The optimal ways of complementing public transport with shared mobility solutions both in urban and rural/peri-urban areas, taking into account best practice examples from cities, regions, and Member States

Public Transport EGUM Subgroup – Topic 3

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1. EXECUTIVE SUMMARY

This third report concerns the complementation of traditional, collective public transport with shared mobility services and elaborates on the wider ecosystem of shared and on demand mobility services.

Mobility remains one of the main levers for decarbonisation and the reduction of greenhouse gas emissions (GHGs), through the electrification of engines and the development of alternative fuels. Also, through the potential for the massification of flows enabled by public transport solutions will lead to a shift from more polluting modes to public transport and hence less emissions. This can be seen in suburban and rural areas: GHG emissions from journeys from these areas to the centre of metropolitan areas are generally 25 times higher than those from journeys to the heart of conurbations.[1] The number of these journeys continues to rise under the combined effect of demographic pressure and urban sprawl, which are pushing centres of activity further and further away from living areas.

Given the average distances travelled and the mobility needs of users in these areas, shared mobility also has the potential to be used for everyday journeys. It is therefore a combination of shared mobility with public transport that needs to be devised to offer a credible and effective alternative to the private car.

Furthermore, integration of mobility services can also strengthen the benefits of public transport by offering services that compliment it. To comply with the ambitious goals of the Sustainable Urban Mobility Plans (SUMPs) and to achieve an integrated multimodal system, it is crucial that authorities design policies to reduce the use of personal cars, increase vehicle occupancy rate (both in collective and individual modes of transport) and create better conditions for active transport, public transport and shared and on demand mobility. The authorities need to ensure that transport gaps (sub-urban, peri-urban, rural areas) are covered, and promote polycentric cities moving all together to a more sustainable urban design. In addition, authorities should ensure sustainable mobility options can complement one-another by means of: Overall policy, Infrastructure, and Integration.

a) Recommendations related to Overall Policy

Competent authorities have to include and foster the usage of different options of transport , e.g. strategies for safer mobility infrastructure such as segregated lanes for users, stronger integration with public transport e.g. during peak hours, night or in underserved areas, corporate programmes , such as mobility budgets, to allow employees to use more multimodal options (preferably flanked by tax advantages when using public transport or multimodal options), and encourage the enforcement of rules for all traffic participants. Furthermore, it is important to concentrate on the shift to environmentally friendly modes, and therefore focus overall (multimodal) journey. The existing shared mobility options, including shared micro-mobility and ride-hailing complement public transport and strengthen the mobility portfolio of urban areas as they are available around the clock and can help reducing pressure during peak hours. In order to make use of the broad mobility ecosystem, it needs to be ensured that

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[1] The climate change mitigation effects of daily active travel in cities

every person has access to affordable and climate neutral mobility services and therefore promoting social inclusion.

- **Ensuring complementarity of shared mobility and public transport**

Regulations should be designed to ensure that new mobility services can complement public transport without risking its replacement as a backbone system of public transport (e.g., achieved through demand response public transport services) is always required to prevent exclusion of vulnerable citizens. Shared mobility services provide additional sustainable options to many users but may not be accessible, affordable or reliable enough for everyone or for every travel need.

- **Ensure reliable and dependable business models through clear strategic consideration**

A clear consideration of shared mobility as integral part of sustainable mobility strategies support service providers with their market and business case development and allows authorities to demand accountability and transparency e.g with the use of performance-based indicators. In areas that do not support viable commercial business cases, service provision under public contracting may be a suitable option to ensure public transport complementation.

b) Recommendations related to Infrastructure.

Multimodal redistribution of public space: urban development, dedicated infrastructure for shared and on demand mobility, walking, public transport, cycling and micromobility and mobility hubs with access to various forms of sustainable mobility and recharging infrastructure for alternatively fuelled vehicles as well as direct connection to public transport.

1. **Reverse the hierarchy of transport modes to manage the competition for public space.**

A more balanced sharing of public spaces between all urban uses supports the shared mobility development. More prominent consideration of active modes as well as collective transport and shared transport assets as sustainable alternatives to private automobiles naturally frees-up space currently occupied by private vehicle parking and circulation.
A new systemic approach designed to consider all components of space use, in particular the effectiveness given to use, supports allocation of space to those shared mobility providers that do provide good service and high utilization of vehicles.

2. **Adapting the current infrastructure and the rolling stock to best accommodate shared mobility services.**

To enable the transformation of the mobility system, it is essential to have the option to give priority parking to vehicles from expanded public transportation services (like carsharing, bike sharing, etc.) at the kerbside or parking lots. Kerbside management will enable the inventorying, optimization, allocation, and administration of public space around mobility, safety, and access to maximize various requirements in this area (multifunctionality). Regulation should support mobility authorities to create dedicated traffic lanes and parking spaces for carpooling (vehicles carrying at least two people). Equipping all public transport stops with freely accessible bike racks (as a priority) and closed lockers for bikes (both

collective and individual), or shared mobility parking areas is essential. Improving access to rolling stock with specific spaces for micromobility is essential for increasing daily shared mobility-public transport intermodality.

c) Recommendations related to Integration

Trusted data-sharing policies and data standards will enable the integration of information, booking, ticketing and payment which is essential to achieving a multimodal transport.

1. Integrate public transport, shared and on-demand mobility solutions into urban development, office and housing projects

Local authorities can take the initiative to integrate shared and on-demand mobility and its corresponding infrastructure into new construction projects by imposing specific rules in planning permissions. For instance, by providing space for shared (micro-)mobility hubs and by entering into bilateral partnerships with developers. Furthermore, integrating urban planning and mobility in national planning guidelines will also encourage convenient access to the services.

2. Make attractive multimodal hubs in rural as well as in urban areas.

To encourage multimodal infrastructure in a systematic way, it is key to integrate mobility hubs in strategic planning documents as well as in sectoral plans (i.e., SUMPs and urban development plans, housing plans with parking requirements). A long-term planning approach that goes beyond administrative borders strongly supports the success of mobility hub usage, especially in metropolitan regions. To facilitate the integration of different mobility hubs, it is important to consider the potential of Mobility as a Service (MaaS[2]) to enable visibility of the hubs and availability of services at these centres. Establish a fair regulation framework, at all levels of government will provide clear responsibilities and multilateral commitment for a stable transport offer while streamlining coordination process within mobility providers as well as with authorities and partners. A network of hubs, constructed in a logical, coherent and consistent way, widely covering the urban and suburban space will increase awareness of new transport services and enhance multimodality, low carbon lifestyles and improve them by making them safer and more convenient.

3. Enable meaningful integration into Multimodal Digital Mobility Services (MDMS)

By achieving a digital integration of all different types of publicly accessible transport and mobility services, single-interface information and sales platforms can emerge, as described by the notion Multimodal Digital Mobility Services (MDMS). The development of integrated mobility services must not be restricted to commercial business cases, rather, all service providers should follow a clear and harmonized set of rules and regulations. The data and interfaces required to complete integrated mobility services should be available to all service providers, respecting reasonable conditions for re-sale.

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[2] The MaaS concept promotes the combination of different transport services into one single mobile platform.

4. Ensure safety of shared mobility services and inclusive service development

Local and regional authorities must prioritize the provision of high-quality active mobility infrastructure, suitable for shared micromobility users, segregated and protected to the greatest extent possible, ensuring the safety of both riders and pedestrians. Communication campaigns will raise awareness of the need for better road sharing between shared mobility and cars and shared mobility and public transport. By sharing relevant data with authorities, shared mobility providers will enable timely repairs and improvements to enhance overall safety and usability.

Public transport and shared mobility services should fulfil the mobility needs of all passengers, including women, children, elder people, and individuals with reduced mobility. The service should consider factors such as physical accessibility, safety, and specific mobility patterns of these groups in both vehicle design and service planning. This means bridging the digital divide, engaging directly with individuals with access needs and disabilities co-designing vehicles and services, and implementing comprehensive training programs for shared mobility drivers.

2. INTRODUCTION

a) The Challenge

Accelerating the shift towards sustainable mobility is essential. This shift is moral imperative given the threats posed by the climate crisis and major health problems. It is also a strategic priority, and a core challenge for EU mobility policy and funding.

