



TOPIC GUIDE

INTEGRATION OF SHARED MOBILITY APPROACHES IN SUSTAINABLE URBAN MOBILITY PLANNING

Imprint

About

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Title

Integration of shared mobility approaches in Sustainable Urban Mobility Planning

Authors

Dr.-Ing. Wulf-Holger Arndt, Fabian Drews, Martina Hertel, Victoria Langer, Emmily Wiedenhöft

Reviewers

Frederic Rudolph (Wuppertal Institute), Alexandre Santacreu (ITF/RPA)

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Contacts

German Institute of Urban Affairs (Difu)
Department of Mobility
Zimmerstraße 13-15
D-10969 Berlin



European Commission
Directorate-General for Mobility and Transport
Unit B4 - Sustainable & Intelligent Transport
Rue Jean-Andre de Mot 28
B-1049 Brussels

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Guide to the reader

This document provides guidance on a specific topic related to **Sustainable Urban Mobility Planning (SUMP)**. It is based on the concept of SUMP, as outlined by the European Commission's Urban Mobility Package¹ and described in detail in the European SUMP Guidelines (second edition)².

Sustainable Urban Mobility Planning is a strategic and integrated approach for dealing with the complexity of urban transport. Its core goal is to improve accessibility and quality of life by achieving a shift towards sustainable mobility. SUMP advocates for fact-based decision making guided by a long-term vision for sustainable mobility. As key components, this requires a thorough assessment of the current situation and future trends, a widely supported common vision with strategic objectives, and an integrated set of regulatory, promotional, financial, technical and infrastructure measures to deliver the objectives – whose implementation should be accompanied by reliable monitoring and evaluation. In contrast to traditional planning approaches, SUMP places particular emphasis on the involvement of citizens and stakeholders, the coordination of policies between sectors (transport, land use, environment, economic development, social policy, health, safety, energy, etc.), and a broad cooperation across different layers of government and with private actors.

This document is part of a **compendium of guides and briefings** that complement the newly updated second

edition of the SUMP Guidelines. They elaborate difficult planning aspects in more detail, provide guidance for specific contexts, or focus on important policy fields. Two types of documents exist: While 'Topic Guides' provide comprehensive planning recommendations on established topics, 'Practitioner Briefings' are less elaborate documents addressing emerging topics with a higher level of uncertainty.

Guides and briefings on how to address the following topics in a SUMP process are published together with the second edition of the SUMP Guidelines in 2019:

- **Planning process:** Participation; Monitoring and evaluation; Institutional cooperation; Measure selection; Action planning; Funding and financing; Procurement.
- **Contexts:** Metropolitan regions; Polycentric regions; Smaller cities; National support.
- **Policy fields:** Safety; Health; Energy (SECAPs); Logistics; Walking; Cycling; Parking; Shared mobility; Mobility as a Service; Intelligent Transport Systems; Electrification; Access regulation; Automation.

They are part of a growing knowledge base that will be regularly updated with new guidance. All the latest documents can always be found in the 'Mobility Plans' section of the European Commission's urban mobility portal [Eltis \(www.eltis.org\)](http://www.eltis.org).

¹ Annex 1 of COM(2013) 91.

² Rupprecht Consult - Forschung & Beratung GmbH (editor), Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan, Second Edition.

1 Executive summary

Car traffic in cities produces significant impacts: air pollution and noise emissions, traffic accidents, congestion and competition for land use are the consequences. Car ownership is one of several factors of determining mobility patterns and should be addressed in long term policies. In search of space-saving, sustainable transport solutions, the linkage of existing infrastructures with new mobility services is becoming increasingly important. In this light numerous sharing concepts have emerged in recent years, which have been developing dynamically ever since. Some sharing concepts – esp. station-based car sharing – address alternatives to car ownership in order to reduce the space consumption, but others serve rather as an additional mobility option to get around: free floating car sharing and public bike rental systems, newer phenomena in the form of e-Scooter sharing and e-Moped sharing, on-demand mobility concepts (ride hailing and ride sharing) as well as the shared transport of goods (freight transport).

As one of the most important players, municipalities should perceive and promote the potential of sharing modes as an ecologically component within the urban mobility system as well as benefit from the positive effects. In this context, clear municipal policy objectives towards sustainable mobility and the active perception of existing options for action are indispensable. The most essential requirement is a policy that is no longer car

focused but sees the wider range of mobility. This includes as well new developments where e.g. car sharing can give an alternative to car ownership – reducing the needs for providing car parking space. This involves, among other things, providing space for new offers (including checking whether and to what extent areas reserved for the individual motorized traffic can be reduced), implementing regulations (in particular for free-floating systems) in order to guarantee the reliability and spatial availability of the sharing systems.

Control options for the municipalities are already available within the framework of the Sustainable Urban Mobility Plan (SUMP). SUMP is the central instrument that can ensure that desired effects are achieved. For this reason, all innovative mobility offers should already be examined and taken into consideration during the preparation of a SUMP, both on the strategy and on the measure level. It is also necessary to understand the impacts and potential of the various forms of shared mobility.

The following brochure concentrates in particular on sharing services and the starting points for municipalities within a SUMP. It shows the steps in sustainable urban mobility planning when particular planning aspects must be taken into account while integrating sharing modes.

2 Introduction

Shared mobility is in fashion. This 'new mobility' includes options that were only possible through or that have been considerably improved as a result of digitalisation. One main idea is 'Using instead of owning'.

The following chapters describe the guidelines for mobility options that could be accessible for everyone – public bike sharing, e-Scooter sharing, e-Moped sharing, (e-) car sharing³, ride sharing and hailing and shared freight mobility. These Offers targeting very numerous users groups and were conceived for various purposes⁴.

For some groups and routes, the new offers present mobility options – especially for intermodal trip chains – by providing attractive solutions for the 'first' and 'last' miles in combination with public transport. These services can also serve as supplement in public transport systems in off-peak hours or relieve them in peak travel periods. Various types of transport in different trip chains support multimodal transport behaviour, thus reducing the 'compulsion' to own a car. Young, urban, digitally experienced user groups should feel particularly addressed. This target group will shape the demand for transport in the future and municipal traffic planners should be taking them into account now. Shared mobility allows everyone who does not own a car to be mobile.

Shared mobility services support sustainable mobility targets that present municipalities with a number of questions:

- Is the main target to have an alternative to **owning** a car or to **using** a car?
- How should current private-sector offers be evaluated in terms of reliability, sustainability and spatial availability?
- Do they guarantee privacy?
- Do sharing offers require space that might be taken from motorised individual transport (MIT)?

- Are station-based, free-floating or possibly hybrid offers preferred, promoted or regulated?
- Should a municipality issue calls for tenders to develop and operate sharing offers – and make funds available for that?
- Can and should public transport be individualised? If so, how and with which actors?
- How can increased vandalism of sharing offers be combated or curbed?
- In the future, how will municipalities deal with public space, which is a valuable resource?

Municipalities play an important role in shaping public space. Shared mobility should be discussed in this regard and integrated into transport development planning (TDP) or sustainable urban mobility planning (SUMP) – following the eight SUMP principles (chap. 3).

Only if the overall framework is favouring the use of ecomobility⁵, we can expect that car ownership can be replaced by car sharing. There are various types of car sharing with different impacts. Station-based car sharing offers usually round trip options, is perceived as very reliable and has strong impacts on car ownership. It is used as alternative to car ownership which offers also a potential to reduce the demand for parking in new developments with good access by ecomobility.

Free floating car sharing offers one-way trips. After usage, the car can be left at any legal parking spot - but only within the operational area. In most cases, the operational area covers only central parts of larger cities – so free floating car sharing is mainly used for short distance trips within the city. As the system does not allow real prior reservation, the reliability is perceived as low.

³ Car sharing refers to the use of cars from a service provider or platform – in UK often called car club.

⁴ 'Ride hailing' generally refers to sharing a private car but is often used to denote the shared use of trips in robot-taxis (or cabs) or robot-shuttles.

⁵ 'Ecomobility' includes foot and bicycle traffic and also local and long-distance public transport.

Recent studies [H 2020 STARS project⁶] show that free floating car sharing has no impact on car ownership and is rather taken as an additional mobility option.

Including 'shared mobility' as a pull factor can be an important way to promote ecomobility. All new mobility

options should be collective, with fewer trips made in privately owned cars. The modified mode of transport or 'modal shift' in transport actively contributes to environmental protection, which is a top concern for municipalities. Steps for integrating sharing systems into

⁶ Learn more about the STARS (Shared mobility OpporTunities And challenges foR European CitieS) project (<http://stars-h2020.eu/>) and study results on STARS project (https://www.carsharing.de/sites/default/files/uploads/stars_bremen_workshop_20190124_bcs.pdf)

Figure 1: Business models in comparison – traditional transportation

Source: Own representation according to Berger (2018: 4)

	Consumer behavior	own	use	share
Asset intensity	Information provider			
	Agent		Travel agencies	
	Service provider	Car insurance companies and car workshops	Public transportation companies and airlines	
	Vehicle provider	Car and bike manufactures	Leasing and rental car companies	
	Infrastructure provider	Garages	Bus station and car park operators	

Figure 2: Business models in comparison – innovative mobility

Source: Own representation according to Berger (2018: 4)

	Consumer behavior	own	use	share
Asset intensity	Information provider		Intermodal routing and sight-seeing apps	Crowd navigation and review platforms
	Agent		Intermodal booking and taxi apps	P2P parking and P2P car sharing platforms
	Service provider	eCall/bCall and tele diagnosis service providers	Mobile "parking" and mobile payment	Ride sharing-providers
	Vehicle provider	E-Bike and micro vehicle manufactures		Bike sharing and car sharing operators
	Infrastructure provider		Mobility stations and e-charging stations	

sustainable urban mobility planning must be carefully considered and defined (chap. 4).

Cities and their metropolitan areas are heavily determined – and burdened – by the organisation of the movement of goods and the transport of individuals. Minimising the negative consequences of this traffic, especially the emissions of harmful greenhouse gases, particulate matter, nitrogen oxide and noise, is a huge challenge. The adverse impacts of traffic also include MIT's extensive land use as on street parking is occupying excessive amounts of public space.

The new multimodal mobility options can offer municipalities a way to reduce automobile traffic as well as some commercial traffic. However, it faces numerous challenges, especially regarding the use of public space. Most of the new offers come from private companies that describe themselves as mobility service providers. They make bicycles, e-Scooters, e-Mopeds and both electric and conventional cars available for a fee – mainly by using the public space for free (!).

Other challenges are sharing trips in private, semi-public or public vehicles using apps (ride sharing and ride hailing). These offers create direct or indirect competition to local systems of public transport financed by municipalities. It is important to consider the possible rebound effects⁷ created through free-floating car sharing, whereby sharing offers tempt public transport users to switch to cars if the quality of public transport is low. For most mobility providers the new mobility options

come with certain business models. Based on the philosophy of 'using instead of owning', they assume that users are ready to share modes of transport.

