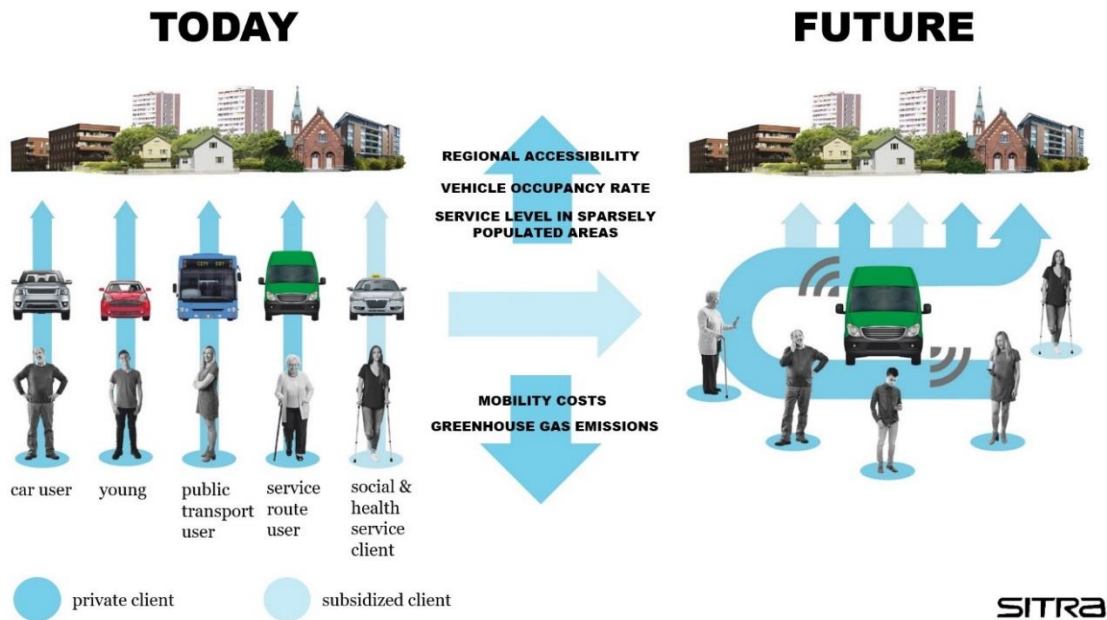
Co-ordinated service delivery

In many countries, service contracts are also used to provide transport for students, those with additional needs, transport connected with social care and non-emergency patient transport. The responsible bodies for these varied transport obligations are often in different areas of the public sector and lack co-ordination in commissioning and procuring service delivery. As a result, there is often duplication of services operating in the same area but delivered to different groups of users, with the use of services restricted to those groups. For example, in the United States, the Americans with Disabilities Act of 1990 requires a paratransit service readily available when setting up a bus service in a community.

Packaging and bundling contracts across sectors has the potential to deliver large benefits (see section on DRT and financial frameworks), but is hampered by the lack of partnership planning. The best way to achieve efficiency in sparsely populated areas would be by implementing a DRT system that can manage fixed to fully flexible transit, whilst catering for the unique passenger requirements of each service (see Figure 19). Accessibility issues and vehicle standards issues could be solved by introducing common vehicle standards to all service contracts to remove barriers to co-ordinated delivery. In some jurisdictions, this would also involve removing regulatory barriers against carrying the general public on specialised transport services. In Australia, the law restricts the types of customers CT services can carry and these restricted services face competition from open-access DRT services (Mulley et al., 2012). The results of a Swedish study in 2014, showed that different regulations for public transport and special passenger transport generate administrative costs and complicate co-ordination. Travelers using special transport can during the same trip be covered by several compensation systems and regulations (Ministry of Infrastructure, 2020). Several jurisdictions have started to co-ordinate special and public transport services. In Denmark, Flextur was launched in 2003 for elderly residents. The service has subsequently been opened to other users and replaced fixed line buses where these were not viable. Since 2013, the Slovenian Road Transport Act allows integration of “special public transport” with general public transport. However, in the majority of municipalities this integration was not implemented (SMACKER, 2019).

In some cases, easing competition regulation on rural transport operators could allow basic service levels to be maintained through co-operation with competing operators (e.g. distributing pooling fare revenue, reducing overlapping routes). Special exemptions to competition law were implemented in Japan in November 2020, enabling multiple transport providers (when working jointly with bus transport providers) to engage in direct discussions when pooling or co-ordinating services, adjusting routes, fares and timetables.

Figure 19. Co-ordinated mobility service delivery using a single on-demand system



Source: SITRA (2019).

Community transport

As discussed above, innovative funding approaches to integrate different transport services and pool funding across sectors or to cross-subsidise with commercially viable operations, could maximise the available funding. In combination with this, the use of lower-cost community providers is suggested to maximise cost-efficiency in service delivery. However, CT providers are not-for-profit organisations and as a whole do not operate commercially viable services. As they operate largely with volunteers, staff costs are minimal and the main overheads are for building and depot costs, vehicles and fuel. In order to remain financially stable, CT services rely on public grant funding to cover many of these costs, including purchasing vehicles which meet accessibility requirements. However, in the European Union for example, this creates a conflict when bidding for public service contracts since EU State Aid³² rules dictate that public sector grant funding can only be used for vehicle purchase when those vehicles operate only on non-commercial services and no other competitor in the area already provides the service to the target users. This leads to CT providers not being allowed to bid for public service contracts where they intend to use a vehicle purchased with public grant funding (these vehicles being the most suitable for service), as these service contracts would constitute a commercial service.

There are other innovative mobility solutions where state aid rules stifle opportunities in rural areas. For example, if public funds have been used to establish a pool of vehicles (accessible minibuses or community cars) which are available for use by organisations within the community, then state aid rules restrict the vehicles use to only organisations in the community operating on a non-commercial basis. This deters innovative mobility providers aiming to establish routes and uses that may become commercially viable. This means the use of the vehicles will require continuing on-going subsidy. CT providers are also able to use one profit making aspect of their business to cross subsidise other loss making, but vital services. For example, they may hire out their vehicles (sometimes including drivers) to local associations at weekends and in the evening on an exclusive use basis at a profit. They then use the profit to subsidise transport services during the weekdays providing essential trips for the local community for shopping, health and

social purposes. Overall, they remain a not-for profit business. State aid rules would prohibit them from hiring out any vehicle purchased from public funds and so would remove this revenue stream. In effect, state aid legislation is further limiting the ability to provide essential rural transport services for local trips. Further legal constraints for CT operators are explored in Box 5 below, exemplified by the English CT sector.

Box 5. Constraints for community transport in England

Community transport (CT) services are predominantly small scale and largely operate under section 19 and 22 permits or in volunteer cars (Transport Act 1985). They are usually not-for-profit and due to legislative restrictions are unable to generate a commercial surplus, relying on a range of funding from grants, contracts, fares and donations. Challenges resulting from this include:

- a. Difficulty staying on top of overheads and other variable costs – CT organisations cannot generate cost savings through economies of scale and the “exclusively non-commercial purposes” exemption prevents organisations from “cross-subsidising” services.
- b. Inconsistent levels of support for different legal structures – some funding opportunities are open exclusively to charities, which can disadvantage those who operate under different legal structures (e.g. Community Interest Company [CIC]).
- c. Limitations on the sorts of journeys that CTs are allowed to provide – cases of semi-commerciality and competition from private operators can lead to CT operators being relegated to providing services that are the most costly to make.
- d. Lack of co-ordination and support in case of demand surges can strain organisational resources – for example, many GPs and hospitals tell their patients to use CT to reach health services, but fail to communicate with CT organisations to help to co-ordinate travel and to provide any funding to support this surge in demand.
- e. Lack of recognition – the current service commissioning environment prioritises economic outcomes. This can place CT operators at a disadvantage compared to commercial operators.

Source: Statement provided by the UK Community Transport Association (unpublished).

Volunteer ridesharing and peer-to-peer services

There is common use of volunteer drivers using their own private vehicles to deliver non-essential transport for social, shopping and leisure purposes, for example in Germany and the United Kingdom. The operational costs of volunteer car schemes are often met by user contributions and sponsorship or donations. However, volunteers’ private cars often do not conform to accessibility standards and needs of specific user groups. Providing access to a community pool of accessible vehicles for volunteer car schemes can remove this barrier.

In addition to volunteer car services, community peer-to-peer carpooling or ridesharing should be facilitated and promoted for certain groups, such as peri-urban and rural commuters and students. Ridesharing and carpooling schemes in rural areas tend to be co-ordinated by social enterprise companies with paid staff. Often these rely on third party funding from large employers to cover staff and overhead costs and are targeted to employees. Costs for carpooling schemes are often met by users of the schemes,

although there may need to be some small additional costs for scheme management and marketing to widen the potential opportunity of peer-to-peer services for rural areas.