Both the decarbonisation and the democratisation of mobility is essential to ensure a safe, convenient, and equitable mobility for all. Transport poverty is a result of transport injustice. The transition must be just, or it will not happen. A just transition requires addressing the practical needs of urban, peri-urban and rural areas.

Different settings pose distinct challenges. In suburban, peri-urban, and rural areas, those who can (even if barely) afford a car must spend a disproportionate amount of the family's revenue on it, and those who can't, must spend a disproportionate amount of their time on a public transportation that has inherent limitations in those areas. In urban centres, high volumes of traffic from the periphery make public transport lose time and money, monopolise public space, and block the emergence of innovative mobility services.

Car dependence was created by urban sprawl, either through car-centric urban planning or by the absence of adequate planning. It is now sustained by the lack of affordable and convenient alternatives to individual car ownership and use. To tackle these issues effectively, there is a need for a comprehensive strategy that starts with sustainable urban planning accompanied by well-funded public transport services. Addressing it effectively requires a combined approach – increasing the capacity of public transport and complementing that offer by deploying shared mobility services.

This combined approach poses its own challenges. This Report explores the key challenges in terms of overall policy, infrastructure, and integration, and provides recommendations for action on each of these fronts. While these challenges are felt at the local and regional level, they are central for the advancement of EU goals, and must be understood and addressed by EU policy, regulation, research, and funding.

b) Asking the right question

The question is not about whether the future will belong to private or public means of transport. Over the years, the strong focus on individual car use has led to challenges that need to be addressed. First, the decades-long emphasis on the individual ownership and use of cars has created an unsustainable situation in terms of congestion, various emissions, land use and public health. While cars retain an important role to play, individual ownership and use does not.

Second, new transport modes and services are emerging, which do not fit a public-or-private transport binary choice. Shared and on-demand mobility services are not an entirely new phenomenon, but they are developing very rapidly, and offer great potential in terms of reducing pollution, increasing resource efficiency and rethinking urban space allocation.

Digital innovation and public policies for energy transition have encouraged the emergence of more and more of these services, while some also disappear again in a volatile market environment. Overall, they are well-known and have changed the mobility offer and are influencing citizen behaviour.

Today we know that the real challenge is not shifting from one mode to another, but rather shifting from a one-mode monopoly of individual cars to a multimodal freedom of choice.

The future belongs to multiple choice of transport modes, the majority being services based on public access. Public authorities have, for example, succeeded in making certain "individual" modes of transport, such as bikes, scooter, or cars, shared. Thanks to innovation, public authorities can offer a portfolio of new services complementing public transport, and this innovation is going to transform public spaces in cities, peri-urban and rural areas.

The deployment of shared and on-demand services complementing conventional public transport systems, offers a unique opportunity to satisfy different mobility needs and serve more people from the first to the last mile through the entire day. This is the reason why a strong policy needs to be developed in the peri-urban and rural areas that are not sufficiently served by public transport nowadays.

While mass public transport is the backbone of urban mobility, providing most certainty and stability, it cannot cover all needs equally. The complementarity of the different modes of transport provides travellers with the best, safe, reliable and accessible mobility options from door to door. A well-planned and well-governed combination of public transport with shared mobility offers the opportunity to reduce car dependence and to reallocate urban space.

c) Definitions and scope

As described in TOPIC 2 introductory report, the EGUM subgroup on Public Transport focuses on this system services with significance to daily mobility in functional urban areas and their surrounding region.

The subgroup embraces the emerging, overall definition of Public Transportation that includes any forms of transport, which are available to the public. This includes buses, trains, metros, tramways, some ferries and cable cars, bike- and car- moped- and scooter sharing, taxis, ride hailing, demand-responsive transport and ride-pooling, publicly availably forms of car-pooling, etc.

This broad definition starts at the notion of access without ownership, acknowledging that a vast variety of transport services exist that are available to the public to fulfil mobility needs without the prerequisite to privately own a transport asset, such as a car or a bicycle.

Different types of shared mobility services include:

- Services based on the shared use of a vehicle directly used or driven by one user after the other, which include:

- o **Shared bikes (including e-bikes but also cargo-bikes) and shared e-scooters**: the user can access and ride them directly. These systems can be free floating or centre around docking stations (especially bikes) and/or dockless pick-up/drop-off areas (leave the bike/e-scooter at the destination in a designated area).

- o **Shared cars: the user can access a car that he/she can drive**. These systems can mainly be station-based (the car must be returned to its point of departure after use – also for peer-to-peer service models) or "free floating" (the car can be left at its point of arrival, in the street or in a station).

- o **Conventional rented cars & vans to complement and satisfy specific mobility needs.**

- Services based on the shared use of a vehicle that is driven by a driver, professional or not or even a software in the case of driverless services. Different users can share the vehicles at the same time or one after the other. 'On-demand Mobility' and includes:

  - o **Demand-responsive transport**, being for specific targeted users e.g. people with reduced mobility or for everyone

  - o **Car-pooling**: Carpooling involves sharing car journeys so that more than one person travels in a vehicle, saving others from having to drive to a location themselves. By allowing several people to use the same vehicle, carpooling reduces everyone's travel costs, such as fuel, tolls and driving stress. Carpooling drivers are partially reimbursed for the cost of using the vehicle.

  - o **Taxis and ride hailing, ride pooling**.

Yet, the availability of transport services alone does not necessarily enable smooth multimodality or generate a more sustainable and inclusive mobility system. The need to develop synergies between mass public transport and shared mobility services, with the aim of providing better mobility options for citizens as a real alternative to the private car while building a multi-modal, integrated, and robust public transport system should be the goal.

This should be central to sustainable mobility systems, today and even more tomorrow, with the introduction of autonomous vehicles (AVs). To proactively address challenges, AVs could be introduced as part of fleets of driverless shared autonomous vehicles, ensuring a harmonious integration alongside traditional collective public transport services to avoid a negative scenario with privately-owned AVs competing with traditional public transport services and worsening congestion problems.

This technology is many years away from being mainstream and we need solutions now, but it is important that the development is steered into a direction of shared fleets of AV that are integrated with collective public transport services for high-capacity corridors. The CCAM Partnership[3] and various EU-Projects (e.g. Ultimo) do follow this approach.

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[3] https://www.ccam.eu/

3. CHALLENGES

Although public transportation, car rentals, and bike-sharing programs have been available for decades, additional forms of shared and on-demand mobility services have emerged in recent years and experienced a rapid growth. Efforts to combine public transport and shared and on-demand mobility can effectively reduce emissions, particularly when accompanied by infrastructure improvements and incentives for shared and on-demand modes. While shared and on-demand mobility often complements public transport, there are instances where it substitutes for it, in deregulated markets, but even in regulated environments for instance during public transit disruptions or for underserved populations. Overall, integrating public transport with these solutions offer a flexible alternative to private car ownership, benefiting both individuals and urban communities by reducing emissions and improving accessibility while also coping with citizens' transport needs. Integrating public transport and car sharing/rentals into a unified mobility system enables citizens to substitute the need for personal car ownership. For example pick-up and delivery activities or longer leisure trips during the weekend can be replaced through these services and increase their access to sustainable mobility.

Establishing shared mobility systems as components of the public transport network entails aligning them with the same standards and responsibilities that apply to conventional public transport, including ensuring area coverage and equitable service distribution and responsible labour practice. The challenge lies in orchestrating a cohesive mobility strategy that involves both public and private entities. This approach should ensure that shared mobility services are not concentrated solely in urban centres but are extended to surrounding areas[4] and that these operate consistently.

Understanding where shared mobility adds to public value and recognising its potential in complementing public transport can support the further refinement of shared mobility business models and the consolidation and maturation of the shared mobility market. In areas where shared mobility services effectively complement collective public transport, but commercial business models are not viable, orchestration and compensation through licencing and public procurement contracts is a useful solution to support the shared mobility industry but does require continued public funding until the business model will be sustainable.

a) Overall policy

i. Complementing Public Transport with Shared and on demand Mobility in Suburban, Peri-Urban and Rural areas

Developing public transport in peripheral and rural areas is essential to support the development of cities in an inclusive way and ensure accessibility to mobility, but it faces three challenges:

- **Ensuring quality public transport in less densely populated urban areas, suburbs and rural areas is challenging**. Households in areas without adequate

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[4]https://www.eiturbanmobility.eu/integrated-and-safe-how-innovation-can-increase-micromobility-end-user-adoption/

public transport often have a captive dependency on the use of private cars or face mobility poverty.

