

SUMP-PLUS



D1.3 Conceptual and Analytical Framework for New Business Models

Frameworks for mobility and logistics partnerships with solutions providers supporting SUMP implementation

Project Acronym:	SUMP-PLUS
Full Title:	Sustainable Urban Mobility Planning: Pathways and Links to Urban Systems
Grant Agreement No.:	814881
Deliverable No.	D1.3
Workpackage No.:	WP1
Workpackage Title:	Conceptual Framework and Analytical Tools
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Document control page

Programme	Horizon 2020
Grant Agreement no.	814881
Project Acronym:	SUMP-PLUS
Coordinator	City of Antwerp
Website	www.sump-plus.eu
Starting date	01.09.2019
Duration in months	36
Call identifier / Topic	H2020-MG-2018-TwoStages / LC-MG-1-3-2018
Deliverable no. and title	D1.3 Conceptual and Analytical Framework for New Business Models
Work Package no and title	WP1: Conceptual Framework and Analytical Tools
Status	Final
Date of issue	31/03/2021
Dissemination level	Public

Version	Date	Modified by	Comments
Draft 1	21/02/2021	Tim Durant, Paul Green, Stefan Gabi	Draft report incorporating concepts presented at SUMP PLUS meeting in September 2020; revised structure based on dialogue with WP1 leader
Draft 2	16/03/2021	Tim Durant, Stefan Gabi	Draft report circulated to WP1, WP3, WP4 & WP5 leaders for comment. Specific sections relating to SUMP PLUS cities also sent to city partners for review/checks
Final	31/03/2021	Tim Durant, Stefan Gabi	Responding to and incorporating comments received from WP leaders and city partners

Disclaimer

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Abstract

Over the last ten years we have seen waves of private sector investment in urban mobility solutions, from ride-hailing through to shared micro-mobility and the piloting of Mobility-as-a-Service subscription packages. Within the urban logistics sector we also see new services emerging, seeking to reduce pollution and increase efficiencies through improved consolidation and deployment of zero-emission vehicles. For the cities at the forefront of this roll-out of new mobility solutions, there has been a process of introducing new regulatory processes and learning to work in partnership with multiple service providers. In other, typically smaller cities, there are questions of how to attract and form partnerships with private-sector service providers in situations where business cases may be more marginal.

This report sets out to establish conceptual frameworks covering: the business models of urban mobility and logistics solutions; approaches to the formation of mobility and logistics partnerships; and the role these play within an overarching SUMP Financial Strategy. This work is undertaken with the underlying objective of understanding how partnerships with mobility and logistics providers can support the development of SUMP Implementation Strategies (see D1.2). The conceptual frameworks set out in this document form the basis for further research and investigation within the SUMP PLUS City Laboratories and the preparation of a Financial Framework Tool.

List of beneficiaries

No	Name	Short name	Country
1	STAD ANTWERPEN	ANT	Belgium
2	MUNICIPALITY OF ALBA IULIA	ALBA IULIA	Romania
3	KLAIPEDOS MIESTO SAVIVALDYBES ADMINISTRACIJA	KLAIPEDA	Lithuania
4	COMUNE DI LUCCA	COMUNE DI LUCCA	Italy
5	DIMOS PLATANIAS	PLATANIAS CRETE	Greece
6	TRANSPORT FOR GREATER MANCHESTER	TR G MANCHESTER	United Kingdom
7	FONDATION NATIONALE DES SCIENCES POLITIQUE	Science Po	France
8	POLYTECHNEIO KRITIS	TECH UNIV CRETE	Greece
9	UNIVERSITY COLLEGE LONDON	UCL	United Kingdom
10	EUROPEAN INTEGRATED PROJECT	EIP	Romania
12	MEMEX SRL	MEMEX	Italy

13	SPACE SYNTAX LIMITED	SPACE SYNTAX	United Kingdom
14	VECTOS GmbH	VECTOS	Germany
15	ICLEI EUROPEAN SECRETARIAT GMBH	ICLEI EURO	Germany
16	UNION INTERNATIONALE DES TRANSPORTS PUBLICS	UITP	Belgium

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Introduction

1.1 Aim of the deliverable

SUMP PLUS is a project focussed on bringing SUMPs into implementation. The development of a city-level **financial strategy** that complements the implementation strategy (see D1.2) is fundamental to this. Preparing a SUMP Financial Strategy requires an understanding of the funding sources and opportunities at European, national, metropolitan and city levels, as well as the **business models** and revenue streams of individual measures. As private sector mobility entrepreneurs and financiers have become increasingly active in the shared urban mobility sector in recent years (notably ride-hailing and shared micro-mobility), we have witnessed increased diversity in the business models pursued. With respect to urban logistics, there is also an emergence of new solutions that seek to exploit opportunities for improved consolidation of goods and the related operational and financial efficiencies, as well as the deployment of zero emission vehicles. In this context, questions that SUMP PLUS seeks to address are: How can city authorities prepare robust SUMP Financial Strategies that make optimal use of private sector inventiveness and funding sources? To what extent are the business models of new mobility solutions profitable? And can public authorities therefore rely on sustained private sector investment as an element of their SUMP implementation strategies?

On a related matter, city authorities rely on **mobility partnerships** and **freight partnerships** with operators and solutions providers in order to bring their SUMP visions to life. Private sector investment in new forms of collective urban mobility services has challenged city authorities to react and adapt in what has been a public sector-controlled domain. The most progressive cities are also creating partnership platforms that encourage entrepreneurship and the development of new mobility solutions that support city objectives. From the perspective of urban logistics, a different dynamic can be observed, as public authorities seek to more strongly influence a sector traditionally dominated by the supply chains and operations of private businesses. Understanding options for regulation and incentivisation of desirable logistics practices, in order to improve local air quality, road safety and reduce greenhouse gas emissions, is climbing up local authority agendas. SUMP PLUS addresses the question of how city authorities can best form partnerships with the private sector in order to develop, pilot and upscale **new mobility and logistics solutions**.

As there is a strong interplay between the development of a SUMP Financial Strategy, the business models of individual solutions providers, and the proactive development of mobility and freight partnerships, the aim of this deliverable is to develop a clear conceptual basis and analytical framework for these aspects of SUMP implementation. This framework will be used to inform research and co-creation activities undertaken with the SUMP PLUS City Labs (WP2 'City-led Innovation Labs'), and to help shape the SUMP PLUS Financial Framework Tool and Action & Budget Tracker Tools developed in WP1.

By clarifying terms and providing an analytical framework, the deliverable also seeks to contribute to work in other WPs as follows:

- Investigation of how different organisational priorities and underlying political positions can support or hinder partnership formation and the agreement of funding strategies, in liaison with WP3 ‘Governance and Capacity Building’ and in connection with the stakeholder engagement platforms implemented in WP4 ‘Engaging people and business’.
- The provision of a clear conceptual basis for communicating the work of the project and development of policy recommendations and training and capacity building materials in WP6 ‘Findings and SUMP Guidelines’ and WP7 ‘Maximising Impacts and Exploitation’.

1.2 Addressing SUMP PLUS Objectives

This Deliverable, prepared under project Task 1.4 responds directly to the objective: ‘develop new business models, based on new technologies, funding schemes and new forms of public/private sector partnerships, to be customised to innovative mobility solutions.’

It also supports the objective: ‘Develop context-sensitive transition ‘pathways’ to implement coordinated SUMP/SULP in order to achieve the desired sustainable mobility and liveable cities outcomes’, by addressing financial planning aspects of pathway development. In this way it complements D1.2 ‘Developing Transition Pathways towards Sustainable Mobility in European cities’.

1.3 Relationship to the SUMP Guidelines and ‘State-of-the-Art’

As described in D1.2, the development of the European policy community to address urban mobility challenges has been a tremendous achievement, and many European cities have benefited from producing Sustainable Urban Mobility Plans (SUMPs). Nevertheless, cities continue to face great challenges in implementing sustainable mobility policies, particularly with regard to funding and financing. In this respect, SUMP PLUS seeks to complement and build upon knowledge and guidance in certain topic areas. Here we provide a concise review of SUMP Guidelines, Practitioners Briefings and Topic Guides publications relevant to the concepts of Financial Strategies, Business Models and Partnerships covered in this deliverable, which provides the starting point for further elaboration of the SUMP PLUS conceptual and analytical frameworks. The outputs of CIVITAS SUITS are also summarised here as similar topic areas were addressed by the project.

The work of further relevant EU projects are referenced in Sections 2 – 6.

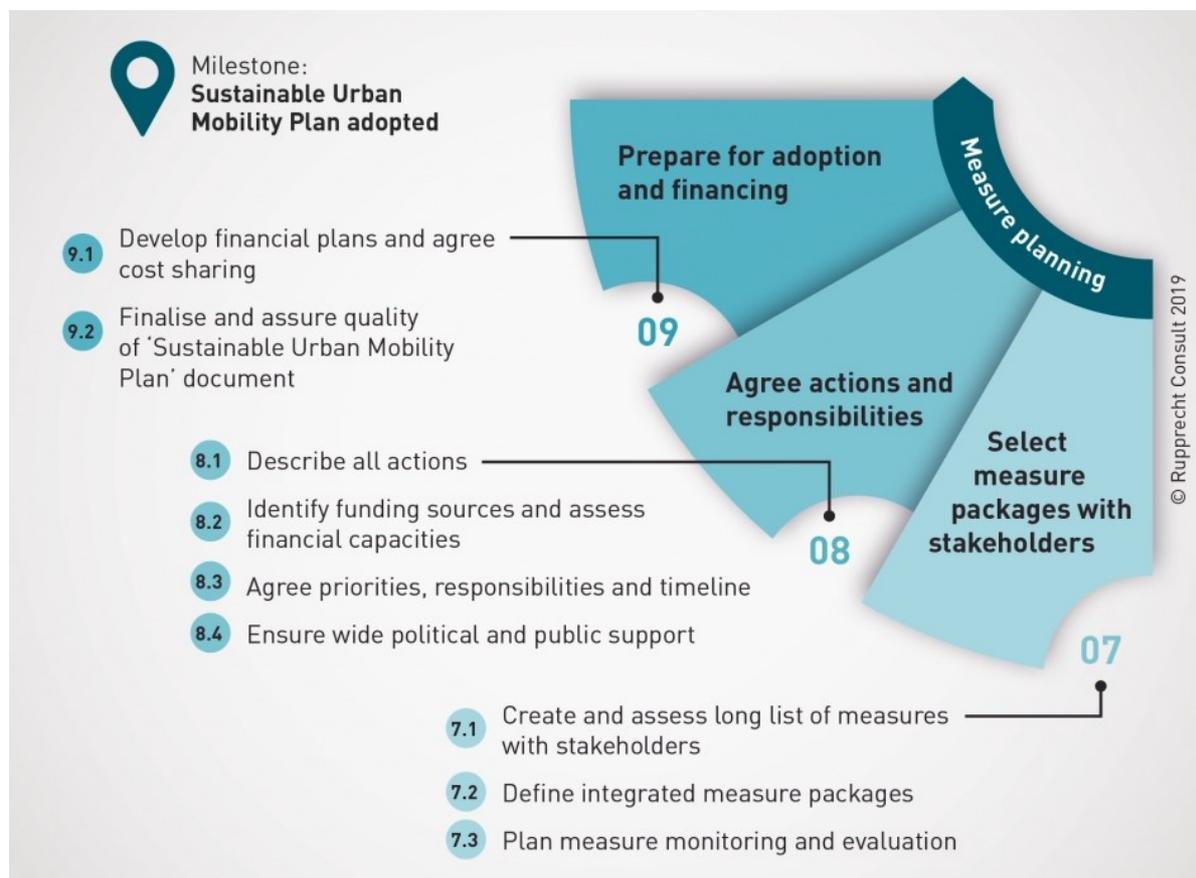
1.3.1 SUMP Financial Strategy

Development of “a clear implementation plan” is highlighted as one of eight core principles in the *Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan*¹ (hereafter referred to as the SUMP Guidelines). Within Activity 8.2, the guidelines recommend that a thorough financing plan is needed and the types of taxation and revenue funding that should be taken into consideration are signposted. Activity 8.3 goes on to stress the importance of

¹ Rupprecht Consult (2019) – <https://www.eltis.org/mobility-plans/sump-guidelines>

prioritising actions, and agreeing responsibilities and timescales for implementation, while Activity 9.1 refers to the development of financial plans.

Figure 1 - Steps 7 to 9 of the SUMP Guidelines (Source: Rupprecht Consult 2019)

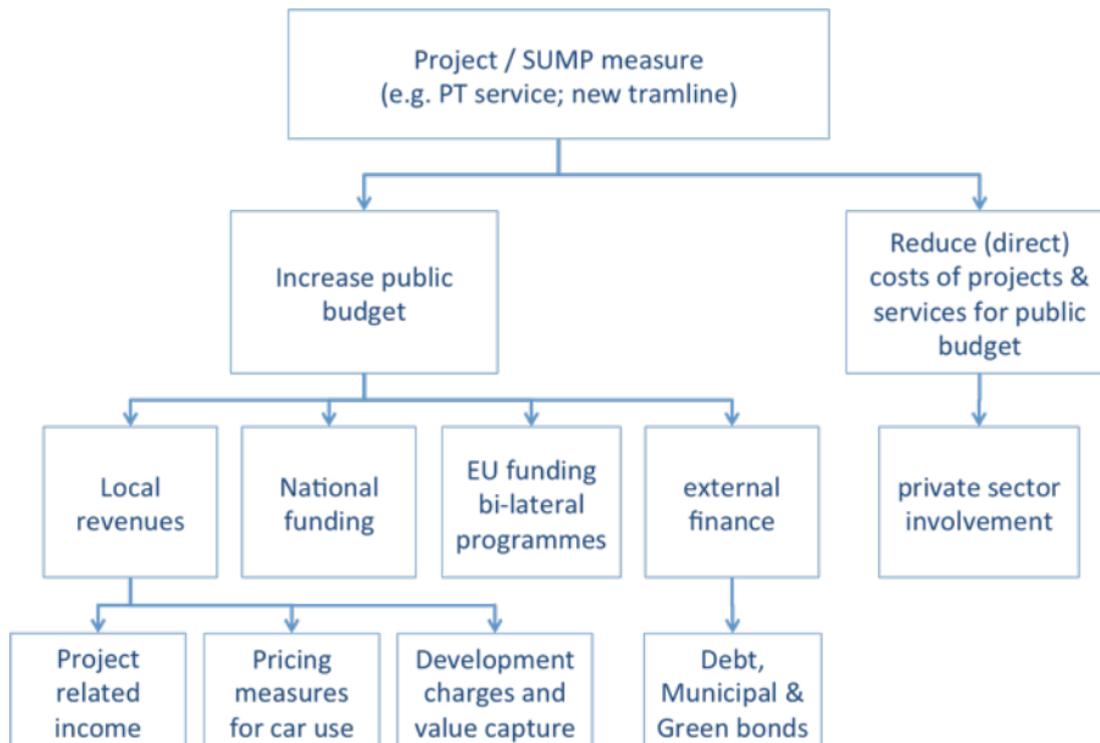


A supplementary Topic Guide, *Funding and Financing of Sustainable Urban Mobility Measures*² contributes further advice, providing an overview of funding and financing instruments that should be taken into consideration (Figure 2). Explanations of funding types, together with case studies including Milan's Area C congestion system and Nottingham's Workplace Parking Levy Scheme, are provided.

The diagram of funding and financing instruments highlights the potential to reduce public budget requirements and subsidies through encouraging private sector involvement. In this regard, the role of Public Private Partnerships in infrastructure delivery is explained. Additionally, the role of ride pooling and taxi sharing services, as flexible mobility options that supplement public mass transport systems (especially in times of low demand for public transport), is highlighted.

² Wuppertal Institute (2019) -

https://www.eltis.org/sites/default/files/funding_and_finance_of_sump_v2.pdf

Figure 2 - Overview of funding and financing instruments from the SUMP Topic Guide

Additionally, the CIVITS SUITS project has developed a *Capacity Building Toolbox*³ (CBT) that contains a list of financing mechanisms that could be used to fill in gaps in funding. These include for example, congestion charges, municipal green bonds, civic crowdfunding, stamp duty land tax etc. Acknowledging the difficulties in recommending or prescribing funding approaches, the CBT advises that the applicability of identified finance mechanisms would depend on the local context and would be determined by existing legislation and policy.

The reviewed publications establish the basic principles for a sound ‘actions and implementation planning’ approach, together with a resource of funding sources to be taken into consideration when preparing a SUMP Financial Strategy. Following on from this, SUMP PLUS seeks to develop further understanding and guidance based on the following principles:

- **Short-term pragmatism and long-term planning** - Funding strategies should be pragmatic, particularly in relation to the early years of the implementation strategy, to ensure that ‘quick win’ measures can be delivered. Development of additional funding applications and/or political commitment and legislation for new forms of funding could have a long-lead time and therefore further opportunities should be explored from the outset.
- **Systematic approach to investigating funding options** – A structured approach to considering which of the myriad funding sources are applicable, to which types of measures, and over what timescales, is beneficial to inform the development of a SUMP Implementation Strategy. Through the application of a Financial Framework Tool, SUMP PLUS seeks to provide the basis for exploring funding options at the

³ Source: <https://cvt.suits-project.eu/suits-tools/idst>

European, national and local levels, taking into account also the opportunities for attracting private sector-led investment and solution implementation within partnerships.

- **Funding mechanisms for measure implementation and behaviour change** - As well as generating funds that can apply directly in SUMP measure implementation, mechanisms such as increased parking charges, congestion charges and low emission zones can also directly influence mobility behaviour, so deserve particular attention in SUMP financial and implementation planning.

1.3.2 Business Models

Interest in the concept of Business Models has grown alongside the growth of private sector investment in new ride-hailing, micro-mobility and demand responsive transport offers in Europe's cities.

The SUMP Guidelines refer to the role of new business models in relation to emerging products and services, including Mobility-as-a-Service (MaaS) and shared mobility, but the document does not provide detail. A supplementary Topic Guide on *Mobility as a Service and Sustainable Urban Mobility Planning* raises the prospect of competition amongst mobility providers and their instinct to protect their respective business models, stating: "In some cities, the tight competition among various stakeholders makes them unwilling to share information, expose their business models and therefore collaborate with their competitors in the same MaaS scheme." The so-called "cannibalisation" of one shared and/or active mode by another is a clear concern that can threaten the financial survival of individual businesses.

Innovative Business Models are also addressed by the CIVITAS SUITS project CBT, which introduces the Ostwalder *Business Model Canvas* and identifies a series of mobility service types where new business models can be observed: car on-demand; micro-mobility; carsharing; ridesharing, bikesharing; and smart parking.

While the topic of Business Models has received considerable attention, particularly in relation to new shared mobility services and MaaS, it is considered that that SUMP PLUS can contribute as follows to further improve understanding and capacity building amongst cities:

- **Business model typologies** – What are the main characteristics of, and differentiators between, business models for mobility and logistics solutions? – E.g. are there big differences in the business models of different e-scooter providers?
- **Penetration of new business models, mobility and logistics solutions** – The SUMP PLUS cities represent a diverse range of typologies. How widespread are private-sector led solutions across these cities? What trends can be observed in relation to their financial sustainability (including in the challenging circumstances of the COVID-19 pandemic)? And what can we learn from this in relation to their contribution to SUMP implementation?
- **Business models for 'aggregator' services and individual mobility and logistics solutions** – The focus within Section 3 is on business models for individual mobility and logistics solutions, while the report does also address the approach of so-called 'aggregator' services. Such travel assistance services and MaaS packages also adopt

key differentiators, including whether they target individual consumers or promote their services to companies.

1.3.3 Mobility and Logistics Partnerships

The term 'partnership' is used in various contexts and therefore it is important to clarify that in the context of SUMP PLUS, the expressions Mobility Partnerships and Logistics Partnerships are used to refer to the relationship between a city authority and mobility providers/logistics providers. This relationship could take various forms, from well-established engagement channels and forums, the signing of memorandums of understanding, through to activities governed by regulation and contracts.

Cooperation across institutional boundaries is a key principle for SUMP development and, as an element of this, the guidelines advise that a SUMP should be based on "coordination with public and private sector providers of transport services". The guidelines go on to stress that "only a SUMP that was developed in cooperation with important stakeholders and the public will be accepted and effective in practical and financial terms" (Activity 1.4). Activity 7.1 also refers to the potential for "...inclusion of new and innovative ideas, alongside measures that would be implemented by the private sector."

Similarly, with respect to city logistics, the Topic Guide *Sustainable Urban Logistics Planning* emphasises that one of the main success factors for implementing an effective Sustainable Urban Logistics Plan (SULP) is to involve all the actors that are "involved directly in urban logistics operations... (i.e. freight forwarders, transport operators, shippers, major retail chains, shop owners,... etc)." The lack of coordination of urban logistics actors and data/information availability are considered to have contributed to insufficient urban planning in the past, despite the fact that the practice of establishing Freight Partnerships as a means to enable collaboration at a local level has been relatively well developed and reported on⁴.