For peer-to-peer ridesharing services and volunteer car services using private vehicles the financial reimbursements to drivers are limited by legislation to ensure that private car insurance policies remain valid. This limit is set at GBP 0.45 (British pounds) per mile in the United Kingdom, but varies by country. The general rule is that it is set at a level which covers fuel costs and wear and tear on the vehicle, but no profit can be made by the driver. It is uncertain how micro-subsidy payments could be made to volunteer car drivers or to drivers of peer-to-peer ridesharing without violating legislation. It may be that any trips by volunteer car drivers or peer-to-peer rideshare that qualify for micro-subsidy reimbursements that exceed these limits would need to be made to the provider managing the service (e.g. community organisation or social enterprise provider) as an administration charge and not to the drivers. If the subsidy is not received by the drivers, this is likely to limit the level of new transport supply that could otherwise be attracted.

Public-private partnerships

Public-private partnerships involve collaboration between the public and private sector for the joint delivery of services to improve efficiency and cost effectiveness for specific service delivery. Such models are often used to provide an add-on to existing commercial operations at a cost which is lower than the public sector providing or procuring the service itself. In cases where no competition exists and demand for the service is not commercially viable as a standalone service, partnerships with selected private sector enterprises can dramatically reduce the cost of operation.

One example, is where a public-private partnership is formed with taxi providers or other commercial ride-sourcing operators in rural areas to secure services offering first- and last-mile connections at affordable fares to support integration with the mainline public transport network. This may be the best solution for commuter connections where volunteer-based services and peer-to-peer options do not offer the level of service reliability required. This form of partnership is most suited to areas where little to no competition exists and where commercially viable service delivery would not be possible without the partnership arrangement. However, thresholds and a lack of legal recognition of non-conventional mobility services quickly become an obstacle for more efficient service provision. In the European Union, direct awards to private sector providers through partnerships for enhanced service provision are limited to the threshold at which general European Union procurement rules apply. That is, up to a lifetime contract value of EUR 14 000 (excluding VAT) when partnership is with a local public authority.³³ In Japan, the town of Nakatonbetsu in Hokkaido concluded a co-operative agreement with Uber to introduce a ridesharing service. Since commercial ridesharing is not allowed under Japanese law, commercial ridesourcing operators utilise their knowledge and capabilities to co-ordinate volunteer drivers to provide volunteer ridesharing and peer-to-peer services.

Another example of public-private partnerships in rural areas relates to public funds being used to purchase a new vehicle (e.g. a fully accessible bus) or shared asset (e.g. bikes, e-bikes, cars, etc.), but the public sector forms a partnership with the private sector (e.g. bike shop) or community organisations for service delivery. Businesses or organisations that own suitable premises and/or have the capacity to deliver the service using the publicly funded assets can often do so for less cost than the public sector can on its own, i.e. the private sector providers subsume the operating cost of the service (e.g. bike hire) within their existing operations, premises and staff costs and only receive public sector payments to cover additional asset maintenance costs.

State aid rules place limitations on the operators and operation of these services when public sector funding is used to finance part of the service delivery. The asset sharing services provided need to be non-commercial and there cannot be other competition in the area to provide the service to the target users. So, where public-private partnership funding is used to pay for bikes or e-bikes and for their maintenance, the private sector provider cannot make direct profit from the operation of the service, but can profit from indirect sales of merchandise to the bikeshare users. Policy makers should consider exemptions to these practices to allow small businesses to both benefit and contribute to local mobility support.

Barriers to booking and payment integration

Local collective transport services in rural areas are often fragmented and not treated as an integral part of the public transport offer. This has knock-on impacts on fare integration for intermodal journeys. For example, fares are not usually designed and integrated with the wider transport network. This is a result of insufficient legal framework for these services, resulting in a lack of regulation of the functioning, organisation and financing of CT. Another related issue is that other funding streams provided to conventional bus operators (e.g. tax relief on fuel) or to certain vulnerable passengers (e.g. discounted travel for elderly, disabled, young passengers) are often not applicable to CT services or collective services delivered by taxi providers or to any peer-to-peer provision. This potentially restricts the financial viability of these services, stifling innovative undertakings from private sector, community or peer-to-peer providers. It also results in less affordable fares and higher costs of using these local shared services, as well as confusion on fares charged between different service providers.

Increased use of digital platforms for managing booking and payments (e.g. MaaS platforms and managing micro-subsidies) involves data sharing between individuals, public sector and private sector or community partners. Within the European Union, the General Data Protection Regulation 679/2016/EU (GDPR) must be adhered to when sharing and processing data relating to an individual's personal information, trips and financial information when monitoring and managing user's subscriptions and accounts. Other similar data protection regulation exists in other countries. Observing data protection rules or possible mandatory data sharing requirements through operator licensing agreements to facilitate MaaS may pose an additional burden on small local transport providers and they may require additional support for machine-readable data collection and sharing. This also includes guidance on the extent to which operators can utilise the data acquired to increase service efficiency and detect potential markets for new mobility services, while securing users' privacy.

Consolidation of passenger and freight transport

Deregulating separate licensing schemes for passenger and freight transport can be a partial solution for increasing efficiency and tackling driver shortages in rural areas. In Japan, consolidation of passenger and freight transport is allowed with limited weight cargo in sparsely populated areas. For example, this has allowed flexible organisation of delivery services and transportation for residents, which has improved the time and cost efficiency of these two transport streams. Where such amalgamation of services is currently not permitted, regulators should consider relaxing restrictions in rural areas. For example, Danish passenger transportation law forbids the transport of passengers in vehicles designed and equipped for the transport of goods. At the same time, some regulations have been relaxed for deliveries undertaken by rural CT operators in the United Kingdom as a result of the Covid-19 pandemic.

Policy takeaways: Legal frameworks

- Build regulation to foster integration and complementarity ahead of enforcing “fair competition” in rural areas. This means that legislation limiting or forbidding subsidy payments to community and peer-to-peer providers needs to be relaxed if innovative bottom-up services are to flourish.
- Where relevant, provide guidance on processes and compliance with data protection and sharing regulations to support small communities and operators in developing digitally enabled mobility services and encourage their integration into trip planning and ticketing services.

Rural transport planning

Mobility needs in rural areas are often highly individualised and travel patterns more erratic compared to urban and peri-urban areas. Policy makers and planners need to develop a more comprehensive understanding of rural mobility needs and behaviours to better plan and tailor transport services based on the unique local context (reflected for instance in Sustainable Regional Mobility Plans, SRMP). For example, more detailed analysis of mobility needs can uncover significant potential for promoting active mobility where most trip lengths are short (see e.g. Öko-Institut, 2020). Currently, there are two main barriers to effective and inclusive transport planning in rural areas:

- a lack of clear, consistent and complete data on mobility behaviours, which then causes issues for transportation planning
- a lack of knowledge and consideration of diverse mobility in planning, which risks exclusion of those unable to drive or afford a car.

Data availability and analysis

Data availability and quality is one of the preconditions for successful rural transport planning. However, there is often little knowledge about the individual and context-related factors shaping mobility in a specific area. In addition, a lack of knowledge about daily trip patterns in rural areas is an obstacle for planning the most appropriate infrastructure and determining the level of service for fixed and flexible transport. Several issues exist when trying to collect data on transportation within rural contexts (Ronald, Thompson and Winter, 2016; Benevenuto, Azevedo and Caulfield, 2019; Velaga et al., 2012):

- **Wide geographic areas.** Due to the dispersed settlement patterns in rural areas, data collection needs to take place over much greater geographic spaces. This impacts upon both the costs and the quality of data that can be collected.
- **Survey management.** In rural areas the costs of survey administration are higher given the distances that are required to be covered by fieldworkers. This could also result in an inability to achieve representative samples for subsequent analysis. Lower digital literacy rates in rural areas can also lead to lower response rates.
- **Poor location data.** In some rural areas there is a lack of information on the number and density of housing. This incomplete data makes it impossible for transport planners to accurately provide adequate services for access to employment, education, and health care services.

- **Sensor and mobile network data issues.** In urban areas authorities rely upon sensors to collect a large amount of data on how mobility systems operate. Several issues in rural areas preclude this from operating as efficiently. Issues such as poor mobile phone signal (absence of 3G in many rural locations) and difficulty in achieving the required density of sensor networks, results in rural areas being unable to reach the same data quality as is seen in urban areas and also impacts on the development of new mobility, such as flexible DRT services.
- **Ad hoc services.** In rural areas transport services can tend to be ad hoc and informal. This results in a lack of data on these services resulting in an underestimation of carsharing and other similar services.

Poor data availability and quality highlight the need for more investment in data collection and analysis capabilities in order to better reflect mobility needs and design more effective services. To prioritise investments, more in-depth studies are needed to identify geographical areas in greatest need of assistance for rural transport projects. Better analysis is important as it uncovers a variety of issues related to car dependence, such as the distance and spatial separation of housing, jobs and services, limitations on driving a car due to age or disability, and car-related economic stress faced by low-income households. It is also useful to evaluate the social inclusiveness of transport policy. However, there are only very few examples where broader accessibility analysis has been applied. In Ireland, Carroll, Benevenuto and Caulfield (2021) developed a method to identify hotspots or areas that are susceptible to increasing rates of “forced” car ownership and transport disadvantage in rural areas using GIS tools, spatial datasets and census data. It is the first ever GIS-based study on transport disadvantage in Ireland. In Scotland, SEStran (2020: 35) combined census data and deprivation indexes to determine priority areas for mobility hubs. Accessibility analysis has been used in 18 selected rural pilot areas in Germany to determine the ease of access to facilities of general interest, local supply and local amenities by different modes, including bicycle and public transport. Although these studies delivered important insights, they are not carried out systematically and the understanding and definitions of the maximum desired time and distance to the transport offer and local amenities differed (Federal Ministry of Transport and Digital Infrastructure, 2018). In Mexico, multiple aspects of accessibility were studied based on ILO methodology developed in the 1990s adapted to contexts with limited funding or technical expertise. The process was carried out in four socially vulnerable rural micro-regions in the state of Estado de Querétaro (central Mexico), but has not been extended to other parts of the country or mainstreamed into state or national policy (Aguerreberre and Bustos, 2021).