- Often the inner-city authority is not responsible for the surrounding areas, so a **cooperation between authorities and actors is needed**.

- Just like in the inner city the need to **carefully manage the introduction of shared mobility solutions** to ensure they do not detract from the existing public transport offer, are integrated in the multimodal system and urban spaces, and add to it instead.

However, solutions cannot be simply copied from urban areas as they must embrace unique local circumstances. The evolution of mobility has redefined public transport and unlocked new possibilities. Rapid developments in shared and on-demand mobility services promises an integration of all the systems. Combining public transport with more tailored on-demand and shared mobility services can go a long way towards overcoming long-standing mobility deficits in rural areas. The providers of these services need to meet the same requirements in terms of social and employment legislation in force. Successful strategies must embrace the different scales and needs of rural areas and build upon a set of preconditions for combined mobility solutions to fully unlock their potential.

Rural areas and suburbs require special attention to provide equal opportunities and access. They can become a suitable ground for innovative transport systems, based on digitalisation, with new forms of on-demand public transport or shared mobility services. Typically, local actors struggle with finding their roles, mitigating uncertainties, distributing responsibilities, and negotiating business models given that demand is low and fixed systems are costly.

ii. Broad set of partners

The evolving landscape of urban mobility necessitates a paradigm shift in governance, urging Public Transport Authorities (PTAs) to orchestrate diverse mobility offerings. PTAs are tasked with integrating new MaaS solutions into existing public transport frameworks, ensuring these innovations align with broader transport policy goals and consider the comprehensive mobility needs of both urban and suburban populations[5]. This shift highlights the necessity to go beyond traditional city boundaries, addressing the underserved mobility demands of the whole Functional Urban Area[6].

Public transport, shared and on-demand mobility providers are built on cooperation with various actors and through a variety of spaces: both physically and digitally. The greater the complexity and number of partners involved, the more complex and challenging this becomes. The nature of these partners can also be very varied. Regarding public and private partner management, different stakeholders with different priorities, visions, and plans need to be

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[5]https://www.eiturbanmobility.eu/integrated-and-safe-how-innovation-can-increase-micromobility-end-user-adoption/

[6] SUMP Topic Guide: Sustainable urban mobility planning in metropolitan regions: https://sumps-up.eu/fileadmin/user_upload/Tools_and_Resources/Publications_and_reports/Topic_Guides/sump_metropolitan_region_guide_v2.pdf

coordinated. It is therefore vital to establish a clear vision, process, and responsibilities with one identified leading organisation.

iii.   Business model

To build long-lasting connections between public transport, shared and on-demand mobility providers, they must "grow the cake", i.e. attract new customers, which can require efforts, and avoid "eating from the cake", i.e. attracting existing customers from their partners, into their own services. Building trust between partners and effective communicating with users, so that they understand the complementary nature of both services and analysing their behaviour, is critical to ensure that both build on each other so that citizens can get from A to B, in the most effective and complementary manner. This has an implication for the business models of both parties and seeing shared mobility as key services alongside public transport. Replacing a private car means higher revenues and potentially higher margins per customer but also the highest value for cities as well as suppliers. The challenge is for both parties to come to this joint realisation and understanding, rather than regarding that their services compete. Policy and regulation play a key role in driving this collaborative approach. The public side of this partnership needs to acknowledge its crucial role by offering new services for the mobility of its citizens in exchange of covering negative externalities for private car ownership. This "promise for mobility" might contradict mainly revenue and profit oriented private mobility businesses.

b) Infrastructure

i.   Competition for space

Space is a limited resource. That is especially the case in consolidated urban areas, where the public right-of-way is delimited by private property perimeters that are virtually impossible to move. The available space in this right-of-way must be managed in a fair, efficient, and inclusive manner, which addresses collective needs and individual rights. This management is done through an allocation of space and an allocation of speed to the different transport modes.

The allocation of space must be done in a way that enables safe and convenient circulation and parking of the transport modes admitted in the public right-of-way. Because available space is limited and it is impossible to provide optimal conditions to all modes, priority must be given to the needs of the modes that are more sustainable, safe, equitable, and efficient in their use of space – this means walking, cycling, public transport, and shared mobility.

The allocation of speed must be done in the same way, i.e., priority must be given to the needs of the modes that are more sustainable, safe, equitable, and efficient in their use of space. Safety is a primary concern, and it is not an isolated concern – allowing motorised traffic to travel at high speeds increases the risk for all other transport modes using the public right-of-way, and effectively discourages people from walking, cycling, public transport, and shared micromobility. Speed, in other words, makes a potent claim on space.

Because of decades of car-centric transport planning and traffic management, individual car ownership currently has a quasi-monopoly over space and speeds in the public right-of-way. As with any other monopoly, this one harm freedom of choice, by discouraging the use of alternatives transport modes, and also their emergence and consolidation. The case of shared micromobility is in this respect instructive – reducing speed limits for all road users and converting parking spaces is an indispensable step to fix chaotic parking and riding on sidewalks.

In brief, for shared mobility to complement public transport, space must be shared more efficiently. Space for circulation, and space for parking. This is not an exclusive problem of shared mobility. People who opt for walking and cycling face the same problem, and so do people who make the good choice by taking a bus. These users have the right to be rewarded with fast bus lanes and convenient bus stops.

c) Integration

i. Access to public space and at mobility hubs

Multimodal transport hubs facilitate connections between different modes of transport and can play a critical role in complementing Public Transport with Shared Mobility. Mobility hubs for shared mobility can include different combinations of shared mobility, including shared cars, bikes, cargo bikes, scooters and standing scooters, and even additional services that are highly valuable for sustainable mobility, like delivery lockers.

Often, they connect urban areas with rural and peri-urban areas. Their main purpose is to provide access to public transport and a connection between different modes of transport. These multimodal hubs have several additional advantages, e.g., they can help reduce the demand for on-street parking, increase viability and appeal of shared mobility services in lower-density areas, support local retail, and give public space back to the public.

There are two main types of multimodal hubs to consider:

- **Larger hubs created around a railway station or bus public transport, or other fixed mobility stop on a major transport network line.**

The TEN-T Regulation requires urban nodes to set up such hubs, connecting the trans-European transport network with local mobility services, in particular public transport links. Beyond long-distance and regular public transport lines, these hubs may also bring together on-demand public transport lines and shared vehicles, bikes stations and services, etc. Examples: Large interchange hub like a main train station, local interchange hubs, Suburban interchange hubs such as park & ride facilities, as well as Village hubs to typically connect small towns with the main urban area.

- **Smaller mobility hubs are placed closer to where people live, typically on public space, which may or not be served by public transport.**

In sparsely populated areas, where small interchanges are developing, the aim is to bring together available modes of transport and their infrastructure in one place and to create a

mobility hub in areas where services are limited or scattered. The hubs can bring together "light" mobility systems, such as active or shared modes, for example in a business or tourist site, or even to public transport, as some areas have none. In such cases, these hubs provide access to these services and that is why these smaller hubs need to come in big number to ensure more widespread and equal access to mobility. These types of mobility hubs include Key destination hubs, Neighbourhood hubs, Micromobility hubs.

An additional challenge at mobility hubs is counting with sufficient grid capacity due to the big demand for electricity stemming from both public transport services as well as recharging infrastructure for shared cars and potentially bikes. Thus, smart grid technologies can play an important role especially as countries are considering grid shutdowns in the event of reduced capacity.

ii. Technology as an enabler of shared and on demand mobility

Many public authorities have struggled to keep up with the fast-paced nature of shared and on-demand mobility services in their cities, meaning that policies and regulations are unable to adapt quickly enough to ensure the complementary nature of both public transport and shared mobility. Technology can play an important role in facilitating and improving the complementarity of shared and on demand mobility and public transport, as the provision of infrastructure alone often is not enough. MaaS concepts can play a fundamental role in helping provide an integrated service, sharing real time information, ticketing, and helping citizens in understanding and complementing their journeys in the most efficient manner possible. One of the biggest challenges in terms of MaaS is the need to share data or insights that would allow both providers to complement their services even better. The challenge is that operational data needs to be shared both safely and securely, accurately and on-time, so it ultimately benefits the citizen. Overall analytical data can be shared in retrospective based on a contract between the service providers. It is also important to mention data, which is for analysis of the overall service, like requests for trips/tickets made by customers, that provides the companies with intelligence about their customers and the customer needs.

iii. Safety and Inclusion

Public Transport is the safest mode to travel in urban, suburban, peri-urban, and rural areas. The main challenge to the safety of its passengers lies not inside its buses, trams and subways, but outside, when its passengers are walking or cycling to the stop or station and can be subjected to much higher risks posed by motorised traffic.