The SUMP-Up *Innovate for Advanced Cities* manual investigates "new ways to cooperate with stakeholders and citizens and open up for participation", describing approaches that include future search workshops, living laboratories and crowdsourcing. The [Urban Mobility Innovation Index](#) (UMii) is also identified as a platform for exchange on innovative mobility solutions amongst city leaders. Additionally, the SUMP *Topic Guide: Public procurement of sustainable urban mobility measures*, introduces different approaches to public procurement that can support bringing innovative services into operation, leveraging the market power that the public sector has in certain areas.

While the importance of stakeholder engagement, including with mobility and logistics services providers, has been emphasised in the SUMP Guidelines and supporting documents, it is considered that SUMP PLUS can contribute further in the following ways:

⁴ Hans Quak et al, 2016 citing Lindholm & Browne 2013 – 'From freight partnerships to city logistics living labs – Giving meaning to the elusive concept off living labs' *Transportation Research Procedia* 12, pp. 461-473

- By understanding the different stances adopted towards the formation of Mobility and Logistics Partnerships, having regard to the accepted roles of the public and private sectors; and
- By researching ways in which SUMP PLUS cities are (or are not) proactively engaging mobility and logistics providers to design, test and upscale solutions that meet city objectives.

1.4 Structure of the deliverable

Following on from this introduction to the aims and lines of enquiry within the Deliverable, the report is structured as follows:

- Section 2 introduces the concept of a multi-level funding chain, in order to establish the role of business models for mobility solutions in context, and to provide a framework for the development of SUMP Financial Strategies.
- Section 3 provides background information on the concept of business models and how this can be beneficial for designing customer-focussed and viable mobility solutions. It then goes on to establish typologies for business models in the fields of both passenger mobility and urban logistics.
- Section 4 describes how mobility partnerships involving city authorities and the private sector are evolving and approaches to fostering partnerships that can help support SUMP delivery.
- Similarly, Section 5 takes a look at the important role of partnerships in urban logistics, presenting an overarching framework for partnerships, regulations, incentives and logistics solutions.
- Drawing the concepts and analytical frameworks together, Section 6 provides an overview of how these will be further investigated and applied within the SUMP PLUS City Labs, and how they will inform the development of the SUMP PLUS Financial Framework Tool.
- The report ends with a brief conclusion, reflecting on the circumstances that will influence work on this topic during the timescales of the SUMP PLUS project.

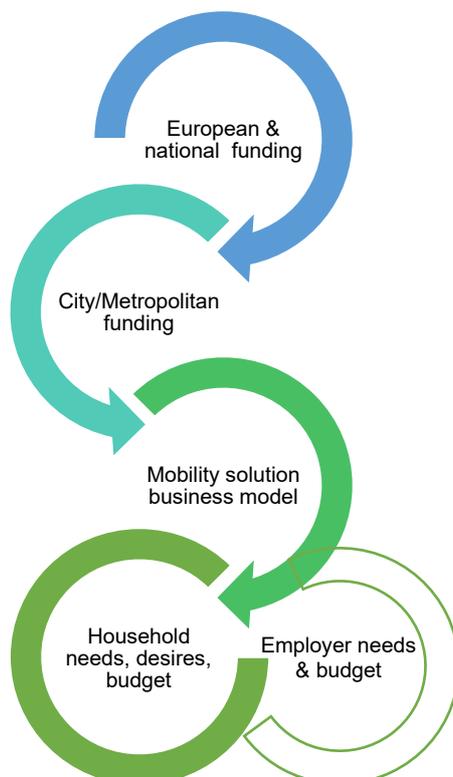
2 SUMP Financial Strategy and the role of Business Models

2.1 Funding a carbon-neutral transition

As established in D1.2, developing a Transition Pathway that has realistic prospects for success needs to be underpinned by financial resources with a degree of certainty and stability that promote confidence in long-term planning. Not all funding sources can be specified 10, 20 or 30 years in advance, but rigorous appraisal of SUMP implementation costs in relation to existing funding levels will contribute to both medium-term implementation planning and the longer-term funding debate at local, national and European levels.

SUMP PLUS proposes an approach to Financial Strategy development that takes into account two distinct elements. Firstly, the interaction between four main levels of a ‘funding chain’ from the perspective of designing and implementing SUMP measures. And secondly, the influence of funding mechanisms on actual mobility behaviour. The levels of the funding chain are presented in Figure 3 and introduced below:

Figure 3 - Multi-level funding chain



- European and national funding** – City authorities often target specific urban mobility funding programmes when developing a SUMP. European and national funding and taxation decisions will also play a role in influencing behaviour at the household end of the chain. For example, taxation schemes for company cars.
- City/metropolitan funding** – In many instances city budgets will form the core of a SUMP Financial Strategy, but these budgets can be variable over time as administrations respond to competing priorities. Balancing of ‘push’ (e.g. car parking charges) and ‘pull’ (e.g. subsidised public transport fares) financial instruments will, additionally, inform people’s mobility choices.
- Mobility solution business models** – Understanding the business models of private sector businesses provides a basis for understanding how partnerships can contribute to ‘win-win’ situations in terms of meeting both private sector commercial goals, and city policy objectives. Business model concepts also involve consideration of how the ‘client’ user group is engaged and a service is accessed.
- Household needs, desires, budgets** – Household mobility financial budgets show a tendency to increase proportionally as overall incomes rise – i.e. mobility is both a basic

need and can be a luxury item. Sustainable mobility should be available for all, as well as convenient, safe and attractive to use. Increasing usage of public and shared transport means the potential for higher revenues to support maintenance, expansion and quality improvements.

- **Employer needs and budgets** – Based on discussions with the SUMP PLUS consortium, it was agreed that businesses should be specifically included within this framework, as major employers in particular can have an important role in providing and funding mobility solutions for their own staff. The City of Antwerp has engaged closely with business through their ‘Approach for Employers’ measure, as part of the Smart Ways to Antwerp campaign, and it is apparent that the business models of several solutions providers focus on a Business 2 Business client group (see Sections 3.2 and 3.3). This is also of relevance for the Greater Manchester City Lab that seeks to develop a joint healthcare and transport strategy, given the role of the National Health Service (NHS) as a major employer.

Developing a Financial Strategy to support implementation planning is a complex area, for example, understanding upfront implementation costs in relation to on-going operational and maintenance costs. In this section we concentrate on providing further background and evidence relating to the Financial Strategy and multi-level funding chain concepts, before then focussing on the specific contribution of business models in relation to these (Section 3). Section 5 goes on to outline the SUMP PLUS Financial Framework Tool and Action & Budget Tracker and the process for developing these within the project.

2.2 Understanding the SUMP funding chain

The main levels of the SUMP funding chain and their roles in supporting SUMP implementation are described in further detail below, followed by a commentary on the role of funding mechanisms in driving beneficial behavioural change (in sub-section 2.2.5).

2.2.1 European and national funding

Funding for SUMP implementation - Major public transport projects often form the ‘backbone’ of SUMP and, given the high capital costs involved, targeting grant funding from European and/or national governments is typically necessary if these are to be delivered. The European Regional Development Fund (ERDF) is a principal form of grant funding offered by the European Commission that aims to strengthen economic and social cohesion by correcting imbalances between regions⁵. The funds have been allocated in relation to 11 thematic priorities that have been set by the cohesion policy, of which two are relevant for urban mobility:

- Supporting the shift towards a low-carbon economy
- Promoting sustainable transport improving network infrastructures

To provide an example of a beneficiary from the 2014-2020 funding period, the ERDF invested 7,915,957 Euros in the project “Improvement of air quality in the Kędzierzyn-Strzelecki Subregion” (Poland), where total investment was 12,851,831 Euros. The project involved the upgrading of public and non-motorised transport infrastructure, including providing 26kms of

⁵ Source: *European Regional Development Fund* - https://ec.europa.eu/regional_policy/en/funding/erdf/

bicycle paths, modernisation of street lighting, the purchase of 19 new buses and improvements to public transport infrastructure, passenger information and e-ticketing services.⁶

Of the SUMP PLUS cities, Alba Iulia in Romania has had recent success in securing European funds for public transport improvements, including the purchase of electric buses through the Regional Operational Programme (2014-2020, Priority Axis 2), as well as demonstration initiatives including the CityChangerCargoBike project that explored both mobility and logistics applications. These sources therefore represent an important factor for SUMP development and implementation planning. For Antwerp there is a greater reliance on funding from national, regional (Flanders) and city sources. For example, recent projects to extend tramlines are joint initiatives of the Flemish public transport company De Lijn, the City of Antwerp and the Flemish Roads and Traffic Agency⁷. An important aspect of the SUMP PLUS implementation planning approach (see D1.2, Section 6.3) is to understand how funding for core measures, such as public transport network improvements, can be leveraged to deliver supporting measures via other funding streams.

2.2.2 City and metropolitan funding

It is at the level of a metropolitan or city budget that the preparation of a SUMP Financial Strategy is focussed. EU and national budget contributions are a significant and important portion of an urban mobility budget, but 'local' sources of funding are also added to the pot. The graphic representation of an 'urban transport budget' and the various revenue and taxation incomes prepared by CODATU is a very useful visualisation⁸ (Figure 4) and this provides an important inspiration for the SUMP PLUS Financial Framework Tool that will be developed to assist city authorities in the development of funding approaches (see Section 6.2). As shown, the Urban Transport Budget diagram defines four main 'contributors' to the urban mobility budget, comprising: (i) taxpayers, the ultimate funders of public authorities; (ii) partners, such as donor agencies and banks that offer financing, typically in relation to major infrastructure projects; (iii) the indirect beneficiaries of transport investment, such as property developers, businesses and shops; and (iv), the direct beneficiaries of passengers that contribute back into the mobility budget through fares and subscriptions. For SUMP PLUS, it is interesting to understand the extent to which the proportion of each finance and funding stream varies between cities, providing an understanding of which forms of transport are subsidised (and to what degree) and where certain forms of funding are not currently exploited, representing a future opportunity.

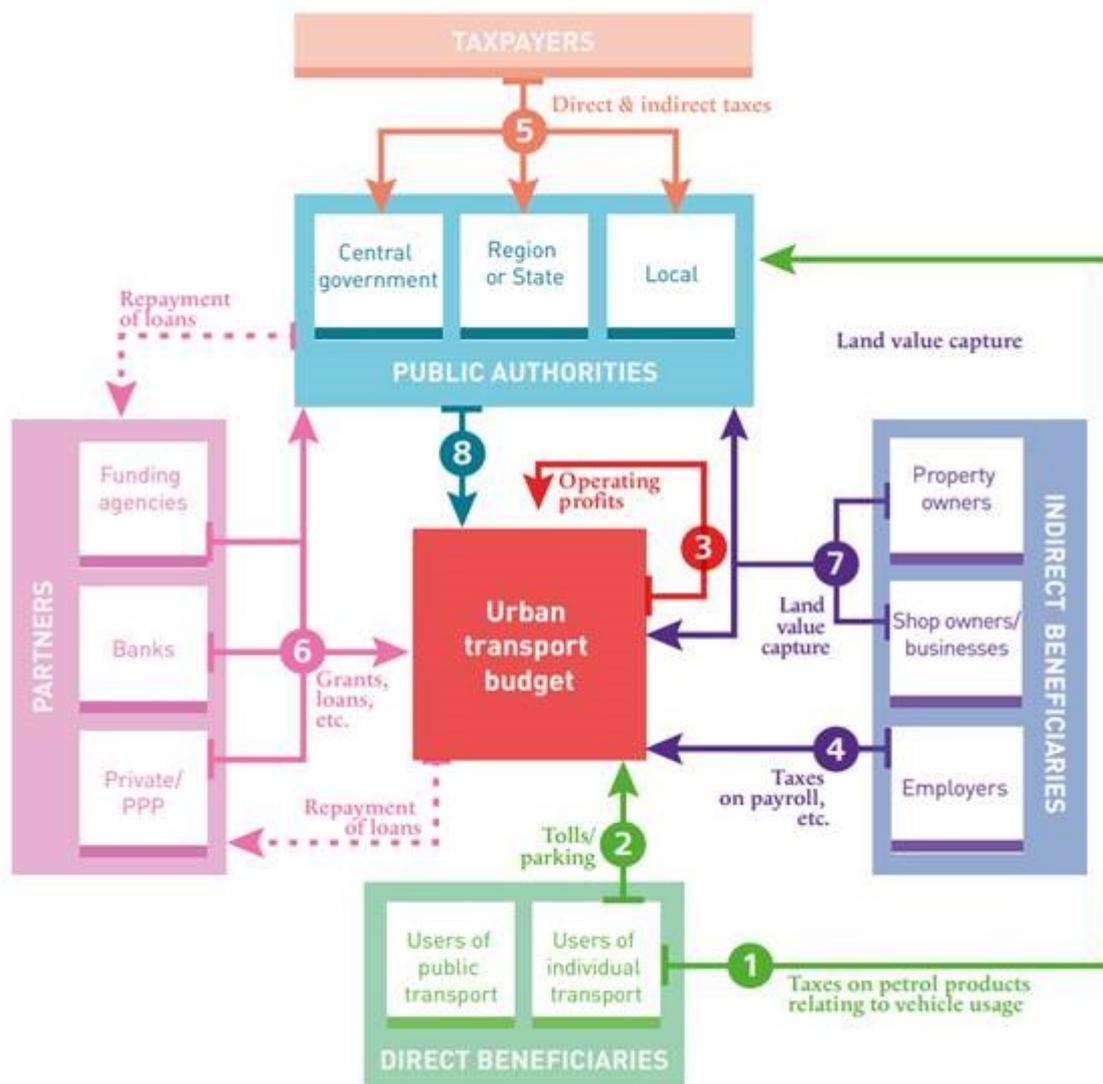
⁶ Source: EC, *Poland's Kedzierzyn-Strzelecki subregion improves public transport for better air quality* - https://ec.europa.eu/regional_policy/en/projects/Poland/poland-s-kedzierzyn-strzelecki-subregion-improves-public-transport-for-better-air-quality

⁷ Railway Pro (2017) *Antwerp makes significant tram changes* - <https://www.railwaypro.com/wp/antwerp-makes-significant-tram-changes/>

⁸ CODATU (2014) *Who Pays What for Urban Transport? Handbook of Good Practices*

While the CODATU diagram provides a helpful basis for understanding funding frameworks, it implies a detachment from other city budgets that tends not to be the case in reality. Discussions with SUMP PLUS cities suggest that tracing direct contributions from different forms of city government income to an “urban mobility budget” would be very difficult, which makes the development of a SUMP Financial Pathway more challenging. In the case of Klaipeda, it is the city authority’s Strategic Plan covering a 3-year timescale that provides the starting point for implementation planning.

Figure 4 - The funding flows of an urban transport budget



In this context, and as a starting point for SUMP financial pathway development, it is suggested that there are five key questions:

- **How much is the public authority willing to pay for sustainable urban mobility?**
In other words, to what extent is a city willing to prioritise sustainable urban mobility within its budget? For example, provision of free public transport is a growing trend and in 2016 there were 107 entirely fare-free public transport networks around the world,

including over 30 in France⁹. Within Europe, Tallinn is a high profile example of a city that took the decision to provide “free” public transport for residents, who only need to pay a 2Euro fee for a green card in order to access buses, trams, trolleybuses and trains¹⁰.

- **What is the most cost-effective means to utilise available budgets?** Weighing the impacts (GHG emissions reductions, congestion reduction, road safety) that might be achieved by different types of measures, relative to cost and deliverability, will be important in order to prioritise measures within a SUMP.
- **To what extent is the city authority willing to use financial instruments as ‘push’ measures to influence behaviour?** – Higher parking charges and Urban Access Restrictions provide means to generate income while discouraging private car use as the routine mobility choice (see sub-section 2.2.5).
- **Is the city authority willing to “ringfence” funds generated by the mobility sector in order to invest in sustainable urban mobility?** – London’s Congestion Charge is a well-known example of where revenues from the charge were circulated back in to public transport improvements¹¹. Within the frame of the CIVITAS PORTIS project, the City of Constanta planned new parking restrictions and investigated the option of “ringfencing” income for sustainable mobility improvements.
- **Should other sectors contribute to urban mobility budgets?** – As transport is partially a derived demand from decisions made in other sectors (e.g. health, education, tourism, retail, etc.) to what extent, and in what way, is it reasonable to expect those sectors to contribute financially (or “in kind” through direct service provision) to urban mobility.

These questions will be taken into account in formulating the SUMP PLUS Financial Framework Tool.

2.2.3 Mobility solution business models

Interest in business model concepts and how these apply to SUMP development and implementation has grown as a result of two main factors. In recent years the urban mobility sector has experienced a wave of private sector investment and innovation, taking the form of ride-hailing, shared micro-mobility and urban/suburban-focussed Demand Responsive

⁹ Metropolitics (2018) *Dunkirk as a New “Laboratory” for Free Transit* - <https://metropolitics.org/Dunkirk-as-a-New-Laboratory-for-Free-Transit.html>

¹⁰ The Guardian (2016) *The Tallinn experiment: what happens when a city makes public transport free?* - <https://www.theguardian.com/cities/2016/oct/11/tallinn-experiment-estonia-public-transport-free-cities>

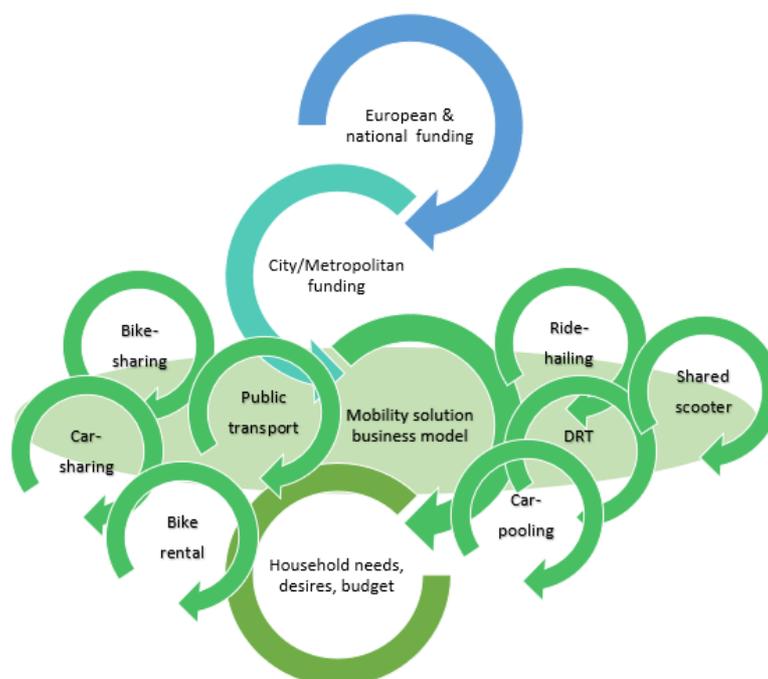
¹¹ C40 Knowledge Hub. *How road pricing is transforming London – and what your city can learn* - https://www.c40knowledgehub.org/s/article/How-road-pricing-is-transforming-London-and-what-your-city-can-learn?language=en_US#:~:text=In%20the%20first%20year%20of%20congestion%20charging%20alone%2C%20London%20saw,for%20transport%20investment%20per%20year.

Transport services. During a similar timeframe we have also seen the advent of Mobility-as-a-Service as a means for integrating diverse transport offers to create intermodal packages for businesses and individuals. There is no doubt that new and exciting forms of mobility service have been introduced, with convenient access enabled via the swipe of a smartphone app. It could also be observed that this has raised expectations as to the potential for increased contributions of private sector finance and funding within urban mobility systems, following a period when public sector budgets were particularly constrained by austerity measures.

Developing a SUMP Financial Strategy opens the opportunity to explore the contributions of private sector providers, both from the perspective of benefitting from private sector funding and service delivery, and in relation to the “user-centric” nature of new mobility services and business model development – i.e. how to connect with a client user group, price products and provide convenient access.

At the same time, the financial realities of business need to be taken into account. As illustrated in Figure #5#, there is not one business model in the overall city funding-chain, but several cooperating and/or competing with one another. In their report *Mobility Services: turning business models into profits*, the consulting firm Accenture comment that “despite significant investments and growth, many leading transport companies have not cracked the code on how to profit from mobility services.” Stressing that profitability in mobility relies on “uptime” and efficient use of vehicles, they go to advise that service providers should pool their fleets into a single, seamless platform.¹² They are referring to vehicle fleets within a single company. Cooperation within MaaS provides a unified channel for companies to reach customers, while an element of competition amongst modes and organisations remains.