In addition to regionwide or countrywide accessibility analysis, better day-to-day collection of data is needed to understand local trip patterns. For example, DRT can benefit from the generation of activity patterns from mobile phone network data to improve operations and deliver a service that is targeted to rural users. However, poor mobile network coverage may result in incomplete data. In addition, people without (regular) access to a car tend to move around based on what is available to them, rather than based on need (Connected Places Catapult, 2020). The data reveals usage of existing transport provision, but does not reveal “desired” travel patterns, and may therefore hide situations of suppressed demand that could have important consequences for economic opportunities, health and general well-being. Further, it does not capture the movement of people not using a mobile phone, including many of the older population.

New data collection methods should be combined with other methods, such as census data, transport surveys and qualitative research to provide useful insights. For example, local authorities should make additional efforts to gather views directly from residents in order to better understand needs and potential suppressed demand. Effective ways to gather qualitative insights include visiting communities and

speaking directly to potential users. Analysts should make sure to cover different cross sections of society representing diverse user types (“personas” and scenario thinking). Another possibility is to enable community members to conduct in-depth surveys in their own locality, a technique that has been deployed in some remote communities of Australia (ITF, 2021a). Co-design has gained more attention in recent years, as involving potential users directly in the design of DRT services has been proven to maximise the chances of long-term success (UK DfT, 2020b). This way of engaging users also facilitates marketing efforts and increases ownership in the service.

Planning for diverse mobility needs

In order to truly meet the mobility needs of rural communities, it is important to understand the local socio-economic conditions, population structure and demographic makeup. Mobility needs vary based on numerous factors, and it is critical that all factors are taken into account when developing a mobility solution (Liviņa et al., 2020). For example, an analysis of the main barriers to developing DRT services in five Baltic Sea countries found important gaps in understanding the market, users and their needs (Kirsimaa and Suik, 2019).

Mobility needs and travel behaviour may vary significantly based on “individual-related” factors and “context-related” factors (Table 2). Individual-related factors are associated with the travellers themselves, whereas context-related factors concern the immediate surroundings of the traveller or community. These factors may be interconnected and mobility needs may vary based on their unique combination.

Table 2. Individual- and context-related factors shaping mobility needs

Individual-related factors	Context-related factors
<p>Age – there is a difference in the way young people and older people travel, as well as the reasons for their travel. For example, young people may be more responsive to innovative mobility solutions, such as ridesharing, whereas older populations may prefer more traditional modes of transportation, such as the bus. Older populations also tend to be less likely to drive due to safety concerns, more reluctant to ask for rides for non-urgent trips, and less likely to be comfortable with technology (e.g. using apps or the Internet to book a ride).</p>	<p>Cultural and economic conditions – certain conditions may determine whether it is culturally appropriate to use public transport. The political culture determines the level of public transportation considered necessary or appropriate. In addition, the local economy may or may not support the mobility needs of residents.</p>
<p>Gender – mobility needs may differ depending on gender. For example, safety may be more of a concern for women or LGBTQ2+ travellers than for men. Women may also feel more comfortable walking or taking public transport than men. In single-car households, irregular access to a vehicle tends to affect women disproportionately, as they are more likely to perform unpaid care work at home or paid work closer to home than men, who tend to commute longer distances to access higher paying jobs. In Germany, the average daily distance travelled by car is twice as high among men aged 30-49 than for women of the same age category (Federal Ministry of Transport and Digital Infrastructure, 2018, p. 52).</p>	<p>Geographic specificities – mobility needs may be affected by the spatial configuration of the community and land use. For example, if households are spread out, it may not be possible to have a centrally located pick up or drop off location. Geography could also affect whether a mobility hub can be placed strategically with other services, such as grocery stores, post offices, etc. (Liviņa et al., 2020). This category could also include the existence of transportation infrastructure and distance to other communities and towns.</p>

Individual-related factors	Context-related factors
<p>Lifestyle – lifestyle affects mobility needs and travel behaviour, such as the presence of children, level of activity, and relationship status. For example, a lower-income family with two or more children may be more likely to purchase a vehicle to meet their mobility needs because of the increased flexibility it brings, than a lower-income couple without children who may favour cost savings over flexibility.</p>	<p>Broadband/mobile network coverage – many innovative mobility solutions are technologically-driven and require the Internet to book rides/tickets. Broadband coverage may be limited in rural areas and Internet accessibility may be unreliable or expensive, which in turn could affect a resident’s ability to access innovative services. For example, rural households in Finland, Lithuania, Norway, Poland and Sweden are far less likely than urban households to have access to high-speed broadband.</p>
<p>Socio-economic status – lower-income earners may be more likely to rely on public transport for affordability reasons.</p>	<p>Seasonality – some seasons may result in more travelling than others, such as the summer for tourism and the fall/spring for school. There could also be seasonality in jobs depending on the industry. For example, some agricultural operations may thrive more at specific times of year for harvesting etc. This in turn could mean more agricultural workers could be travelling during this period.</p>
<p>Perceived levels of safety – women and young people are more likely to fear other travellers, while seniors are more likely to fear injuries.</p>	<p>Climate – road infrastructure and climate conditions, such as snow storms, icy mountainous roads, wetland roads, and gravel/soil quality, particularly in remote areas, can affect access to transportation (Liviņa et al., 2020). Furthermore, some remote northern communities may only be accessible by road in the winter (presence of ice roads). Such is the case for some remote locations in Canada’s Northwest Territories.</p>
<p>Language – if someone does not speak the official language of that region or country fluently, it could affect their confidence or ability to access services. For example, migrants or tourists may not feel comfortable using public transport because they do not understand the official language that the company uses to conduct its business (e.g. booking tickets, asking for help, etc.).</p>	
<p>Ethnicity/race – ethnic minorities or individuals of mixed race may experience feelings of discrimination, which could discourage them from using public transport. On the flip side, new migrants may be more likely to rely on public transport if their incomes are low.</p>	

Source: Randall et al. (2020), except where indicated.

The Seven Principles of Universal Design developed in the 1990s are a useful checklist for planners to take into account all categories of users. These principles aim for solutions with: equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance of error, low physical effort, size and space for approach. Inspired by the Universal Design concept, the EU-funded INDIMO project has developed guidelines and self-assessment checklists for decision makers and planners who aim to develop more inclusive services (INDIMO, 2020). The EU H2020 Inclusion project identified 12 different user groups and their mobility needs in relation to 8 characteristics of inclusive mobility (safe, accessible, affordable, convenient, efficient, empathetic, empowering, gender equitable). These categories are relevant for all user groups, but diagrams for each user group show a “heat map” of each user group’s most pressing (and most commonly unmet) needs (INCLUSION project, 2020c).

Taking into account the individual- and context-related factors above, mobility projects should consider at least the following features when implementing mobility services in rural areas:

- **Timing of service** – ensuring the service is available at appropriate times of day, days of the week and seasons. Flexible scheduling and booking might be needed to avoid excluding people commuting at unusual times (e.g. health workers).
- **Affordability** – the service should be affordable for all. This need is particularly important if there is a large population of low-income earners.
- **Proximity** – the provider may want to consider offering a door-to-door service for those with reduced mobility, and/or pick up/drop off points close to popular locations (e.g. universities, hospitals, nursing homes, pharmacies, post offices, shops etc.). For example, a ridesharing initiative offered in Tolg village in Sweden was successful because of its central pooling station (Randall et al., 2020).
- **Connectivity with broader transportation network** – it is important to connect local mobility solutions to the broader transportation network to support tourism and longer-distance travel.
- **Flexibility** – mobility demand is evolving and travel behaviour tends to be more erratic and dispersed in rural areas. Innovations such as DRT are more flexible and adaptable in meeting those changes. However, flexibility in vehicle size may also be important in terms of both passenger demand (e.g. using smaller vehicles to meet lower demand), as well as the type of vehicle to cater for passengers with all types of physical abilities and varying climate conditions (e.g. accessible vehicles and those that are adapted to poor road and weather conditions) (Liviņa et al., 2020).
- **Accessibility** – services should be easily accessible for persons with a disability (e.g. wheelchair accessible, audio-visual capabilities, etc.).
- **Comfort and safety perceptions** – services should take into account measures to enhance safety (e.g. ensuring pick up and drop off spots are well lit) and comfort (e.g. spacious seating, padded seats, etc.).
- **Easy booking experience for all users** – multiple mechanisms for booking rides or tickets should be available, including online or by phone. To ensure the successful implementation of digital solutions in rural areas, service providers should also consider engaging communities to increase their digital literacy skills, particular in communities with large elderly populations (Roventale, Randall and Briggs, 2020). Where digital literacy is low, people should be able to book on-demand transport via phone or television as practised in some Japanese rural areas.³⁴

Policy takeaways: Planning frameworks

- Invest in analysis to uncover transport disadvantage in rural areas. This includes in-depth analysis of access to opportunities and services (e.g. multidimensional remoteness or deprivation indexes) across a country or region to identify white spots and priority areas for investment in better transport services and infrastructure. Good examples include studies by Carroll, Benevenuto and Caulfield (2021) and SEStran (2020).
- Use a combination of different datasets (e.g. census data, stated preference surveys, mobile network data) and qualitative surveys to analyse demand in rural areas. It is important to

gather views directly from residents to understand needs and potential suppressed demand that may affect access to opportunities and services.