The same applies to shared mobility in general, and to shared micromobility in particular. While e-bikes and e-scooters are not risk-free, and single-crashes are a fact for all active mobility modes. Proper risk management must consider the combination of frequency and potential damage, and address, first of all, the primary source of danger. In this case, motorised traffic circulating at unsafe speeds and parked in unsafe locations.

Making shared mobility safer is a necessary step to better complement public transport with shared mobility. This requires acting on the primary source of danger for both. Additional actions are necessary for instance through the streamlining of regulation of vehicles being

used for shared micromobility. However, it must be clear that such measures have a secondary role, and cannot, by themselves, compensate for the lack of action on the primary source of danger.

Upgrading and adapting transportation systems must address the diverse needs of the different user groups to ensure equitable access to mobility options, with particular attention to gender and social inclusion. Women, who generally use public transportation more than men, face unique challenges such as safety concerns, and the need for more accessible (shared) vehicles and multimodal options to accommodate travel with children or other dependents.

People with reduced mobility also face significant barriers in accessing public transport and shared mobility services, which are not tailored to their needs. The digital divide further complicates access for vulnerable groups, particularly in peripheral urban and suburban areas, risking greater social and economic exclusion. Addressing these issues requires a comprehensive approach, inclusive innovation, and community involvement in the design of mobility solutions.

4. RECOMMENDATIONS

To ensure that these shared and on-demand mobility services align with desired standards and regulations, transport authorities can establish rules covering various aspects, among them:

- Economic factors, including regulatory conditions for fair competition, reliability and convenience, within the constraints of infrastructure capacity;
- Rules ensuring that shared mobility services complement, and not undermine, public transport systems;
- Environmental considerations such as emissions and energy efficiency;
- Safety standards for vehicles and operations;
- Equal rights, prohibiting discrimination based on ethnicity, age, or gender for both employees and users;
- Depending on the city context, requirements to participate in existing local or broader MaaS apps.

a) Overall policy

i. Ensuring Complementarity of shared mobility and public transport:

Priority: High
Levels of Action: EU, National, Regional & Local Authorities, Public Transport Authorities, Shared Mobility Providers

Regulations should be designed to ensure that new mobility services can operate alongside traditional public transport services in a way that helps increase the overall efficiency of the mobility system and that builds on public transport as its backbone, complementing and never rather than undermining.

Local authorities and shared and on-demand mobility operators should actively and constructively collaborate to create an efficient transport and mobility system with seizing opportunities while ensuring adequate rules are in place. This system should seamlessly integrate public transport and shared and on-demand services in a way that is appropriate to the area where implemented. It is essential to consider all aspects of sustainability and shift away from policies and investments that support inefficient transport solutions.

Regulations should streamline the exercise of mobility competence by local authorities, empowering them to implement tailored solutions such as car-sharing, car-pooling, and on-demand transport. These regulations should enhance coordination among transport organizing authorities to facilitate seamless journeys for travellers while also engaging employers and users in the process. Establishing partnership committees can further facilitate collaboration and decision-making among relevant stakeholders.

The European Commission could initiate a benchmark to understand how public authorities and shared mobility stakeholders are currently developing public-private partnerships to speed up the introduction of new services to complement the traditional public transport offer. **This**

benchmark will help to set up a regulatory framework that enables cooperation between transport authorities, public transport operators, and shared and on-demand mobility providers at the local level.

The goal of this framework is to ensure policies toward shared and on demand mobility are fully integrated with public transport, parking, road safety and pedestrian accessibility policies and regulations. Also that public authorities at the regional and local level have a leading role in the definition and implementation of these policies, and are enabled by this framework to steer private actors providing shared and on demand mobility services to towards the public goals.The policy measures should include performance-based indicators to measure the effectiveness of the engagements, while ensuring flexibility, accountability and transparency of operators towards SUMP goals. National governments can provide guidance in this regard.

To encourage shared mobility, a "sustainable mobility package" should be created by the Member States, enabling employers to give incentives to employees who use shared mobility services for their home-work journeys. The "sustainable mobility package" should create closer partnerships with local authorities and shared mobility stakeholders.

Mobility as a Service (MaaS) Integration: Utilize MaaS packages as multifaceted tools to tackle traffic congestion, reduce private car usage, and enhance the accessibility and affordability of shared mobility services. This includes employing strategies like road user charges and parking restrictions to encourage sustainable transportation options, while integrating shared mobility services with public transit networks by offering integrated fares and tickets.

ii. Ensure reliable and dependable business models through clear strategic consideration.

Priority: High
Levels of Action: Regional & Local Authorities, Public Transport Authorities, Shared Mobility Providers, Shared Mobility Supply Industry

For Shared Mobility to be able to provide adequate complementation to the public transport system, the services need to be reliable and dependable, which requires a viable commercial case, or service provision under public contracting.

b) Infrastructure

i. Reverse the hierarchy of transport modes to manage the competition for public space.

Priority: High
Levels of Action: EU (Harmonization and Guidance), National, Regional & Local Authorities

The urban road network is still very much characterised by the high priority given to the car, while traffic calming and multi-modal sharing policies are struggling to materialise outside city centres. However, the challenges of improving street design are the same everywhere,

regardless of the urban areas concerned: improving mobility for all, reducing nuisance and pollution, reducing accidents, etc.

In this situation, a more in-depth review of the model for organising public road space (in terms of both design and operation) seems necessary and can be undertaken by reversing the hierarchy of modes of travel in urban space, in favour of shared modes and public transport.

Regulations must evolve in this direction and promote road and public space planning practices that:

- Allow a safer and fairer sharing of these spaces between all urban uses;
- Give full rein to active modes of transport and other alternatives to the "solo" car;
- Rethink living spaces in a different way, for greater well-being, safety, ease of use, social cohesion, urbanity and attractiveness;
- Promote built-up up of sufficient charging and refuelling infrastructure for alternatively fuelled vehicles operating in public transport and shared mobility fleets.

The new systems must be part of a systemic approach designed to consider all the components and sensitivities involved in developing urban public space. The challenge of shared mobility and multimodal road sharing must be an integral part of urban travel plans. **Shared mobility must be integrated into travel policies as a genuine mode of daily travel, not just a leisure mode.**

Most cities are already built-up and free space is scarce. Nevertheless, stations for shared mobility services must fit into the existing urban landscape. The link between urban planning and transport needs to be strengthened, because monitoring the planning and implementation phase of transport infrastructure makes it easier to anticipate areas that need to be densified and/or urbanised, and vice versa.

ii. Adapting the current infrastructure and the rolling stock to best accommodate shared mobility services.

Priority: High
Levels of Action: National, Regional & Local Authorities, Public Transport Authorities, Public Transport Operators, PT Supply Industry

To enable the transformation of the mobility system prioritizing access and usage opportunities is relevant. It's essential to have the option to give priority placement to vehicles from expanded public transportation services (like carsharing, bike sharing, etc.) at the kerbside or parking lots. This is because the societal benefits of carsharing, for instance, far outweigh those of privately owned vehicles, which often remain unused and obstructive for most of the time. The kerb edge serves as the access point for sharing services to the transportation network. It is thus an important control tool for operationalizing strategic objectives of the public sector. Kerbside management enables the inventorying, optimization, allocation, and administration of public space around mobility, safety, and access to maximize various requirements in this area (multifunctionality).

Regulation should authorise mobility authorities to create dedicated traffic lanes and parking spaces for carpooling (vehicles carrying at least two people).

Considering stops and exchange hubs as places of service and resources for users of shared mobility, located as close as possible to residential and employment areas, is a powerful lever for developing daily multimodality. The main challenge of intermodality development is to make the combined use of bicycles, shared mobility, and public transport fluid and simple for the greatest number of people. This translates into equipping all public transport stops with freely accessible bike racks (as a priority) and closed/ secured bikes lockers (both collective and individual), or shared mobility parking areas. Beyond access to train stations, improving access to rolling stock is essential. For daily commutes (homework, home-school, etc.), bringing a bike or scooter on board trains or intercity buses can meet certain needs when there is no alternative to reach the final destination (public transport, bike rental services, etc.), or as a backup solution in case of technical issues or inclement weather. For these reasons, being able to bring a bike on board is essential and should always be possible. However, bringing bikes on board is not the primary lever for increasing daily bicycle-public transport intermodality. To achieve this, it is necessary to assist transport authorities in financing the purchase of rolling stock that includes specific spaces for bikes or scooters.