Figure 5 - Multiple cooperating and competing business models



¹² Accenture (2020) *Mobility services: Turning business models into profits* - <https://www.accenture.com/us-en/insights/automotive/mobility-x>

From the perspective of cities, the question over profitability of mobility services raises further questions. Can we depend on key mobility services being available in the long-term and should a city be prepared to step in and provide financial support in the event of failure? This issue is further addressed in Section 4.

2.2.4 Household needs, desires and budgets

As the consumers of urban mobility services, authorities and operators seek to provide us with attractive services at prices we are able and willing to pay. The data available on household spending on transport at a European level is rather dated, but figures from 1990 through to 2008 suggest that the share of income households spend on personal mobility has remained relatively stable across time and countries. In 2007 total spending on transport services, purchase of vehicles and operation of transport equipment was 12% in Belgium, 10.4% in Greece¹³, 13.4% in Italy, 16.7% in Lithuania, 16.1 in Romania and 15.3% in the UK.

The stability in the share of income spent on transport demonstrates the value people place on mobility. For example, long-term falls in the average price of vehicles appear to have been countered to some extent by the purchase of more expensive models. Similarly, in time periods when transport prices have fallen in relation to average incomes, the volume of transport has tended to increase¹⁴. Based on this, it would be expected that Financial Strategies and business models can assume stable or buoyant demand for transport, although it will be interesting to observe the recovery of the mobility sector following the lockdowns of the COVID-19 pandemic and changes in work practices.

From a social inclusion perspective, a key driver is to ensure that sustainable mobility options remain affordable for low income households. The notion of 'forced car owners' (i.e. households owning a car despite financial difficulties)¹⁵ tends to be found in the context of outer suburbs with poor links to public transport, but the City of Antwerp is also concerned that emerging MaaS subscription packages for residents across the urban and metropolitan area are out of financial reach for a portion of residents. It is for this reason that the Antwerp City Laboratory includes a specific Activity to investigate this matter.

¹³ This increased to 13.5% in Greece by 2018, against an EU average of 13.2%.

¹⁴ European Environment Agency (2011) *Indicator Assessment: Expenditure on personal mobility* - <https://www.eea.europa.eu/data-and-maps/indicators/expenditure-on-personal-mobility-2/assessment>

¹⁵ University of Leeds (2017) *Editorial – Household transport costs, economic stress and energy vulnerability*

2.2.5 SUMP funding approaches as a means for promoting behavioural change and sustainable mobility

There is the potential that certain funding mechanisms, such as car parking charges, can both influence travel choices and contribute to the funding of sustainable mobility infrastructure. Alignment of policies at different levels of the funding chain, and decisions regarding which forms of infrastructure and services should be subsidised, is of vital importance in this regard. For instance, in a negative scenario, a city authority could decide to invest part of its budget in sustainable travel planning for businesses, but with impacts significantly hampered by subsidies for company cars and fuel prices that do not fully reflect ‘polluter pays’ principles. In a more positive scenario, public sector subsidies, at European, national and local levels, and travel costs are aligned in order that behavioural changes increase the usage and revenues of collective, shared and alternatively fuelled forms of mobility in a virtuous cycle.

To expand on the example raised earlier, it is estimated that company cars cost Europe’s taxpayers around 32 billion a year in subsidies, with the result that car driving is incentivised and alternative means of transport are less attractive. With 60% of new cars sold to companies (of which 96% were petrol and diesel in 2019 – according to date for Germany), the second-hand car market is also heavily influenced by company car regulations. It should be noted that the levels of such subsidies do vary significantly from country to country, with those in Germany being the highest. With respect to how this issue is now being addressed, Belgium’s new coalition government has committed to allowing favourable tax treatment for zero-emission company cars only by 2026¹⁶, helping to promote a shift to electric-mobility. An alternative or complementary approach is to offer a “Mobility Budget” to employees in place of a company car, which would have the dual benefit of removing the incentive to drive as the routine choice, while pumping revenue into sustainable mobility networks¹⁷.

As decisions are typically taken at the member state level, discussions with national governments on funding sustainable mobility should be broadened beyond a focus on direct funding for infrastructure, in order to ensure alignment with efforts to promote sustainable mobility at the city level. For example, more forceful carbon pricing mechanisms, such as those now planned in Germany, will influence mobility choices at the household end of the funding chain. Until recently, Greenhouse Gas Emissions from the transport and building heating sectors have not had a German or EU-wide price. In December 2019, the German government took the decision to put a price on greenhouse gas emissions in the transport and building sectors from 2021 as a key instrument to help reach its climate targets. This system envisages a fixed price of 25 euros per allowance (tonne of CO₂ equivalents – meaning ~7 cents price increase for a litre petrol), with annual increases in order to reach 55 euros by 2025¹⁸. Market-based pricing approaches, such as this carbon taxation mechanism, provide opportunities to

¹⁶ Energypost.eu (2020) *Only giving tax breaks to zero-emission company cars will accelerate e-mobility* - <https://energypost.eu/only-giving-tax-breaks-to-zero-emissions-company-cars-will-accelerate-e-mobility/>

¹⁷ Deloitte (2019) *The Mobility Budget, a second alternative for the company car* - https://www2.deloitte.com/content/dam/Deloitte/be/Documents/tax/Deloitte_Mobility-Budget-EN.pdf

¹⁸ Clean Energy Wire (2020) *Germany’s carbon pricing system for transport and buildings*

channel/ringfence tax revenues to support provision of sustainable mobility infrastructure, as well as the potential for increased usage and revenues for sustainable modes in the long-term.

2.2.6 Applying and developing the SUMP funding chain in SUMP PLUS

As described in Section 1.2, there is the potential to provide a structured and more holistic approach to investigating funding options to complement the existing suite of SUMP guidance. The funding chain described above provides one element of a framework that will be used to inform the co-creation of Implementation and Funding Strategies with Klaipeda and Platania, as well as implementation management in the case of Alba Iulia. Additionally, individual aspects of the funding chain will be investigated within City Labs, such as specific activity relating to the affordability of MaaS solutions in Antwerp, as referred to above. Section #6# provides an overview of relevant project activities, as well as how the SUMP PLUS Financial Framework tool will be deployed in order to undertake gap analysis of SUMP funding streams and identify new opportunities for funding mechanisms that might be deployed.

Having established the role of business models for mobility solutions within the funding chain, in the next section we set out to explain further the concept of business models and the distinctions between business models for passenger mobility and logistics.

3 Developing an analytical framework for business models: mobility and logistics

Having established the role of business models for individual mobility measures and solutions within a ‘funding chain’, in this section we investigate further the typologies of business models emerging within urban passenger and logistics systems. We begin by outlining the overall concept, before then identifying distinctions between business models in the urban mobility sector and the extent to which these are present in the SUMP PLUS cities. This is followed by consideration of business models emerging in the urban logistics sector, further informing the development of a framework for considering the role of private sector solutions providers in SUMP delivery.

3.1 The concept of business models

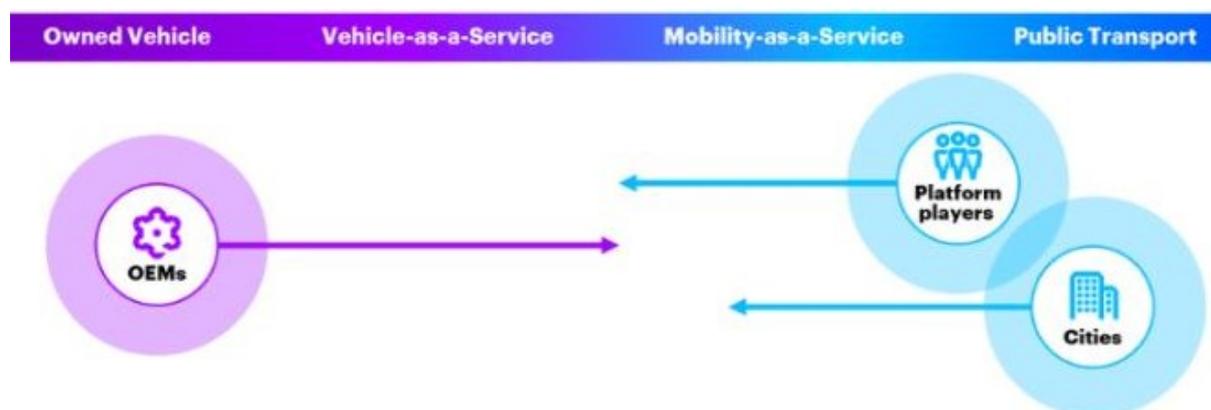
As referred to above, the emergence of new on-demand and shared mobility services has raised expectations regarding the potential of new business models to deliver and sustain investment. In order to appraise the opportunities, it is necessary to first define what is meant by business models, and to then set this in the context of a city authority developing an implementation Pathway for sustainable mobility.

The business model concept first gained popularity during the dotcom boom of the 1990s, at which time it was used to communicate complex business ideas to potential investors within a short time frame¹⁹. There are numerous definitions, but the GECKO project identified a particularly useful and well captured interpretation, citing a paper by Teece (2010) *Business models, business strategy and innovation*:

“A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value... It’s about the benefit the enterprise will deliver to customers, how it will organise to do so, and how it will capture a portion of the value that it delivers.”

This emphasis on the value proposition for the customer is of importance with respect to enticing people to try new forms of mobility, providing alternatives for customers to the dominant business approach of an “owned vehicle”, as represented in this Mobility Spectrum diagram in Figure 6. This depicts a range from privately owned cars, through private use of shared vehicles (Vehicle as a Service), to Mobility as a Service combining shared mobility and public transport.

¹⁹ <https://www.sciencedirect.com/science/article/pii/S0959652618318961>

Figure 6 - Mobility Spectrum²⁰

Numerous tools to inform and inspire the creation of new business models have been promoted. For example, with shared mobility services as a focus, EY designed a four-layered mobility business model that presents variables across four key layers: Infrastructure/resources, Value proposition, Customer segments, and Partners/stakeholders.²¹ Although this approach incorporates 'infrastructure', this might be viewed as solution-specific infrastructure such as a charging station. It is not clear that the road, cycleway or parking space infrastructure features prominently within the business models of new mobility solutions, hence the importance of forming partnerships with public authorities.

An approach to analysing business models with enduring popularity is that of Alex Osterwalder, who developed the Business Model Canvas template. This template was developed with the aim that, the essence of how a business idea will create, deliver and capture value can be illustrated on a single page. The Business Model Canvas has been promoted and applied in a range of EU research projects, including CIVITAS DESTINATIONS, GECKO, SOCIALCAR and SUITS.

An important aspect of the Business Model Canvas is that it is not focussed only on financial aspects, but on the 'Value Propositions' offered to a specific client group. As shown in Figure 7, the canvas is therefore divided into three main segments, which are further divided into nine building blocks in total. The three segments are: 'Desirability', 'Feasibility' and 'Viability'. The Desirability of a product or solution is the first aspect to be addressed²².

Desirability – Do customers want it?

The four building blocks within this segment are:

- **Value propositions** – describing the bundle of products and services that create value for a specific Customer Segment.

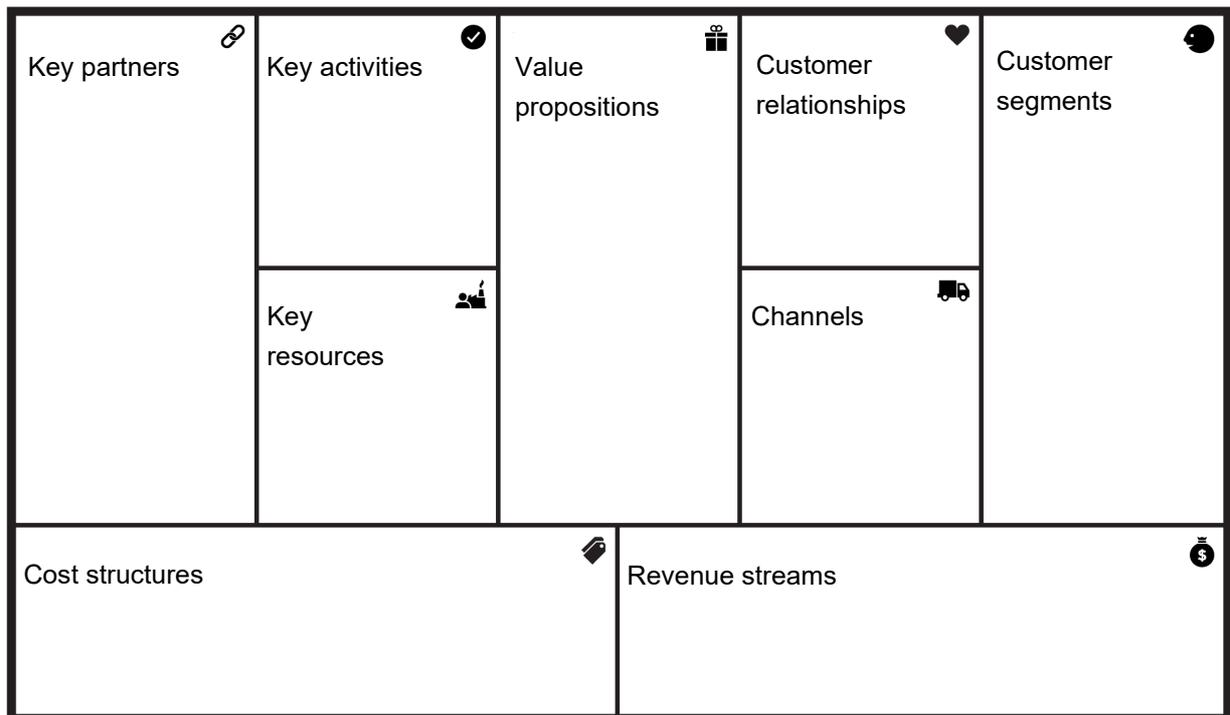
²⁰ Sourced from: Accenture (2020) *Mobility services: Turning business models into profits* - <https://www.accenture.com/us-en/insights/automotive/mobility-x>

²¹ EY (2020) *Urban mobility redefined: Sharing is the new buying*

²² Strategyzer *Business Models: a business model describes the rationale of how an organisation creates, delivers and captures value.*

- **Customer segments** – defining the different groups of people or organisations a business aims to reach and serving customers is at the heart of any business model.
- **Channels** – describing how a company communicates with and reaches its Customer Segments
- **Customer relationships** – this relates to relationship options such as personal or automated.

Figure 7 – The three segments and nine building blocks of the Business Model Canvas



Feasibility – can we deliver it?

- **Key resources** – describing the most important assets required to make a business model work, which could vary from infrastructure through to an IT platform or human resources.

- **Key activities** - describing the most important things a company must do to make its business model work.
- **Partnerships** – describing the network of suppliers and partners that enable a business to optimise its product, reduce risk or acquire resources.

Viability – what is it worth?

- **Revenue streams** – representing the one-time transaction payments or the potential for recurring revenues through subscriptions.
- **Cost structure** – The cost structure describes all costs incurred in order to operate a business.

Understanding these structuring elements for a business model provides insights into how similar mobility solutions can be underpinned by different business approaches in each of the three main segments.

3.2 Main categories of solutions and business models in the urban mobility sector

For the purpose of SUMP PLUS and the cities involved in the project, it is beneficial to understand what the categories and characteristics (and differentiators) of business models for mobility solutions are. The aim in doing so is to provide a framework for understanding which business models are applied by operators in different cities, and whether there is potential for these to be transferred and introduced in other contexts to support SUMP implementation.

Examples of approaches to systematically compare mobility service business models are those pursued by the GECKO project and 'Board of Innovation'. While reviewing business models, GECKO defined four main categories of new mobility services: Connected, cooperative and automated mobility; Infrastructure, network and traffic management; MaaS and MaaS Platforms; and Shared On-demand Mobility. The Business Model Canvas was then applied in order to understand the underlying concepts for each product and service²³. Board of Innovation (BoI), an independent consulting company, applies its own business model mapping approach in order to visualise and present key organisational, value proposition and revenue generation aspects of five urban mobility companies.²⁴

These comparative studies provided useful resources that, supplemented with other examples, enabled the population of a table comparing the business models of ten mobility solution providers (see Table 1). The table is structured to distinguish between four main types of solution (shared mobility; ride-pooling / DRT; car pooling; journey planning/ travel assistance services), which provided insights into sometimes subtle differences in business model and approach. This led us to define three main factors for categorising mobility solutions, and the business models underpinning these, for application within SUMP PLUS:

²³ GECKO (2019) *Deliverable 1.2: Review of business models for new mobility services*

²⁴ Board of Innovation. *Mini Guide: Mobility business model examples*

- **Value propositions** - individual mobility solutions or Mobility as a Service (integrated/aggregated solutions) as two main categories relating to the Value Proposition building block of the Business Model.
- **Customer / client segment** – with services sold direct to consumers, to an employer or to a public authority
- **Revenue streams** – with some providers found to combine different forms of revenue

These basic categories form the basis for identifying the current deployment of business models in SUMP PLUS cities (section 3.3) and these are explained further below.

Main value proposition - Individual mobility solutions or Mobility as a Service (integrated/ aggregated solutions) - With reference to Table 1, the solutions within the shared mobility, ride-pooling/DRT and car pooling categories can be considered individual mobility solutions. Separate to these, the journey planners can be viewed as ‘aggregators’ that seek to compare and recommend different mobility solutions, or combinations of solutions to provide intermodal trips. There are numerous examples of private sector apps that seek to fulfil this journey planning function, including Google, Moovit and Urbi. In the case of Citymapper’s operations in London, the company has branched out from providing a journey planning app, to also providing a travel card that offers a form of payment integration.

Please note that Table 1 does not present the subscription MaaS services such as Whim that could be considered a fully integrated mobility package covering shared bikes, taxi, car rental and public transport.

Customer / client segment – with services sold direct to consumers, to an employer or to a public authority - Provision of carpooling services provides an example of a solution that may feature in a SUMP, where alternative business models have been tried and tested by service providers in practice. For example, Liftshare was the first car-pooling system provider in the UK and after 20 years in business remains the largest. The company provides services and advice on sustainable mobility options direct to companies as the core of its business²⁵, taking care of their travel planning needs. In contrast, NaboGo, a car-pooling provider founded in Denmark provides a digital carpooling platform on behalf of public authorities, by agreeing a service contract for a multi-year period. This company intends to also integrate journey planning information in order that app users are presented with both public transport and carpool journey options. And finally, as shown in Table 1, Waze deploys two revenue approaches in order to create a viable business model. For carpooling it charges a fee for each lift taken and through its journey planning app, it also advertises local services and offers that are geo-sensitive, based on the location of the traveller.

Revenue streams - In order to create a financially viable operation, as in the case of Waze, it is evident that businesses sometimes seek multiple forms of revenue generation across the main categories of Business to Consumer (B2C), Business to Business (B2B) and Business to Public Authority. For example, it is understood that Citymapper sells aggregated mobility data to city authorities, combined with offering travel card services direct to consumers. The

²⁵ Liftshare does also provide services to direct to local authorities and the public, but the offer to companies is at the centre of its business model.

shared e-scooter operator BIRD operates a B2C service across many cities, including Antwerp, but also offers its e-scooters for direct sale to customers.

By introducing variations in their business models, other solutions providers have found ways to stabilise incomes or cut costs. Swapfiets offers bicycles for long-term rental rather than single trip hire within a bike-sharing scheme, and can therefore anticipate more consistent income regardless of actual usage levels. HelbizGo e-scooter sharing is based on a characteristic pay as you go B2C approach, but the company seeks to reduce operating costs by paying users that recharge the batteries.

Navigating a complex marketplace of solutions and business models

The mobility spectrum presented in Figure 6 provided a straightforward means to visualise the range of mobility business model categories, from vehicle ownership through to MaaS and public transport, but conceals many of the hybrid approaches developing and competing in the market. For example, the service models of car manufacturers are also evolving to respond to changing customer expectations and policy drivers. The Citroen AMI compact vehicle is marketed using slogans: 100% electric, accessibility for all, mobility for all, and freedom. Due to its vehicle classification as a quadricycle, it is possible for people as young as 14-16 (depending on licence regulations in the Member State) to drive it, and it will be made available through a car-sharing platform, long-term rental/leasing (from around 20Euros per month, following a down payment of 2,600Euros) and the traditional vehicle ownership model (around 6900Euros).²⁶



As a rather crude comparison, monthly pricing of around 40Euros (taking into account assumptions for parking and insurance) could be viewed as competitive in relation to emerging MaaS subscription packages that are being piloted in Antwerp²⁷. When reviewed in September 2020, Whim Everyday packages were offered at a price of 55Euros/month

including unlimited bus, tram and Velo shared bike usage, 10Euros of taxi credit and “pay as you go” for train Mobit bike and car rental. It is clear from the examples presented above that the individual business models of mobility solutions are carefully calibrated and that the challenge of constructing attractively priced packages across multiple providers and business models is not to be underestimated. The recently published MaaS Alliance *MaaS Market Playbook* highlights limited awareness about the total lifetime costs of owning a private vehicle as a factor that could hamper market growth for new mobility solutions.