The new and innovative mobility services are particularly interesting for investors because, compared with 'traditional' modes of transport, they involve different types of investment: less 'hardware' and more 'software' (Figure 1 and Figure 2).

As a consequence, municipalities that are generally oriented towards the public interest are facing a dynamic market with many private-sector actors promoting innovative, shared mobility. There are, however, many good practical solutions for municipalities regarding the opportunities and challenges of the various new modes of transport (chap. 5). Approaches to 'shared mobility' must suit existing structures (city size, legal frameworks, etc.) and be attractive to both providers (supply) and users (demand).

Cities have to understand that not all kinds of 'sharing' lead to similar impacts. Some sharing services can increase Ecomobility, preferably at the expense of MIT. In order to produce positive environmental and climate effects, they need more space and supplementing good framework conditions by municipal transport policy (see also Agora Verkehrswende 2019b). More and more cities are combining various sharing offers at mobile stations in effort to boost the visibility, availability and acceptance of shared mobility (see cover picture).

⁷ That is, when attempts to address the problem make the situation worse. For example, earnings gained by saving or shifting the gains made by reducing individualised motorised transport can make MIT attractive again – so that the new advantages are lost.

3 The 8 SUMP principle in the context of shared mobility

Like other modes of transport, integrating the interests of shared mobility services should follow the principles of a Sustainable Urban Mobility Plan (SUMP). This chapter describes special features of shared mobility offers with respect to the SUMP principles (ELTIS 2018b), which are shown in italics and the new draft of the “Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan (Second Edition)” of 15 May 2019.

1. Plan for sustainable mobility in the ‘functional city’

The SUMP concept is mostly a planning methodology, with the plan being determined by the planning process. Nonetheless, SUMP has a clear general direction, the aim of its resulting plan must always be a sustainable mobility system for the entire functional urban area. A sustainable mobility strategy contains commonly accepted criteria (which are prioritised when a plan is prepared).

Sharing offers, which can ensure some mobility for specific population groups, areas or times of day, should be integrated into transport planning goals. Certain issues should be clarified during the planning process: What objectives can sharing offers help to achieve? Where can accessibility be improved? Are sharing offers intended to improve accessibility in the exurbs and suburbs, or for the last mile in the city? Can more sustainable modes of transport be used for commuter traffic? Or can we even target a reduction of car ownership?

2. Develop a long-term vision and a clear implementation plan

A Sustainable Urban Mobility Plan is based on a long term vision for transport and mobility development for the entire urban agglomeration, which covers all modes and forms of transport: Public and private, passenger and freight, motorised and non-motorised, moving and parking traffic. It contains a plan for the short-term implementation of the strategy, which includes an implementation time table and budget as well as a clear allocation of responsibilities and resources required for the implementation of policies and measures set out in the plan.

Transport sharing, like other transport services, must be integrated in a municipality’s vision of sustainable mobility and the long-term effects of sharing offers clarified. How can they support a sustainable mobility strategy? Implementation plans must be drawn up to support or provide planning support for shared mobility offers. The additional resources and funds needed must be specified, and the person responsible for approving the deployment of shared vehicles and the installation of stations in public spaces identified. Do you have targets? (as the City of Bremen did in its car sharing action plan of 2009: targeting a quadrupling of users from 5,000 to 20,000 by 2020 – related to a reduction of 6,000 private cars of these users)

3. Assess current and future performance

The development of a Sustainable Urban Mobility Plan focuses on achieving ambitious, measurable targets derived from widely agreed objectives that are aligned with a vision of mobility and embedded in an overall sustainable mobility strategy. A Sustainable Urban Mobility Plan builds on a thorough assessment of the current and future performance of the urban transport system in the functional urban area. It provides a comprehensive review of the present situation and the establishment of a baseline against which progress can be measured. The status analysis includes a review of the current capacities, resources and institutional set-up for planning and implementation. Suitable indicators should be identified to describe the current status of the urban transport system. A Sustainable Urban Mobility Plan identifies specific performance objectives, which are realistic in view of the current situation in the urban area, as established by the status analysis, and ambitious with regard to the objectives of the plan. A Sustainable Urban Mobility Plan sets measurable targets, which are based on a realistic assessment of the baseline and available resources. Specific indicators are used to measure progress towards targets.

How can the effects of sharing offers be assessed? For that, it is necessary to first determine which areas of the transport system need to be sustainably improved. These objectives must be based on measurable indicators (quantitative and qualitative) that accurately determine the effects that can be obtained with reasonable effort in

a timely manner. Which indicators are suitable for measuring the effects of shared mobility? How can the modal shift be made to more environmentally friendly types of transport? Each municipality must determine the indicator set it needs to assess the impacts of the sharing offers in its list of objectives. The starting value must also be determined. What is the level before sharing offers are introduced? These values are required for reliably determining the changes. Other impacts, such as those on urban development and the city image, should also be considered.

4. Develop all transport modes in an integrated manner

A Sustainable Urban Mobility Plan fosters a balanced and integrated development of all relevant transport modes, while encouraging a shift towards more sustainable modes. The plan puts forward an integrated set of actions to improve performance and cost effectiveness with regard to the declared goals and objectives. These actions include technical, promotional and market-based measures and services as well as infrastructure. The following topics are typically addressed in a Sustainable Urban Mobility Plan: public transport, active mobility (walking and cycling), intermodality and door-to-door mobility, urban road safety, flowing and stationary road transport, urban freight and logistics, mobility management, and Intelligent Transport Systems (ITS).

Sharing mobility services support the integration of different modes of transport. In which segment should sharing offers be placed? The most likely ones are mobility management and intelligent transport systems. Other planning changes needed with regard to sharing offers must also be clarified.

5. Cooperate across institutional boundaries

The development and implementation of a Sustainable Urban Mobility Plan follows an integrated approach with a high level of cooperation and consultation between different levels of government and relevant authorities. Integrated planning and implementation encompasses: A commitment to sustainability, i.e. balancing economic development, social equity and environmental quality. Consultation and cooperation between departments at the local level to ensure consistency and complementarity with policies in related sectors (transport, land use and spatial planning, social services, health, energy, education, enforcement and policing, etc.). Close exchange with relevant authorities at other levels of government (e.g. district, municipality, agglomeration, region, and Member State). Coordination of activities between authorities of neighbouring urban and peri-urban areas (covering the entire 'functional urban area').

As multimodal services, sharing offers interface with different transport services and modes of transport and thus come under the purview of various municipal authorities. That is why it is especially important to coordinate the regulatory offices, such as those that issue regulations and permits, urban and traffic planning and tender planning, as well as the civil engineering office, if that is needed for installing stations. The public order office is particularly important for monitoring offers from the private sector.

6. Involve citizens and relevant stakeholders

A Sustainable Urban Mobility Plan focuses on people and meeting their basic mobility needs. It follows a transparent and participatory approach, which brings citizens and other stakeholders on board from throughout the plan development and implementation process. Participatory planning is a prerequisite for citizens and stakeholders to take ownership of the Sustainable Urban Mobility Plan and the policies it promotes. It makes public acceptance and support more likely and thus minimises risks for decision-makers and facilitates the plan implementation. In addition to fulfilling general democratic principles, early and active involvement of citizens and other stakeholders in the

planning process should be regarded as a political risk mitigation strategy, rather than as an additional complication.

The introduction of sharing offers should be accompanied by participation procedures – like in all measures involving traffic. Since certain sharing offers target specific user groups, it is important to first determine the stakeholders involved in sharing offers. This includes not just the users, but also the suppliers of private-sector sharing services. Participatory methods for planning and implementing sharing offers are derived from this special mixture.

7. Arrange for monitoring and evaluation

The implementation of a Sustainable Urban Mobility Plan is monitored closely. Progress towards the objectives of the plan and meeting the targets are assessed regularly based on the indicator framework. To this end, appropriate actions are required to ensure timely access to the relevant data and statistics. An ongoing monitoring of the implementation of SUMP measures can suggest revisions of targets and where necessary corrective actions in measure implementation. A Monitoring Report transparently shared and communicated with citizens and stakeholders informs about the progress in developing and implementing the Sustainable Urban Mobility Plan.

Suitable sharing-offer indicators are used to monitor implementation and impact. The way to conduct this monitoring is not necessarily derived from experience with other modes of transport or transport services and may call for special concepts to be developed. Attention must be paid to privacy issues within sharing offers because movement profiles can easily be created during login and logout. The collection and use of such data for purposes not directly connected to objectives like monitoring must be clarified under the data protection law. It is also important to decide the intervals for collecting this data and who – the municipality, the provider or third parties? – will do it. Sharing offers have rapid impacts because of their comparatively simple implementation, so data should be collected promptly.

8. Assure quality

A Sustainable Urban Mobility Plan is a key document for the development of an urban area. Having mechanisms in place to ensure its quality and validating its compliance with the requirements of the Sustainable Urban Mobility Plan concept is an effort worth taking. This task can be delegated to an external quality reviewer, an oversight institution (e.g. regional or national level) – and it can be facilitated by using tools like the SUMP-Up Self-Assessment tool.

Sharing offers can create rebound effects, and car sharing in particular can increase the use of MIT. Private-sector providers of sharing services do not necessarily respect sustainable mobility goals, so it is necessary to repeatedly pose the question: Do the sharing offers always contribute to SUMP objectives or do they need to be adapted?

4 Sustainable urban mobility planning steps for shared mobility

When developing the SUMP, all innovative mobility offers must be examined during strategizing and measuring. Guidelines should be set for planning, such as how sharing offers can be linked to local public transport and dealing with limited public space.

The SUMP Circle (Figure 3) depicts the most important steps in creating and implementing a strategy for sustainable mobility for an entire urban area. It describes which specific features should be considered during the planning process in order to successfully implement sharing systems into the mobility strategy.

Phase 1: Good preparation and analysis

The first milestone is the municipality’s decision to create a SUMP. At this state, the first considerations for implementing a sharing system can be incorporated. The internal and external framework conditions for planning and implementation must be identified at the start of the process.

Creating an interdepartmental core group is helpful. This way, professional competencies can be pooled and availability taken into consideration right from the beginning. With regard to planning staff resources (if there are any), professionals must be made responsible for sharing

Figure 3: The 12 Steps of Sustainable Urban Mobility Planning (SUMP 2.0) – A planner’s overview.



Source: Rupprecht Consult 2019

mobility. Stakeholders who could be pertinent for implementing the offers and would be interested in cooperating should also be involved in the planning.

The SUMP should be spatially and temporally demarcated. This includes setting the timeframe and determining which financial resources are available and calculable for implementing the entire plan and individual action areas such as sharing mobility.

Although SUMP focus on urban mobility, regional and national framework conditions must always be considered. These include legal regulations, funding guidelines and comprehensive strategies for spatial and transport development. For this reason, it is important to first create a framework concept for a specific city.