Enhancing system performance extends beyond merely integrating various modes. It involves significant infrastructure projects, requiring stable, long-term planning and investment. Such initiatives have primarily been driven by individual cities or countries. Yet, the European Union holds a strategic position to systematically support the execution of public transport infrastructure projects, particularly within urban segments of the TEN-T network, by providing specific timelines and financial resources (e.g. CEF calls). The requirement of systematic integration of shared mobility solutions in these projects could be envisaged.

c) Integration

i. Integrate public transport, shared and on demand mobility solutions into urban development, office and housing projects

Priority: High
Levels of Action: National, Regional & Local Authorities, Shared Mobility Providers, Shared Mobility Supply Industry

The local authority can take the initiative to integrate shared and on-demand mobility and its corresponding infrastructure into new construction projects by imposing specific rules in planning permissions, such as providing space for shared (micro-)mobility hubs, and by entering into bilateral partnerships with developers. Additionally, integrating urban planning and mobility into national planning guidelines can encourage convenient access to public transport integrated with shared mobility solutions, as well as promote mixed-use and compact urban development. Redesigning property taxes to incentivize more efficient land use and development connected to public transport and shared mobility services is another strategy. Furthermore, amending sustainable building guidelines and standards to place greater emphasis on integration with public transport and shared mobility can significantly enhance urban sustainability.

ii.   Develop attractive multimodal hubs in rural as well as in urban areas.

Priority: High
Levels of Action: National, Regional & Local Authorities, Public Transport Authorities, (Public Transport Operators, Shared Mobility Providers)

The choice of location, size and functions of these "hubs" are no longer necessarily linked to the presence of major public transport services and may involve new areas where alternatives to the car are few and/or far between. To encourage multimodal infrastructure in a systematic way, it **is key to integrate mobility hubs in strategic planning documents as well as in sectoral plans (SUMPs, urban development plans, housing plans with parking requirements, etc.)**

A long-term planning approach that goes beyond administrative borders strongly supports the success of mobility hub usage, especially in metropolitan regions. To facilitate the integration of different mobility hubs, including those that are privately led, it is important to consider the potential of MaaS to enable visibility of the hubs and availability of services at the hubs.

Establish a fair regulation framework, at all levels of government will provide clear responsibilities and multilateral commitment for a stable offer while streamlining coordination process within mobility providers as well as with authorities and partners.

A regulation framework is needed for the functional reallocation of public realm/existing space for transport functions as well as for the use of mobility hubs by private service providers besides (in some cases) public service providers.

For mobility hubs to flourish, **stakeholders' involvement as well as clear leadership on branding, design and communication are vital**. Mobility hubs are based on a thorough understanding of users' and residents' needs as well as those of providers. It also requires a recognition that a hub is in continuous development and that every location is different. Implementing a strong branding for mobility hubs, supports better awareness, acceptance, and recognition. To make the best of mobility hubs, authorities must actively stimulate and encourage a multimodal ecosystem made up of different mobility service providers as well as supportive stakeholders. This includes small businesses such as bike repair shops, start-ups, or associations.

It is important to build not just one hub, but a network of them, constructed in a logical, coherent, and consistent way, widely covering the space, and meeting the maximum number of requirements. These can contribute to various objectives, including:

- Increasing awareness of new transport services and multimodal, low-carbon lifestyles;
- Enhancing the connectivity of traditional public transport and new transport services;
- Improving public transport and active mobility by making it safer and more convenient;
- Improving community facilities and liveability;
- Ultimately, fostering sustainable and low-carbon mobility by providing: More-attractive and accessible alternatives to owning a car;
- Services to communities that could potentially reduce the need to travel.

iii. Enable meaningful integration into Multimodal Digital Mobility Services (MDMS)

Priority: Medium
Levels of Action: Public Transport Authorities, Public Transport Operators, Shared Mobility Providers, Shared Mobility Supply Industry

The widespread use of smartphones and mobile internet that have enabled the development of App-based mobility services (e.g. apps to book taxis and taxi-like services, key-less car, bike and scooter sharing, etc.) and have already simplified public transport information and ticketing processes across Europe promise a further development leap. By means of digital integration of all different types of publicly accessible transport and mobility services, single-interface information and sales platforms can emerge, as described by the notion Multimodal Digital Mobility Services (MDMS). This in turn allows a further, commercial integration into packaged bundles of different mobility offers, as described by the notion MaaS.

This simplification allows customers to access the full flexibility and compound accessibility of the integrated services, which can match or even exceed the level of reach provided by private car use. With effective, public-value driven governance of such digital integration services, public transport and sustainable mobility sector at large can become more attractive and competitive.

In addition to the service product and customer tool, the MaaS concept represents a formidable lever for organising and managing mobility at the regional and local levels across all modes of transport. It can support local and transport authorities in their obligation to ensure that every traveller has always access to the right information and quality services in all spatial settings. With this overarching vision and legal mandate for transport, public authorities play a crucial role in coordinating all those involved in this mobility ecosystem. They must offer the best possible service to citizens and visitors and achieve sustainability, accessibility, and equity policy goals.

A long history of public-private sector coordination in the public transport sector has revealed that without an effective governance framework, private interests do not naturally align with sustainable mobility goals, as promoted by cities, regions, and the EU. However, market governance based on public-value principles offers an effective means to control undesirable but foreseeable market deficiencies and to inspire meaningful innovation that satisfies business interests and sustainable mobility objectives alike.

Given the public sector experience and their central role as integrator, their local knowledge, and their legitimacy as elected officials, any regulation or policy initiative should recognise the strong context specificity of mobility. Also, the instrumental role of public authorities in the orchestration of the local and metropolitan mobility system should be recognised both in the physical and digital realm. To advance digital integration, the EU should encourage and enable local and regional (transport) authorities to describe the conditions for resale of publicly produced and funded transport and infrastructure services and define non-discriminatory contracts for interested resellers. All operators of transport services within a certain jurisdiction must be allowed, and encouraged, to join the area's digital mobility ecosystem. The authorities

or operators that bear the production risk for the services they provide, must be able to condition access to their sales systems.

The development of integrated mobility services must not be restricted to commercial business cases, rather, all service providers should follow a clear and harmonized set of rules and regulations (e.g., passenger rights, accessibility information). Additionally, access to the required data should be available to all service providers under the same conditions. The development of the European Data Space for Mobility (EMDS) can play an important role in harmonizing the technical infrastructure and governance mechanisms enabling the required mobility data sharing[7].

iv. Ensure safety of shared mobility services and inclusive service development

Priority: High
Levels of Action: EU, National, Regional & Local Authorities, Public Transport Authorities, Public Transport Operators, Shared Mobility Providers, Shared Mobility Supply Industry

Safe infrastructure: Local and regional authorities must prioritize the provision of high-quality active mobility infrastructure, suitable for shared micromobility users. This infrastructure should be segregated and protected to the greatest extent possible, ensuring the safety of both riders and pedestrians. Additionally, to facilitate efficient infrastructure maintenance and improvement, shared mobility services should collaborate by sharing relevant data with authorities, enabling timely repairs and improvements to enhance overall safety and usability.

Environment and Climate Change: Local authorities must set licensing requirements to ensure compliance with local (e.g., Low Emission Zones), national, or EU emissions standards for vehicles operating in shared mobility services, thereby contributing to environmental protection efforts.

Health, Safety, and Consumer Protection: Governments and local authorities should implement robust administrative regulations, ordinances, and laws mandating insurance coverage, driver health assessments, and transparent disclosure of accurate information to safeguard passengers and prevent the spread of misinformation.

Communication campaign: launch of a campaign to raise awareness of the need for better road sharing between shared mobility and cars and shared mobility and public transport.

Design for Diversity: Public transport and shared mobility services should prioritize meeting the diverse needs of all passengers, including women, children, elderly, and individuals with reduced mobility. Consider factors such as physical accessibility, safety, and specific mobility patterns of these groups in both vehicle design and service planning.