In such a complex landscape of new mobility services, city authorities need to establish appropriate means for forming partnerships with mobility service providers, that provide the

²⁶ TechCrunch (2020) *Citreon introduces a two-seat EV that costs 19.99Euros a month*; EFAHRER.com (2021) *Citreon Ami im Test: So Viel Elektroauto geht fuer 20 Euro pro Monat*

²⁷ Assuming that insurance for young drivers is approximately 50% of direct vehicle ownership costs and that parking is an additional 30% (<https://inrix.com/press-releases/cod-uk/>) then a basic monthly cost of around 40Euros could be assumed, following the large downpayment.

flexibility for businesses to flourish, while providing a framework for meeting city objectives. The SUMP PLUS Financial Framework Tool could assist cities to identify where private sector operators can support delivery of a specific mobility service, but whether a city then directly procures a service, or provides an open framework for competition amongst different providers, remains an important question. This is the subject explored further in Section 4, after we investigate the business models currently deployed in SUMP PLUS cities and emerging business models in urban logistics.

Table 1 – New Mobility Service Business Models – selected examples

Customer client segment	Value proposition		Shared mobility			Ride-pooling/ DRT		Carpooling		Journey planning		
			BIRD	Swapfiets	HelbizGo	Uberpool	ViaVan	LiftShare	NaboGO	Waze	Citymapper	IMOVE
	Service offered	Dockless E-scooter sharing	Bicycle leasing	E-scooter sharing	Shared rides	Shared rides	Carpooling + travel planning	Carpooling	Navigation + carpooling	Navigation + travel card	MaaS package	
Service timescale	On-demand	Monthly	On-demand	On-demand	On-demand	Year/ multi-year	Year/ multi-year	On-demand	Monthly	Pilot scheme		
Business 2 Consumer	Revenue approach	Pay as you go	1\$ to unlock + 0.15\$/minute	Pay as you go; users paid to charge e-scooters	Pay as you go – savings, especially at peak times	Pay as you go – fixed price, plus time / distance surcharge			Fee for every carpool ride			
		Subscription		20Euro/month						Travel card subscription		
		Ownership/ purchase	\$1,299 for e-scooter									
Business 2 Business		Advertising							Location-sensitive virtual billboards			
		Licensing/ franchise	Licenses for independent operators									
		Service + reporting					Service contract	Service contract			MaaS for new developments	
Business 2 City	Data					Service contract (PTA, Schools)		Service contract		Aggregated mobility data		

Multiple sources: Board of Innovation. *Mini Guide: Mobility business model examples*; GECKO (2019); IMOVE project, Gothenburg pilot (2019); SMARTA (2020)

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3.3 New mobility solutions and business models in SUMP PLUS cities

Investment in new shared mobility solutions across Europe is uneven, with larger cities tending to present the best potential for returns on private investment, and regulatory stances also influencing the decisions of companies. In this section we investigate the mobility services and business models present in the SUMP PLUS cities, in relation to the following:

- Shared and on-demand mobility services:
 - Demand Responsive Transit and Ride-pooling
 - Ride-hailing/sourcing
 - Car sharing
 - Car pooling
 - Moped-sharing
 - Bike-sharing
 - E-scooter sharing
- Journey planners and MaaS (as aggregators of mobility services):

In line with the categorisation of mobility solutions and business models described above, in each case we portray the Business 2 Consumer (B2C) and Business 2 Business (B2B) services currently available and provide a commentary addressing the comprehensiveness (or otherwise) of mobility services, and conclude with observations arising from the experience in each city.

This exercise results in the following summary observations:

- There is wide variance in terms of the distribution of private-sector mobility solutions, reflecting trends expected at a European level. As a larger city, it is apparent that the City of Antwerp has received significant interest from private sector mobility providers in comparison to Lucca, for example. We therefore need to be cautious about assuming a business case for a mobility solution in one city will work in another.
- Regulatory approaches, for example in relation to ride-hailing services and e-scooters, have played a role in altering the distribution. For example, it might be assumed that Greater Manchester would be an attractive location for an e-scooter sharing system, but until recently the penetration of these systems has been prevented by UK regulations.
- Cities with a relatively high reliance on the tourism economy, in particular Platánias, typically have a good rental offer for bicycles, mopeds and cars, suiting typical holiday-makers. This does not translate to a convenient solution for the everyday mobility of residents, but may represent an opportunity.
- The provision of mobility services direct to companies as customers, either as individual forms of mobility or a MaaS / aggregator solutions, is particularly well advanced in Antwerp. This may represent a particularly beneficial form of transfer amongst the cities and should be included in the Financial Framework Tool as a consideration.

3.3.1 Alba Iulia

Table 2 - MaaS aggregators and mobility solutions in Alba Iulia

MaaS B2C	No MaaS service							
MaaS B2B	No MaaS service							
Mobility Solutions B2B								
Mobility Solutions B2C								
ALBA IULIA	Public transport	DRT/ Ride-pooling	Ride-hailing/sourcing	Car sharing	Car pooling	Moped sharing	Bike-sharing / rental	E-scooter sharing

Overview of new mobility solutions - The city of Alba Iulia has been highly engaged in SmartCity programmes and pilots, but with an emphasis on other technologies, rather than the mobility solutions covered in this appraisal. *The Business Case for Smart Cities: Alba Iulia* report (2017) produced by Siemens and Arup refers to the following technologies and systems being investigated in the smart transport model for the region: operational sensors, real time journey planning and smart parking management.

Unlike larger cities in Romania, and Bucharest in particular, Alba Iulia has not yet seen ride-hailing or car sharing companies launching their services in the city. There are plans that the bicycle rental services offered by Bucharest-based company i'Velo will include E-bikes. Additionally, the city has commenced a partnership with Lime that will involve the provision of around 200 e-scooters in 25 locations across the city.

MaaS packages - The public transport operator STP offers journey planning on its website and app, but at present there is no integration of the existing car-sharing offer or bicycle rental information.

3.3.2 Antwerp

Table 3 - MaaS aggregators and mobility solutions in Antwerp

MaaS B2C	 							
MaaS B2B	 							
Mobility Solutions B2B				  			 	
Mobility Solutions B2C	  			  		 	     	  
ANTWERP	Public transport	DRT/ Ride-pooling	Ride-hailing/ sourcing	Car sharing	Car pooling	Moped sharing	Bike-sharing / rental	E-scooter sharing

Overview of new mobility solutions - As portrayed in Table #, residents and visitors to Antwerp have the potential to access a wide range of mobility services. Cycle sharing and rental options are particularly diverse, including the dock-based Velo bike-sharing system and free-floating Cloudbike (utilising geo-fenced drop zones), as well as the long-term rental services offered by Swapfiets and Levanto (for students and companies). Uber has only begun operating in the city relatively recently (since November 2020²⁸), as a result of a change to regulations, commencing with UberX services and not UberPool given the COVID-19 pandemic circumstances. Options for urban DRT are the only category not current fulfilled.

Provision of car sharing options direct to businesses is a competitive market, including specialist companies serving this niche, as well as Cambio, Poppy and Green Mobility who also offer business accounts as well as direct services to consumers.

Through its Marketplace for Mobility (see section ##) the city has been proactive in engaging businesses to trial their services and solutions in the city, but at the same has been careful to put in place regulations to prevent the potential negative impacts of micro-mobility – i.e. oversupply, uncontrolled parking and blocking of pavements.

MaaS packages - Antwerp is considered a pioneering city with respect to offering digital journey planning and MaaS services. The city authority's Smart Ways to Antwerp journey planner delivers intermodal route finding capabilities and the MaaS provider Whim decided to launch in the city in 2018. The current plans do not provide access to all mobility offers, but does include public transport, shared mobility services of Mobit, Poppy and Velo, as well as car rental with Hertz and Sixt. Olympus Mobility provides mobility packages directly to businesses, which includes public transport along with Cambio car-sharing and bike-sharing from Blue-bike, Mobit and Velo.

Further initiatives - A mobility voucher scheme is being piloted through the 'Gift2Give's open CitiZen' platform. Additionally, two peer to peer car-sharing companies, CozyWheels and Dégage, operate in the city and are promoted on the Smart Ways to Antwerp website.

Observations on new mobility services and business models - As Antwerp has attracted a range of private sector mobility services providers, it provides an example of the dynamics occurring in larger cities. Observations include:

Bike-sharing benefits from subsidy – the City of Antwerp took the decision to subsidise the widespread Velo bike-sharing system, in order to ensure cheap prices and high usage.

E-bike sharing for the metropolitan area – limited private sector experience of delivering an e-bike sharing system serving longer distance commuting, together with cross-boundary challenges relating to legal competencies of districts to provide docking stations, has delayed delivery of this additional scheme.

²⁸ Uber Blog (2020) *Antwerp, Leuven and Ghent: We are here* - <https://www.uber.com/nl-BE/blog/antwerp-leuven-ghent-launching-uberx/>

Mergers in the e-scooter market – Early in 2020, the US based e-scooter provider Bird acquired its Berlin-based competitor, Circ. This type of merger activity was anticipated, given that for consumers the array of offers was perhaps becoming confusing, and that for the operator a larger fleet has economies of scale in respect of operating costs²⁹.

Sharing services discontinued – In July 2020, the electric shared moped service, Scooty (part of Europcar Mobility) took the decision to discontinue services in Belgium³⁰. It is not clear if this was linked to reduced trips as a result of the COVID-19 pandemic.

²⁹ Frankfurter Allgemeine (2020) *Fusion auf dem E-Scooter Markt* - <https://www.faz.net/aktuell/wirtschaft/auto-verkehr/e-scooter-fusion-auf-dem-rollermarkt-bird-kauft-circ-16604630.html>

³⁰ FleetEurope (2020) *Scooty suspends services in Belgium* - <https://www.fleeteurope.com/en/shared-mobility/belgium/article/scooty-suspends-service-belgium?a=BUY03&t%5B0%5D=Europcar%20Mobility%20Group&t%5B1%5D=Scooty&curl=1>

3.3.3 Klaipeda

Table 4 - MaaS aggregators and mobility solutions in Klaipeda

MaaS B2C	No MaaS service							
MaaS B2B	No MaaS service							
Mobility Solutions B2B								
Mobility Solutions B2C	  Keltas.lt							
KLAIPEDA	Public transport	DRT/ Ride-pooling	Ride-hailing/ sourcing	Car sharing	Car pooling	Moped sharing	Bike-sharing / rental	E-scooter sharing

Overview of new mobility solutions - Two companies have been particularly active in introducing shared mobility services across the Baltic states. Lithuanian company CityBee commenced by providing car sharing services, but later also added bike-sharing and e-scooter sharing services in some cities (CityBee has not offered E-scooter sharing in Klaipeda). Bolt was originally founded as Taxify in Estonia in 2013 and re-branded in 2019 as its service offer diversify. Bolt offers both ride-hailing and food delivery services, as well as e-scooter services³¹.

MaaS packages - At present, there are no MaaS packages offered in Klaipeda. The public transport authority, KKT (Klaipėdos Keleivinis Transportas) enables payments for single trips, daily, monthly and annual passes via e-wallets, but access to shared mobility services are not included with this.

³¹ CNBC (2019) *European Uber rival Bolt say it's seeing signs of profitability in most markets*

Observations on new mobility services and business models - Bike-sharing withdrawn - CityBee introduced a bike-sharing scheme in Klaipeda in 2018, which became popular amongst recreational riders in this coastal city which is also a popular tourism destination. The bike sharing scheme was introduced at the cost of CityBee, but by 2020 the company took the decision to withdraw the service. The City of Klaipeda is in the process of reviewing options to re-introduce a bike-sharing service.

3.3.4 Lucca

Table 5 – MaaS aggregators and mobility solutions in Lucca

MaaS B2C	No MaaS service							
MaaS B2B	No MaaS service							
Mobility Solutions B2B								
Mobility Solutions B2C							Pro Classic Cycle Poli Bizzarri	
LUCCA	Public transport	DRT/ Ride-pooling	Ride-hailing/ sourcing	Car sharing	Car pooling	Moped sharing	Bike-sharing / rental	E-scooter sharing

Overview of new mobility solutions - At present the range of shared mobility solutions available in the Lucca conurbation is relatively limited, owing perhaps to the smaller size and very compact nature of the city. Bicycle rental is available from the Tourist Center Lucca, but with the service more oriented towards visitors, rather than the provision of a network available for use by citizens on a daily basis.

MaaS packages - Public transport for Lucca and surrounding districts is operated by CTT PISA Nord (Compagnia Toscana Trasporti), which offers an electronic payment card (*Carta Mobile*) and a journey planning app, but given the limited range of shared mobility options, no MaaS packages are offered.

3.3.5 Manchester (Greater Manchester)

Table 6 – MaaS aggregators and mobility solutions in Greater Manchester

MaaS B2C	 							
MaaS B2B	Pilot schemes in EU projects:							
Mobility Solutions B2B								
Mobility Solutions B2C	 	TfGM, Local Authorities and NHS offer separate DRT options (Accessible Transport Service)			 		 New scheme planned	 Salford pilot, Rochdale Pilot
GREATER MANCHESTER	Public transport	DRT/ Ride-pooling	Ride-hailing/ sourcing	Car sharing	Car pooling	Moped sharing	Bike-sharing / rental	E-scooter sharing

Overview of new mobility solutions - Ride-hailing companies were relatively quick to establish services in the UK due to the accommodating regulatory/licensing environment and both Uber and Lyft are established in the Greater Manchester area. They do not, at present, offer ride-pooling,

although car-pooling services are offered by Liftshare and Car Share GM. Ring & Ride is a demand-responsive transport service provided by TfGM that focuses on providing a minibus service for people that have difficulty using public transport, rather than a volume ride-pooling service.

In relation to shared micro-mobility, the Mobike free-floating bike-sharing scheme was unfortunately not successful, with vandalism being cited as a key reason for the company withdrawing this service. Nevertheless, Greater Manchester Combined Authority and TfGM are working to bring forward new solutions in partnership, involving a subsidised dock-based scheme that will include e-bikes. Implementation is planned for spring 2021 and the first phase of the project is expected to cost around £10million³². The implementation of E-scooter schemes in the UK has been restricted by legislation for this type of vehicle, but pilot schemes such as that with Lime in the Salford area, are now taking place.

MaaS packages - TfGM has been actively exploring the delivery of MaaS packages, including working with Mobilieo and Enterprise (car sharing and rental) in the frame of the EU IMOVE MaaS4EU projects.

³² Manchester Evening News (2020) *A new bike hire scheme is coming to Greater Manchester – and it “won’t be another Mobike”* - <https://www.manchestereveningnews.co.uk/news/greater-manchester-news/new-bike-hire-scheme-coming-18290222>

3.3.6 Platanias

Table 7 - MaaS aggregators and mobility solutions in Platanias

MaaS B2C	No MaaS service							
MaaS B2B	No MaaS service							
Mobility Solutions B2B								
Mobility Solutions B2C				Rental services			Rental services	
PLATANIAS	Public transport	DRT/ Ride-pooling	Ride-hailing/ sourcing	Car sharing	Car pooling	Moped sharing	Bike-sharing / rental	E-scooter sharing

Overview of new mobility solutions - Mobility services in Platanias are heavily oriented towards the tourism sector, with multiple options for car, moped and bicycle rental. These services are not so well set up in terms of the network of pick-up locations and seasonal opening periods to serve the everyday mobility needs of citizens. This may however represent an opportunity to be investigated during the development of the SUMP – i.e. whether the business cases of rental companies can be further supported by facilitating year round use of shared vehicles by local residents.

MaaS packages - KTEL, the privately owned entity which operates the public transport service, enables online ticket reservation and discount cards for specific groups (students, disabled, multi-child families, military staff), but as shared mobility options in the area are unavailable, there are no MaaS packages offered. There is an opportunity for partnership with the PT operator to offer discount cards for regular passengers, thus encouraging the use of PT by citizens, who are currently highly dependent on individual car use.

Further initiatives - A bike-sharing system has been initiated in the neighbouring city of Chania. Experience and lessons learnt from this pilot operation, and the potential for synergies, will be examined during the SUMP development process. Lime e-scooter sharing services has been also launched in Chania; currently withdrawn due to COVID-19, with the potential for a re-launch during the summer season being examined.

3.4 Typologies of business models in urban logistics

In the city logistics context, the freight mission is a simple one, or at least it is simply stated. The logistics operator wants to complete their deliveries as quickly and as smoothly as possible before moving on to the next job. To facilitate this process the transport operator runs to a tight schedule, probably involving multiple deliveries. The schedule is synchronised to vehicle and driver utilisation and there will be efficiency targets to be achieved for both. Any disruption to these schedules can therefore not only result in service failure, it can be costly for the operator too, as time is always of the essence in all areas of freight logistics, whether that be Business to Business (B2B) or Business to Consumer (B2C).

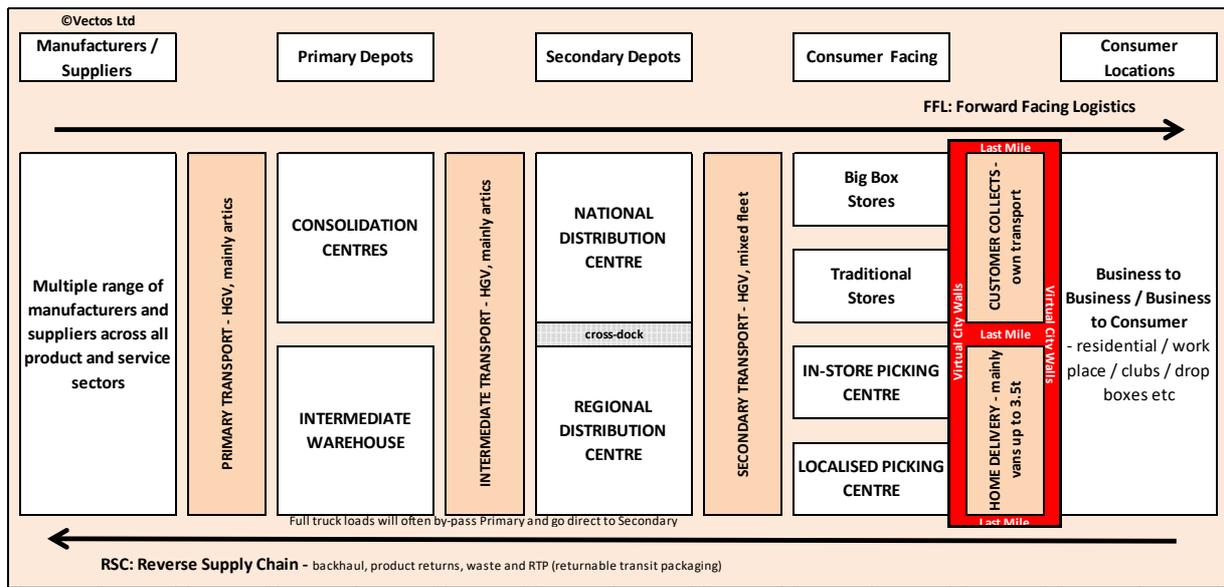
The mission of logistics providers has become more challenging due to the substantial growth in e-commerce, occurring during a period when the industry is coming under increasing pressure to deliver services with reduced emissions. The shift in service provision from fewer large deliveries to a single shop, to multiple 'last mile' deliveries to homes and businesses has been accompanied by significant pressure to keep prices low. Additionally, the traditional supply-chain was largely a one-way process and only damaged or faulty goods were returned. Now, part of the offering to internet customers is "free returns" encouraging them to over order at no cost. These volumes are significant in supply chain terms and while many of the returns can be accommodated in vehicles returning to depots, it is inevitable that there is a consequential impact on total trips.

In this section we provide a brief overview of the development of supply chains, in order to identify the role of 'last mile' urban logistics solutions and examples of emerging business models. The focus of this section is on B2B and B2C urban freight logistics in the retail sector, so other forms of logistics such as construction and long-distance freight movements that pass through a city are not specifically considered.

3.4.1 Understanding the supply chain

Traditionally, and since at least the 60's, logistics has 'danced' to the mantra: *Right product, Right time, Right place*. Indeed, this is a worldwide exposition of the role of logistics where product, time and place are usually determined by the consumer. This mantra and putting the customer first is at the heart of why supply chains operate as they do. It is therefore the single most important determinant of change and evolution in supply management over the last half century or more. Indeed, routes to market have become many and varied and whilst there will always be exceptions, we can take a generic example to illustrate graphically how composite supply chains work. As varied as the supply chains themselves is the terminology used to describe them, but in this generic version of the 'Supply Chain Map' (Figure 8) we can see how the supply chains of retailers with stores and those who operate from virtual web shops, co-exist alongside each other.