The last step in properly preparing for the SUMP is making a comprehensive analysis of the current mobility situation. In order to get valid data on the status quo, locally available data on transport, mobility and the environment must be checked. In order to identify specific potential, challenges and needs for action when developing measures and implementing new sharing offers, a thorough survey should be made of existing sharing services, the modal shift in the use of sharing types and other parameters.

Phase 2: Strategy development

In this phase it is particularly important to closely examine how sharing systems can be integrated into planning.

Various scenarios and their expected impacts can be used to define result indicators and realistic targets for possible mobility situations. One useful indicator is a defined service area of the sharing offers and scenarios for expanding or restricting it. Scenarios can also be created regarding the fleet size, timed expansions and flexible modifications to be made in light of market developments and the intensity of use.

Scenarios help map the likely impact of measures and make them transparent for relevant stakeholders. At this point, all stakeholders should be actively involved. Cooperation with sharing and charging infrastructure providers as well as public transport actors can make it possible to optimally link transport offerings (e.g., by adding information and booking systems or linking intermodal offers).

Besides suitable scenarios, SUMP also need long-term sustainable visions. With respect to the further development of existing and new, more innovative, sharing offers it is very easy to define common visions of a future new culture of mobility with which political groups, citizens and institutions can identify. For example, the concrete goals and common visions of Paris, Vienna and New York have helped bring the bicycle to the fore as an everyday means of transport in these cities, particularly through bike sharing systems.

A vision can also help determine the indicators and measurable targets to be reached by sharing mobility measures. In this framework, it is useful to classify and prioritise **shared modes** in the entire mobility context. One possibility is using a pyramid of transport modes to present the relevance of shared mobility in planning and show how measures are implemented.

Measures can be prioritised and quantitative and/or qualitative goals for **shared mobility** can be set using the principles of city planning.⁸

Phase 3: Measure planning

This part of the process completes the strategic planning and goals agreed by all stakeholders. The third planning phase serves to identify and list specific appropriate and effective measures for **shared mobility**.

Next, packages of measures specifically designed for **shared mobility** should be developed. Various concepts for zoning, locations, repositioning and redistribution, as

⁸ In 2009, the German city of Bremen incorporated its car sharing Action Plan into its 'Bremen 2020' city planning guidelines. Objective: To increase the number of car sharers to at least 20,000 by the year 2020 (Senate Department for Environment, Construction, Transport and European Affairs 2009).

well as special possibilities to link to local public transport, should be considered. First-hand experience and research can lead to incorporating measures used in other countries.

Determining responsibilities and working out a financing plan with the municipality are closely linked to the selection of packages of measures for sharing. This calls for good coordination and timely communication between the various authorities.

Optional areas of responsibility and/or their linkage to shared mobility:

- Traffic planning – various aspects
- City planning – also including overall urban strategy
- Civil engineering – permits, introducing sharing in city-wide land-use plans (e.g., for legally designating parking spaces), stations, and if applicable, charging infrastructure
- Regulatory office – controlling compliance with legal regulations on areas and parking spaces
- A mobility management or municipal climate protection manager or environmental officer who is already – or can be made – responsible for the processes

At this stage, municipalities should also make sure that the legal framework is respected, particularly with regard to existing regulations for parking spaces. Respecting the minimal width of pavements, ambulances and green spaces etc., as well as clarifying if public parking spaces can be used to provide and park sharing vehicles (bikes, scooters, cars...) are important factors in a system's success.

Once the measures for integrating one or more sharing systems have been identified and the SUMP has been approved, a monitoring and evaluation plan is drawn up.

Phase 4: Implementation and Monitoring

Successful monitoring and evaluation (M&E) requires a database with sufficient capabilities. It is possible to request customer data (e.g., about the use of stations or vehicles) collected by sharing operators. To get this quantitative and possibly qualitative data, a clause stipulating the free transfer of anonymised usage data to the city for use in traffic planning can be written into the contract between the municipality and the service providers.

Data about the offer can be evaluated by analysing bookings, system utilisation and customer satisfaction. Example indicators about the effects achieved include the degree of user motorisation or car ownership, savings and *modal shift* effects, impacts on the parking situation, air pollutants and possibly the streetscape.

Evaluations should always check whether all the desired measures were implemented and objectives achieved. In order to ensure high acceptance of new offers, the municipal population or local residents and cooperating actors should be informed about and involved in planning (through citizen information services, posters and TV commercials). Collaboration with sharing service providers can also be helpful for locating appropriate sites for stations.

A comprehensive M&E plan⁹ can also be used for making decisions about developing or dismantling stations or expanding the offering. Whenever adjustments are made, it is crucial to keep in mind the new challenges they create. On the basis of lessons learnt, a targeted readjustment can be made, for example, adjusting the design of the system infrastructure (e.g., the number of parking spaces) based on user behaviour or winning customers through incentive schemes like rebates.

The final milestone is passed when the measures have been implemented and the impact assessment completed.

⁹ Monitoring and Evaluation plan

5 Shared Mobility in Cities

5.1 Public bike sharing systems

5.1.1 Dynamic development

Public bike sharing can change a cityscape with regard to a new or rediscovered cycling culture – as examples from London, Paris, Barcelona and Hamburg show (OBIS 2011) (Figure 4). The successful public bike sharing systems in these cities are mainly station-based and partly free floating.

Bike sharing shows how urban mobility has changed, offering many new ways to use bicycles for spontaneous everyday use, for commuter rides to inner cities and at peripheral workplaces as well as for leisure-time transport in metropolitan regions.

The 'modern' public bike sharing systems (CivITAS 2016) have been subject to a certain dynamic for two decades (Panozzo 2018), which has increased considerably since about 2016 due to digitisation and the associated financial flows. The European Bicycle Federation (ECF 2019) has confirmed that public bicycle rental systems are the most innovative in the field of mobility.

Figure 4: Examples for public bike sharing systems



Source: Santander Bike in London (formerly 'Barclay Bike')
©Martina Hertel



Source: Vélib in Paris (©Martina Hertel)

read more (<https://www.legco.gov.hk/research-publications/english/1819in02-bicycle-sharing-systems-in-selected-places-20181015-e.pdf>)

read more (<https://www.france24.com/en/20180504-paris-velib-hidalgo-fiasco-velibgate-rise-fall-bike-sharing-program-green-transport>)



Source: Bicing Barcelona (©Martina Hertel)



Source: Stadtrahd Hamburg (©Martina Hertel)

read more (http://www.bikeoff.org/dr_PDF/schemes_public_bicing.pdf)

read more (<https://www.bikecitizens.net/hamburg-promoting-cycling-bike-benefit/>)

According to the 'Bikesharing Blog'¹⁰, nearly 2,000 cities around the world have bike sharing systems with some 14.9 million bicycles of all types, including pedelecs.¹¹ One study found that a comparable number of cities (2,095) have car sharing systems – but with only about 157,000 vehicles. Cities in China have the most public bicycles to share – over 2.3 million in Beijing and 1.7 million in Shanghai – while in the year 2018-19, the 'successful' bike sharing cities in Europe have comparatively few bikes: London 18,000, Paris 15,000, Berlin 14,000 and Barcelona 7,000 (Berger 2018).

However, the uncontrolled and quick growth of free-floating¹² bike sharing services is creating problems for some Western European cities as described in the introduction of numerous planning guidelines and handbooks (see 5.1.3). The large number of bikes overloads limited public space, which is stressed and overused due to parked cars anyway, and led to very negative reputation in the media. The prosperous cities of the Netherlands (Amsterdam and Rotterdam), Spain (Madrid and Barcelona), Germany (Munich, Cologne and Berlin), Austria (Vienna) and Switzerland (Zurich) are most affected.

In summer 2018, the mobility service providers Mobike and Ofo dominated Chinese bike sharing. Financial investors from digital industries are investing in mobility: In 2018, for example, MoBike was bought out and the ride sharing provider Uber invested in the bike sharing start-up, Jump. These two companies are also very active in the European market. The Roland Berger consulting firm predicted the first consolidations in the bike sharing market – some large providers going bankrupt and many smaller providers being marginalised – and that the market will grow by 20 per cent by the year 2021 (Berger 2018).

5.1.2 How municipalities should implement a public bike system

If municipalities consider public bike sharing systems in their mobility strategies and integrate them into concepts for housing, operational and municipal mobility management and SUMP, the public bike sharing system has to last at least for some years. Municipal bidding programs have to guarantee reliability, which must be contractually regulated to prevent providers discontinuing their offers by invoking entrepreneurial freedom. The security of supply must be claimed by the municipality or the public transport organisation (the contracting authority) and guaranteed by the operator (contractor).

A reliable offer usually includes year-round operation, accessible contact persons for municipalities at the supplier, and the provision, maintenance and redistribution¹³ of roadworthy vehicles. (This also applies to all other types of sharing, which will be dealt with in this brochure). Cities may define no-go or no-park zones for such bike-sharing (e.g. in pedestrians zones, parks etc.) – to be controlled by geofencing. Redistributing bikes from overfilled to empty stations and parking areas makes a large part of the operating costs of a public bicycle sharing system.

Experiences with municipal bike sharing systems show that public bike sharing systems are successful and sustainable, if they have high quality, suitably designed and smoothly operating rental bicycles, along with easily accessible information and customer services and functional smartphone apps that respect privacy regulations. Especially the integration of cargo-bike sharing is

¹⁰ Go to bike sharing blogspot (<http://bike-sharing.blogspot.com/>) go to bike sharing World Map (https://www.google.com/maps/d/viewer?ll=25.641526341914655%2C-42.890625&source=embed&ie=UTF8&om=1&msa=0&spn=143.80149%2C154.6875&z=1&hl=en&mid=1UxYw9YrwT_R3SGsktJU3D-2GpMU) go to 'Legend – In Operation – Beginning' Approximately 14,860,200 self-service public bicycles and pedelecs, either station-based or free-floating (dockless), are in use in cities worldwide.

¹¹ Pedelec: a bicycle that must be pedaled to power a small electric motor

¹² Free-floating systems do not require stations. Borrowing and returning are digitally processed by entering credit card details and codes.

¹³ I.e., distributing and transporting the bicycles

extremely useful for sustainable urban mobility – as a recent study shows¹⁴.

The spatial availability of rental bikes is another factor in a system’s success: Whether the choice is a station-based, free-floating or hybrid system, the pros and cons of each should be carefully analysed in advance.

A successful station-based system needs a dense network of stations and lots of available bicycles. Careful network design is crucial because stations anchored to one place determine the system’s structure and the budget determine the number of stations. This is also true for free-floating systems.

The quality of the rental bicycles is another major factor in the success of any system. The bikes must be stable

and not require much maintenance, and also be as easy to ride and have sturdy frames, wide tyres, protected chains and low-maintenance brakes.

Before municipalities can begin to call for tenders for a public bike sharing system, the following aspects must be considered, discussed and, if necessary, approved (Table 1).