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[7] https://www.eiturbanmobility.eu/unlocking-the-future-of-mobility-with-european-data-spaces/

Policy, research, and management must invest in learning, understanding, and properly addressing the needs of women (of all ages and abilities), which stand for more than half of the population and, often, an even higher proportion when it comes to walking, using public transport and some on demand services. Decades of transport planning and management have often ignored or failed to properly analyse and address some specificities in terms of needs, risks, and behaviour for this majority of the population.

Bridging the Digital Divide: Address the digital gap by providing alternative access to mobility services for individuals lacking digital resources, ensuring equal access to information and services for all segments of society. Apply universal design principles when designing new digital services and co-create with groups at risk of vulnerability.

Co-Design with Users: Engage directly with individuals with access needs and reduced mobility to co-design vehicles and services. Their lived experiences provide valuable insights into the challenges they face and the most effective solutions.

Neighbourhood-Centric Approach: Tailor mobility solutions to the unique requirements of different neighbourhoods, especially in peripheral or suburban areas, to combat social and economic exclusion while reducing reliance on private vehicles.

Empowerment and Training:

- **For users**: Implement empowerment and training programs aimed at groups at risk of vulnerability, such as low-income individuals, immigrants, and marginalized communities. Offer initiatives that provide education on utilizing shared mobility services effectively, including understanding fare structures, navigating safe routes, and accessing support services. Additionally, provide training opportunities for these communities to develop skills related to transportation, such as safe biking practices or using MaaS apps.
- **For drivers:** Implement comprehensive training programs for shared mobility drivers, covering reduced mobility awareness, accessibility best practices, and effective handling of harassment situations. Equip drivers with the necessary skills and knowledge to provide inclusive, safe, and respectful service to all passengers.

Affordability: explore innovative pricing models and implement solutions to enhance the affordability of shared mobility services, such as introducing fare integration packages that provide discounted rates for frequent users or those with low incomes. Collaborate with local authorities to offer subsidized fare programs for individuals facing financial constraints, ensuring equitable access to essential transportation services.

5. CONCLUSION

The coverage and accessibility of Public Transport within cities has improved, and in some cases the cooperation with shared mobility services is already well established. Yet, overall, further efforts need to be established to ensure better integration between public transport and shared and on-demand mobility services across Europe, especially to cover the first and last mile trips. This will also contribute to the reduction of the use of motorised vehicles and thus can have a positive impact in reducing congestion and harmful emissions.

Implementing this complementarity services requires governance, funding, legislation, and collaboration. Therefore, coordination is critical to find optimal ways of complementing public transport with shared and on-demand mobility solutions.

6. ANNEXES

a) Case studies in relation to complementing public transport with integrated shared mobility in urban and rural/peri-urban areas

Integration of shared mobility services into the public transport hubs

1) The case of Wiener Linien from a public transport provider to a mobility provider

Vienna public transport operator Wiener Linien started planning mobility Hubs in 2018, under the brand name 'WienMobil Station' (its multimodal brand) within a research project, with a plan to reach a net of hubs of more than 100 hubs (approved by the city in 2021) to offer a powerful, complementary service to the well-established public transport services. By the beginning of 2023, 50 hubs had been built, mostly in public spaces, and each one can offer slightly different services according to the location and needs of population and customers within the specific area.

The bike-sharing and carsharing services provided by Wienen Linien can also be found in the hubs as well as mobility services of partners (such as shared e-scooters, taxi, e-charging for cars). The implementation phase includes conceptualising and day-to-day adjustment of a citywide network of mobility hubs consulting with, and official approval by, several public authorities cooperating and coordinating all partners of mobility services, including public tendering constructing low-key infrastructure with an external builder company hiring in-house staff funding by the city of Vienna.

The network of hubs includes large network interchanges, local interchanges, neighbourhood hubs, micromobility hubs, suburban interchanges, and key destinations hubs. The network is twinned with the multimodal app of Wienen Linien, also called WienMobil. Mobility Hubs and shared mobility are part of the smart city concept of the city of Vienna, the local SUMP (Fachkonzept Mobilität) and part of the strategic development of Wiener Linien, from a Public Transport provider to a "mobility provider".

The integration of tendered bike-sharing and carsharing services into the portfolio and branding of Wiener Linien symbolises this shift towards holistic mobility service offers for all people in Vienna.

2) Integrating sustainable transport modes in a medium-sized city –

Dijon proves that seamless mobility is resilient mobility. Since 2017, DiviaMobilités in Dijon, France, has been managing public transport, parking and bikes in the area. To create a seamless mobility experience, Dijon has integrated the entirety of the mobility offers together to facilitate intermodality. All services have been integrated as well, from branding to passenger information, interoperability of the ticketing system, mobility offers and customer relations. The app gathers all the mobility information in Dijon, including a route planner and online payments. In the future, combined mobility offers will be implemented including public transport, parking and bikes and a real-time passenger information system.

Overall, ridership of public transport has been increasing and even stayed steady after the COVID-19 lockdowns during 2020/21. User satisfaction is high and more than 98% of users would recommend using DiviaMobilités.

3) The case of Hamburg Hochbahn and the strong hvv switch brand for mobility

Hamburger Hochbahn AG, the Hamburg public transport operator, started to build mobility hubs in 2013 as a means of interlinking public transport with other shared mobility services, initially close to large intersections in the public transport network. Since 2017, they have also been placed in densely populated neighbourhoods (mandate to plan, develop and operate by the City of Hamburg). Under the brand of 'hvv switch' (formerly known as 'switchh') 96 hvv switch stations were developed with dedicated parking space for the hvv switch partners, such as the providers of shared mobility services like car-sharing, ride-pooling, shared (electric) bikes and shared e-scooters.

Hochbahn is responsible for planning, implementing, and operating the hubs. It has a dedicated staff of three to four people for implementation and for the contractual partnerships with shared mobility providers as well as other stakeholders such as electricity providers, and public bodies. The hvv switch brand is a sub brand of the main Hamburger Verkehrsverbund brand (HVV – the public transport authority A), which is the umbrella organisation for all public transport in the Greater Hamburg region. Currently, hvv switch stations are only found in the city of Hamburg, but expansion to the metropolitan region is possible. The brand includes the name, logo, typography, icons, animations and movies for a website, Instagram, and YouTube. The brand and product communication follow the strategy of a 360° campaign model. Since June 2021, the hvv switch app allows users to book, use and pay for shared mobility options and provides information on the availability of parking/shared cars at hvv switch stations.

4) New mobility services contributing towards a sustainable transport system in Budapest.

Based on SUMP principles, Budapest issued its first transport development plan for the region in 2015. It lays out the strategic goals and directions of development up to 2030, including the foundations of a future integrated network in the region. New mobility services should be made accessible and close to public transport infrastructures to encourage the usage of sustainable transport modes. Different pilots are ongoing in Budapest to understand how to build the integration of transport modes.

In the Mobility Points pilot, a mobility hubs network was deployed and within this scheme, the city bike-sharing system, free-floating bike, e-scooter and moped operators and car sharing services were involved and integrated in the solution. Another pilot is looking at granting parking space to free-floating e-scooters, to avoid poor parking. Called Micromobility Points, signage marks the parking spots and are often located close to the bike-sharing stations.

5) Implementing Mobility Hubs in Warsaw

This case study explores the SmartHubs Project, funded by EIT Urban Mobility, aimed at evaluating the introduction of mobility hubs in Warsaw. These hubs are designed to aggregate

a range of shared and environmentally friendly transportation options in accessible locations, thereby promoting sustainable urban mobility.

Features of the Mobility Hubs:
- Car Sharing Zone: Each hub includes a designated area with four parking spots dedicated to shared vehicles, facilitating easy access and convenience for users.
- Micromobility Zone: Adjacent to the car sharing zone, there is a space allocated for shared electric scooters and mopeds, catering to shorter, more agile urban trips.

Primary Goals of the Mobility Hubs:

- Enhance Access to Shared Mobility: By centralizing various shared mobility services, the initiative aims to make these options more accessible and attractive to the public, encouraging a shift away from private vehicle use.
- Reinvigorate Urban Spaces: Transforming underutilized parking areas into bustling mobility hubs serves to repurpose urban spaces for better community use and engagement.
- Promote Sustainable Transportation: The long-term vision is to reduce the reliance on private cars, thereby lowering the rate of individual motorization and contributing to a greener, more sustainable urban environment.