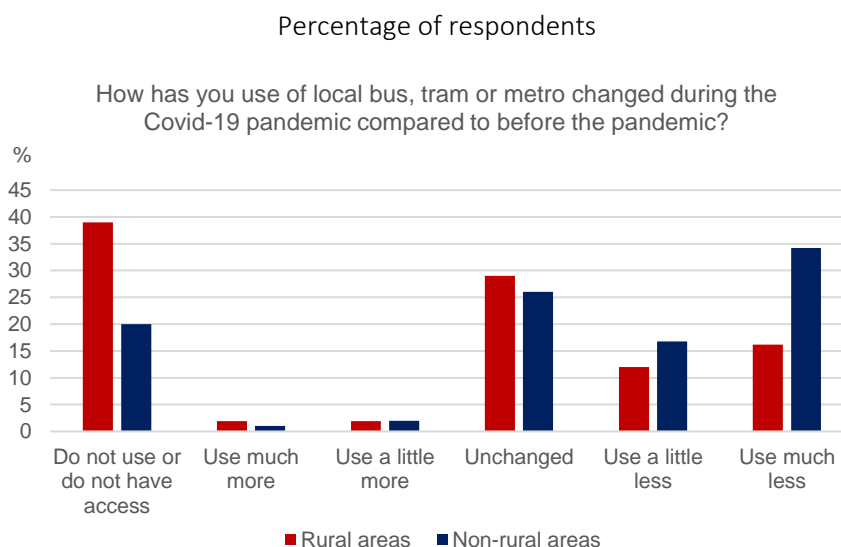
- Design mobility solutions with diverse needs in mind, for example by using principles, self-assessment tools and inclusive design manuals developed by the EU INCLUSION and INDIMO projects.
- Explicitly address possible future trends and uncertainties (e.g. availability of funding, available technology, shifts in mobility patterns or demography) that can affect plans and policies, ensuring that plans are adapted as required.

Implications of Covid-19 for innovative rural mobility

The effects of Covid-19 on rural mobility

The Covid-19 pandemic had an extraordinary impact on the way people live, work and travel. There is a wealth of information available on how the pandemic has affected the transport sector (see, for example, the ITF Covid-19 Compendium [ITF, 2021c]). However, much of the reported impact of Covid-19 on travel behaviour focuses on urban areas (see, for example, DeWeese et al., 2020; Shibayama et al., 2021) and there is relatively little documented experience of how rural travel behaviour has been impacted. Several country-level studies have been conducted, including in Germany (Eisenmann et al 2021); Poland (Wielechowski, Czech and Grzeda, 2020) and Australia (Beck, Hensher and Nelson, 2021), although the focus is predominantly urban or metropolitan areas. This pattern was confirmed by the recent survey on rural mobility in the context of this ITF Working Group, which revealed a lack of rural specific data for several countries, including Denmark, Germany, Mexico, Norway and Poland. Whilst there are few statistics on the impact of Covid-19 on travel activities based on geographical location, a Swedish study shows that people in rural areas report less changes in travel with local public transport compared to people in small, medium and large urban areas (see Figure 20). A possible explanation is the lack of alternative transport options for those depending on rural public transport.

Figure 20. Use of local public transport in Sweden before and after the Covid-19 pandemic



Source: Ihlstrom and Nuruzzaman (2021).

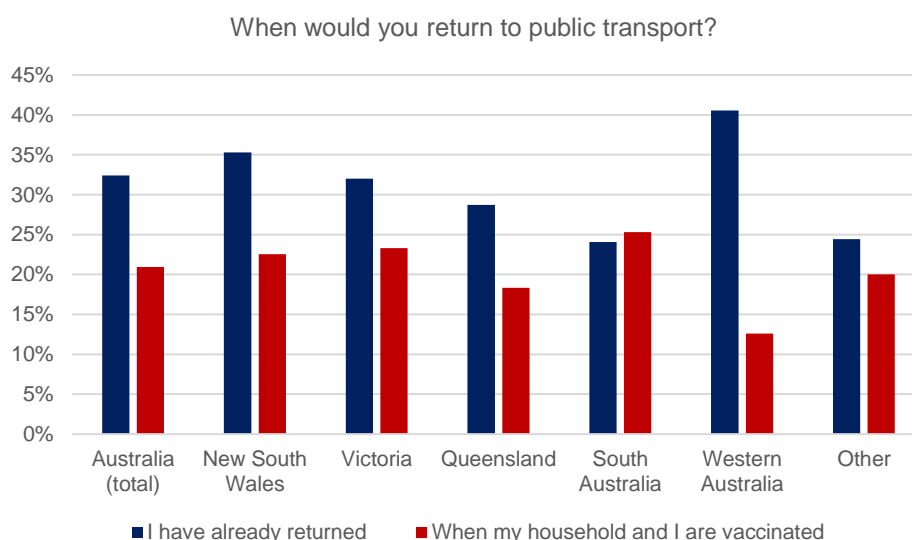
In New Zealand, Waka Kotahi (the NZ Transport Agency) has undertaken a Covid-19 tracking project that sought to understand: (a) how travel was changing and evolving in response to the virus on a weekly basis (such as trip frequency and changes to types of journey); and (b) why travel was changing and evolving in response to Covid-19, by capturing perceptions and attitudes towards Covid-19 and various travel options. From this research, as of May 2020, there is a limited amount of analysis that has been undertaken for

rural areas.³⁵ A relevant finding is that those living in rural areas are much less likely to say that they can easily get to where they need to during a lockdown, with suburbanites most likely to say that they can still easily get to where they are going. Interestingly, rural residents were less likely to find that citizens were looking out for each other than their urban counterparts. At a more general regional level, public transport usage declined in periods of lockdown with people stating that they were travelling less in general.³⁶

In rural areas of Japan, pre-Covid-19, many people were uneasy about the decline of public transport and want good public transport in order to maintain their quality of life. In particular, elderly people living in rural areas were very worried that it would be difficult to get around if they cannot drive (MLIT, 2020). These issues have been exacerbated by the pandemic.

Beck, Hensher and Nelson (2021), in their Australia-wide analysis of the impact of Covid-19 on public transport trends note that many people still have concerns over biosecurity issues linked to public transport, that concerns about the health risks of Covid-19 also translate into concerns about exposure to Covid-19 on public transport, and that those with greater concern about the hygiene of public transport also had greater concerns about catching Covid-19 at work. Even as Covid-19 restrictions are eased, concern about crowds and hygiene have a significant and negative correlation with public transport use. This challenges the recovery rate of public transport patronage, which initially declined by more than 80% during the first months of the pandemic and, with similar decreases in bus passengers per kilometre.

Figure 21. Returning to public transport, Australia, March 2021



Note: Respondents who did not select either of the responses above have either never abandoned public transport, will not use public transport in the foreseeable future or have never used it, irrespective of Covid-19.

Source: University of Sydney (2021).

The slow return to public transport is highlighted by the latest Transport Opinion Survey (March 2021), which is a regular national survey to measure public opinion on transport-related issues in Australia.³⁷ Overall, 32% of respondents have started using public transport again since the outbreak of the Covid-19 pandemic, but over 20% of Australians will not return to public transport until they or their close household members have been vaccinated for Covid-19. The remaining respondents have never abandoned public transport, will not use public transport in the foreseeable future or have never used it, irrespective of

Covid-19. However, the findings show significant differences in the willingness to return to public transport between the different states in Australia. Commuters from Western Australia were least concerned, with only 12.6% saying they would only use public transport after they were vaccinated, compared to South Australia with 25.3% of respondents waiting until after vaccination, the highest of any region. The survey found that among all the states, residents of Victoria and South Australia feel the least safe using public transport (5.8 and 6.0 out of 10), while Western Australian residents feel the safest (6.9 out of 10). The survey findings strengthen the general perception that a return to public transport will be contingent on a successful vaccination programme and massively improved messaging programme to keep citizens updated as to the current Covid-19 risks, and that current delays will only add to the challenges in attracting Australians back to public transport.

Box 6. Impact of Covid-19 on community transport services: The Huntly Community Bus

Most reports of how rural mobility has been impacted by Covid-19 are anecdotal, especially in the CT sector. Many older people, and those that do not have access to a car, rely on these services for health, well-being and social connection and as a form of social support for independent and healthier lifestyles (Nelson et al, 2017). Disruption of certain services highlighted how vital this type of service is for rural residents. While the rural transport sector was already facing huge challenges to connect communities, the pandemic has forced places to adapt even more radically.