Figure 8 - The Supply Chain Map: route to market matrix – generic example – terminology may vary



Raw material supply to manufacturers is intentionally excluded

Modern supply chains are designed to move vast volumes of goods, over long distances at least total or average ‘case’ cost. All of the static assets in terms of warehouse and consolidation space are strategically located to provide network and geographical coverage. At the centre of the process are the National Distribution Centres (NDCs) and Regional Distribution Centres (RDCs). They are the centres that convert bulk stock into itemised store orders before shipping to stores within the geographical area allocated to them. The only real difference between the NDC and the RDC is usually the range of products based on their stock turnover. The NDC and the RDC are the workhorses of logistics supply chains across the world and their job is to bring the product to the final stage before it reaches the consumer, either via a retail outlet or in the home delivery scenario as a localised ‘picking centre’ from where the final distribution is arranged.

Transport is organised into three distinct sectors: everything up stream of the secondary depots is denoted as primary transport, the sector between secondary depots and stores is denoted as secondary transport and everything downstream of stores is denoted as the tertiary movement. It is the tertiary movement where logistic operations and the ‘city centre’ (in its broadest definition) come into contact most often and interact on a daily basis, and to which we frequently refer to as the ‘last mile’.

3.4.2 Tertiary movements in retail – the ‘last mile’

The most significant change to have occurred in recent years is the growth of internet shopping with ‘home’ delivery. Home delivery is not a new concept because items such as furniture and whitegoods have always been home delivered. Furthermore, mail-order from a catalogue has been around for many years too. What has changed so dramatically is the range of goods that are available, often with rapid order and delivery terms, all of which has been facilitated by the digital revolution in the form of computer technology and internet connectivity leading into virtual shops. It is therefore the sheer scale and ingenuity of the online operations that has

transformed the retail fulfilment environment. None more so than in the parcels industry, where businesses have set up whole new supply chains to serve the ever-growing demand for home delivery, and in what seems like ever shortening lead times. And, through track and trace systems, consumers have now become extended digital stakeholders in supply chain software.

So, to be precise, it is in the tertiary movement where we have seen the most significant structural change in how supply chain transport is organised and it is in exactly this space that internet-powered transport meets the urban city centre in the so called 'last mile'. In Europe in 2020 online sales were predicted to reach 717 bn euros, up from 621 bn euros in 2019, all delivered to the consumer, to a place of their convenience and at a time of their convenience. Germany leads the chart in terms of early adopters but closely followed by the UK and France. Clothing and footwear easily account for the highest product sector and the UK leads for food. With 85% of the European population being active internet users this upward trend is predicted to continue for the foreseeable future³³.

Although detailed and verifiable figures are not easy to come by it is widely understood that the additional trips created to satisfy online demand are not fully off-set by a reduction in consumer shopping trips and the net position is actually an overall increase. As a result of the COVID-19 pandemic, it could be expected that the take-up of e-commerce has been further accelerated. In this context, there are important questions about how 'last mile' logistics services can become carbon neutral and how the shift in balance from personal or business shopping trips, towards e-commerce, results in greater or reduced environmental impacts.

3.4.3 Business models for 'last mile' logistics

There is high potential for "win-win" situations in last mile urban logistics, when we consider that efficient operations are the commercial aim of the logistics company, as well as a city or metropolitan authority. In this section we investigate the main typologies of solutions pursued and the business rational that underpin these.

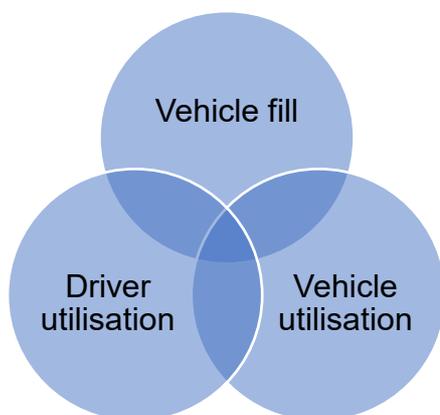
Logistics operators have three principal metrics they manage in order to achieve efficient and profitable operations: vehicle utilisation; driver utilisation and vehicle fill (see Figure 9). The last of these, vehicle fill, is arguably the most challenging to control and achieve. Logistics operators will work very hard to always run full truck loads, but that is not always feasible and when it isn't, it results in more vehicles trips than is actually required to deliver the equivalent volume. When this is multiplied across many operators it results in a proliferation of vehicle trips across the city all vying for limited road space and limited servicing space for loading and unloading. Improving vehicle fill across operators would therefore have city wide benefits in terms of reduced pressure on highway capacity, and reduced emissions where diesel remains the predominant power source.

Below we identify three business model approaches which relate to improving vehicle fill from the beginning, or at the end of 'last mile' trips: urban consolidation centres; consolidation of

³³ Ecommerce Europe (2019) *European E-commerce report 2019*

freight in time; and consolidation of the destination. A fourth typology of business model relates to the introduction of zero emission vehicles. In each case examples are provided:

Figure 9 - Three key metrics of cost-efficient urban logistics and approaches to freight consolidation



Freight consolidation approaches	Business examples
Urban consolidation centres	
Consolidation in time	 CARGO VELO
Consolidated delivery locations	
Clean vehicles plus consolidation	

Urban consolidation centres – Logistics operators, either as the “in house” arm of a company, or as a contracted carrier (e.g. DHL, DPD, UPS, etc.), undertake consolidation as a natural part of achieving efficient operations as products move through the supply chain. Nevertheless, sub-optimal vehicle fill can arise as vehicles reach their final destinations. Consolidation centres are therefore foreseen to consolidate the freight of different operators, re-packing and utilising fewer vehicles for the ‘last mile’ from a location on an urban periphery. The idea of shared-user urban consolidation centres has been around for more than two decades and whilst there have been attempts at establishing them as a going concern, in many cases as a public sector-led initiative, the idea has not gained momentum. There are niche

examples, but more generally they have never been able to command the kind of critical mass (volume) that would be needed to make a viable operation and to trigger wider uptake.

From a business model perspective urban consolidation centres are problematic on the basis that they introduce an additional stage of “freight handling” between a company’s Regional Distribution Centre and the recipient. So, while vehicle fill may be improved, this efficiency gain may not be sufficient to outweigh the time and costs associated with consolidation. Additionally, the process of passing on freight to another carrier for the last mile represents a service and reputational risk for logistics operators.

Examples of urban consolidation centres that have been sustained include:

- **Logistics hotels** - Underground garages in Paris, no longer required for parking, have been repurposed into consolidation centres, but are not necessarily replicable.
- **Good Hubs (Goederenhubs), Netherlands** – This initiative started over ten years ago and has expanded to serve over 40 towns and cities in The Netherlands³⁴. It is understood that this is a commercial operation, not benefitting from public subsidy, but unfortunately limited information on scale of the operations and effects achieved has been published.

In the context of increasing volumes of e-commerce, the role of urban consolidation centres as an additional hub in the supply chain, as well as their financial viability, may be strengthened. A trend towards increasing volumes of smaller packages and parcels, delivered to more distributed addresses, means that the tertiary depots become more valuable, even when these remain within the supply chain operations of a single organisation.

Consolidation in time – A further approach to increase vehicle load is to consolidate deliveries for a specific location over time, in order that more deliveries can be achieved in one trip. In a highly customer-oriented sector this requires a degree of understanding and acceptance on the part of the customer. The grocery home delivery market has grown faster in the UK than in other European countries and the supermarket Sainsbury’s has introduced a “Green delivery timeslot” system, which places emphasis on the customer to select a slot that would consolidate deliveries in their area (see Figure 10). Furthermore, price incentives already exist for slower versus faster delivery in the form of premiums for “next day” or “1hr delivery”, but the extent to which pricing reflects the real commercial and environmental impacts is not clear.

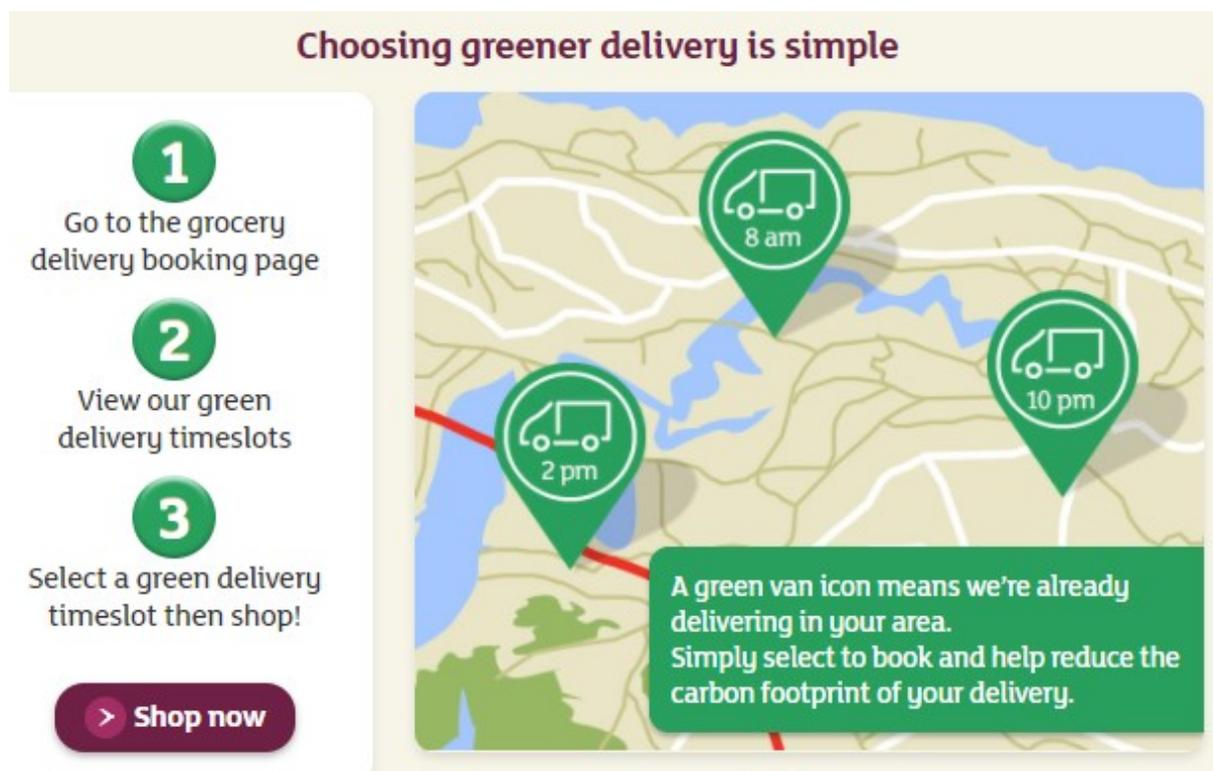
Consolidated delivery locations – Provision of Out-Of-Home (OOH) solutions, such as parcel lockers, provides a means for consolidated delivery location and avoidance of failed deliveries to homes. Lockers are typically provided at railway stations, shopping centres and sometimes at large office campuses, while more widespread provision at neighbourhood mobility hubs is also promoted.

There are some important distinctions between differing business and services models for OOH solutions. For example:

³⁴ See: <https://goederenhubs.nl/home>

- Some parcel locker networks are “**closed**” (**carrier-specific**) and have typically grown from national post networks that have sought to retain the competitive advantage of nationwide network coverage. Deutsche Post DHL’s network of post offices, access points in other retail premises, and lockers provides one example³⁵.
- Swipbox provides an example of an “**open**” (**carrier agnostic**) locker network that is made available to multiple logistics operators. This approach is advantageous to avoid duplication of locker capacity and to prevent underutilisation, particularly in rural and remote areas³⁶.
- Rather than providing lockers, Parcelly partners with retailers to enable people to collect their deliveries in existing shops. This network is also “open” to different carriers, as the customer essentially assigns the shop as their home address³⁷.

Figure 10 - Sainsbury's Green Delivery Timeslot's



Zero emissions vehicles – A further area for business model innovation in urban logistics relates to the deployment of zero (tailpipe) emission vehicles. The introduction of alternatively-fuelled vehicles may be seen to represent an evolution of existing service approaches, rather

³⁵ Parcel and Postal Technology International (2019) *Why open networks are a closed subject with many posts and A new trend in parcel lockers*

³⁶ SESAM GmbH (2020) *Sustainability of last mile delivery concepts*

³⁷ See: <https://parcelly.com/>

than a disruption of the sector, as whole life cycle operational costs improve. For example, Electric Vehicle purchase prices are expected to reduce and EVs are expected to benefit from reduced maintenance and energy costs. Nevertheless, a wider shift towards using smaller vehicles wherever possible, such as cargo-bikes and light vans, may require more fundamental changes in service approaches.

The key determinant is the volumes that need to be moved and the delivery location. Cargo bikes certainly have their place in any city logistics strategy but with their carrying capacity limited to around 100kg, they are labour intensive compared with a light van and a medium truck. A light van will have a load capacity of about a 1,000kg and a medium truck perhaps 10,000kg, equating to 10 and 100 cargo-bikes, respectively.

The Bremen-based start-up RYTLE combines concepts of consolidation and containerisation with cargo-bikes to help overcome this constraint. Inspired by sea containers, the concept of introducing containers in city logistics breaks with the traditional urban delivery system.³⁸ Use of standardised and modular load units are thought to provide the potential for more efficient exchanges from larger to smaller vehicles. The system approach of RYTLE combines mobile depot HUBS that can be delivered by truck to a strategic location. Each of these HUBS is capable of accommodating nine BOX containers. Each BOX can then be transported to a final destination by e-cargo bike³⁹.

Figure 11 - RYTLE HUBS and BOXES system (Source: RYTLE)



It is apparent that substantial entrepreneurial energy is being invested in urban logistics and the challenge of improving vehicle load in combination with the deployment of e-cargo bikes and zero (tailpipe) emission vehicles. By setting in place appropriate controls and incentives, city authorities have the ability to provide improved conditions for the success of these businesses, which is the topic covered in Section 5.

³⁸ ForesightDK (2019) *Transforming urban deliveries for zero-emission cities* - <https://foresightdk.com/transforming-urban-deliveries-for-zero-emission-cities/>

³⁹ See <https://rytle.de/?lang=en>

4 Mobility partnerships: Conceptual development

In the previous sections we have established an understanding of different categories of business models for new mobility and logistics solutions, as well as an understanding of the current distribution of new shared and on-demand mobility solutions within the SUMP PLUS cities. Formation of partnerships with private-sector operators increases the prospect of solution delivery that supports SUMP implementation, and in this section we explore the means through which city authorities can foster these.

4.1 Defining ‘Mobility Partnerships’ in relation to ‘Links’

For the purpose of SUMP PLUS the term **Mobility Partnership** is used in order to avoid confusion with **Links** and the varying uses of the term ‘Public-Private Partnerships’. As explained further in this section, Mobility Partnerships refer to the relationships formed between a local authority and a mobility or logistics provider/operator, with the aim of promoting sustainable and efficient mobility solutions; these can vary in strength from engagement forums, written Memorandums of Understanding and through to legal and contractual arrangements. Logistics partnerships are addressed more specifically in Section 5.

4.1.1 Distinguishing Mobility Partnerships and Links

Various forms of cooperation across institutional boundaries is a key principle for SUMP development and the guidelines advise that a SUMP should be based on:

- Vertical integration – “Close exchange with relevant authorities at other levels of government (e.g. district, municipality, agglomeration, region and state)”
- Planning for the “functional urban area” – “Cities are connected with their surroundings by daily flows of people and goods, meaning the geographical scope of a SUMP needs to be based on this functional urban area”, hence cooperation with relevant neighbouring authorities is required.
- Cross-policy/sectoral integration – “Cooperation to ensure the consistency and complementarity of the SUMP with policies and plans in sectors related to transport (e.g. land use and spatial planning, social services, health, energy, education, enforcement and policing).” Aspects of cross-sectoral integration are covered by **Links**.
- **Mobility partnerships** (SUMP PLUS term) – “Coordination with public and private sector providers of transport services”.

These dimensions of integration are further referred to in the SUMP Glossary on [Eltis.org](https://www.eltis.org) and can be visualised as shown in Figure 12. The SUMP PLUS concepts of Links and Partnerships are shown using the projects icons.

One important clarification is that Mobility Partnerships can also be relevant for cross-sectoral integration, for example where cycle paths or bus services to a school are improved as mobility solutions. As shown in Table 8 (the Accessibility and Mobility Framework developed for the Manchester Co-created Laboratory Plan), **Links** relate specifically to actions that seek to 'AVOID' travel, by making services accessible at home or via provision in the local area. **Mobility Partnerships** relate to the 'SHIFT' mode and 'IMPROVE' segments of the table. **Freight Partnerships** are relevant to the 'home delivery' aspect of the AVOID segment in the table.

Figure 12 - SUMP development and dimensions of integration

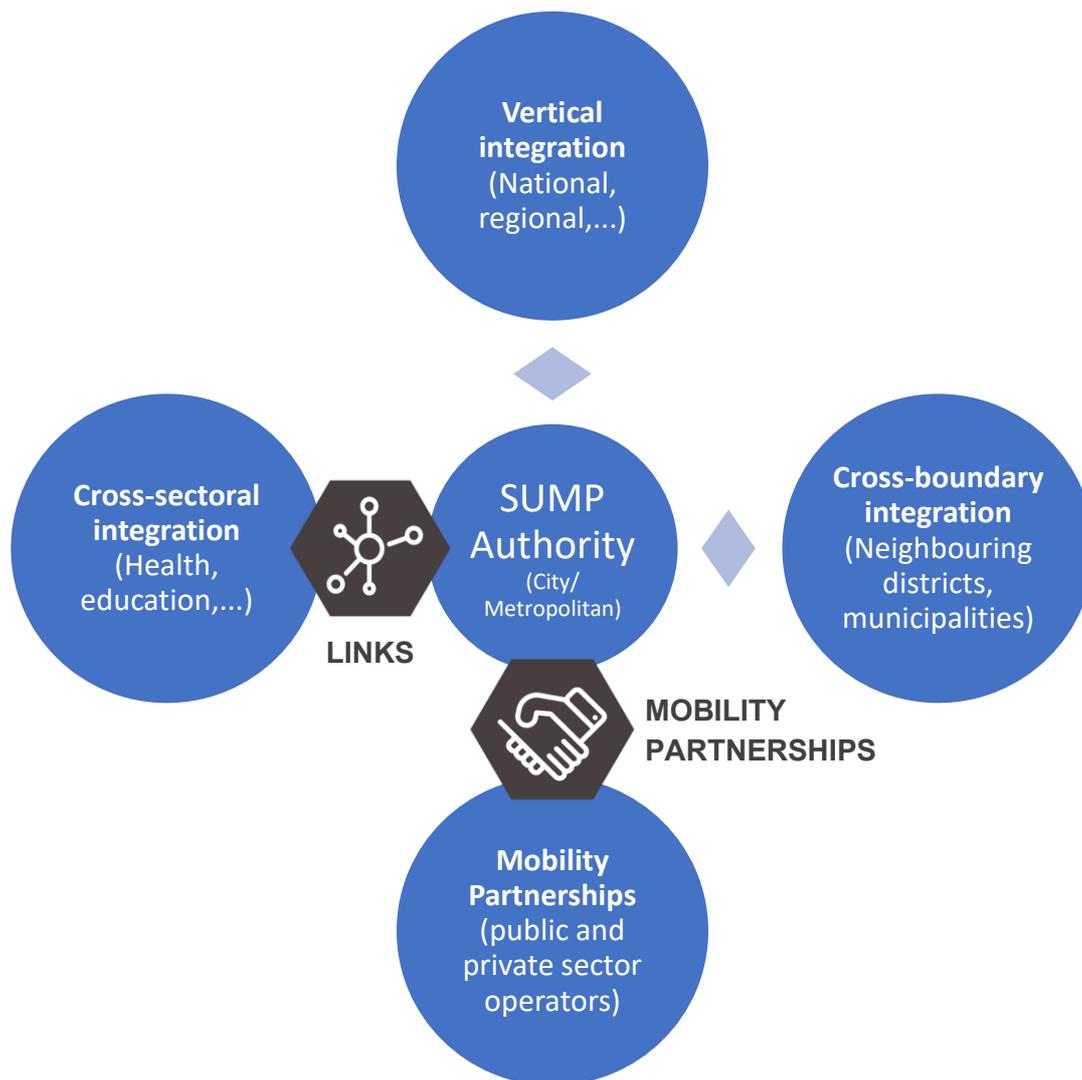


Table 8 - Accessibility and Mobility Framework applied to healthcare sector

Accessibility and mobility framework		Transport benefit	Interventions (examples included)	Impacts		
			Type	Customers/ patients/ visitors	Staff	Logistics
LINKS	'AVOID' travel	1. Reduced volume of travel	Internet communication	NHS Direct Remote consultations		
			In-home service provision	Dialysis machines		
			Home deliveries (<i>relevant to freight partnerships</i>)	Prescriptions		
			Health-related visits to homes	District nurses		
		2. Shorter health-related trips	Localisation of health facilities	District health centres		
PARTNERSHIPS	'SHIFT' mode	3. Changing transport mode shares	Improved walking & cycling facilities	'Beelines' strategy		
			Improved Public Transport (PT)	Improved bus frequencies		
			Shared mobility		Car pooling to work; Shared vehicle fleets	
			Intermodality		MaaS pilot	
	'IMPROVE'	4. Reduced carbon and air pollution	Clean air regulations	Clean air zone		
			Cleaner vehicle fuels	Electric and hydrogen PT, shared & private vehicles		Electric/hydrogen freight vehicles
Grid balancing & energy storage			Timing of vehicle movements Vehicle 2 Grid deployment			

Note: the activities shown in green are examples of those already being undertaken in Manchester.