Outcomes and Performance:

- Year One Results: in 2021, the SmartHub witnessed significant engagement, facilitating a total of 1,328 rides. A majority (66%) of these interactions were users picking up shared vehicles from the hub, while the remainder (34%) involved users concluding their journeys there.
- Subsequent Improvement: In 2022, the performance of the hub saw considerable improvement, with a total of 3,278 rides recorded between January and September. Notably, electric scooters dominated the usage statistics, accounting for approximately 75% of all rides, while car sharing services made up the bulk of the remaining usage.

This case study showcases the potential of multimodal mobility hubs in transforming urban transportation landscapes. By providing convenient access to a variety of shared mobility solutions, Warsaw is making strides toward a more sustainable and liveable city, in line with global trends and environmental goals.

6) **Enhancing Public Transport Connectivity: DSB and Donkey Republic's Last-Mile Solution**

In a bid to promote public transport usage and address the last-mile challenge, Danish National Railways (DSB) and Donkey Republic forged a collaborative effort in 2022. This partnership aims to seamlessly connect train stations with workplaces, offering commuters in the peri-urban area of Ballerup, Greater Copenhagen, an efficient and eco-friendly transportation option.

Key Features:

- Strategic Bike Placement: Shared bikes are strategically stationed at key transit hubs, providing commuters with easy access to a convenient mode of transportation for short-distance trips.
- Dedicated Bike Spaces: Central to the initiative's success is the allocation of dedicated spaces for Donkey Republic bikes at train stations, ensuring accessibility and visibility.
- Integrated Communication Campaigns: Both entities actively engage in communication campaigns to advocate for integrated transportation solutions, emphasizing the benefits of using public transport in conjunction with bike-sharing services.
- Partnerships with Workplaces: The collaboration extends beyond physical infrastructure, with efforts focused on establishing partnerships with large workplaces. This encourages employees to incorporate cycling into their daily commute, further promoting sustainable transportation options.

Adaptation and Innovation:
Initially, the collaboration involved a separate app for user interaction. However, through iterative improvements, it was determined that utilizing the existing bike-share provider's app directly offered a more streamlined user experience. Additionally, the collaboration shifted towards a platform allowing companies to easily sign up, manage payments, and facilitate access to the service. The solution is financed by the workplaces with varying degrees of co-payment from employees using the service.

Impact and Expansion:
The collaborative effort between DSB and Donkey Republic has shown promising results, with increased accessibility and usage of shared bikes at train stations. Building on this success, the initiative aims to expand its reach to additional stations, further enhancing public transport connectivity across Denmark.

7) Alleviating Congestion: Canton of Geneva and TPG's Multimodal Solution

In 2023, the Canton of Geneva through Transports Publics Genevois (TPG) partnered with Donkey Republic to combat congestion and bolster the regional public transport network. This collaboration aimed to provide commuters with efficient and sustainable transportation options, reducing congestion and pressure on public transit during peak hours.

Key Features:
- The integration of bike-sharing stations at train and trolley stations offers commuters a convenient and eco-friendly mode of transportation for first- and last-mile connectivity. By strategically placing these stations in proximity to public transit hubs, the initiative facilitates smooth transitions between different modes of transportation.
- Bundled Memberships: To incentivize usage, users are offered bundled memberships that grant access to both public transit services operated by TPG and the bike-sharing network provided by Donkey Republic. This integrated approach simplifies the user experience and encourages multimodal commuting.
- Usage Data Insights: Comprehensive data analysis reveals significant shifts in commuter behaviour. In 2023, 48% of trips made using Donkey Republic bikes

replaced journeys typically taken with public transport during rush hours, highlighting the efficacy of the multimodal solution in relieving pressure on existing transit systems.
- Modal Shift from Cars: Notably, 13% of trips made with Donkey Republic bikes replaced car journeys, signalling a tangible reduction in private vehicle usage. This modal shift not only reduces traffic congestion but also contributes to environmental sustainability by lowering carbon emissions.
- Employee Engagement: The initiative extends beyond commuter services, with 19% of TPG employees actively utilizing Donkey Republic memberships to commute to work in conjunction with public transport. This high level of employee engagement underscores the effectiveness of incentivizing multimodal commuting practices among transit staff.

Adaptation and Progress:
To further optimize the multimodal transportation solution, ongoing adaptations and enhancements are implemented based on user feedback and evolving mobility trends. Efforts are underway to streamline the user experience by integrating bike-sharing services directly into existing public transport apps, providing commuters with a single platform for planning and executing their journeys.

Impact and Expansion:
The collaboration between the Canton of Geneva and TPG has yielded tangible benefits, with significant reductions in congestion and private vehicle usage observed. Building on these positive outcomes, the initiative aims to expand its reach and influence, with plans to introduce additional bike-sharing stations and optimize transit routes to better accommodate multimodal commuters. By fostering a culture of sustainable transportation and prioritizing the integration of diverse mobility options, the partnership sets a precedent for effective urban mobility solutions in the Canton of Geneva and beyond.

8) Implementing various shared mobility in Ile-de-France

Île-de-France Mobilités (IDFM) is the Organising Authority for Mobilities (AOM) of the Île-de-France region and is an integrated organising authority, responsible for all modes of transport in the Île de France area. It oversees organising and developing the public transport service and coordinating policies related to mobility at the regional level. Ile-de-France Mobilités develops new forms of Mobility:

- **Carpooling:** An ongoing scheme provides free carpool rides for holders of a Navigo pass (monthly or Imagine R) with 5 partner carpooling companies, which help reduce the personal use of cars by mutualising fuel costs and finding routes that complement public transport.
- **Carsharing**: Creation of a regional certification label in order to define a strategy in a concerted manner, throughout the Île de France area. A car-sharing label guarantees users and local authorities a common set of services, such as the use of zero-emissions vehicles, the possibility of booking the service for short periods, and access for young drivers from the age of 18. Plans will look to develop the car-sharing offer in rural areas or peri-urban areas, where there is a lack of public transport.

- **Driverless shuttles:** In 2017, the SUMP added the development of autonomous vehicles as a new priority. In parallel, they have started to develop smart roads. The challenges for Ile-de-France Mobilités are twofold: to integrate autonomous technologies into existing equipment to improve operations (safety, operational efficiency, etc.); and to integrate sufficiently mature, interesting, and economically viable autonomous services into the transport network.
- **Cycling:** In Ile-de-France, has the largest bike-sharing system with VELIB and Véligo Location, the world's largest fleet of electric bicycles for long-term rental. Rolled out in 2019 by Île de France Mobilités, it has the largest electrically assisted bike fleet in the world, comprising of a hire service with a fleet of 20 000 bikes.
- **Bicycle purchase subsidy:** Grant of 500 euros for the purchase of an electric bike and up to 600 euros for a cargo bike.

The emergence of these new services also raises planning issues, with several infrastructures to be developed (multimodal hubs, carpooling areas, dedicated lanes), improved, or even developed. IDFM has adopted a budget to equip the stations in IDF to offer 140,000 bicycle parking spaces (with lockers and free access) in the vicinity of stations on its public transport network by 2030. More than 10,000 spaces already exist, with 4,000 under construction.

9) French charter to better integrate shared mobility services in the public transport network

Local authorities' commitment on carpooling - Carpooling as a new form of public transport:
In 2021, the French government and local authorities signed a charter as part of a proactive approach to encourage the development of car-sharing. This voluntary agreement aims to consider car-sharing as an alternative mobility solution to the private car and a complement to conventional public transport, in all their public actions in the field of mobility. The signatories of this charter, aware of the issues raised by carpooling in terms of public health, the economy, and solidarity, are committed, under the watchful eye of the public, to promoting the growth of carpooling in their area. The charter will also enable public stakeholders committed to carpooling in their area to form a network and share their practices.

Reduce dependency on privately-owned cars and prioritise public transport:
The combination of public transport and micro-mobility has the potential to act as a flexible alternative to privately owned cars. It represents an opportunity to encourage a modal shift away from the most polluting modes and to reduce the dependency on cars, whilst allowing cities to rethink urban space for the benefit of their citizens. While public transport systems are the backbone of urban mobility systems, micro-mobility services can improve accessibility for the first and last mile, enabling citizens to reach or travel from destinations that are underserved by public transport. Based on operators' data, first and last-mile trips complementing the public transport network account for 41% - 55% of total trips performed in 2021/2022, underlining the role that micro-mobility can play in improving public transport accessibility.