Before the outbreak of the Covid-19 pandemic, the Huntly Community Minibus was a busy service, running regular outings for care home residents, members of the local stroke club and many other community groups. During the pandemic, it has been a lifeline in assisting people with their shopping, hospital appointments and providing essential human interaction. The Community Bus is one of the few remaining transport options for rural residents without their own vehicle and is the only CT locally with wheelchair access. Since the coronavirus outbreak, the regular social activities the bus was used for had to cease. It was decided that the bus would be available on a taxi-like basis – travellers call to request a pick up and arrange a suitable time when the bus is available. The service is free to use, but relies partly on donations. Adaptations were made to ensure the bus was complying with official guidance on social distancing and cleaning. The bus is available for anyone to use, but the main customers are older people who do not have access to a car. It has become a vital service for those who are otherwise cut off in their rural communities. A Huntly Minibus Committee member commented: “this crisis has highlighted how important this type of service is for rural residents so we really hope we can expand and help more people across a wider area.”

Note: For more information see www.ageing-better.org.uk/stories/reworking-rural-community-bus-during-Covid-19-pandemic (accessed 20 November 2021).

In Mexico, information retrieved from news reports and other informal sources suggests that in the municipality of Los Choapas, Veracruz, public rural transport routes have decreased by up to 60%, due to strict controls over travel between different communities. In the municipality of Mocorito, Sinaloa, several rural transport routes could disappear altogether due to zero daily passengers. The cancellation of face-to-face classes in schools caused the flow of passengers between the city of Mazatlán, Sinaloa and the rural area to the south of this state to fall by more than 50%.

Despite the numerous instances of service cessation amongst shared transport services, stories of adaptation and resilience abound. In order to assist with Covid-19 and reduced vehicle capacity, one DRT

operator in New South Wales has been offering to pick up parcels as a part of the on-demand service for the price of a fare. This has been popular with elderly and vulnerable customers. Similarly, in the United Kingdom the community transport (CT) sector has adapted to the unusual situation (Box 6) and has been given permission to distribute goods and packages.

A new normal for rural public transport?

A significant consequence of Covid-19 is the impact of working from home. Working from home has been a hugely successful natural experiment, showing that it is not necessary for many to travel to a place of work each day. It is an example of a non-transport policy to help solve a transport problem. However, some aspects of the experiment still need to be validated, including changes in productivity, stress and working hours. Nevertheless, it is clear that some degree of working from home is likely to remain and be encouraged. Studies (e.g. Beck and Hensher, 2021) suggest that 30-40% of those who can, may work from home in the future. This may represent both an opportunity and a threat for rural areas. If teleworking becomes a long-term pattern, people may be encouraged to move from cities to the countryside. This movement may provide a much-needed injection of cash into rural areas, but could also lead to increased urban sprawl or stress on infrastructure and community services in those areas.³⁸

Travel patterns in rural areas could eventually evolve due to an influx of new residents relocating from cities to rural and island areas. Milne (2021) comments that this should entail taking a closer look at the requirements of travellers and specific characteristics of trips (residents, seasonal workers, business, recreational travel, etc.). A number of observations on public transport planning in a post-Covid world can also be drawn from Nelson (2021):

- The pandemic has been an important reminder of how public transport is a crucial part of the basic infrastructure of society. This is a good reason for using public money to finance the system.
- The need to keep a degree of social distancing can perhaps encourage a review of what is considered an acceptable capacity in public transport vehicles.
- The pandemic has also induced more active travel as a replacement for short-distance travel by public transport.³⁹ Improved conditions for active transport modes, including in rural areas where e-bikes could play a role, will support network design recommendations concerning greater distances between stops, and frequent, faster and more direct services along key routes.
- The travel patterns being exhibited in the “current normal” imply that public transport customers have become more adaptable and less predictable, with greater flexibility as to where and when they work. A more personalised transport offer, with elements of flexibility could be seen as more attractive.
- To reflect this “new normal”, it may be more efficient in some locations to run smaller on-demand services instead of fixed-route services on a larger scale.

Building on the last point, Nelson and Wright (2021) document experience with flexible transport services in rural areas where they can be deployed as an effective component of an integrated transport offering. There are some positive findings about the experience with demand-responsive transport (DRT) during the pandemic. For example, MyWay by Metro⁴⁰, a trial on-demand shuttle bus service in Timaru, New Zealand found there was a higher demand for the service during the Covid-19 period. In a case-study in regional New South Wales, Nelson (2021) notes that on-demand patronage in September 2020 was at 74% of passenger numbers in February, while the fixed-route bus was at 54%.⁴¹ The ability to book ahead

ensures that physical distancing is maintained (and vehicles are usually larger than taxis and ridehailing companies). In many cases, through its booking and confirmation of pick up and drop off, DRT allows contact tracing where required.

An active Rural MaaS agenda continues to develop, although this will need to adapt to the effects of the Covid-19 pandemic. Recent experience from Finland shows that the global pandemic has made the implementation of the MaaS experiments significantly more difficult, by bringing uncertainty to the continuation of ongoing experiments and delay to the development of MaaS solutions. The restrictive measures initially severely restricted the provision of transport services and interrupted, among other things, the amalgamation of transport services. However, moving forwards, it is this co-ordination of services that is one of the biggest opportunities for the provision of transport services in sparsely populated areas (see sections on DRT, MaaS and financial frameworks). Delays and barriers due to Covid-19 have affected almost all of the innovative mobility pilots examined by this Working Group. Ultimately, the pandemic may result in changes, both in people's attitudes towards passenger transport and in reducing the investment capacity of transport operators for new solutions.

Finally, Nelson and Wright (2021) note that more research is needed on how to best include non-timetabled (flexible) public transport services within MaaS. It will be necessary to consider the effect that Covid-19 will have on market demands and operator supply for both flexible public transport services and MaaS solutions, and whether there will be more or less interest and need for these services in the future. As a result, in switching to more flexible offers, policy makers may accept greater cost of provision with greater flexibility of operation to account for continuing or future social distancing needs.

Longer-term impacts for rural mobility

There is a lot of uncertainty around the longer-term impacts of Covid-19 on mobility in rural areas. Cabras (2020) notes that rural communities, in particular, will be hit hard. The closure of local hubs such as pubs and community centres in rural and remote areas has been a trend in recent years and this has been exacerbated by the pandemic. Furthermore, the impact of measures imposed by governments to contain the contagion – such as the temporary closure of non-essential businesses and the instruction to work from home where possible – have been felt particularly strongly in rural communities. It remains to be seen how the long-term impacts of Covid-19 will influence the development of business models and technology with respect to ridesharing and DRT, and especially whether changes in demand and acceptance will impact availability and/or innovation in this area.

It has also been recognised for some time that it is harder to work from home in many rural areas on account of poor Internet bandwidth. Farrington et al. (2015) identified a two-speed Britain, in which over 1 million people were potentially excluded from, or at best find it challenging to participate in, what is generally regarded as “normal” online social, commercial, creative and civic life, because they live in deep rural areas. In the United States nearly one-third of rural residents do not have access to high-speed Internet, and of the 24 million people who lack any Internet access, 80% of them are in rural areas.⁴²

More positively, there is evidence that increased use and access to online services has resulted in new business opportunities with a greater emphasis on bringing services to people (home delivery, telehealth, etc.), rather than people needing to travel to services and also a more effective provision of some community services. Some community groups have found that their activities became more invigorated by a strengthened online presence, although it is important to consider demographic factors (rural populations are often older) that can contribute to the (so-called) digital divide. The Digital opportunities for rural areas have been identified by OECD (2020) and are summarised in Figure 22.

Figure 22. Opportunities emerging with the Covid-19 crisis

Higher relevance to enhance quality and use of digital tools/broadband in rural regions
Remote distributed work might increase linkages between rural and urban
Shift in consuming habits can favour local products and destinations
Greater awareness to ensure accessibility to quality services (e-health, e-education)
Reshoring of strategic industries that were once delocalised (i.e. raw materials)
Momentum to accelerate a just transition towards a low-carbon economy for rural communities
Mobilise and strengthen local networks and co-operative structures to face future shocks

Source: OECD (2020).

Government priorities often bypass rural areas and there is a danger that this remains the case. In the pre-pandemic era, the UK Government had stated that given the low population density (and hence low profitability) of rural areas, it is a challenge for the market to provide efficient, sustainable transport solutions (UK Government Office for Science, 2019). Related concerns have been raised in the United States by TRIP (2020), who estimated in June 2020, that State transportation revenues could decrease by 30% (approximately USD 50 billion) over 18 months, due to reduced vehicle travel as a result of Covid-19, leading to delays to repairs and improvements to the rural transportation system (specifically roads and bridges).

The effect of loss of revenue due to continuing restrictions on international travel is another pressing concern for rural economies, affecting transport demand in rural areas. For example, Australian tourism revenue may be down by 30% or more in 2021 and this has direct implications for regional and rural locations, which very often depend on the revenue generated by tourism. This is not a shortfall that can be made up by increased domestic spending (KPMG, 2021).