Sponsors can help relieve municipal bike sharing system budgets. If a municipality wants to use its ‘own’ bike sharing system for marketing purposes – as in Barcelona, Hamburg and Copenhagen – it has to bear most of the expense. Otherwise, in return for co-financing the bike sharing system, the operator is permitted to place advertisements on the bicycles (Santander in London;

¹⁴ Publication “Exploring the Potential of Free Cargo-Bikesharing for Sustainable Mobility” (<https://www.ingentaconnect.com/content/oekom/gaia/2018/00000027/00000001/art00012>)

Table 1: Aspects of a public bike sharing-system, strategic instrument – regulatory policy

Strategic instrument		
Public service	Goals	Specifications for providers
Quality standards	Tender	Multimodality
Operator model / Infrastructure	Inclusion of freight bikes / pedelecs	Rates
System issues (fix, flex, mix)	Financing	station structure
Regulatory policy		
Controllability	Traffic safety	Excessive sharing
Special uses	Complaint management	Legal basis
Administrative costs	Space allocation	

Source: Source: Own representation according to Ffrierder Zappe (Verkehrsverbund Rhein-Neckar-GmbH)

Deezer in Berlin) or being operated by the local newspaper (WK-bike in Bremen).

The positive effects of public bike sharing systems for municipalities go beyond measurably reducing city traffic. Public bike sharing systems also raise the quality of an integrated system of public transport – ideally as a component of a mobility station – and contribute to long-term sustainable mobility behaviour. Public bike sharing systems can also improve the appearance of urban landscape and the image of cycling. For this reason, when considering the idea of setting up and operating a system, it is important to not just keep the direct costs and effects related to mobility in mind, but also the indirect – positive – effects. A public bike sharing system can be an important instrument for promoting cycling and ecomobility.

5.1.3 How municipalities should deal with providers of free-floating bikes

The uncontrolled growth of free-floating offers in many European cities has inspired numerous planning guidelines and handbooks on both free-floating and station-based rental bikes sharing.

A referential selection:

- CiViTAS PROSPERITY Project (2018): Regulating dockless bike sharing schemes
- ECF (Panozzo 2017) (2017): Policy Framework for Smart Public-Use Bike Share
- ITDP (Institute for Transportation and Development Policy 2018): The Bikeshare Planning Guide, New York.
- Fietsberaad: Dossier Deelfiets (2018)
- Transport for London (2018): Dockless Bike Share - Code of practice – For operators in London (Transport for London; Mayor of London 2018)

- Eidgenössisches Departement für Umwelt, Verkehr, Energie und Kommunikation [Swiss Department for the Environment, Transport, Energy and Communication] UVEK/Bundesamt für Strassen [Federal Agency for Streets] ASTRA/bolz+partner ag (2018): Öffentliche Veloverleihsysteme in der Schweiz. Entwicklungen und Geschäftsmodelle – ein Praxisbericht, Bern [Public bike-rental systems in Switzerland. Developments and business models – A practical report]
- Agora Verkehrswende (2018): Handlungsempfehlungen für deutsche Städte und Gemeinden zum Umgang mit stationslosen Systemen [Recommendations for German cities and communities with regard to free-floating bike sharing systems], Berlin
- ADFC (2018): Arbeitshilfe – Neue Bikesharing-Anbieter in Deutschland [Guidelines –New bike sharing providers in Germany], Berlin
- Observatorio de la Bicicleta Pública en España (2019)

Analysing various German (Fahrradportal 2018)¹⁵ and Swiss (Forum bikesharing Schweiz 2019) cases show that communities can help to steer the development of bike sharing systems: mostly through good communication with the providers but also by providing subsidies and designating parking areas and especially by issuing clear and binding rules for all providers. Beyond that, municipalities are well advised to develop land-use concepts because bike sharing is just one of many mobility offers that require public space.

Municipalities should

- explore the legal steering options and decide on a strategy;
- issue and monitor clear, uniform and binding regulations;
- request that providers have contact persons available for local authorities;
- maintain steady communication with providers;

¹⁵ Bike sharing – An opportunity or a risk for municipalities?

- authorise only providers with transparent websites that include all information about locations, prices, terms and conditions, and data protection (before an app is downloaded); and
- require compliance with all relevant privacy policies.

5.2 e-Scooter sharing

The American term ‘e-Scooter’ is used in many countries for pedal scooter with electric drive, small or large wheels, with or without bars (Figure 5). So-called electric hoverboards ‘are a cross of a barless Segway and a motorised waveboard. The user stands on two platforms that are connected by an axle and steers the vehicle in the desired direction by shifting their weight’ (Kuhlmann 2016). All these ‘electric mini-vehicles’ can be used for the first and last miles, especially in combination with local public transport, provided that the transport infrastructure (roads and pathways) has a high-quality, firm and even surface.

In US cities¹⁶, including San Francisco, Austin¹⁷ and Santa Monica,¹⁸ e-Scooter sharing has been introduced since 2017. A smartphone app has to be used to locate an available e-Scooter and book, unlock and bill it. All offers in the USA (and meanwhile in Europe) are made by private firms such as Bird, Lime and Uber; no municipal services exist yet due to hefty criticism about the massive number of e-Scooters¹⁹, users who endanger pedestrians and cyclists, and the – thus far messy – parking problem they create in limited public space. A

large number of accidents, some of them fatal, further undermine their potential²⁰ (Consumer Report 2019), (McCarthy 2019), (Vox 2018), (health plus 2019).

In Europe many countries such as Austria (Vienna), France (Paris), Switzerland (Zurich), Finland, Norway, Sweden (Malmö), Belgium (Antwerps) and Denmark (Copenhagen) have approved electric pedal scooters.

In Germany it lasted a little bit longer. First the Bavarian city of Bamberg made an exception for a pilot project conducted in cooperation with the Bird company. It stipulates that the scooters must be collected at 9 PM each evening in order to prevent a messy streetscape and vandalism (Spiegel Online 2018). However, from spring/summer 2019, e-Scooters in Germany, too, are to be treated as small electric vehicles – like bicycles, albeit with special regulations (llg 2019):

- They have to use bicycle infrastructure. They must not be used on sidewalks or in pedestrian areas.
- They must be insured and have an insurance sticker on the vehicle.
- The maximum permissible speed is 20 km/h.
- The devices may be carried on public transport (as hand luggage).
- Helmets are not required.
- The driver must be at least 14 years old.

¹⁶ Meanwhile more than 100 cities across the US now have dockless, rentable electric scooters (<https://www.cnet.com/news/electric-scooters-to-double-in-san-francisco/>).

¹⁷ The Texas city of Austin supposedly has 10 scooter providers with a total of 6,700 scooters (an increase of 6,000 scooters within the first year of operation). Source: Linder (2019).

¹⁸ Santa Monica Beach (California, USA) is the ‘home town’ of the e-Scooter, where this has been available in large numbers since 2017 (Ibid).

¹⁹ Although a study from a pilot project in Portland finds that riders in the program used e-scooters primarily as a means of transportation to get to a destination as opposed to recreational excursions (Portland Bureau of Transportation 2018), Paris’ mayor vowed to crack down on the “anarchy” caused by the sudden proliferation of thousands of new two-wheeled vehicles on its streets (Financial Times 2019).

²⁰ In Barcelona, a 90-year-old woman was killed in an accident with an electric scooter, now Spain has banished the electric scooters from the pedestrian path again (Jahberg 2019).

- Failure to comply with the regulations is viewed as an administrative offense, which is punishable by a fine and an entry in the central traffic register.
- The lack of insurance may result in criminal charges for breaching the law on compulsory insurance.

Now, since the 15th of June 2019, e-Scooters are allowed to drive on German public roads when the “Elektrokleinstfahrzeuge-Verordnung” (eKfV) entered into force and opening the market for e-Scooter. All e-Scooters which have a type-approval according to the regulation can be used in Germany and have to be used on cycle lanes or streets.

These national regulations may be supplemented by voluntary agreements between municipalities and

operators (e.g. Hamburg, Stuttgart) or as subject of a permit for special use of public street space (e.g. Bremen). Latter gives municipalities more legal options in case of breaching the agreements – also defining maximum numbers of e-Scooters.

At present, there are only few empirical studies on e-Scooter sharing systems available. Paris has gathered quite some experience and is going to regulate the operation much stricter. The city of Madrid has declared itself the pioneer city for electric scooters in Europe. It reduces the area for cars to make room for e-Scooter. Nevertheless, there are big problems. In the last autumn, the city temporarily withdrew the licenses from the rental scooter providers because the users did not adhere to the pavement ban and had caused many accidents. Now

Figure 5: The different types of e-Scooter



Source: Bird e-Scooter in Bamberg (©Stadtwerke Bamberg)



TIER e-Scooter Sharing (©TIER Mobility)



Source: Kickboard Skater (©Holger Schué on Pixabay 2017)



Source: Hoverboard (©Patrick Neufelder on Pixabay 2017)

the use of e-Scooters is restricted to smaller streets (30km/h) and banned on big streets.

The Integration of e-Scooters into the SUMP should be critically reviewed using the 8 SUMP principles (chapter 3). The most important aspect is probably to provide sufficient space for cycling, where e-Scooters should also be used. If a municipality wants to promote e-Scooters as part of SUMP policies, improving the infrastructure for cycling is probably the best way.

5.3 e-Moped sharing

They have funny names for serious business models: 'Felyx' in Rotterdam and Amsterdam, 'Coup' in Paris, Berlin and Madrid, 'Emmy' in Berlin and Hamburg, and 'Eddy' in Düsseldorf (Figure 6). Most private-sector providers of e-Moped sharing are electronics companies like Bosch and Vattenfall that are seeking new sales markets (Coup) – instead of organisations concerned about creating a (municipal) sustainable mobility strategy.

E-Moped sharing is only used in European city centres that have good public transport. The offer seems convenient: In addition to the vehicle, two helmets and hairnets are usually provided. The sharing of E-Moped promises easy handling, because it requires just a driving licence and a smartphone, but it can create motorised competition for more active types of mobility such as cycling and walking short distances.

Figure 6: e-Moped sharing examples



Source: 'Felyx' in Rotterdam and Amsterdam (©felyx sharing B.V. 2019)



Source: 'Coup' in Paris, Berlin and Madrid (©Coup Berlin 2018)

However, a test in Germany has identified one possible dissuasive factor: the insurance deduction that ranges from 150 to 500 euros. All rental companies include clauses in their terms and conditions that clearly disadvantage customers. 'These include the 'reversal of the burden of proof', which means that it is the users who have to prove that they did not cause the damage' (ADAC 2018).

Analogous to issues on integrating e-Scooters into shared mobility, e-Moped sharing can be regarded critically: topics like (municipal) regulations for parking, data protection and vandalism, as well as competition with cycling, need to be addressed. There are no empirical findings for municipal e-Moped sharing services yet available. Their integration into the SUMP should be critically reviewed using the 8 SUMP principles.