4.1.2 Mobility Partnerships and their relation to Public-Private Partnerships (PPPs)

A Public Private Partnership (PPP) typically refers to a cooperative arrangement between two or more public and private sector actors, generally of a long-term nature.^{40 41} Established within water, health, education sectors etc., these involve governments and businesses working together to complete a project and/or to provide services to the population.⁴² A typical example of a PPP agreement in transport is that of a toll road concession, involving construction and maintenance of the road for an agreed duration by a private company, before transferring to the public sector. The establishment of PPPs across many sectors and types of activity has been controversial, due to concerns that public return on investment is lower than returns for the private funder.⁴³ Although aspects of the overarching debate around PPP are relevant also to the transport sector, the focus within SUMP PLUS is on how urban mobility partnerships are evolving, and how local authorities can best work with the private sector in order to achieve shared objectives.

4.2 The components of Mobility Partnerships

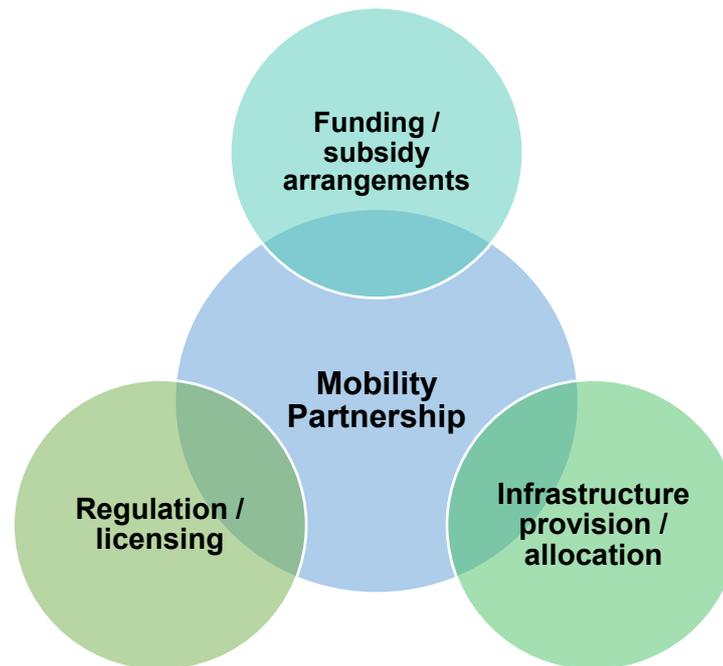
In order to build a conceptual framework for Mobility Partnerships, we began with the proposal that there are three main components of interaction between a public authority and a private sector operator. These represent ways in which a mobility solution can be supported, and options for control where, for instance, there are undesirable negative externalities. These basic components are illustrated in Figure 13 and summarised below:

⁴⁰ Hodge, G. A and Greve, C. (2007), Public-Private Partnerships: An International Performance Review, *Public Administration Review*, 2007, Vol. 67(3), pp. 545–558

⁴¹ Roehrich, Jens K.; Lewis, Michael A.; George, Gerard (2014). "Are public-private partnerships a healthy option? A systematic literature review". *Social Science & Medicine*. **113**: 110–119

⁴² Caves, R. W. (2004). *Encyclopedia of the City*. Routledge. pp. 551. [ISBN 9780415252256](#).

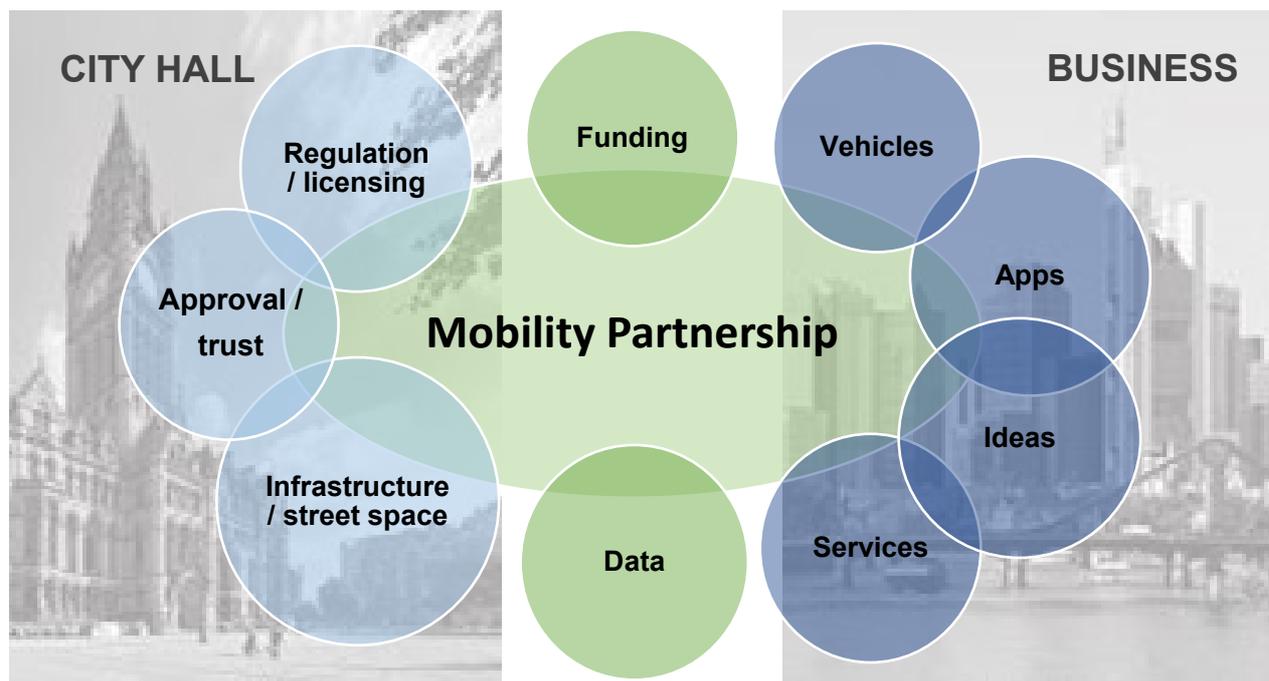
⁴³ On Public-Private Partnership Performance: A Contemporary Review, *Public Works Management & Policy*, pp. 1–24

Figure 13 - Components of Mobility Partnerships

- **Regulation / licensing** – This represents the most direct form of control that can be exercised by a public authority. For example, the City of Antwerp wishes to encourage private sector micro-mobility providers to operate in the city, but has restricted the number of licenses to prevent over-supply and ensure a high-quality and non-disruptive service offer.
- **Funding/subsidy arrangements** – As explored in Section ##, attracting private sector investment and funding that supports SUMP delivery is desirable, but in many cases public sector financial support may be beneficial or, in fact, necessary. In the case of Antwerp, the Velo dock-based bike-sharing scheme is operated by a private company, but financially supported by the city in order to ensure affordable prices and high usage levels. In contrast, a bike-sharing scheme was implemented in Klaipeda primarily as a private sector venture, but with restricted months of operation (in the summer) and the scheme was later withdrawn.
- **Infrastructure provision / allocation** - A public authority also has the potential to support (or dissuade) mobility services by controlling the street space (a form of regulation) and by delivering enabling hard infrastructure, including parking and storage areas, dedicated paths and lanes etc. Usage of e-scooters has become popular in Antwerp and, as part of the SUMP PLUS mobility city lab, the authority is providing “dropzones” that are physically marked on the ground and geo-fenced to prevent blocking of pavements through irresponsible parking.

During the course of partner meetings and discussions, including the presentation of the Mobility Partnerships concepts during the online meeting in September 2020, it was agreed that further components are important and should be added. These additions are illustrated in Figure 14 and comprise:

Figure 14 - Components of Mobility Partnerships - a broader view



- **Approval / trust** – By adding their endorsement to a product/service, a city authority may increase trust and support take-up of a solution by the public. This approach is apparent in the Smart Ways to Antwerp campaign, where the numerous mobility services offered in the city (as summarised in section 3.3) are promoted on the city authority’s website and within the online Journey Planner.
- **Data** – Alongside potential shared funding of mobility solutions, the sharing of data has been recognised as a key component for offering intermodal journey planning, ticketing and MaaS packages.
- **Entrepreneurship** – from the business perspective, it is the new ideas for customer-focussed products, both physical and digital, that has driven the surge of investment in new mobility services in recent years, and which we explore in sub-section 4.3

4.2.1 Further development of mobility partnership concepts: property developers and energy

Review of this framework for mobility partnerships also led to the identification of property developers as a third key player in the delivery of mobility solutions. This role is particularly strong in the context of major urban regeneration and urban extension schemes, which present the opportunity to redefine streetspace hierarchies and uses, incorporate intermodal and shared mobility hubs, and plan for networks/grids for alternative vehicle fuelling and electrifications of fleets. Even where such widespread development is not occurring, there remains the potential for more isolated interventions in line with a long term plan, together with the potential for pooling funds towards mobility infrastructure through land value capture mechanisms.

During the formulation of the Accessibility and Mobility Framework for the Manchester CLP, it was agreed to include grid balancing and energy storage within the AVOID section of the table, on the basis that a shift to electric-mobility for both private and fleet vehicles may bring about closer integration with the energy sector. For example, in the UK, EDF Energy has begun advertising Vehicle to Grid (V2G) services for commercial operators⁴⁴, which could have implications for the business case and operations of vehicle fleets.

4.3 Observing an evolution in mobility partnerships

The components of partnership, for example the importance of data sharing, represent a contemporary view and it is worth reflecting on the extent to which the balance in the relationships between the main partners of city authorities and mobility operators have shifted. It is clear that within the last ten years we have seen the emergence of new “disruptive” mobility services, resulting in different reactions and stances by city authorities, and the emergence of new forms of partnerships. Greater Manchester is taken as an example to describe this.

4.3.1 Mobility partnerships in Greater Manchester prior to 2014

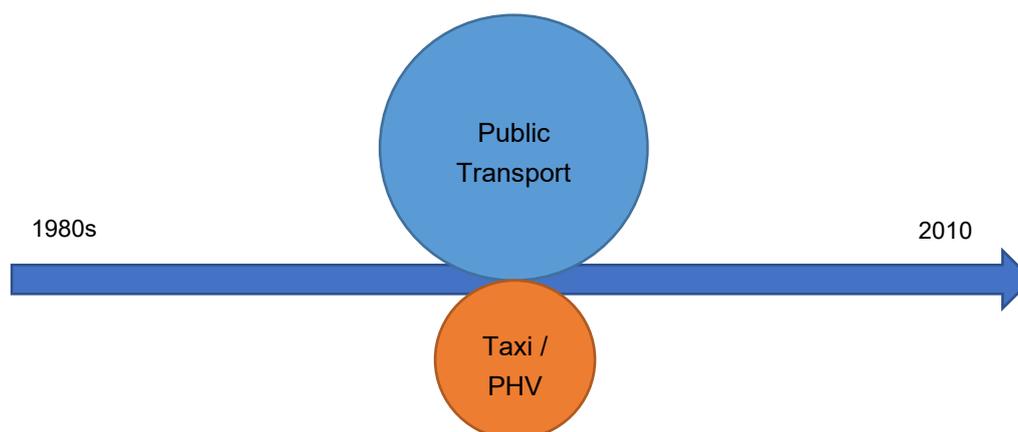
As represented in the diagram below, prior to 2014, there were two main forms of Mobility Partnership for collective mobility in Greater Manchester, namely public transport and taxi. So-called ‘deregulation’ (privatisation) of bus operations occurred early in the UK, commencing in the 1980s, when compared to forms of privatisation taking place in EU Member States. Public transport trips have made up around 10% of trips across the Greater Manchester city-region⁴⁵, but taxi services have also played an important role in the collective transport network. Based on a random household survey conducted in the early 1990s⁴⁶, the main conclusions were that: (i) within Greater Manchester, the taxi accounts for as many trips as the local train service; and (ii) perceptions of the taxi as a luxury mode of transport are false – it is predominantly used by people with mobility problems and people who do not own cars to perform trips which would otherwise have been impossible. The researchers therefore argued that taxis play an important role in public transport provision, a conclusion that we can see being taken forward in MaaS contract services in more recent years, such as the inclusion of a Taxi budget within the Whim package offered in Antwerp.

⁴⁴ EDF Energy Vehicle 2 Grid Business Solution - <https://www.edfenergy.com/electric-cars/vehicle-grid>

⁴⁵ The modal share of public transport in 2015 was 10.5%, which has shrunk slightly to 9.7% in 2019.

⁴⁶ Cosby, S. (1992) Are Taxis Public Transport? - [PUBLIC TRANSPORT PLANNING AND OPERATIONS. PROCEEDINGS OF SEMINAR D HELD AT THE PTRC EUROPEAN TRANSPORT, HIGHWAYS AND PLANNING 20TH SUMMER ANNUAL MEETING, \(SEPTEMBER 14-18 1992\), UMIST. VOLUME P356](#)

Figure 15 - Principal Mobility Partnerships in Greater Manchester from the 1980s to 2013 – size of circles based on approximate proportion of trips



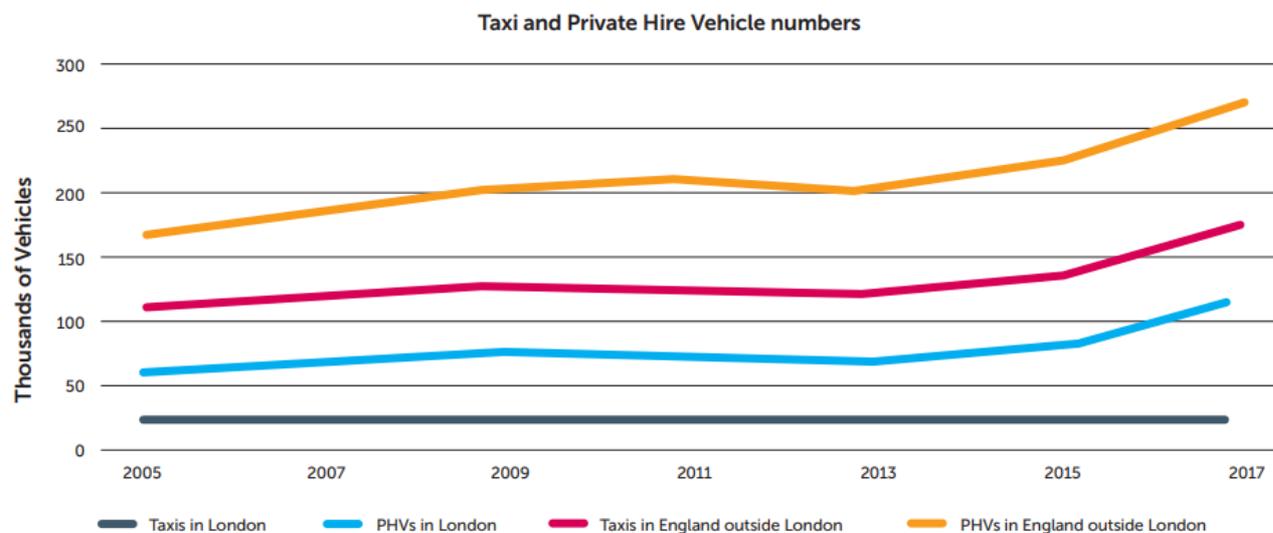
In the case of public transport, the public sector typically has a far greater role in funding/subsidising the service, as well as providing suitable infrastructure and industry-specific regulation (e.g. safety regulations). In contrast, taxi services have been privately owned and operated, but do rely on public sector upkeep of infrastructure and allocation of taxi ranks on public space. Local authorities also manage a licensing process for taxi operators.

4.3.2 Mobility partnerships in Greater Manchester after 2014

During the last 6-7 years, this well-established landscape of mobility partnerships has been changed, albeit to different degrees, through the emergence of two new forms of mobility partnership: that of ride hailing and that of shared micro-mobility. It is acknowledged that other forms of mobility provision have emerged since the 1980s, such as car-sharing, however the trip share of these remains relatively small.

Uber entered the UK Market in 2012 and began operating in Greater Manchester in 2014. The emergence of so-called Transport Network Companies / ride-hailing operators has been linked to a strong increase in the number of Private Hire Vehicles (PHVs) across the UK. For example, the number of PHVs (as distinct from taxis that are able to pick up passengers at taxi ranks) was found to increase by 45% in the West Midlands and by as much 78% in London. A similar trend can be anticipated for Greater Manchester, as illustrated in Figure 16 (which shows the average growth for all English cities outside London)⁴⁷.

⁴⁷ Urban Transport Group – *TAXIS! Issues and options for city region taxi and private hire vehicle policy* - (https://www.urbantransportgroup.org/system/files/general-docs/UTG%20Taxis%20Report_FINALforweb.pdf)

Figure 16 - Taxi and Private Hire Vehicle (PHV) numbers⁴⁸

A few years later, in June 2017, Mobike launched its dockless bike-sharing scheme in Manchester. Although public authorities were broadly supportive of this initiative, unfortunately this first instance of shared micro-mobility was not successful. When the Chinese firm launched the service it said its bicycles were ‘vandal-proof’ – a claim taken as a challenge by a small number of people who set about proving it wrong. By September 2018, Mobike decided to pull out of Manchester due to unsustainable losses from theft and vandalism.⁴⁹ In 2021, a new docked-based bike-sharing scheme comprising around 1,500 dock-based bicycles, and costing £10m, will be launched.⁵⁰ Until that time, and data on passenger-kms achieved becomes available, micro-mobility does not feature on the mobility partnerships grid for Manchester.

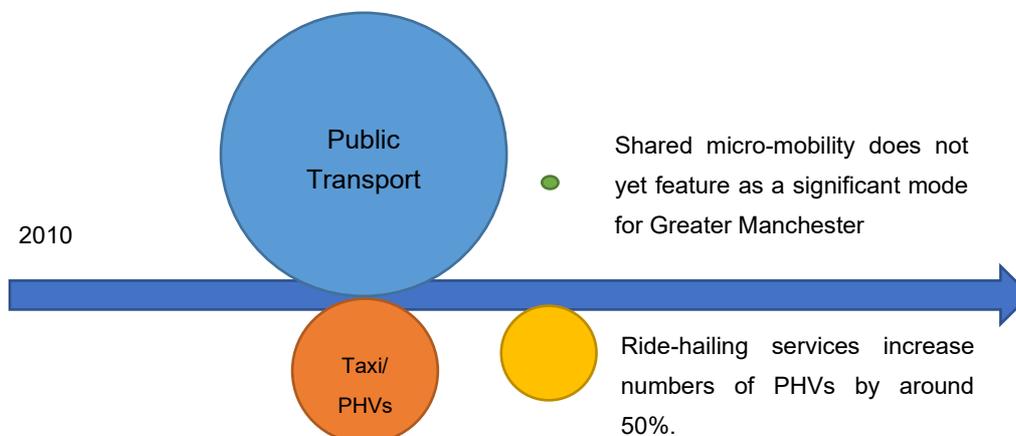
The emergence of the ride-hailing and micro-mobility mobility services have had a number of implications for public authorities: firstly, they have forced different levels of government, from national to local, to re-evaluate their regulatory and licensing approaches, as well as the allocation of public space, and to find new ways to forge mobility partnerships with private sector providers. In this regard the public sector has experienced differing levels of reciprocity, with some businesses taking a more assertive/aggressive approach. As seen in the case of Antwerp, the city may be presented with the challenge of managing partnerships with a considerably greater number of service providers than was previously the case. But, this is not always the case and to date, several of the SUMP PLUS cities have had more limited interest

⁴⁸ Urban Transport Group – *TAXIS! Issues and options for city region taxi and private hire vehicle policy* -
https://www.urbantransportgroup.org/system/files/general-docs/UTG%20Taxis%20Report_FINALforweb.pdf

⁴⁹ The Guardian (2018) *Mobike pulls out of Manchester citing thefts and vandalism* -
<https://www.theguardian.com/uk-news/2018/sep/05/theft-and-vandalism-drive-mobike-out-of-manchester#:~:text=The%20bike%2Dsharing%20operator%20Mobike,city%20because%20of%20anti-social%20behaviour.>

from private sector mobility providers, or have even seen services introduced and then withdrawn.