Policy takeaways: Covid-19 and the future of rural public transport

- National and regional level transport data collection should give greater attention to the rural context and provide disaggregated data, especially in terms of the impacts of Covid-19 on the mobility of rural users at risk of exclusion.
- Given that the underlying fragility of the rural public transport network has been exacerbated by the pandemic, greater resources should be directed towards strengthening essential transport services.
- The CT sector should be recognised for the lifeline services they provide to rural communities and need to be provided with a strong legal and funding environment.
- Given that the pandemic may result in changes in attitudes towards traditional passenger transport, more investments should be made for piloting and implementing flexible and responsive forms of transport (including taxi services) and to MaaS-type solutions in rural environments.
- Investment in digital infrastructure in rural areas should go hand in hand with investment in physical transport infrastructure.
- Working from home and generating proximity through polycentric rural planning should be recognised as transport demand management tools.

Conclusions and recommendations

Less predictable and dispersed demand in rural and peripheral areas make it difficult to sustain traditional public transport services and these difficulties have been exacerbated by the drop in demand resulting from the Covid-19 pandemic. This affects a broad range of geographic areas, from the margins of towns and cities to sparsely populated remote areas.

Although these areas see innovative and more cost-effective alternatives emerging, this report has shown that the long-standing deficits in rural transport, regarding policy, service provision, funding, institutional capacity and research, are still important barriers. In the absence of target-based policy, legal recognition, structured funding programmes and technical assistance, many rural communities still rely on private means of transportation, with alternatives available only through inconvenient bus services or isolated community initiatives.

To support rural areas in their sustainable development, a profound rethink of current transport provision is needed that reflects current socio-economic and demographic developments. Part of this effort will be redesigning transport networks and governance structures to achieve better outcomes at the local level, by putting in place the right mobility approaches which reflect unique local circumstances, and finally, by adapting the legal and funding frameworks to allow tailor-made solutions to thrive.

From afterthought planning to holistic rural development strategies

There is very heterogeneous provision of mobility, even under single jurisdictions. Few countries have developed binding standards for the provision of basic transport services. In most countries, urban mobility is treated as a priority, while rural mobility issues are often addressed as an afterthought. Notable exceptions are regional or local policies such as those in Flanders, North Hesse or the Bern and Zurich regions. In part, this “afterthought planning” reflects limited knowledge about travel patterns and unserved needs in rural areas. While some countries perform accessibility analyses or have multi-level rural area classification systems, these are not used to build eligibility criteria for financial support or for specific regulation for licensing of services in thin markets, which, for example, would benefit from exemptions from rules for tendering services in competitive markets. In rural areas, passenger transport law and procurement law effectively limit the number of eligible bidders, often excluding operators using smaller taxi-sized vehicles and community bus services. Some jurisdictions still tightly regulate on-demand and ridesourcing services because of competition concerns, although these services could fill gaps in the provision of traditional public transport in rural areas. The lack of strategic rural mobility or accessibility policies results in piecemeal short-term, programme-based funding, which is a major obstacle to delivering integrated and efficient services. The provision of local transport is often in the hands of municipalities, some of which face severe financial constraints for transport provision. Where mobility is devolved to larger administrative entities, these often still lack adequate funding to carry out their mandate.

Formulate a countrywide strategic accessibility policy and implement Sustainable Regional Mobility Plans (SRMP)

To improve equality of access to opportunities, policy makers should shift from programme-based support, provided for example through rural transport funds, to a policy-based approach. This could include target-bound rural mobility policy at the national or provincial level defining minimum standards for access to

local service centres and connection to a core network of inter-urban trains and buses. These may take the form of statutory duties for local transport authorities to provide Swiss-style legal minimum service frequency standards to villages and towns, according to their size, density, jobs and service profile. To ensure implementation, mobility guarantees or accessibility standards should be accompanied by Sustainable Regional Mobility Plans (SRMP).

Such a broader strategy would better recognise local needs, with reliable connections across three hierarchical levels:

1. the core train and bus network as a competence of the state, province or region
2. branch networks providing inter-village or feeder traffic as a responsibility of the region or an alliance of smaller regions
3. local flexible services that cover the first and last mile(s) and are provided by municipalities that co-ordinate or purchase these services together.

The Flanders Basic Accessibility policy provides a good example of a strategic approach, by structuring the passenger transport network in a hierarchical and layered manner, where the core network is the competence of the state and the “supplementary” and local “tailor-made” networks are the responsibility of the transport regions consisting of various municipalities.

Similar frameworks integrating local services could also work in less densely populated countries. In Ireland, for example, community transport (CT) associations can participate in local tenders, which provide bus or taxi services at a lower cost due to the involvement of volunteers. In very sparsely populated countries, harmonised transport appraisal based on remoteness and social criteria is most suitable (ITF, 2021a).

Finally, authorities should ensure that the transformed rural public transport network is affordable, in order to put an end to rural transport poverty and to provide an alternative to car use that is sufficiently attractive to address the climate emergency.

Adopt a whole-of-government approach for rural public services and the local economy

To ensure efficient use of resources and to achieve broader societal and economic objectives, rural mobility policy needs to be embedded within broader policies towards public service provision, regional economic development, land-use planning, digital connectivity and climate policies. Overarching objectives should include a combination of improving access to basic services in rural areas, promoting transit-oriented development of larger rural settlements and extending access to broadband telecommunications networks.

The right mobility approach for different types of travel

Rural areas require a flexible approach to ensure the mix of schemes in each area takes into account specific population needs and context. Local authorities should be given sufficient mandate and resources to develop innovative mobility solutions that are most suitable in their specific environment. Different types of travel require different approaches. For example, active travel can have an important potential where people wish to cover short distances within or between villages, carsharing and solidarity ridesharing may serve short shopping or medical trips for those who cannot drive, and multimodal integration of last-mile services are crucial for connections between rural areas, towns and bigger cities.

Allow hybrid car and ridesharing to develop in rural areas

Interesting hybrid solutions are currently emerging that can help solve local transport challenges in more cost-effective and sustainable ways. Volunteer transport can be combined with a number of innovative practices, such as carsharing. There is great potential for hybrid solutions, such as jointly managed community vehicles or the combination of e-carsharing services and solidarity ridesharing. Hybrid carsharing models built on municipal or corporate fleets made available for private use have a high potential to solve financial viability issues common to rural carsharing schemes. Municipal vehicles may, for example, be used by local clubs or for the transport of mobility-impaired people by volunteers.

Increase central government funding for shared and active travel in rural areas

A significant proportion of trips in rural areas (e.g. 60% in German small towns and villages) are under eight kilometres and can be made without a motorised vehicle. Bikeshearing schemes, particularly e-bike rental schemes that include repair services, have a high potential as long as the right infrastructure is in place.

Rural mobility funds or Covid-19 recovery stimulus packages could be a way to fund safe active mobility infrastructure outside cities, including to connect to mobility hubs. Better modelling tools, such as those developed in the United Kingdom, can help inform authorities of the areas with most potential and need for active mobility support. Shared and active travel should also be a key component of the hub-and-spoke network connecting cities and rural areas, and as such, should form part of a countrywide or regionwide basic accessibility policy. In addition, policy makers should promote the integration of local cycling networks into a broader national or international cycling network (e.g. Eurovelo) to achieve side-benefits for local tourism and should ensure bicycles can be transported on local trains and buses.

Promote mobility hubs to connect local services to the core network

Mobility hubs should act as the glue between the core network and local rural collective or shared services. They provide the basis for physical integration of various shared options, promising more convenient intermodal travel. However, there is currently little support for intermodal and transit-oriented development outside the big cities.

A core element of strategic rural transport policy is multimodal mobility co-ordination (e.g. at the regional level) for more convenient and seamless travel. This should be complemented by schedule co-ordination and the provision of better last-mile connections, allowing for more convenient and sustainable travel between rural areas and cities. Mobility hubs also offer possibilities to integrate local services and business to make waiting times more attractive. The scale and range of services offered through the hubs will vary according to location and population density.

Support the development of national or regional Mobility as a Service

Digital integration for trip planning and ticketing purposes is important to better connect local rural services and the core network.

Mobility as a Service promises to improve convenience through the digital integration of the service offer. Only very few countries are rolling out national or regional trip planners and ticketing, a consequence of the lack of strategic accessibility policies that factor in rural mobility needs. In addition, the high cost for communities, versus the prospects of small uptake, limits its application in rural areas. This is why successful rural Mobility as a Service (MaaS) projects are linked to efficiency improvements and innovative funding models. Rural MaaS in Northern Europe relies on DRT services that pool different sources of

transport demand and supply, including statutory services to ensure access to health and education. Japanese rural MaaS models have focused on ways to combine transport with non-transport services such as health, tourist activities and local retail to improve the financial model. Projects in the United States have developed multimodal trip planners, including options to involve users as contributors to the pool of drivers and vehicles.

For MaaS, regional (Flanders) or national leadership (Denmark) is recommended to avoid multiple city-based apps overlapping in adjacent regions and creating interoperability issues. Mobility guarantees are a feature that can justify the extension of MaaS into rural areas. Where poor reliability and flexibility makes shared transport unattractive, mobility guarantees can trigger a substitution ride in case of a lack of return trip or missed connection, providing the necessary security for users of shared transportation. Digital channels will open the door to managing micro-subsidies for narrowly defined user categories (income, disability, age, etc.) and other journey features (time, location, transport mode, trip purpose etc.). This could also open subsidy channels to other transport means than conventional buses, by allowing users to choose and pay for non-conventional mobility services out of a mobility budget reflecting their personal circumstances.