5.4 Car sharing

5.4.1 Car sharing business models – an overview

'Car sharing' ('car clubs' in the United Kingdom) denotes the organised, joint use of vehicles by a number of people. In the best case, car sharing promotes a car-free lifestyle, and putting the (shared) car in the role of a stop-gap when the modes of eco-mobility don't offer sufficient connections. Thus, it has the potential to create

environmental relief with respect to city traffic (Bundesverband CarSharing e.V. (bcs) 2007). There are huge differences in the impacts of station-based, free-floating and peer-to-peer (P2P) car sharing. These business models are described below, are more closely examined in the CiViTAS 'Shared Mobility' brochure (CiViTAS 2016) and in the EU project called STARS.

Station-based car sharing

Station-based car sharing is conceived for round trips, with the registered customer returning the vehicle to the station where it was picked up. Internet platforms and provider apps indicate the locations of available cars and can also be used to make reservations – making this service very reliable. This business model targets people who don't own a car and also sometimes want to travel longer distances, such as beyond the city boundaries and plan in advance. The cars are parked in designated areas, usually in residential and business areas.

Point-to-point car sharing (free-floating and station-based)

In point-to-point car sharing ('one-way' car sharing), the customer uses a smartphone app and GPS tracking to pick up a vehicle anywhere within the provider's business area. A vehicle can be used for one-way trips within a defined geographic area. The impacts on car ownership are minor. A recent survey of STARS showed that free floating car sharing has no impact on car ownership – different to station-based services or combinations. (Loose et al. 2018). In larger cities, such car sharing vehicles can be part of intermodal chains. One-way car sharing services target users who seek a supplement to local public transport for travelling within the city limits (CiViTAS 2016).

Peer-to-peer (P2P)

Peer-to-peer car sharing (P2P, also known as 'private' car sharing) is the smallest share of the market. When they are not being used, private vehicles are brokered to other users on commercial Internet platforms. This form of arrangement is conducted privately and municipalities have little control over it, we do not examine this type of car sharing in greater detail.

5.4.2 Success factors and potential for urban transport

The primary factor for the successful implementation of car sharing services is population density (critical user mass) in the catchment area and service availability (Civitas 2016: 17). Large cities and conurbations are predestined for having car sharing as alternative to car ownership. Such car sharing service can be integrated in SUMP to reduce the need for parking in urban neighbourhoods and as well new urban residential developments. In Bremen's SUMP, there is the target to reduce the parking pressure by 6,000 cars been given up or not purchased by 20,000 car sharing users targeted by 2020. 80% of the car sharing users in Bremen don't have a car in their household. Such integration has also impacts on the neighbourhood development: car sharing users do more grocery shopping in their neighbourhood – strengthening local economy! In contrast, the reference group drivers four times as much as the Bremen car sharers to shopping malls.

While station-based models have proved successful in densely populated city districts with low levels of motorisation that are also well connected to public transport, point-to-point services have been most successful as a first-last-mile strategy in larger cities with limited and expensive parking (Civitas 2016: 17).

In general, car sharing provides great potential for municipalities to supplement public transport and strengthen eco-mobility. Its help in reducing local emissions is particularly important for densely developed urban areas. Studies document that one station-based car sharing vehicle can replace between 15 (UBA 2017) and 20 (bcs) private cars. Reduced need for parking spaces and more efficient use of the transport infrastructure are other positive effects of car sharing (team red 2014). The integration of electric cars is a chance for users to get familiar with e-mobility. But e-cars may create some barriers for car sharing users due to higher costs, range limitations and unfamiliar procedures. Thus, pure electric fleets may not yet be forced by SUMPS.

However, in the interest of sparing negative ecological effects, the impacts of the various kinds of car sharing need to be assessed - especially that if they lead to

reduced travel in passenger cars and private car ownership. In the future, managing this development and implementing targeted measures will be among the most important tasks for municipalities.

5.4.3 Challenges to and action needed by municipalities

The number of providers and the diversity of vehicles are growing (BCG 2016) and creating new challenges for urban planning. In order to fully exploit the benefits of shared mobility for municipal transport planning and appropriately respond to the new circumstances, local authorities must recognise their options to act and implement.

Car sharing may promote less car-oriented multimodal mobility behaviour. This can be achieved good by integrating car sharing stations in urban neighbourhoods (like the Bremen 'mobil.punkt' stations). It needs to be embedded in the wider eco-mobility oriented SUMP strategy. Not every form of car sharing is leading to a similar reduction in individual motorised transport (STARS, 2019). Especially free floating car sharing may lead to cannibalising eco-mobility (especially local public transport).

In order to check if the desired effects are being achieved, an essential aspect of introducing car sharing systems into the marketplace is conducting pilot projects for one to five years. This is primarily to monitor and evaluate the parameters that are relevant to the city. It should kept in mind that the results of pilot projects may lead to limiting the offer or the size of the business area so that either specific districts are excluded or certain neighbourhoods must be included at all costs (needs-based adaptation).

5.4.4 Legal and regulatory frameworks

The City of Bremen had delivered the first municipal 'Car Sharing Action Plan' already in 2009 – setting the target of quadrupling the number of users from 5,000 to 20,000 with an impact of at least reducing the number of private car by 6,000. Measures are dedicated public street space for the 'mobil.punkt' car sharing stations in densely built up neighbourhoods, integration in new developments to reduce parking space provision, integration with car sharing, leading by example for companies' fleet management and public awareness and information (like the Bremen UDO campaign: Use it – don't own it – "Udo prefers to chill"²¹).

Implementing sharing systems requires providing and designating public spaces, which implies changing land

²¹ UDO cinema spot: https://www.youtube.com/watch?v=5seE_26FYFA / www.mobilpunkt-bremen.de

Figure 7: Example for car sharing signage and parking space in Munich (Germany)



Source: Michael Glotz-Richter



Source: City2Share/ Marcus Schlaf

use. Municipalities must create the required legal framework. The 'Master Plan for "Shared Mobility" Car- and Ride-Sharing in the Region of Hanover' concludes that current market trends can be exploited and shaped through concerted action: For example, specific guidelines for car sharing fleets can be traded off against certain privileges and facilities. A large number of managed parking areas is necessary for free-floating car sharing to be successfully regulated through agreements on parking fees (Agora Verkehrswende 2018: 62).

Municipalities can make agreements on parking space with commercial car sharing providers. A public-law contract (pursuant to sections 54 ff. of the Administrative Procedure Act, VwVfG) (Agora Verkehrswende 2018: 62 ff.) is a sensible way to control free-floating vehicles. Allocating public parking spaces as car sharing stations require a fair and transparent tendering procedure – Bremen has been using a call for 'expression of interest' for its mobil.punkt station with clear requirements in terms of service quality, vehicles (incl. family friendliness of the fleet) and price structure (e.g. no free mileage). Numerous cities are implementing or planning to create mobility hubs that offer shared services and help reclaim public space. Munich has signed public-law contracts with car sharing providers that give them free unlimited parking in managed parking spaces by means of a special permit (LHM 2017).

5.4.5 Special features of e-car sharing

Car sharing and electromobility go well together. The eco-friendly image of car sharing can be further enhanced by the use of electric vehicles. The prerequisite for this is that electric vehicles in car sharing fleets are only charged with green electricity from additional renewable energy sources.

E-car sharing represents an important but only evens an additional part of all car sharing business models. The need to recharge electric vehicles means that they are basically station-bound (ibid). However, municipalities often lack the appropriate electronic charging stations (ECS) for e-vehicles, which limit the use of shared e-vehicles far below the potential.

In this context It should be noted that electric vehicles can also be an obstacle for further market exploitation because they entail higher costs for the customer and user acceptance still has to be created. So it might create also barriers to use car sharing if only electric cars are provided. The example of Autlib in Paris shows the financial risk in operating only electric cars in the point-to-point systems.

Promoting environmentally friendly e-car sharing requires improved parking conditions and creating more public parking spaces and charging stations.

For this purpose, the Berlin Senate's Department for Urban Development has developed a tool to increase the number of charging stations. It targets the needs of shared e-vehicles in the car sharing fleet and is particularly germane for municipalities that intend to operate electronic charging stations (SenStadtUm 2014).

5.4.6 How municipalities can promote and support car sharing systems

For municipalities, car sharing is an important tool in formal and informal planning (e.g., when developing local transport plans or TDP/SUMP).

Essential in the integration of car sharing systems is the close collaboration between the administration and car sharing service providers. Therefore, early cooperation should be developed. But also for municipalities alone, there are numerous opportunities and potential tasks that can make a significant contribution to success. Ways to promote car sharing models for municipalities include:

Administrative procedures or planning procedures

- Incorporate car sharing concepts into urban SUMP or TDP,
- Car sharing as a supplementary measure in thematic sections such as climate change or air pollution control plans,
- Adoption of a municipal car sharing action plan

Ghent learns from Bremen

In August 2014, the city of Ghent decided to create a car sharing action plan and adopted it in 2016. Following the example of the German city of Bremen and the European Interreg project "CARE-North plus", the city set itself ambitious goals. By 2020, the city wants to acquire a total of 20.000 car sharing members and generate 500 own parking spaces for community vehicles (same goals as in Bremen).

Another part of the car sharing action plan is a communication campaign. In January 2017, Autodelen.net and the city of Ghent launched a two-year communication campaign: "Gent op en top autodeelstad" (Gent car sharing City). While at the beginning of the campaign in January 2017 there were 6.000 car sharing members, in May 2019 around 11.958 car sharing members had already been reached (Autodelen Gent 2019).

Traffic law (parking spaces)

- Creation of car sharing parking space development concepts (example: area-wide parking space concept of the city of Flensburg (Schick 2016, https://carsharing.de/sites/default/files/uploads/arbeitschwerpunkte/pdf/vortrag_schick_carsharingfreiburg_07.02.2017.pdf),
- designation of car sharing spaces in development plans,
- issuing a parking space law based on building codes that limits the current obligation to create parking spaces when cities establish mobility concepts, particularly for car sharing.

Good Practice Flensburg (Germany) – Successful integration of car sharing in medium-sized cities

In the city of Flensburg, which has a population of 90.000 inhabitants, car sharing was integrated in 2013 as a measure in the city's climate protection plan. The aim of the municipality together with the provider cambio was to achieve a publicly visible number of vehicles and a meaningful spatial coverage with car sharing stations in the core city. The partners of the urban climate alliance (e.g. municipal actors, transport companies etc.) are the main carriers of the car sharing offer and make their business trips with the vehicles. This guarantees a basic utilization of the offer. Each partner got a car sharing station. In addition, the vehicles can be used by the population who lives nearby.

Characteristics of car sharing in Flensburg:

- 14 vehicles at 6 stations
- 705 customers (50% company and administration with approx. 35% of journeys, 15% students, 35% private)
- an average of 24 new customers per month
- 7 hours and 30 minutes average daily load
- one to three trips per car per day
- 34.400 5 km/year annual output

The launch of the offer was accompanied by marketing campaigns in public transport, at stops and in the town hall. Already in the second year of operation, the system was fully economically viable.