Figure 17 - Principal Mobility Partnerships in Greater Manchester from 2014 – size of circles based on approximate proportion of trips



The roll-out of ride hailing and shared micro-mobility enterprises have been supported by waves of speculative financing, fuelling a sense of anticipation that sustainable mobility solutions might increasingly be delivered through the new business models explored in Section 3. App-based transport services have taken advantage of the new ‘channel’ that smartphones provide, increasing convenience for the customer and reducing costs associated with information and call centres. Nevertheless, these new business models are yet to be proven in the long-term. Uber has raised over \$24billion in subsequent funding rounds, but despite its more than ten years of operation, has yet to show signs of sustainable profits.⁵¹ 2018 was dubbed ‘Year of the Scooter’ by *Wired*, due to the speed with which dockless bike and scooter-sharing schemes multiplied across all continents. By 2019, however, the market was also shrinking with operators beginning to pull out of cities, a situation that may since have been further exacerbated by the COVID-19 pandemic.⁵²

Acknowledging that ride-hailing (and in particular ride-pooling services), as well as micro-mobility services do present opportunities to city authorities, new forms of mobility partnerships are being fostered. In this regard, a spectrum of approaches might be seen, with the funding of a scheme providing an important factor in the relationship. Where the mobility service is independent from a financial perspective, then the city authority concentrates on regulation and licensing. This has tended to be the case for ride-hailing services and dockless e-scooter schemes. As observed in Antwerp, many micro-mobility services do require (at least currently) subsidy in order to deliver a sufficient service level at an affordable price. As noted above, the city centre dock-based bike-sharing scheme is subsidised and there is a high expectation that a planned e-bike sharing scheme covering a wider geographical area would also need to be subsidised. In these business relationships, the local authority clearly has greater leverage.

⁵¹ <https://www.odtap.com/why-on-demand-economy-highly-sustainable/>

⁵² <https://www.smartcitiesworld.net/opinions/opinions/has-the-micro-mobility-bubble-burst>

Understanding that the varying ability of different forms of new mobility services to be financially independent of a city authority brings us back to the questions posed in the introduction: how can city authorities best work with the private sector in order to implement a SUMP? And to what extent can they rely on specific services being available in the future?

4.4 Proactive approaches for fostering Mobility Partnerships and innovation

Recognising the potential of new mobility solutions to help deliver against SUMP objectives, paired with the objective of fostering and supporting ‘homegrown’ entrepreneurship and economic development, public authorities are devising new approaches to the development of mobility partnerships. These can be seen at two levels: firstly, in the approach taken to developing integrated and intermodal mobility through journey planning, ticketing systems and MaaS; and secondly, in the creation of supportive environments for companies wishing to pilot and upscale individual mobility and logistics solutions.

4.4.1 Public authority role in delivering journey planners and MaaS

In 2018 the SOCIALCAR project undertook a review of new mobility services available in ten cities across Europe, recording also the extent to which access to these is made available through a single journey planning and ticketing information source or app. It was found that different cities are consciously, or as a result of circumstance, following different paths to providing journey planners and MaaS, which resulted in the identification of four main organisational approaches. These are introduced briefly below, together with examples from of cities that characterise a specific approach:

Public authority as enabler - In such cases, public authorities have taken the view that the private sector is best placed to provide travel assistance services. Positive aspects of this approach are considered to be the speed with which innovative new App functions and services can be introduced by the private sector, as well as cost reductions for the public sector. Potential drawbacks include: loss of access to user data, which could support mobility planning and service improvement; service fragmentation and confusion amongst consumers as well as limited quality control; and limited ability to influence travel behaviour where this is a policy objective.

In 2010, **Transport for London (TfL)** responded to lobbying from software developers, who had long wanted to exploit their data, by setting up an Open Data portal and unified API. It was acknowledged that the public who fund TfL are the true owners of the data⁵³, and recognised strategically that there are cost savings from not having to produce apps in-house⁵⁴. It has been estimated that there are over 600 Apps powered by TfL Open Data, used by 42% of Londoners. TfL has continued to develop its own online Journey Planner and developed an App to enable top-up of the Oyster integrated ticketing card. Until very recently, however, TfL

⁵³ Centre for Public Impact (2016) ‘Public Transport in London’ -

<https://www.centreforpublicimpact.org/case-study/public-transport-london/>

⁵⁴ Deloitte (2017) ‘Assessing the value of TfL’s open data and digital partnerships’ -

<http://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf>

had not developed a trip-planning App and a range of well-known international players (e.g. Citymapper, Moovit) are present in the market.

During 2020 this situation changed when TfL launched a new travel app to help people plan their journeys during the COVID-19 pandemic. The TfL GO App aims to provide real-time train times and information to enable travel at quieter times outside peak hours to help passengers maintain social distancing⁵⁵. In this regard, TfL has moved further back towards the following approach.

Public authority as enabler and provider - Some public authorities have taken the decision to continue to develop their own journey planning services, while also remaining dedicated to the provision of open data in order to foster competition and innovation in MaaS. Positive aspects of this approach include: the inherent trust citizens have in services offered by a public authority; the ability of the public authority to gather data to inform mobility planning and service improvements; and the ability of the public authority to influence travel choices to improve the overall efficiency of the transport network and manage disruptions (e.g. during construction works or major events). Possible drawbacks include the cost of maintaining both open data sets and Apps and services that remain attractive to users in a competitive environment.

Supported by the CIVITAS PORTIS project, the **City of Antwerp** has developed the “Slim naar Antwerpen” (Smartways to Antwerp) Online trip planner. A headline innovation aspect of the trip planner is that it offers truly intermodal route-planning, calculating the full range of intermodal route options involving combinations of bus, tram, train, bike-sharing, cycling, walking, ferries etc. This key service improvement is underpinned by other important aspects of innovation. The system architecture is designed so that other route planner apps (including international businesses and local SMEs and start-ups) could also utilise the city authority’s route planner and display the results in their own apps. This is significant as it fosters competition and innovation for travel support and MaaS products across the city-region, something that the city authority has also sought to promote through Marketplace for Mobility calls, resulting in service offers from Olympus Mobility, Whim and others (see section 3.3). A second important benefit of this approach is that the city is able to directly shape route recommendations in order that these align with the integrated spatial planning of the city. This journey planning approach is now being applied to freight routing within the SUMP PLUS logistics City Lab.

As further mobility integration is sought across the Antwerp transport region, it is understood that there is increasing pressure for regional public transport operators to take the lead in providing integrated travel assistance services, resulting in a potential shift towards the following typology.

Public transport operator as provider - There is a clear motivation for Public Transport Operators (PTOs) to provide information digitally, in order to attract customers and provide a high quality service, but also potential drawbacks. Positive aspects of PTOs taking the lead in developing journey planners and MaaS are the large existing customer base and visibility,

⁵⁵ Computer Weekly (2020) *TfL Go launched to support travel in London during the pandemic* - <https://www.computerweekly.com/news/252487280/TfL-Go-launched-to-support-travel-in-London-during-pandemic>

which can be a major bonus for start-up initiatives such as carpooling and other shared mobility schemes that wish to form an alliance. PTOs also have the most direct access to data and influence on speed of updates and quality. A very significant advantage for national and regional PTOs is their ability to deliver services and drive data and tariff standardisation across administrative boundaries, reflecting the real commuting and travel activities of customers. Potential drawbacks include the natural tendency of any organisation to protect its customer base, so there may be resistance to integration with services seen as competitors. There can also be resistance to sharing of data that is considered to be sensitive.

Switzerland is well known for the high level of public transport integration and national PTOs are taking a lead role in developing high quality travel assistance services. The SBB Mobile App, developed by the Swiss rail company, offers trip planning and real-time information for rail, urban rail/tram and bus services. Ticket purchase for rail is also available via the App. Additionally the SBB Reiseplanner App also integrates carsharing and bikesharing schemes.

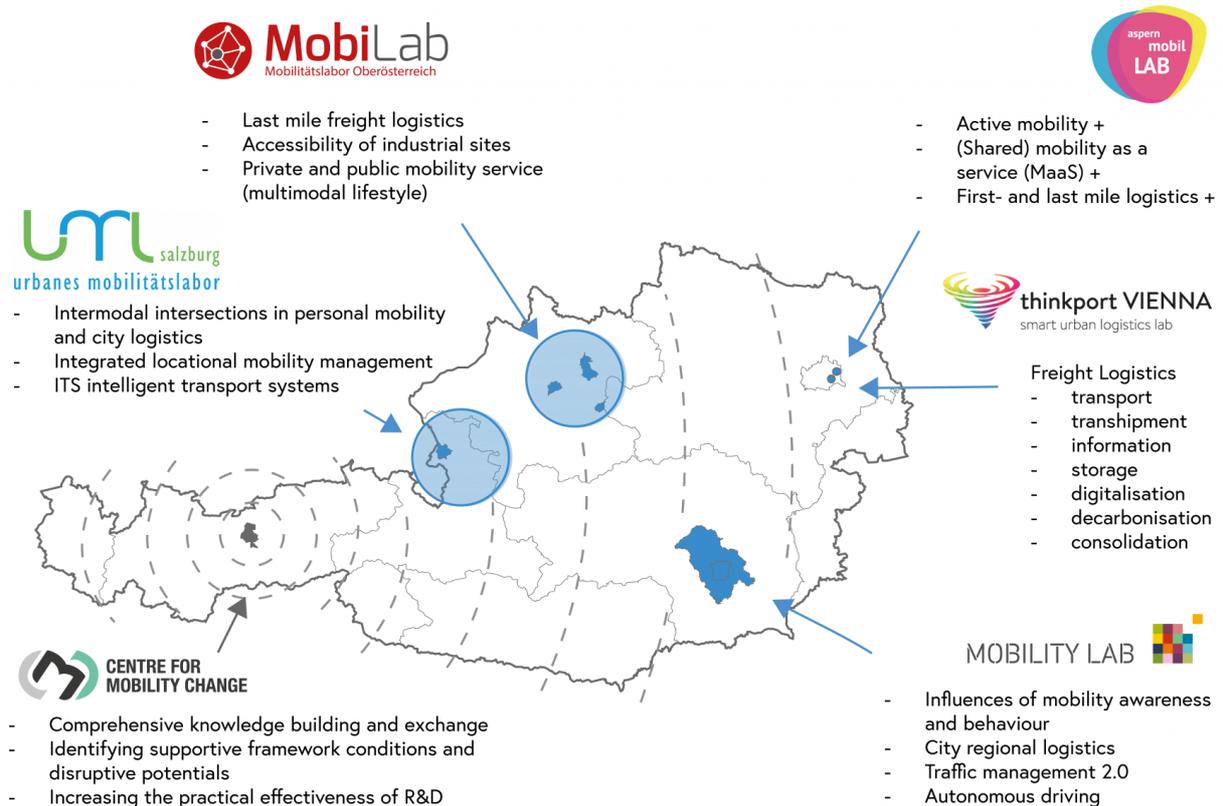
Public authority as driving force - The most intense competition amongst travel assistance services is currently occurring in the larger cities of western Europe, where the greatest gains from investment are anticipated. In smaller cities, city and regional authorities may decide to lead and shape the development of Apps and mobility services for citizens in the most proactive way. This may involve in-house development or procurement of journey planning services.

For example, Zagreb has seen the emergence of competitive private sector services, including Uber, as well as journey planning app development by third parties. Nevertheless, there remains an absence of high quality travel assistance services for intermodal trips. Following the formation of the 'Integrated Transport Area of Zagreb', there was reported to be high potential that this publicly-owned company would take a lead role in collating and managing mobility data, and the development of journey planning services.

4.4.2 Providing enabling environments for new mobility solution development

Austrian Mobility Labs – An initiative of the national government, these co-creation labs seek to unlock new research and innovation resulting in solutions that work in the real-world context. Commencing in 2014, the Austrian Ministry for Transport, Innovation and Technology (BMVIT) created five Urban Mobility Labs located in four urban areas: Graz, Linz, Salzburg and Vienna. As shown in Figure 18, a Centre for Mobility Change has also been established in Innsbruck, providing a forum for exchange amongst the labs. The intention behind the labs has been to create open experimental environments that empower citizens and local innovators to turn problems into new solutions. By also involving public authority representatives in a multi-actor cooperation platform, there has been the intention to enable adjustments in framework conditions such as policies and administrative procedures, providing solutions with the best circumstances to succeed.

Figure 18 - Austrian Mobility Labs



Antwerp Marketplace for Mobility – Initiated in 2016 by the city authority, the Marketplace for Mobility is a cooperation platform for developing partnerships with private mobility and logistics solutions providers. The overall objective is that partnerships should pilot solutions that have the potential to reduce congestion in the Antwerp region. This might be achieved through a modal shift, a time shift, a change in location where something occurs or an increase in the service's efficiency⁵⁶.

There are three main forms of partnership within the Marketplace framework, with one or the other being more attractive to a private sector provider depending on their existing levels of resources, maturity of the solution, and extent to which the existing legislative and operational conditions are supportive:

- **Partnerships with promotional support** – Solutions providers can become a partner if they are optimising their services in terms of sustainable mobility and wish to receive promotional and communication support as part of the Smart Ways to Antwerp campaign.

⁵⁶ Kischenko, K. & De Roeck, M. et al. (2019) The Antwerp Marketplace for Mobility: partnering with private mobility service providers as a strategy to keep the region accessible, *Transportation Research Procedia* Vol. 39, pp. 191-200

- **Partnerships with financial support through a project call** – This involves launch of an open call, typically once or twice a year. Selected projects receive extended (financial and non-financial) support from the city authority during the duration of the pilot project, including the facilitation of engagement with relevant stakeholders. The implementation, progress and results of each project are actively monitored.
- **Long-term partnerships through European calls to tender** – The Marketplace for Mobility also provided the framework for tendering the provision of travel assistance services and MaaS, as referred to in Section 4.4.1.

It is the second mechanism, the partnerships with financial support through a project call, that form the basis for partnership formation and testing of both mobility and logistics solutions within the SUMP PLUS city labs.

4.5 A framework for mobility partnerships and solutions

In the preceding sections we have sought to clarify the concepts of a multi-level SUMP funding chain, categories of business models for new mobility solutions, as well as the evolving form of mobility partnerships. From a practical perspective of working with the SUMP PLUS cities, and providing support for the development of SUMP Implementation and Financial Strategies, this process has been useful for increasing awareness of the differences between city situations. These are both contextual, in terms of which new mobility solutions have been introduced or piloted, and also in terms of the approaches the cities have fostered for working with mobility providers.

Moving forward, the development of an overall framework for mobility solutions, and the partnerships and funding streams that enable these to be delivered, provides the basis for gap analysis and identification of opportunities working with the cities. The table below provides an overview of this framework, which integrates the different concepts explored in this report and provides a structure for the SUMP PLUS Financial Framework Tool. Elements include in the framework are:

- The **multi-level funding chain**, showing city-regional authorities in a pivotal role assembling funding streams and forming partnerships / undertaking dialogue with local employers, property developers and with communities.
- To the left of the funding chain are the “PUSH”-type measures, that have the potential to encourage sustainable mobility behaviour while also contributing to the funding of sustainable mobility infrastructure services shown on the right.
- The “PULL” measures are divided in line with the Accessibility and Sustainability Framework utilised also in the Manchester City Laboratory. For the segment AVOID trips, only one aspect of provision – the possibility of local shared working hubs – is shown at this stage, as an aspect explored in the Antwerp City Laboratory.
- Aspects of infrastructure provision are shown in grey and positioned to signal the greater role of government (from EU down to local levels) as well as property developers, in funding and delivering these.
- Following the investigation of business models and main categories of service provision in Section 3, individual mobility services and integrated MaaS packages are shown that focus

on the Business to Business (B2B) and Business to Consumer (B2C) markets. This takes up the point raised by the City of Antwerp that employers are an important partner for the city, as well as funder of mobility solutions, and their may be good potential for transfer of this experience within the SUMP PLUS consortium.

- Private sector mobility providers (both for individual solutions and MaaS) are shown at the bottom of the diagram, while energy providers are shown on the right, reflecting the need for and potential of greater integration between the mobility and energy sectors.

Table 9 - A framework of SUMP solutions, partnerships and funding streams

PUSH measures	SUMP		PULL measures: Provide for sustainable mobility									
	Multi-level Funding Chain		AVOID (localise)	SHIFT Modes			IMPROVE (switch fuels)					
Reduced ICE vehicle subsidies & carbon taxes ➡	EU & National Gov't ➡	City-region Gov't ➡		Cycle network (parking/storage), walking network, public space	Public transport fleet and infrastructure	Mobility Hubs	Charging/ fuelling stations	Energy utility				
Urban Access Restrictions Low Emission Zones Car parking charges ➡			Property Developers ➡						Co-working spaces / local meeting hubs	Business 2 Business MaaS		
			Employers ➡							•	•	•
			Households ➡							Business 2 Consumer MaaS		
			•	•	•							
			3rd Places	Active mobility	Public transport	Shared mobility	E-mobility / V2G					
			Private sector mobility operators									

Legend: ● individual mobility service/solution (e.g. bike-sharing system); ➡ funding stream

This table is a simplified version and elements of this will be deconstructed with the aim of providing an informative and practical analytical framework within the Financial Framework Tool. A further, more detailed version of the table is also included at Section 6.2, showing how specific SUMP PLUS City Laboratory activities will enable further exploration of different aspects.

5 Logistics partnerships: conceptual development

5.1 A contrasting dynamic in partnership formation

Unlike collective urban mobility, which has been managed predominantly by public sector interests, but which has seen an injection of private sector entrepreneurship and investment in recent years, the opposite could be seen to be true for the logistics sector. In general terms, the delivery of goods has been the preserve of logistics companies and business freight departments, operating within a relatively open regulatory framework (e.g. observation of city centre unloading bays and time restrictions). In a competitive business sector with low margins, it is in each company's interest to make their logistics operations as efficient as possible, seeking high load factors (full vehicles), limiting distance travelled (and fuel usage) and driver time. It is perhaps for this reason that stricter regulations have tended to appear in the most sensitive situations: such as highly congested city centres (leading to the London Congestion Charge); and historic town centres with constrained street patterns, such as Lucca.

With increasing public awareness of air quality issues, combined with the EU Transport White Paper target of achieving "...essentially CO₂-free city logistics in major urban centres by 2030"⁵⁷ and accelerated growth of e-commerce, public authorities are increasingly looking for ways to work with the sector to develop pragmatic solutions.

5.2 The importance and role of freight partnerships

Freight is an essential service without which modern society cannot function and this realisation very much came to the fore during the COVID-19 pandemic. That notwithstanding, there is still much that can be achieved to eliminate the negative impacts of logistics operations. To date policy approaches have mainly focussed on controls, regulations and fiscal means of reducing vehicle movements. As raised in Section 3.4, tackling the issue of vehicle fill as a means of minimising vehicle movements is crucial, but this is largely beyond the reach of policy interventions as the solutions are embedded in private supply chains. Change at that level can only be achieved by consensus and partnership between all of the interested parties.

The idea of forming Freight Partnerships, involving logistics and city authorities and other interested parties, is not new. Freight partnerships have been around for many years with varying degrees of success. However, with the new levels of collaboration that are required to create the right balance of regulation and incentives, the Freight Partnership approach has never been more important.

During August 2020, the World Resource Institute ran a series of webinars on city logistics where the experience of the Director for Freight Mobility of New York was presented. On taking up the post, the first task undertaken by the Director was to set up an engagement and communication forum with all of the stakeholders, recognising that without mutual understanding and cooperation on all sides, real progress would probably not happen and certainly not as quickly as would be desired. The success of the resulting partnership was considered to be based on two factors: firstly, that this was a senior level forum where those present had high levels of influence and decision-making powers within their respective

⁵⁷ European Commission (2011) *White Paper on Transport: Roadmap to a single European Transport Area*

organisations; and, secondly, it was set up as an ongoing process linked to the city strategy for freight. The attraction for invited stakeholders was the ability to access the strategy debate and the ability to influence direction and outcomes from an early stage in the process.

5.3 Control, regulate and incentivise – bringing order to the city logistics interface

A city authority welcomes the vital economic activity that logistics facilitates, while a drivers' desire to not dwell any longer than is necessary assists the city authority to make best use of limited delivery servicing facilities. This is theory, but in the execution phase things can be very different. Delivery drivers who are competing for limited delivery servicing facilities may (at least in their view) have little choice but to resort to errant parking behaviours in pursuit of their 'get the job done' ethos. The vehicles used may not always be the most appropriate for the task, either in terms of physical form or meeting best emission standards. And vehicle load data often suggests that the total number of vehicles undertaking the servicing task should be a lot fewer. In response to these long standing and well documented issues city authorities have adopted various policy approaches, but "delivery control mechanisms" remain the standard practice.