Sustainable funding and more cost-effective service delivery

Funding is key to ensuring that rural areas benefit from good levels of accessibility and high-quality transport services. Some adjustments to governance, legal and funding frameworks are needed to allow for more effective provision and for innovative services to develop at the local level. In addition, start-up and pilot funding, as well as technical assistance can provide additional support.

Make regulations more flexible to allow for the development of innovative, cost-effective mobility solutions

Under passenger transport law, a greater variety of mobility solutions should be given a legal status as public transport service providers and therefore benefit from subsidies or tax deductions. Specifically, tender and operator licensing requirements should be adapted to allow local taxi, (demand-responsive transport) DRT and CT providers to bid for public service contracts in rural areas. For example, where on-demand and ridesourcing services are still tightly regulated due to competition concerns, authorities should consider relaxing requirements in low-density areas.

Combine public budgets for mobility to achieve cost savings

A lack of co-ordination often precludes efficient use of subsidy across administrations. Municipalities receive funding for health, education and social services, these individual services then allocate funding to meet statutory obligations to ensure those requiring access to their service are provided with transport. This fragmented funding system results in a tendency for silo-based thinking, and a lack of strategic joined-up planning. The result in rural areas is often multiple transport services operating in the same local areas and providing separate services for the general public, students, non-emergency hospital patients and social care clients.

Pooling demand and supply into a single public transport service can reduce costs for the public sector by replacing multiple subsidised services, including school transport, elderly transport, paratransit etc. This combined provision may be a minimum service frequency fixed-route bus or a DRT service, depending on user needs and demands. However, where subsidised services are not the norm, costs can be prohibitive

for municipalities, making it difficult to maintain fixed-route buses or DRT services beyond pilot phases. This has made transportation involving volunteers, often referred to as community transport or CT, increasingly popular in communities with limited or decreasing budgets. These services rely on proactive and skilled local associations and a supportive regulatory environment that allows these smaller actors to bid for public service contracts. Increasing reliance on volunteers to provide transport for essential travel is not ideal. Countries, including Austria and Japan, have experimented with rural autonomous buses that promise to cut operational costs without reliance on volunteers, however, the deployment of these vehicles currently raises technical challenges related to the rural natural environment, speed and operational restrictions and high upfront costs.

There is great potential in combining multiple transport services operating in the same local rural areas. Instead of providing separate services for the general public, students, non-emergency hospital patients and social care clients, a combined service uses limited local resources more efficiently. In certain cases, this will require regional administrative reform or for a specific public body to provide, or commission and procure, service delivery on behalf of multiple sectors. This single DRT service can then be accessed by users, managed and optimised through a digital platform, such as in the Finnish ALPIO project. On the legal side, introducing common vehicle standards to all service contracts would remove many of the barriers to co-ordinated delivery across general public transport, education and health services.

Fund pilot schemes to test innovative concepts

Time-limited funding should be reserved for genuine pilots and new initiatives. Where time-limited funding is provided, it should be provided for sufficient time to allow meaningful pilots to be carried out, monitored and evaluated, such as through living labs or regulatory sandboxes. This can involve partnerships between multiple municipalities or regional leaders.

Prioritise financial support for innovative services according to high impact levels, rather than high-tech levels

Many innovation funding streams are currently geared towards high tech, while many low-tech but high-impact solutions face important funding constraints. In central funding decisions, high-tech approaches should not crowd-out other high-impact, cost-effective approaches. These may include easy-to-implement technological solutions, such as better dispatch algorithms for non-profit DRT and social innovations, such as combinations of carsharing and ridesharing that involve the local population, not only as users of the service, but also as co-creators, volunteers or “prosumers” by actively contributing to the pool of assets and rides available. Non-conventional shared rural services, such as flexible CT, should be eligible for both start-up funding and regular subsidies.

Use innovative financing approaches to increase funding pools and viability of individual services

Increasing the overall funding available for rural transport services can be achieved through contributions from third-party financing (e.g. “*versement mobilité*” in France), cross-subsidisation from urban to rural areas (e.g. through larger tenders including both urban and rural areas) and cross-sectoral funding involving education, health services and local businesses (e.g. local sponsorship for CT which is common in Europe). Rural MaaS, in particular, requires the assessment of local services that can be combined with mobility to achieve a sustainable business model (e.g. in Japan local businesses contribute to financing mobility apps). By funding partnerships between public authorities and private operators, and by utilising the non-profit sector, costs for individual services can be reduced.

Set up technical assistance at the national or regional level

Develop a Rural Mobility Technical Assistance Programme building local capacity and providing access to centralised expertise, including legal and technical support, to accompany not only local authorities but also community-based bottom-up initiatives. Examples include the legal, funding and operational guidance targeted to small communities in France (France Mobilités Aides) and Germany (Mobilkon repository, NaKoMo), the United States DOT Rural Transit Assistance Program, as well as the US Shared-Use Mobility Centre Technical Assistance and repository of case studies. In the German state of Baden-Württemberg CT associations can receive technical and financial assistance, including for the digital integration of their offer.

This final section has identified the most promising mobility approaches and summarised the two main steps to kick-start the rural mobility transformation. Starting with a countrywide policy that sets out the strategy and defines accessibility standards across all geographic areas, policy makers need to design the right governance, funding and legal frameworks that (a) allow for the redefinition of regional transport networks and (b) provide the basic conditions for more flexible and cost-effective solutions to emerge in rural contexts.

Notes

- 1 Canada has the largest share of Indigenous peoples in rural areas: in 2016, 59% of Indigenous Canadians lived in rural areas, 33 percentage points higher than the share of non-Indigenous peoples living in rural areas. A large difference also occurs in Australia: 48% of the total Indigenous population and only 34% of non-Indigenous peoples live in rural areas (a difference of 14 percentage points) (OECD, 2019).
- 2 Estimated by the LIPASTO unit emissions database, see <http://lipasto.vtt.fi/yksikkopaastot/indexe.htm> (accessed 11 November 2021), based on CO2 emissions of 168g/km for a passenger car (2016, urban driving) and 278g/km for a minibus (6tonne delivery lorry, empty, urban driving, EURO VI).
- 3 <https://ilse-bus.de/>
- 4 “Community Transportation Pilot Grant Program Survey and Final Reporting Evaluation”, Ontario Ministry of Transportation, [www.ruralontarioinstitute.ca/uploads/userfiles/files/CT%20Pilot%20Grant%20Program%20Evaluation%20Results%20MTO%20March%202018\(1\).pdf](http://www.ruralontarioinstitute.ca/uploads/userfiles/files/CT%20Pilot%20Grant%20Program%20Evaluation%20Results%20MTO%20March%202018(1).pdf).
- 5 “Mitfahrbänke”, www.mitfahrbänke.de/ (accessed 9 April 2021).
- 6 The possibility to grant allowances for carpooling to drivers and passengers is one of the new competences of mobility organising authorities (AOM) created under the French Mobility Law of 2019, see www.ecologie.gouv.fr/covoiturage-en-france-avantages-et-reglementation-viguer (accessed 12 November 2021).
- 7 The French Energy Savings Credit system, created in 2006, is based on an obligation to achieve energy savings imposed on energy sellers by public authorities.
- 8 See for instance Cozycar in Belgium, www.cozywheels.be/deel-je-aangepast-voertuig/ (accessed 16 November 2021), which offers specially designed cars for wheelchair users. A further example, is the carsharing service e-Wald, www.emobil-im-sueden.de/e-carsharing.html (accessed 16 November 2021), now called “mer”, which is integrated within the multimodal community mobility programme of Baden-Württemberg Gemeinschaftsverkehr, www.buergerbus-bw.de/angebotsformen/das-buergerrufauto/ (accessed 14 November 2021) to be used as a demand-responsive social transport solution for mobility challenged people (elderly, disabled etc.).
- 9 See for instance the German village car concepts in Schleswig-Holstein Dörpsmobil SH, www.doerpsmobil-sh.de/, Cuxhaven County’s mobine model, <https://neuenwalde.jimdofree.com/mobine/> or the e-Golf carsharing in Tarmstedt, www.volkswagenag.com/en/news/stories/2018/11/an-electric-car-for-everyone.html (accessed 16 November 2021).
- 10 See the SAMO card concept in the Werfenweng Community (Austria), making multimodal transport options accessible for travellers forgoing private car usage, www.werfenweng.eu/EN/SAMO/Card/ (accessed 16 November 2021). The scheme is referred to as “soft mobility”.
- 11 For example, Dörpsmobil SH has been developed from a successful local rural village car initiative, into a programme fostering rural carsharing in the federal state of Schleswig-Holstein (Germany) supported by the State Ministries of Energy/Digitalisation and of Interior/Rural Areas, as well as the Academy for Rural Regions in Schleswig-Holstein and AktivRegionen (a rural development programme, LEADER) in co-operation with local communities and associations.
- 12 See for instance the comprehensive statistical overview prepared by Melanie Herget, University of Kassel (Germany), on the role of the bicycle in rural areas, www.agfk-niedersachsen.de/fileadmin/user_upload/public/Fachtagungen/2020/3-01_Di-0900_Vortrag_Herget.pdf.
- 13 www.pct.bike/
- 14 See: <https://github.com/DrlanPhilips/e-bikeCarbonReductionCapability> (accessed 2 December 2021).
- 15 www.pct.bike/
- 16 See: www.government.nl/documents/publications/2013/07/24/summary-national-policy-strategy-for-infrastructure-and-spatial-planning (accessed 17 November 2021).
- 17 www.mobipunt.be/
- 18 The Scottish Index of Multiple Deprivation (SIMD) measures deprivation across seven domains: current income, employment, health, education, skills and training, housing, geographic access and crime. SIMD ranks small areas from most deprived to least deprived.
- 19 Subsidised transport based on personal status, i.e. age, mobility impairment, non-urgent health-related travel, etc.
- 20 <https://flexdanmark.dk/>