Figure 8: Carsharing of Flensburg



Source: Michael Glotz-Richter

Mobility Packages / Mobility Stations / Cooperations

- Mobility packages as the best joint offer of the environmental network (selling combo tickets for using the mobility services and use of common debiting systems),
- connecting car sharing stations and other modes of transport to mobility stations (car sharing and public transport, charging points, bike sharing, etc.) and expanding charging stations in public streets;
- providing financial assistance for car sharing start-ups and cooperation with service provider in the context of business car sharing. (see example Flensburg below).

Communication and marketing opportunities

- promoting through 'participating' - the municipality should actively participate in car sharing and behave like a role model
- using advertising (special offers and campaigns) to promote car sharing in public places and conducting public relations at meetings in city hall (e.g. press events with mayors) (Agora Verkehrswende 2018).

5.5 Ride sharing, Ride hailing

5.5.1 Business models

Ride sharing and ride hailing are flexible forms of mobility alongside car sharing services. The ride sharing model is more common in Europe. Ride hailing, on the other hand, is increasingly used in low-regulated markets (Asia, Africa, USA). Ride sharing and ride hailing are related concepts, which are briefly presented here.

5.5.2 Ride sharing: Lift, car pooling, van pooling

Ride sharing implies a modern form of car pooling, in which additional passengers are added to an existing car journey on a joint route. The private owner of the car makes the unused seats available to other passengers.

In contrast to ride hailing or ride sourcing, rider-seeking drivers are not "for hire", but can receive monetary compensation for their travel time or mileage (Civitas 2016: 24). The traditional forms of ride sharing include "car pooling" (sharing a ride in a private vehicle, usually as a group), "van pooling" (collective transport companies, commuter groups) and "real-time and dynamic ride sharing" (matching driver and passengers by destination via a mobile app). When booking via a ride sharing app, a distinction is also made between traditional stationary car sharing agencies (fees for mediation) and the online car sharing agency (Keck 2017).

A planned route is offered and communicated via a ride sharing platform. The journey can also be arranged without a ride sharing platform. In any case, travel costs will be shared or charged to each other by alternating rides. In summary, ride sharing includes car pools of different types for the shared use of a vehicle, from a classic private part of the car journey with friends, acquaintances or work colleagues to the booking of car pooling opportunities via a brokerage platform.

By pooling several car journeys into a single journey, which results in a higher utilisation of vehicles and less cars in total, a theoretical contribution to the reduction

of motorised individual transport can be made. This would lead to a reduction in traffic and emission loads.

5.5.3 Ride hailing or ride sourcing: a chauffeur service as commercial transport of passengers on request.

Ride hailing or ride sourcing is a service that allows passengers to connect with other passengers by using their personal vehicles for the travel. It is based on Geographic Information Systems (GIS) and Global Positioning Systems (GPS) technologies on Internet-enabled devices (usually smartphones) that allow users to organize the sharing of journeys in real time and pay for it (see CIVITAS 2016: 24).

Ride hailing services are almost as old as the private car itself. Black taxis or Jitney are regional expressions for such informal taxis. In threshold and developing countries, gaps in the public transport market are often filled by unofficial taxi supply. Since 2010, UberCab (later Uber) has been established, initially in the US region. In 2013 Uber introduced UberX, a cheaper service than a peer-to-peer platform offering private vehicles and their drivers. Later, UberXL was launched, offering larger SUV or minivan capacities (Shaheen 2018).

In addition, there is a significant difference between ride sharing with a professional driver/taxi driver who has a passenger transport license and a profit-making intention through professional transportation (Bps. Via Taxi, mytaxi, UberBlack, UberX, CleverShuttle, allygator) and the ride sharing model with unlicensed driver/private driver with private car (e.g. Uberpop, Wundercar). The latter ride sharing model was banned in Germany by the Frankfurt Higher Regional Court in June 2016.

The example of San Francisco, where ride sharing services such as Uber and Lyft have found their way into the transport infrastructure, shows that public transport in particular has lost customers. For example, the number of customers of the regional train operator BART has declined. (ARD 2018)

Subway ridership dropped in New York City as passengers uses Uber. (Fitzsimmons 2018)

Ride hailing is increasing its importance worldwide, compared to the ride sharing model. Especially in countries with relatively unregulated markets, ride hailing is widespread or increasing. Germany, on the other hand, with its strongly regulated passenger transport law, is rather classified as a car sharing market.

5.5.4 Opportunities and potential for urban transport

Ride sharing/hailing systems could be seen as a new, flexible offer as an addition to the environmental friendly transportation system, but they only make sense as an additional service component in local public transport if car journeys are substituted. Only when this target is reached these new mobility services achieve environmentally friendly effects (noise and pollutant reduction)

Examples of ride hailing services (mostly outside Europe) are Uber, Lyft, Cabify, WunderCar, Gett, the women-specific service See Jane Go, the French provider Chaffeur Privé. In Tallinn, Europe, the provider Taxify is used. The classic international ride hailing markets are in China (where Didi and Ola are the most used providers), Great Britain, France and the USA. Italy occupies an intermediate position. The choice of the sharing model depends on the national framework in the countries.

With increasing access to smartphones, the use of smart mobility offerings is growing. The private car becomes less important in urban centers. In the future, individual mobility will be realized increasingly through sharing offers. The mobility costs of ride sharing services could be reduced in the future by combining them with autonomous vehicles. This makes the model suitable for supplementing public transport, especially in times and areas where the utilisation of conventional public transport vehicles is rather low.

Carpool and Vanpool users should be part of “commuting reduction” programmes that can offer economic and time-saving benefits such as discounts on parking passes, access to shared car parks for carpools or Vanpool vehicles, shared vehicle costs and tolls, use of lanes for carpools or high-load (HOV) Vanpools on major roads, low-cost use of tunnels or bridges, and waiver or reduction of tolls (CIVITAS 2018: 24).

The competition – at present – between ride sharing and ride hailing will hardly be significant in 10 to 15 years (AlixPartner 2018c). According to a consumer survey conducted in the major cities of Germany, France, Italy, Great Britain, China, Japan and the USA, autonomously driving cars (e.g. Robotaxis) will significantly transform motorised individual transport in the conurbations and strongly promote the spread of car sharing (ibid.).

5.5.5 Challenges and action required for municipalities

The ride sharing offers in European metropolises are increasing. Although the mobility service provider Uber, Clevershuttle, Blacklane etc. (as a chauffeur service) are already used in Paris, London, Berlin, Munich, Düsseldorf, Hamburg and Frankfurt am Main, offers are missing in other metropolises such as, Barcelona. The operation of pure ride hailing services is illegal in many European countries due to the legal framework and country-specific legal and social regulations. In April 2018, the European Court of Justice ruled that the mobility service provider can be regulated individually by the member states of the EU. More precisely, the ride sharing service (without a passenger transport licence) can be independently prohibited and prosecuted under criminal law.

Ride hailing providers – such as UberPop or Wundercar –, who offering private individuals as (unlicensed) drivers as a service, are banned in many European countries. The development of such ride hailing services has therefore declined again. In order to integrate the new forms of mobility of ride sharing/hailing in major European cities into public transport sensibly, a legal and regulatory framework should be developed and must be discussed.

A danger is seen in the opening up of the Passenger Transport Act, especially with regard to ride hailing as it in a completion to taxis in particular. The legalisation of ride hailing services can lead to an increase in car traffic in cities. Traffic problems will become even more severe if vehicles – even with ride hailing – are not used to full capacity. Public transport passengers could switch temporarily to ride sharing/hailing services, which may

result in an increase in the motorised individual transport. Classic taxi companies are facing an unfair competition with ride hailing services. In contrast to ride hailing services, taxi companies – as part of public transport – are obliged to take unprofitable journeys with them and are bound by a fixed tariff. But there are as well some studies pointing to the positive impact (or zero impact) that ride-sourcing has on congestion (Transport for London 2016, p. 188)

5.5.6 Specific planning aspects with regard to ride sharing or ride hailing

Ride sharing systems should be assured due to the legal framework to protect drivers and passengers. In order to create safety-relevant profiles of passengers, which are made available to other passengers for protection, it is necessary to modify apps and to embed a binding rating system.

When introducing or dealing with ride sharing/hailing services, municipalities should create a social and institutional environment that integrates the sharing services offered and complete – not compete – public transport. The municipalities have the following options for action and implementation in order to create incentives for (see: Shaheen 2018):

- Parking and stopping privileges at airports and other congested areas for ride sharing providers – in case of poor public transport
- Discounts for pooled cars and vans on toll roads
- Priority for pooled vehicles in urban areas
- Free ride sharing coupons and public transport passes for pooling employees
- Tax benefits for companies that have a large number of employees using car pooling
- Tax relief or reductions on vehicle registration tax to car owners who use their vehicles for car pooling (as opposed to single-passenger)

- Provision of subsidies to low-income passengers using pooled services – in case of no subsidy is made to low income users for public transport
- Granting tax credits to mobility service providers in order to achieve cooperation
- Possibility for taxis to use pooling services

5.6 Shared freight mobility

In the highly diverse mobility sector, sharing concepts are constantly being developed, with new offers being tested and becoming established. Next to car sharing, bike sharing, ride sharing and ride hailing, services for sharing commercial transport have also been expanding. Thus far, commercial transport has been treated as a lower priority in the scientific discussion about shared mobility. One reason for this could be that it follows other patterns than passenger transport because of the way it's been developed and implemented, as well as its requirements and effects (BMVIT 2014).

In the commercial transport sector, sharing basically refers to the joint use of storage facilities, loading platforms and logistic centres (Ibid.) – not only by conventional delivery firms, but by private individuals as well. The many different options and concepts for shared commercial transport can pose a regulatory challenge for municipalities because they are so diverse, industry specific, locally limited and adapted to special needs (Ibid.). Most offers touch on numerous legal areas, which makes it even more difficult for municipalities to deal with them. The conception of the offers very much depends on the actors (e.g., delivery firms, city administration, customers, etc.), which can lead to the further differentiation of offers. Factors driving the rapid development of new sharing concepts in commercial transport include the increase in online trading, customers' desire to receive goods more quickly and with fewer complications, as well as the rapidly growing delivery traffic and the burdens it creates for communities (Altenburg et al. 2018).

The most important trends for sharing in commercial transport – 'collaborative transport' (CT) and 'crowd sourcing' – are examined more closely below. We begin with their operating methods and potential for

Potential of cargo-bike sharing for sustainable urban mobility

As already mentioned before, cargo-bike sharing can be an option to realize sustainable mobility in cities (see 'Cargo-bike sharing for bulk trash'). There are many different types of cargo-bikes – for different purposes and with different sized load constructions. Due to their large transport capacity and the resulting versatility, they have the potential to replace car journeys within cities. But so far, there are not many municipal cargo-bike sharing systems in place in European cities. Now a study on free cargo-bike sharing schemes and their impact on sustainable mobility shows the enormous potential of this sharing mode. More than 45% of the interviewed persons said, they would use a car for their trip if they did not have the bike. This result indicates that cargo-bike sharing schemes can immediately replace car-trips and shows how important cargo-bikes can be for sustainable urban mobility.