Adapting to urban mobility demands:
Micro-mobility services can swiftly be adapted to changes in urban mobility demands and can contribute to relieving pressure on urban mobility systems at peak times.

Improving accessibility:
The integration of micro-mobility into the public transport system can improve connectivity in suburban areas. Moreover, micro-mobility services improve accessibility for the first and last mile, enabling citizens to reach or travel from destinations that are underserved by public transport.

10) The deployment of express bike networks in France

The deployment of "Express Bike Networks", meaning structuring developments on a territory scale, separated from motorized traffic, marked and continuous, is essential for implementing an ambitious multimodal policy. Moreover, designing bike and public transport networks in a coordinated manner enhances the attractiveness and efficiency of each mode. Leveraging the catchment area of cycling extends the catchment area of stops on a route and relieves, when necessary, the burden on public transport services. Attention to infrastructure and proper allocation of space helps prevent conflicts and ensures the performance and safety of each mode. These networks are also, of course, accessible to shared mobility options such as electric scooters.

To ensure good complementarity between these networks and public transport services, it is crucial to integrate the planning and implementation of high-level bike networks into transportation projects. In Paris, the Île-de-France express bike network project, now named "VIF" (Vélo d'Île-de-France), was adopted in 2020 by the Region following the call from bike advocacy associations. The alignment of the routes and their naming based on the transport plan, as well as the principles of continuity, efficiency, and safety, guarantee the attractiveness of the network and reinforce synergy between the two modes.

11) Providing discounted shared micro-mobility journeys for public transport subscription holders in Lyon

To promote complementary use of public transport and shared e-scooters, TIER launched its TIER Connect in collaboration with the Keolis Group and TCL Lyon in September 2021 to offer special discounts for Lyon's residents with an active public transport subscription. Initially run as a pilot and extended due to its success until December 2022, TIER Connect allowed TCL subscription holders to receive a bundle of unlimited unlocks in the TIER app for free. This meant that:

- Riders could unlock all TIER vehicles for free (a €1 discount per ride).
- Riders were charged a per minute rate of €0.22.
- A 10-minute ride cost €2.20€ instead of €3.20 (a discount of 31%).

During the initial 4-month pilot, TIER and TCL analysed the impact of this offer on riders' e-scooter use and found that:

- The offer increased adoption of micro-mobility in the city - TIER Connect riders took 30% more rides than regular pay-as-you-go (PAYG) users.
- The offer promoted shorter trips, indicating an increased first/last mile usage – the average ride duration was 25% shorter than for PAYG users.

A larger survey that was run across all four initial TIER Connect pilot cities (incl. Lyon, but also Dortmund, Münster and Essen) in 2021 demonstrated that:
- 86% of the respondents increased the intermodality of their trips through TIER Connect, combining Public Transport with TIER services.
- 84% of the respondents believed TIER Connect increased the value of their PT subscription.

12) Cooperative, connected, and automated mobility

Project SHOW[8] (shared automation Operating models for Worldwide adoption), funded under Horizon2020, running from 1 January 2020 - 30 September 2024, aims to support the deployment of shared, connected and electrified automation in urban transport, to advance sustainable urban mobility. During the project, real-life urban demonstrations taking place in 20 cities across Europe will see the integration of fleets of automated vehicles in public transport, demand-responsive transport (DRT), Mobility a Service (MaaS) and Logistics as a Service (LaaS) schemes.

One of the project's examples is situated in Frankfurt-am-Main (Riederwald). The pilot site features two EasyMile shuttles, specifically the EZ10 Gen 3b model, operating along a 2.7 km route. The service offers on-demand transportation facilitated through a booking app, seamlessly integrated within the local public transportation system. It connects various key locations including the tram, a retirement home, grocery stores, and a pharmacy, with more than 30 virtual stops available for pick-up and drop-off. To comply with legislative requirements, for the moment, safety drivers are present onboard each shuttle. Since its launch, the service has transported over 2,700 passengers.

13) Ride hailing

- **Uber case**

Uber has launched pilots with various cities and transit agencies across Europe to experiment with last-mile pilots to complement public transport. Over the past years, Uber has developed different "last mile" programmes to complement public transport in key EU cities, working in close collaboration with municipal authorities. These programmes have proven to be successful in demonstrating how shared mobility services can support public transport in underserved areas.

Germany
- Since June 2021, Uber has been offering a 'last mile' service in the outskirts of Berlin and Munich for people to get home from all metro terminal stops for a fixed price of €6.

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[8] https://show-project.eu/mega-sites-germany/

This fixed price is valid 24/7 to destinations within a 2.5 km radius. In 2022 this service was extended to all metro stations outside the city centre. In March 2023, this service was extended to an additional 140 suburban train line stations in Berlin. In total more than 220 metro and suburban train line stations are served by Uber's last mile product.

- Only in Berlin more than 50.000 last mile rides are dispatched per year. The majority of all journeys took place at night, the German 9-Euro-Ticket (June-August 2022) had determined an additional 25% increase in demand for the last mile.

Spain

- Since March 2023, Uber has run a "first/last mile" programme in the outskirts of Madrid ("Uber Metropolitano"), based on a flat fare of € 4.5 for all trips starting from or departing to 8 selected train and metro stations within a 3 km radius.
- Since the launch of this programme, tens of thousands of trips have been by passengers looking for a shared mobility alternative to private cars.
- On top of contributing to the reduction of car dependency, such a programme has a positive impact on the reduction of pollution and congestion. By using Uber Metropolitan with Toyota Corolla Hybrids (emitting 89-120 g/km CO_2) instead of individuals driving vehicles like the Seat Ibiza (emitting 118-133 g/km CO_2), and considering each ride as eliminating one such car from the road, the impact on pollution reduction is markedly enhanced. Additionally, using shared cars, which are constantly moving instead of private owned cars which are parked 95% of the time, reduces the need for parking spots and free public space.

- **Bolt case**

Bolt has put in place a partnership with Renfe, the main public transport operator in Spain with the integration of Bolt's ride-hailing services in dōcō. This MaaS platform aims to provide door-to-door services for citizens by combining solutions such as trains (Renfe), taxis and PHVs (Bolt, MoviTaxi) and mopeds (Cooltra), among others.

- **FREENOW case**

FREENOW was the first private mobility provider in Germany to integrate public transport tickets into its app thanks to a partnership with PTO Rheinbahn, offering e-ticketing solutions wherever Rheinbahn operates: Düsseldorf, Dortmund, Essen, Duisburg, Bochum, and the surrounding rural areas. Thanks to this partnership, FREENOW users can buy single, 24 hours and 48 hours tickets.

FREENOW also integrated the Deutschland-Ticket - allowing passengers in Germany to travel easily by all means of local public transport from 1 May 2023 for €49 per month - for both private users and businesses as an employee benefit, facilitating access to public transport and simplifying travel choices.

b) List of organisations participating to the subgroup

Subgroup leaders
Ile-de-France
UITP - International Association of Public Transport

Cities and Regions
Barcelona Metropolitan Area
Braga Municipality
Budapest
Central Slovenia Statistical Region (w. Ljubljana)
Oradea
Toulouse Métropole

Member States
Belgium
Czechia
Finland
France
Italy
Latvia
Lithuania
Luxembourg
The Netherlands
Poland
Portugal

Organisations
ACEA – European Automobile Manufacturers Association
AVERE - The European Association For Electromobility
Community of European Railway and Infrastructure Companies - CER aisbl
Council of European Municipalities and Regions - CEMR
Cycling industries Europe aisbl (CIE)
EIT Urban Mobility
ERTICO
European Cyclist Federation asbl (ECF)
European Passenger Transport Operators - EPTO
European Transport Workers Federation - ETF-Europe
Eurocities
International Road Transport Union - IRU
LEVA-EU
MaaS Alliance
Micro-Mobility for Europe
MOVE EU - The European Association of On-Demand Mobility
POLIS
Taxis 4 Smart Mobility - T4SM

Observers
CoR – Committee of the Regions
JRC – Joint Research Centre of the European Commission

Ad-hoc expertise
EMTA – European Metropolitan Transport Authorities