NOTES

- 21 www.rejseplanen.dk/
- 22 www.rejsekort.dk/
- 23 See: www.mambaproject.eu/wp-content/uploads/2018/07/WP2_good-practice-cases_MinRejseplan-and-Plustur-FINAL.pdf.
- 24 See: www.connectingcommuters.org/ (accessed 17 November 2021).
- 25 <https://hoppin.be/>
- 26 See:
www.gouvernement.fr/sites/default/files/document/document/2020/11/dp_comite_interministeriel_aux_ruralites_14112020.pdf.
- 27 See: www.gouvernement.fr/partage/12303-lancement-du-plan-avenir-montagnes (accessed 18 November 2021).
- 28 Forced car ownership emerges in contexts of high distances to jobs and services, low access to public transport and high economic stress associated with purchasing and maintaining a car (Carroll et al., 2021).
- 29 www.nakomo.de/
- 30 <https://aides.francemobilites.fr/>
- 31 The United Kingdom 2008 Local Transport Act relaxed restrictions on the sizes of vehicles that may be used by community transport providers and allows drivers of community buses to be paid. It allows community transport and taxi operators to be entitled to the same subsidies and opportunities as commercial operators, which has led to some discontent from commercial bus and taxi operators.
- 32 State aid is a European Commission term and refers to any advantage granted by public authorities through state resources on a selective basis to any organisations that could potentially distort competition and trade in the European Union. State aid rules can, among other things, apply to the following: grants; loans; tax breaks, including enhanced capital allowances; the use or sale of a state asset for free or at less than market price. The rules can apply to funding given to charities, public authorities and other non-profit making bodies where they are involved in commercial activities.
- 33 See: https://ec.europa.eu/growth/single-market/public-procurement/rules-implementation/thresholds_en (accessed 20 November 2021).
- 34 In some rural areas in Japan transport bookings can be completed by using the television remote control to select a pre-registered destination (city hall, station, hospital, etc.), the number of people and pick up time, see <https://www3.nhk.or.jp/news/html/20210726/k10013160321000.html> (accessed 16 September 2021).
- 35 See: <https://www.nzta.govt.nz/assets/resources/covid-19-impacts-on-transport/waka-kotahi-nzta-covid-19-transport-impact-wave-06-20200512.pdf>.
- 36 See: www.nzta.govt.nz/assets/resources/covid-19-impacts-on-transport/waka-kotahi-nzta-covid-19-tracking-deep-dive-greater-chch-public-transport-usage-20201119.pdf.
- 37 See: www.sydney.edu.au/news-opinion/news/2021/04/30/public-transport-return-will-be-slow-new-survey.html (accessed 20 November 2021).
- 38 See: <https://theconversation.com/covid-19-will-have-a-long-term-impact-on-rural-communities-151061> (accessed 20 November 2021).
- 39 In May 2020, the UK Government announced an Emergency Active Travel Fund to support local authorities in implementing temporary measures including pop-up bike lanes, wider pavements, junction improvements and cycle and bus only streets.
- 40 See: www.mywaybymetro.co.nz/ (accessed 20 November 2021).
- 41 Service design issues may also be relevant here, since the transport service that showed the most promising signs of recovery across the state is a rural-based DRT service, rather than a feeder to fixed route services.
- 42 See: www.esri.com/en-us/industries/blog/articles/transportation-in-the-us-after-covid-19-part-three-rural-transportation/ (accessed 21 November 2021).

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Annex A. List of Working Group members and observers

Working Group participant affiliations were provided at the time of their participation in meetings

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Chair (April-October 2020): Haruo ISHIDA	University of Tsukuba, Japan
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Gerardo AYALA SABAN	Ministry of Transport and Telecommunications, Chile
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Daniel BELL	Transport Canada
Juliet BELL	Transport Scotland
Jessica BERG	VTI, Sweden
Alexander BOND	US Department of Transport
Pasquale CANCELLARA	POLIS, Belgium
David CAUBEL	Ministry of Ecological Transition, France
Brian CAULFIELD	Trinity College Dublin
Azarel CHAMORRO	MiraiShare, Japan
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Annex B. List of contributors

The following experts contributed to the collection of case studies through questionnaires (Annex B and C) and/or semi-structured interviews led by Lucie Kirstein (ITF) and Jenny Milne (University of Aberdeen). Affiliations were provided at the time of participation.

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Annex C. Case study questionnaire

Name, organisation, country, email	
What are we talking about? Project pitch	
Type(s) of service(s) (e.g. platform, integration, carpooling/sharing, DRT, community transport...)	
Where? The geographic and social context	
When? Duration/schedule	
Who? Responsible organisation(s), partners and governance	
Funding setup and/or business model	
What for? The expected benefits	
What were the key lessons learnt?	
What were the main challenges faced? a) governance/legal b) funding c) technical/operational	
Has the programme been evaluated? If yes, please provide references and describe a) social b) economic (cost, etc.) and c) environmental impacts.	
How has the Covid-19 pandemic affected the project?	
Will the service be continued? If yes where, for how long and which modifications?	
Other comments or take-aways you would like to highlight	
References and media links	

Annex D. Country questionnaire

1. What are the official geographical definitions of “peri-urban”, “peripheral”, “rural” and “remote” used in your country? What is the proportion of people living in these areas respectively according to this definition?
2. Please list the main objectives, principles and/or targets (if any) announced by your central or regional government(s) regarding mobility in peripheral, rural and remote areas.

Objective	Specific target (to be achieved by [year])	Level of government/ institution/authority	Link to policy
Additional information or explanation if response does not fit table:			

3. How are peripheral and rural transport services organised? Is mobility provided by the public or private sector, or both? Please provide some context. E.g. rationale, regional or provincial differences, etc.
4. How are peripheral and rural transport services financed? Which revenue streams and funding rules?
5. How is procurement/tendering of transport services organised? Is there a procurement procedure for digital services (e.g. mobility platforms)? If yes, how does it work and what are the issues?
6. What are the regulations or rules affecting non-standard mobility services (i.e. not fixed route, non-timetabled, collective transit)? Please specify by type of mobility solution, e.g. demand-responsive transport, shared mobility, platform/integrator, community transport and other “bottom-up” solutions, etc.

Law/regulation, date, year	Type of mobility	Aspects that the law addresses	Comments	Link
Additional information or explanation if response does not fit table:				

7. Which other policies, laws and regulations potentially affect mobility in peripheral, rural and remote areas? Response may include policies and regulations outside the transport sector (digital connectivity, climate, tourism, economic policy, public services, health, education, etc.). Please also include important proposals that are currently being developed or discussed.

Policy/law	Status/ in place since...	Aspects that the policy/law addresses	Comments	Link

Additional information or explanation if response does not fit table:

8. Are there laws, provisions in laws, or guidelines addressing data governance related to new mobility services (e.g. integrators, platforms)?

Document	Type of document (guidelines, legal provision, etc.)	Link
Additional information or explanation if response does not fit table:		

9. Which levels of government or authorities are responsible for the planning and implementation of standard and non-standard (i.e. not fixed route, non-timetabled, collective transit) mobility services in rural areas?
10. Which mechanisms are currently slowing down implementation of non-standard mobility services in rural areas? What is being proposed or done to address blockages?
11. Is accessibility measured in peripheral, rural and remote areas, if yes, which data and methods are used? Which assessments are used to inform or underpin policy making in these areas? How do authorities measure people's (physical or remote) access to services?
12. Please list past, present and planned pilot projects relevant to the topics of this WG (also see pilot questionnaire below).

Project or programme title	When?	Link to project page, results, evaluation

13. Please provide a list of any relevant studies and reports on rural transport and mobility innovation in peripheral, rural and remote areas (any language, both academic and official reports).

Author(s) and year of publication	Title (other languages: please provide the topic in English)	Link

14. How has the Covid-19 pandemic affected public transport specifically in peripheral, rural and remote areas? Please provide statistics and reports if available.
15. Other comments, takeaways, policy advice, etc. you would like to see reflected in the report

Innovations for Better Rural Mobility

Limited transport options in peripheral, rural and remote areas hinder access to basic services, jobs and social activities. This report presents best practices and recommendations for transport provision in communities on the periphery. It examines how basic accessibility for people without access to a car could be provided in cost-effective ways in rural areas.

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