Read more: [Publication "Exploring the Potential of free cargo-bike sharing for Sustainable Mobility"](#)

alleviating inner city traffic and then discuss possible challenges and the need for municipalities to act.

5.6.1 Collaborative transport

'Collaborative transport' (CT) is becoming increasingly practical with regard to shared commercial transport (CiViTAS 2016). CT refers to the common use of storage facilities (hubs, consolidation centres, etc.), delivery vehicles and other resources or processes in the transport chain to help delivery firms save operating costs by increasing efficiency along the chain (Mason et al. 2019). Besides lowering operating costs, CT can also reduce pollutant emissions, which makes it attractive to municipalities. Resource sharing is largely implemented through agreements or partnerships between companies (CiViTAS 2016) so that the packages and goods are not stored, transported and delivered separately by each firm. This type of shared commercial transport must run smoothly with a real-time exchange of information and data that calls for great organisational effort and can make cooperation more difficult.

For the CEP branche (courier, express and parcel delivery), so-called micro-hubs can also be attractive. For

example, micro hubs can be small containers that are used as a collection point for deliveries to a location parking in an urban neighbourhood. From these collection points, last-mile deliveries can then be carried out from the collection points with alternative drives (Arndt; Klein 2018).

The concept of 'collaborative transport' can help cities reduce motorised travel on streets. More efficient delivery of goods and parcels saves vehicle kilometres and reduces negative aspects of transport (noise and pollutants). Ideally, it requires less space in the street for delivery vehicles creates fewer emissions and makes it possible to reduce the number of parked and double-parked delivery vehicles. However, CT also presents many challenges that communities must address, which we discuss later.

5.6.2 Crowd sourcing

Within the commercial transport sector, besides CT for conventional logistics firms, the delivery of parcels and goods by private individuals has also been growing. 'Crowd shipping' or 'crowd sourcing' denotes shipments brought to the recipient by private individuals in their own cars (Mason et al. 2019), allowing for deliveries to be made more quickly, efficiently and cheaply than by traditional services (CiViTAS 2016). Couriers usually offer their services through a parcel-delivery app. Would-be recipients post details about their delivery needs online, along with the amount they are willing to pay. After a

Cargo-bike sharing for bulk trash, Berlin-Neukölln, Germany

As part of the 'Clean Berlin' action programme supported by Berlin's Senate Department for Finance, Energy and Business, the district of Neukölln purchased six cargo-bikes at a cost of 45,000€. The bikes have different types of frames and drives; some are operated conventionally and others have e-motors. Purchased for the 'Beautiful like Us – For a Liveable Neukölln' campaign, the cargo-bikes are intended for removing bulk trash. Neukölln residents can book bikes online and the district authority can also use them to deliver mail to its various locations (Kugler 2019).

Read more: Berliner Morgenpost, [Berlin.de](#), [Kampagne Schön Wie Wir](#)

bidding process, recipients select a courier and supply other necessary details, such as the parcel number, pick-up and delivery address (Ibid.). The courier then makes the delivery. Extra insurance can be paid for the parcel or delivery. Conventional delivery firms may also use crowd sourcing for parcel deliveries (Ibid.). A variety of Internet platforms, such as Postmates (see Postmates Inc. 2019) and Uber Freight (see Uber Freight 2019) in the USA, offer this service or an app that matches carriers with shippers.

These offers can reduce emissions in cities when a person collects a parcel on their way somewhere and drops it off on their way somewhere else. This practice generates no additional city traffic and requires no trips by a conventional delivery service. Double-parking can also be reduced. In the best case, there are fewer emissions and no extra road space is used.

5.6.3 Challenges to and need for action by municipalities

Many offers of commercial transport sharing are new. Especially when entering the market, it may seem difficult to manage the services and regulations needed in a large variety of areas. A regulatory framework is needed for shared commercial transport. The distribution of public and street space must also be reconsidered, such as in allocating space for goods and parcels delivery (loading zones) and pick-up points (Altenburg et al. 2018). The consequences of such measures are difficult to assess: They may affect traffic and public space and increase air and noise emissions. Regulating sharing offers in commercial transport is also difficult for many European countries because start-ups and research and pilot projects often adopt many small approaches to implementing sharing concepts (BMVIT 2014). No all-embracing approach exists.

Another challenge is presented by the fact that sharing offers for commercial transport touch on many different legal areas. Cooperative land use by different firms must respect statutes on competition, traffic, commerce, the environment and data protection, as well as civil and commercial law (Ibid.). Many European cities and countries have legal obstacles for crowd sourcing (Smart

Urban Logistics 2015). For example, drivers in Great Britain may not drive or work more than 11 hours a day. It's hard to imagine how cities or crowd sourcing platforms can control working time (Mason et al. 2019). In addition to these legal areas, labour law is also affected. Cities must establish and implement clear regulatory frameworks. This is the only way that the various potential users of sharing offers can know the concepts that must be implemented to improve urban transport (Ibid).

Aside from needing to create regulatory frameworks, municipalities already have ways to influence commercial-transport sharing services. These include time restrictions for vehicles in particular districts, as well as parking regulations (loading zones), different charging schemes and restricted access (green zones). These measures are useful and feasible, especially for CT. For example the approach of restricted access can be used and set up as so-called "low emission zones" in the city-centre. These zones forbid vehicles of a certain size or weight the access to particular parts of the city. This approach may lead to new concepts for CT being established or existing ones to be further developed. The access control is stimulating a bundling of freight delivery over the different companies. For example, the city of Amsterdam has introduced a low emission zone which restricted the access of conventional duty vehicles (Zukunft Mobilität 2015). Outside this zone and the city-centre, there are consolidation centres and from there, deliveries are bundled and transported independently of the company of the loader to the inner-city area.

Usually, this transport is carried out in a city-compatible and efficient manner using electric vehicles, for example so called 'Cargohopper' vehicles. Such approaches can be observed in different cities (ibid.). Another approach may be that of a charging scheme. One example for this is the city of Stockholm, which introduced a charging scheme for the inner-city area in 2007.

Cargohopper Amsterdam

Cargohopper is a zero emission city distribution system in Amsterdam. It bundles pallets, packages and other goods from various shippers and transport companies in one of our four electrically driven Cargohoppers for delivery within the environmental zone in Amsterdam. It decrease the number of transport vehicles in the city by optimizing the volume per vehicle. One Cargohopper can do the work of multiple halve loaded vans. It is a perfect solution for hauliers who lose much valuable time to deliver one or two pallets in the inner city. This also helps to lower the emissions of NOx, particles and CO2. Cargohopper supports companies to reach their environmental goals and lower their Carbon Footprint.

www.smartcityembassy.nl/initiative/cargohopper

Everyone who wants to get into the inner-city area with a vehicle has to pay a certain amount (Centre for Transport Studies 2014). Such a scheme can also lead to new and innovative solutions for CT or strengthen existing ones, as delivery companies try to reduce their operational costs.

This reduction can be reached by a lower number of vehicles in the city-centre and thus by the collaboration with other delivery companies. Many other bundling approaches are described on the website: <http://www.bestufs.net>.

While the possibilities of regulating commercial-transport sharing are challenging for municipalities, they already have some instruments. As this type of sharing is used more in European cities, the regulatory measures will become more differentiated. In order to be able to react with appropriate measures, cities and communities must carefully consider how commercial-transport sharing impacts urban transport when they are conceiving and implementing services.

Table 2: Example for shared freight mobility Paris, France

BP13	Urban Logistics Space: A warehouse in a car park, freight bicycles, fleet provision, vehicle construction & a social project	
	L1, L10, L14, L16, L28	
	A2	Consolidation
Central location		Collection and distribution centre
Key Data		Motivation
<ul style="list-style-type: none"> • Paris–Saint-Germain, Louvre, Neuilly-Sur-Seine • France • 2001 		<ul style="list-style-type: none"> • Reduce environmental pollution • Reduce congestion and the number of vehicles • Efficient distribution • Job creation for low-skilled labour
Components		Advantages
<ul style="list-style-type: none"> • 250 to 1,000 m2 in existing buildings, such as car parks • Security installations • Traffic signals • E-bicycles – Cargocycles ® 		<ul style="list-style-type: none"> • Reduce noise • CO2-free delivery • Additional jobs • Access to narrow centre-city alleys
Actors		Key factors for success
<ul style="list-style-type: none"> • City administration • Private operators • Researchers • Distributors 		<ul style="list-style-type: none"> • Logistic services' cooperativeness • The city's readiness to reserve space for logistics
Implementation		
<p>In a measure intended to relieve the city centre, an experiment is being conducted with seven central locations selected for freight consolidation and 'last-mile' delivery. The three best-known locations are in car parks, which have separate areas between 250 and 1,000m2 reserved for transferring from conventional delivery vehicles to electric freight bikes to make the last mile. The freight-bike depot is also located in the car park. Aside from the transport service, freight bikes will be built, rented and repaired. So far 80 jobs have been created. The bikes are 1.03 m wide, can carry 180 kg and have a volume of 1.5 m3.</p> <p>Operator: private, Fleet: private, Fees: paid by client, Use: voluntary</p>		
 <p>Photo: La Petite Reine</p>		
Internet:	www.lapetitereine.com	
Contact:	La Petite Reine, Cellule administrative, 1 Bis Villa Charles, 93800 EPINAY/ SEINE, Laure Duez, Tel: +33 1 52 63 29 13, Mail: laure.duez@lapetitereine.com	

Source: Smart Urban Logistics (2015: 48)

Table 3: Example for shared freight mobility Emilia

BP36	The city's provision of a fleet of e-vehicles for private persons and businesses	
	L9, L13, L20	Organised by the city
	E5	Vehicles/Fleets Sharing concepts
Key Data		Motivation
<ul style="list-style-type: none"> • Emilia • Italy • 2003 		<ul style="list-style-type: none"> • Increase the number of e-vehicles • Reduce emissions • Reduce the number of vehicles in the city
Components		Advantages
<ul style="list-style-type: none"> • Electric vehicles • Conventional vehicles • Access cards 		<ul style="list-style-type: none"> • Cost-savings for users • A smaller fleet because of a combination of private and corporate customers
Actors		Key factors for success
<ul style="list-style-type: none"> • City administration • Trade and commerce • Ministry (subsidy) • Car rental service 		<ul style="list-style-type: none"> • Media coverage • Annual information event • Community as a role model • Low rental costs
Implementation		
<p>The ARIAMIA Initiative has accelerated the use of electric vehicles for daily trade and commerce by making 30 e-vehicles available to tradespeople who benefit from the low rental and operating costs. Access restrictions do not apply to the cars, which also don't have to pay to park in the city centre. Key cards are used to access and pay (with a pre-paid account). To set a good example, the community switched its entire vehicle fleet to e-vehicles. The municipal rental-car firm, TiL, organised, managed and serviced the cars. The project was mainly financed through state subsidies, which assumed 65% of the cost of the e-vehicles. A sponsor was found for the key cards and the remaining costs were covered through a loan from TiL. Using the cars as advertising spaces helped lower operating costs.</p>		
 <p>Photo: TiL SrL ARIAMIA playPorter</p>		
Internet:	www.til.it/index.php?option=com_context&view=article&id=176:ariamia-playporter&catid=58:notizie-2010&Itemid=79	
Contact:	TiL SrL, Reggio Emilia, Emilia-Romagna, Italy, viale (street) Trento Trieste, 13 – 42124 Reggio Emilia, Transporte Integrati e Logistica s.r.l., Via Trento Trieste 13, 42100 Reggio Emilia, Corrado Berselli (Sales Executive), Tel: +39 522 927 602, mail: c.berselli@til.it	

6 Recommendations

Lesson learned

Table 4: Tabular presentation of stakeholders, potentials, challenges and recommendations for municipalities with regard to the successful integration of sharing system

Stakeholder	Potential	Challenges	Recommendations for municipal action
municipalities	<ul style="list-style-type: none"> supplementing public transport and strengthening the environmental network 	<ul style="list-style-type: none"> accumulation of supply in inner city areas and less or no supply in suburban or rural areas 	<ul style="list-style-type: none"> act as providers or initiate close cooperation between the operators and municipalities
	<ul style="list-style-type: none"> optimal mobility solution for the first respectively last mile 	<ul style="list-style-type: none"> cannibalization of the offers of the environmental association 	<ul style="list-style-type: none"> establish rules on parking, the minimum technical equipment of the sharing vehicles and the operational quality (with deadlines) of the sharing system
	<ul style="list-style-type: none"> saving of areas and negative ecological effects (noise, air pollutants...), provided that car journeys are substituted by the offers 	<ul style="list-style-type: none"> unorganized parking of bicycles negative appearance in public space 	<ul style="list-style-type: none"> release parking spaces in public areas
providers (of sharing services, platforms, intermodal platforms)	<ul style="list-style-type: none"> contribution to the achievement of municipal transport, environmental and social policy objectives 	<ul style="list-style-type: none"> BS: special use vs. common use 	<ul style="list-style-type: none"> reserve parking spaces and arrange for discounts / exemptions from parking fees for sharing vehicles
	<ul style="list-style-type: none"> increasing the visibility of mobility alternatives in the urban area 	<ul style="list-style-type: none"> investment and operating costs: offers need subsidies ("start-up aid") - especially in sparsely populated areas 	<ul style="list-style-type: none"> include offers in urban mobility communication (e.g. linking to the provider on the municipal website, integrating locations into urban route planners, etc.)
	<ul style="list-style-type: none"> contribution to a sustainable transport development 	<ul style="list-style-type: none"> hardly any parking possibilities (e.g. in connection with public transport) 	<ul style="list-style-type: none"> plan financial resources for a demand-oriented offer in the budget
	<ul style="list-style-type: none"> integration of CS as part of the mobility planning for new buildings possibility to reduce the required number of car parks (and reduce construction costs) 	<ul style="list-style-type: none"> BS: occupied parking areas by cars CS: Illegally parked vehicles on designated CS areas and significant speeding during rental 	<ul style="list-style-type: none"> consistently sanction illegal behavior, especially against moving and stationary automobile traffic stationary (e.g. illegal parking). require operators of sharing systems to comply with standards on data protection, payment processes and registration conditions
customers (private and commercial)	<ul style="list-style-type: none"> strengthening the image of the municipality (e.g. with bicycles as "own brand") 	<ul style="list-style-type: none"> lack of charging infrastructure for e-vehicles 	<ul style="list-style-type: none"> initiate the development of a needs-based charging infrastructure
	<ul style="list-style-type: none"> BS: Reduced number of bicycles on trams, buses and (underground) trains 	<ul style="list-style-type: none"> profit interest may contradict the traffic benefit 	<ul style="list-style-type: none"> contractually regulate that relevant user data from providers are transmitted to the municipalities for urban and mobility planning purposes define responsibilities and criteria for evaluation and impact research with regard to M&E of the traffic impact on urban traffic
	<ul style="list-style-type: none"> fewer delivery trips (commercial transport) 	<ul style="list-style-type: none"> sinking loading rate of delivery vehicles 	<ul style="list-style-type: none"> take on regulation of delivery services as a municipal task
cooperation partners			

Source: Source: Own representation

A message from the experts

Antal Gertheis on bike-sharing

The bike-sharing concept has been available for decades, but since the turn of the millennium such systems have spread across the globe and have become part of the sustainable mobility offer of many cities. With the rapid development of technology and new business models, dockless bike-sharing providers have emerged and boomed in the second half of the 2010s.

While its privately initiated model lacks the complex approach of public bike-sharing systems, dockless bike-sharing can offer a range of benefits for users and cities, including:

- offering new, sustainable mobility options for users;
- offering affordable transport in areas where 'traditional' bike-sharing schemes and/or intensive public transport were not viable;
- providing a last mile solution connecting to public transport.

However, based on initial experiences, developing regulations and guidelines may be necessary for maximizing its potential while minimizing the negative externalities. Cities have pursued different approaches – from 'hands-off' approach through different regulations and contracts to not allowing operation.

The SUMP process and methodology offer the right opportunity for cities to consider the place of dockless bike-sharing in the system of tools contributing to their vision and goals, thus enabling to create the right framework for such systems and to integrate them into their mobility offer.

Antal Gertheis, Managing director, economist at MOBILIS-SIMUS Ltd. Budapest (www.mobilissimus.hu/en)

Mohamed Jama Mohamed on Shared Ridesourcing

Shared ridesourcing is a new type of shared mobility, which provides mobility services using mobile application platforms to organize and manage trips in real time. These services connect drivers – who could use their vehicles – with passengers using smartphone apps, which facilitates booking, electronic payment, and ratings. This new business model is generally promoted as a cheaper alternative to car ownership, conventional taxi and non-shared ridesourcing, however very little is actually known about the impacts and usage characteristics of shared ridesourcing as data is extremely limited.

In London, the largest shared ridesourcing provider is Uber, which offers the UberPOOL service, followed by VIA, which recently introduced the 'ViaVan' service. Recent research undertaken in London indicates that passengers use UberPOOL services because it is perceived to be cheaper and more convenient than other alternatives and that the highest users of the service include students, visitors to London and people going to/from social trips (i.e. night out). There are concerns that shared ridesourcing could be competing with public transport – mainly bus transport –, however without tangible data this is difficult to substantiate. Transport Policy makers need to look at how these new services could be managed better in our cities, to ensure they complement the main public transport services.

Mohamed Jama Mohamed is a Transport Planning Expert and a PhD Researcher at the Transport Research Institute, Edinburgh Napier University, UK

Martina Hertel on Parking management

Shared mobility needs space – especially in public space. Public space is scarce, but unfortunately – due to concept of urban redesign after the second world war – most European cities use a disproportionately large proportion of the public space for parking private cars. The land consumption for cars is comparatively higher than the modal share. On-street parking dominates many European cities and so this public space is lost to vehicles that are statistically not in use for 23 hours per day.

Measures in parking management – preferably described in the action plan of the SUMP – have to be carried out in order to free public space from car parking. This regained public space can be used for parking all kinds of sharing modes, especially bike sharing, eMotorbike sharing and Car sharing, but also for loading zones. In order to increase public acceptance of shared mobility it is absolutely necessary to ban shared bikes and all other shared vehicles from parking on sidewalks. The reuse of public space – shared mobility instead of parking private cars – has to be fixed in the SUMP!

Martina Hertel, researcher, Department for Mobility, German Institute of Urban Affairs (Deutsches Institut für Urbanistik – www.difu.de)



Source: Martina Hertel



Source: Martina Hertel

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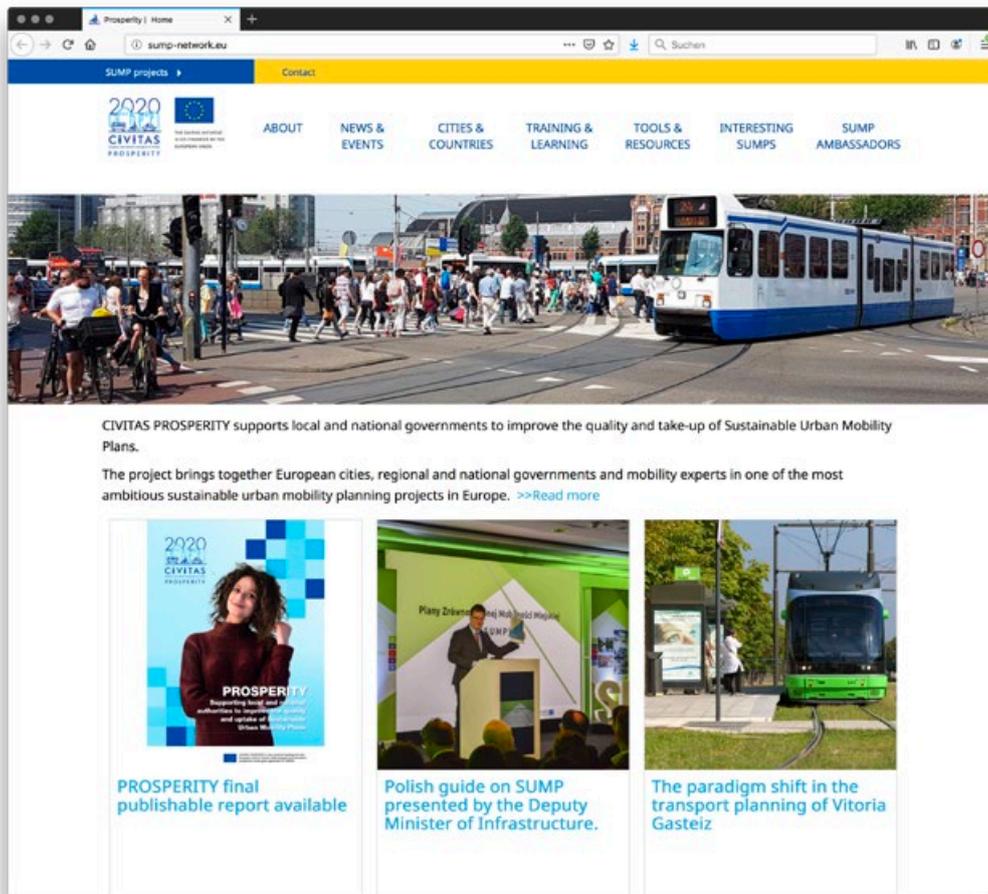
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