5.3.1 Standard controls in urban logistics



Delivery controls such as hours of access, parking restrictions, and other such regulations have been the norm for many European towns and cities. But, they are generally only as successful as the accompanying enforcement regime which usually means patrolling the streets and ticketing offenders. This is obviously the 'stick' approach and historically was widely adopted as it was the only technologically viable option. It was effective

(particularly parking fines) in that it often raised considerable cash sums, but operationally it was only partially effective in that it tended to not change underlying behaviour and many poor practices persisted. Hence the need to maintain a rigorous enforcement regime because evidence showed that any relaxation would quickly result in the re-emergence of 'free-for-all' behaviours.

From the perspective of the logistics operators, it is often the situation whereby limited access spaces for loading and unloading are at a premium and competition for those spaces is above maximum capacity. Access to the loading and unloading space is therefore often a game of chance and it would seem very unfair, at least to a delivery business, that they are financially penalised for doing no more than going about their legitimate business. That is not to say that there is not behaviour that merits a ticketing approach, but when the stick is the only approach it does mean the underlying causation is not being tackled and the base situation will not improve.

5.3.2 Towards a 'virtual city walls' approach – access restrictions and rewards

Increasing digitalisation enables city authorities to more effectively introduce 'carrot' incentives-based approaches to urban freight, as well as the potential to more effectively enforce 'stick' controls where operators do not abide by the process. London, Lucca and Turin provide examples of where different forms of access restrictions have been applied with the aid of technology, with different approaches and results.

London was one of the first cities to introduce access regulations in the form of the Congestion Charge. The scheme was first introduced in 2003 and the present scheme remains largely unchanged. The stated purpose of the scheme was to reduce congestion in the central area which was initially successful but it was not long before traffic congestion returned to pre-charging levels (this is at least partly attributable to the removal of road capacity, including more cycle lanes, wider footways, etc). In this respect the scheme did not entirely achieve its original objective and this is because any vehicle is free to enter the controlled area so long as they pay the charge (although a driver may therefore question their need to make a trip by private vehicle). The charge is levied on all vehicles with only few limited exceptions and no exception is made for essential freight deliveries, even where there is no modal choice. Exemptions from the Congestion Charge do include low emissions vehicles, promoting a switch to cleaner fuels and engines.



In comparison, the schemes introduced in Lucca (in 2012⁵⁸) and Turin involve permit-based schemes that allow legitimate business to carry out freight deliveries within the conditions set by the permit. Access is again controlled by camera and using a pre-authorized access-consented database those entering without the necessary authorisation will receive an automatic fine. These schemes therefore start from the opposite position to London, that access is only granted to those who have specified business in the centrally controlled area.



Using 21st century technology these cities have created 'virtual city walls' that hark back to the literal city walls of the middle ages. The methodology is clearly different, but the principle is broadly similar in that the city authority is setting the conditions of access that will benefit the city as a whole. In the case of Lucca, the virtual city walls correspond with the historic city walls, and one of the challenges addressed in SUMP PLUS is to consider how the digital walls and related urban logistics restrictions and benefits can be extended to other parts of the city and surrounding districts.

Lucca are also seeking to use city access monitoring not only to apply controls, but also to incentivise improved performance of logistics operators. Through the **EcoPoints** approach, developed within the LIFE ASPIRE project, the city administrator intends to reward the best-performing operators with improved conditions for accessing the city, such as extended delivery slots or other benefits. Examples of operator actions that will be rewarded include the deployment of zero (tailpipe) emission vehicles in the city. This provides the basis for

⁵⁸ Following resolution of the municipal council n. 17/2012 regarding provisions for access, transit and parking of vehicles within the historic centre of the City of Lucca.

competitive dominance of best-performing operators in the central area, while not leading to the exclusion of smaller, and potentially specialist operators, servicing certain needs.

5.4 A framework for urban logistics partnerships and policy measures

With freight partnerships viewed as a crucial facilitator for dialogue amongst stakeholders, combined with virtual city walls as an enabler for appropriate access restrictions and incentives, it is possible to construct a framework for progressive urban logistics policy formulation. This approach is illustrated below with horizontal freight partnerships and digital coordination and monitoring layers, with the four main mechanisms for sustainable city logistics shown below: guide and inform, access controls, low and zero emission vehicles, and improved vehicle load factors achieved through consolidation. This configuration is summarised in Table 10 and further details of relevant strategies and measures are provided in Table 12.

Table 10: A framework of urban logistics policy measures – overview

Freight partnerships			
<i>Open constructive dialogue with stakeholders to jointly further the sustainability agenda</i>			
Digital information and monitoring			
<i>Utilise technology to facilitate the ‘virtual city walls’ approach, regulating and rewarding urban logistics operators</i>			
Guide and inform <i>...designate freight priority routes and provide journey planning information for operators</i>	Control and regulate <i>...use of city assets to bring order to the interface/maximise asset utilisation</i>	Deploy the ‘right’ vehicle <i>...for the ‘right’ job to meet emission targets and improve air quality</i>	Optimise delivery vehicle load factor <i>...to minimise total vehicle</i>

SUMP PLUS provides the opportunity to map initiatives within Antwerp and Lucca across this framework in order to examine the range of initiatives, both prior to the project plus the City Lab Activities, and to understand the impacts achieved and lessons learned from partnership building, digital platform deployment and pilots of logistics delivery solutions. A preliminary version of the table for Lucca is provided below (Table 13).

Within both cities, freight partnerships form an important element of stakeholder engagement activities in WP4. Additionally, the Lucca City Lab will involve feasibility studies to understand how the existing ‘virtual city walls’ approach could be extended to cover other districts in the city and neighbouring municipalities.

A further explanation, and examples of city initiatives in relation to the specific measures identified in the lower tier of the framework, is provided below.

Guiding and informing city logistics operators - Within its logistics SUMP PLUS City Lab, the City of Antwerp will investigate and define safe traffic routes for Heavy Goods Vehicles (HGVs). The aim behind this is to ensure that large vehicles do not drive down unsuitable streets in the city, particularly those within residential areas and where walking and cycling are encouraged (including the Living Streets being delivered within the mobility City Lab). This City

Lab Activity will also involve a pilot of HGV access restrictions and a journey planning app aimed specifically at logistics operators will be introduced.

Control, regulate...and incentivise - As described above, delivery control mechanisms such as hours of access and parking restrictions are the norm in many European towns and cities. The Antwerp Logistics City Lab involves an element of restrictions aimed at HGVs, while in Lucca there is strong interest in understanding how the *EcoPoints* system (implemented as part of the LIFE ASPIRE project) will be successful in loosening restrictions for the best performing operators. For example, increased hours of access to the city as a reward for deploying low emission vehicles. Understanding how such approaches could then be extended to other parts of the Lucca sub-region is an important element of Lucca's City Lab.

Deploy the 'right' vehicle - Freight or transportation covers a vast range of modal types and a vast range of scale within those modes (land, sea, air). In terms of road freight, vehicles range from pedal powered cargo bicycles, autonomous robots, through a vast array of light vans before ending up at the European maximum 44 tonnes gvw pantechnican. The point about these vehicles, of whatever shape or size, is they are purpose designed to do the job they do and as such they have very specific needs in terms of the infrastructure that is required to enable them to operate, particularly at the upper ranges of weight and physical dimensions. Ergo, without suitable infrastructure, e.g. cycle lanes, robot friendly paths, trunk roads, access arrangements etc, they may not be able to operate at all and certainly will not be able to 'deliver' with maximum efficiency and least resource consumption. The infrastructure, whether it be physical or digital or the hybrid *phygital*, is therefore the key to matching the right vehicle to the task in hand and with an overriding deferral to zero or low carbon options.



The City of Antwerp's Marketplace for Mobility, as described in Section 4.4.2, has been utilised in order to pilot solutions in partnership with city centre logistics operators. In the past this included the initiatives 'DHL Express' and 'Cargo Velo Antwerp'. Both of these pilots involved setting up logistics hubs at strategic locations within and on the outskirts of the city, enabling last mile deliveries by cargo-bike and bicycle courier.

In the frame of SUMP PLUS, a further specific call for urban logistics has been launched, which involve a further selected project piloting e-cargo bike solutions. The company Bycyckel focuses on making commercial service provision in the inner city more sustainable through the use of electric cargo bikes for service companies, such as the Court of Antwerp, thuiszorg vleminkveld and Manus VZW.

As raised earlier, a shift towards smaller and zero emission vehicles, in combination with the increased volumes of e-commerce deliveries, entails a re-think in network of depots and hubs utilised by logistics operators, as well their freight consolidation practices.

Optimise delivery vehicle load factor - Freight consolidation offers the potential for reduced vehicle movements, and will influence decisions on the appropriate size and type of vehicle to be deployed. In Section 3.4 we established that there are three main opportunities for freight

consolidation: in consolidation hubs at the origin of the trip; by consolidating packages in time; and by consolidating/ grouping the delivery location.

The efficiency gains provide the potential for financial rewards, and as a result it is interesting to observe that the business models of several Antwerp Marketplace for Mobility pilots seek to exploit these. Table 11 summarises the solution pilots that will be conducted in the frame of SUMP PLUS.

Table 11: Antwerp Marketplace for Mobility - Urban consolidation pilots

Type of consolidation	Project title	Summary
Consolidation at source (Consolidation hubs)	Trivizor	Lastly, CULT (Collaborative Urban Logistics and Transport) from Tri-vizor NV is a sustainable, neutral and open partnership of companies that deliver or collect goods at points of sale or residencies in Antwerp. The aim is to reduce the number of journeys by bringing different means of transport together
	ON TIME Logistics	ON TIME Logistics will make its online platform easier to use for traders in the 'Smart and sustainable dispatch in and from Antwerp' project. They will also be converting bikes into cargo bikes, so more packages can be delivered.
Consolidation in time	Cargo Velo / Velopack	With the Velopack Antwerp project, bicycle courier service Cargo Velo is responding to the sharp rise in demand for home deliveries for online purchases. With this project, Cargo Velo is aiming for a 'slow but focused' approach, whereby (online) stores can sign up for their packages to be delivered in a limited number of fixed timeslots (as opposed to deliveries as soon as possible). Orders are saved up during the week and delivered in bulk towards the weekend.
Consolidated delivery location	CityDepot	'Innovative Consumer Retro Logistics' is a project from CityDepot, along with several project partners, in which they aim to make deliveries to and collections from homes (and lockers). This includes deliveries for local traders, last-mile solutions and deliveries for the services industry, such as delivering and collecting washing, food boxes, foodstuffs and so on.
	Mobile Locker	Mobile Locker NV is aiming to offer a package machine that, over time, all courier services can use with the 'Urban locker hub for shops and companies' project. Furthermore, all the shops in the vicinity of the package machine will get access to this service, at a reduced rate, and their customers can pay for their deliveries at the unit.

Table 12: A framework of urban logistics policy measures – strategies and measures

Freight partnerships							
<i>Open constructive dialogue with stakeholders to jointly further the sustainability agenda</i>							
Strategies:				Measures:			
<ul style="list-style-type: none"> Establish formal communication forum Maintain stakeholder networking 				<ul style="list-style-type: none"> Freight Quality Partnership Public consultation general or single issue Regular updates 			
Digital information and monitoring							
<i>Utilise technology to facilitate the ‘virtual city walls’ approach, regulating and rewarding urban logistics operators</i>							
Strategies:				Measures:			
<ul style="list-style-type: none"> Embed technology in all areas of street management Network systems for maximum impact 				<ul style="list-style-type: none"> Traffic control centre Smart traffic lights Camera systems RFID Geo-fencing 			
Guide and inform <i>...designate freight priority routes and provide journey planning information for operators</i>		Control and regulate <i>...use of city assets to bring order to the interface/maximise asset utilisation</i>		Deploy the ‘right’ vehicle <i>...for the ‘right’ job to meet emission targets and improve air quality</i>		Optimise delivery vehicle load factor <i>...to minimise total vehicle movements</i>	
Strategies:	Measures:	Strategies:	Measures:	Strategies:	Measures:	Strategies:	Measures:
<ul style="list-style-type: none"> Designate freight routes within the city avoiding sensitive districts and neighbourhoods 	<ul style="list-style-type: none"> Provide digital journey planner 	<ul style="list-style-type: none"> Deploy access restrictions based on time of day and week, vehicle weight and emissions Allocate city delivery servicing facilities 	<ul style="list-style-type: none"> White list systems Congestion charging Nighttime deliveries Lorry ban periods Road pricing Enforcement Unloading reservations 	<ul style="list-style-type: none"> Actively encourage modal shift Facilitate low carbon options 	<ul style="list-style-type: none"> LEZ, ULEZ Deploy charging points Encourage use of cargo-bikes 	<ul style="list-style-type: none"> Data driven inventory analysis to establish baseline Simulation modelling project to identify options and proof of concept 	<ul style="list-style-type: none"> Urban consolidation centre Transport operator’s operational alliance Consolidation in time Consolidation of delivery locations

Table 13: A framework of urban logistics policy measures – Lucca

Freight partnerships <i>Open constructive dialogue with stakeholders to jointly further the sustainability agenda</i>			
<ul style="list-style-type: none"> Freight Partnership has been existence for extended period Within SUMP PLUS a ‘Logistics Roundtable’ will be strengthened and expanded in order to assess the potential for sustainable logistics adopted in the city centre to be expanded to new geographical areas outside the city walls. 			
Digital information and monitoring <i>Utilise technology to facilitate the ‘virtual city walls’ approach, regulating and rewarding urban logistics operators</i>			
<ul style="list-style-type: none"> Deployment of LOCMAP (Logistics Credit Management Platform) and EcoPoints rewards system Integration of existing city centre access control system, enhanced with RFID technology, to control commercial vehicles entrance/exit A feasibility study will be undertaken in SUMP PLUS to understand whether the existing digital systems can be used to monitor/control also other movements (including passenger mobility) 			
Guide and inform <i>...designate freight priority routes and provide journey planning information for operators</i>	Control and regulate <i>...use of city assets to bring order to the interface/maximise asset utilisation</i>	Deploy the ‘right’ vehicle <i>...for the ‘right’ job to meet emission targets and improve air quality</i>	Optimise delivery vehicle load factor <i>...to minimise total vehicle movements</i>
<ul style="list-style-type: none"> Not currently pursued by Lucca 	<ul style="list-style-type: none"> Loading space occupancy control enforced in combination with LOCMAP 	<ul style="list-style-type: none"> Promoting the adoption of low/zero emission vehicles by transport operators and reward clean vehicle deployments through the EcoPoints approach Provision of new eco-logistics services for last mile deliveries (load/unload parking lots and cargo-bike sharing), both managed by the innovative LOCMAP 	<ul style="list-style-type: none"> Encourage transport operators to enhance their own Consolidation Centres in providing optimised and sustainable logistics services.

Freight is an essential service without which modern society cannot function and this realisation very much came to the fore during the recent pandemic. In this section we have set out a conceptual framework for freight partnerships, recognising that logistics entrepreneurs are devising new solutions for clean and efficient logistics, but that cities have an important role to regulate and incentivise operations in a competitive environment. Providing supportive conditions for new solutions will help to ensure that these are successful in comparison with those poor practices that are more disruptive and polluting.

6 Applying the concepts through research and demonstration in SUMP PLUS

This deliverable has sought to clarify the main concepts and analytical frameworks relating to Business Models, Mobility Partnerships and Freight Partnerships, providing a clear basis for research and application of these within the SUMP PLUS City Labs. In the longer term, it is intended that these will provide frameworks for reporting on the City Labs in WP2 and for the development of guidance and capacity building material (WPs 6 and 7).

In this section we present an overview of how the concepts will be further developed and researched within the City Labs, with reference to specific Activities to be undertaken by the SUMP PLUS cities in liaison with support partners.

6.1 SUMP Financial Strategy and multi-level funding chain

The concept of the multi-level funding chain was not originally included in the Task 1.4 description, but is considered beneficial in that it: firstly, establishes the role of business models for new mobility solutions in the context of a complex series of funding interactions between European, national, city, employer and household level decision-making; and secondly, helps to inform the development of the Financial Framework Tool.

Furthermore, it is apparent that a range of City Lab activities will contribute to improved understanding and practice in the preparation of SUMP Financial Strategies. These range from the support to be given to Klaipeda in the development of a SUMP Implementation Strategy, through to the investigation of how the City of Antwerp can ensure that MaaS packages are affordable for all citizens. Figure 19 presents an overview of the relevant City Lab activities in relation to the funding chain diagram.

6.2 Developing the Financial Framework Tool and Action & Budget Tracker

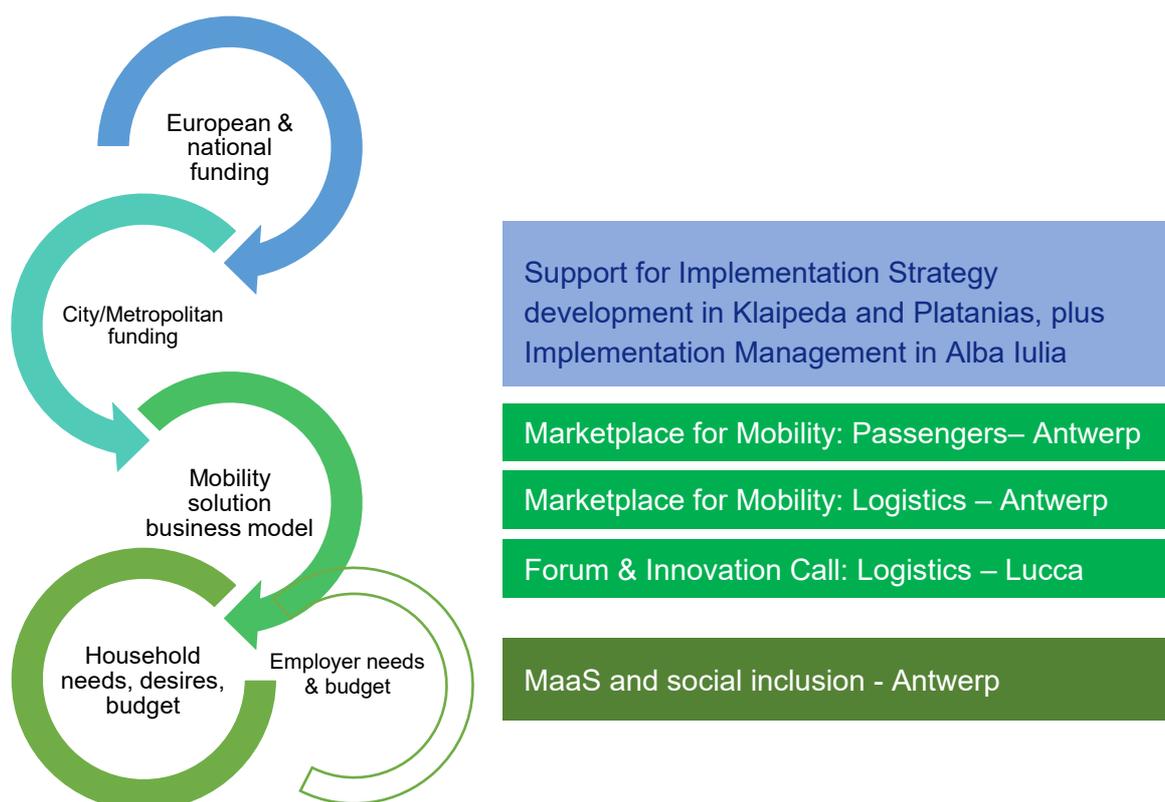
Development of the SUMP PLUS Financial Framework Tool will be advanced, in the first instance, to support the development of a Financial Strategy underpinning the Klaipeda Implementation Strategy. It can then also be applied to support work in the Alba Iulia and Platania City Labs as appropriate. At this stage it is envisaged that the following steps would be followed to apply the Financial Framework Tool:

- **Step 1 – Create a common understanding within the team regarding funding sources currently utilised.** This will be based upon completing a first iteration of the Action and Budget Tracker, showing proposed SUMP projects, estimated costs, committed funding and shortfalls in funding.
- **Step 2 – Create a trendline and projection of core funding sources available (e.g. city authority budget allocations)** – The projection is based on current and historic budget levels, in order to understand the degree of variation and anticipated level of funding throughout a 10-15 year implementation planning period. A second element of

this exercise is to consider whether there are other foreseen city project/priorities that may significantly influence mobility budgets in the future.

- **Step 3 – Assess the potential to access other additional forms of funding** – The CODATU urban transport budget structure (Figure 4) has provided the basis for the preparation of a mobility funding tool that will inform discussions around the possibility of accessing additional sources of funding (see Figure 20). This would involve consideration of the likely timescales for accessing new forms of funding, taking into account application lead-times, a potential requirement for approval of new regulations or legislation etc.
- **Step 4 – Defining a financial strategy** – In parallel with the development of the SUMP Implementation Strategy, a series of actions relating to the securing of funding are defined. Depending on the outcomes of applying the Financial Framework Tool there may be direct feedback into the Implementation Strategy in terms of prioritisation of measures, and seeking to find cost effective means for achieving SUMP goals with partners.

Figure 19 - Multi-level funding chain and City Lab Activities

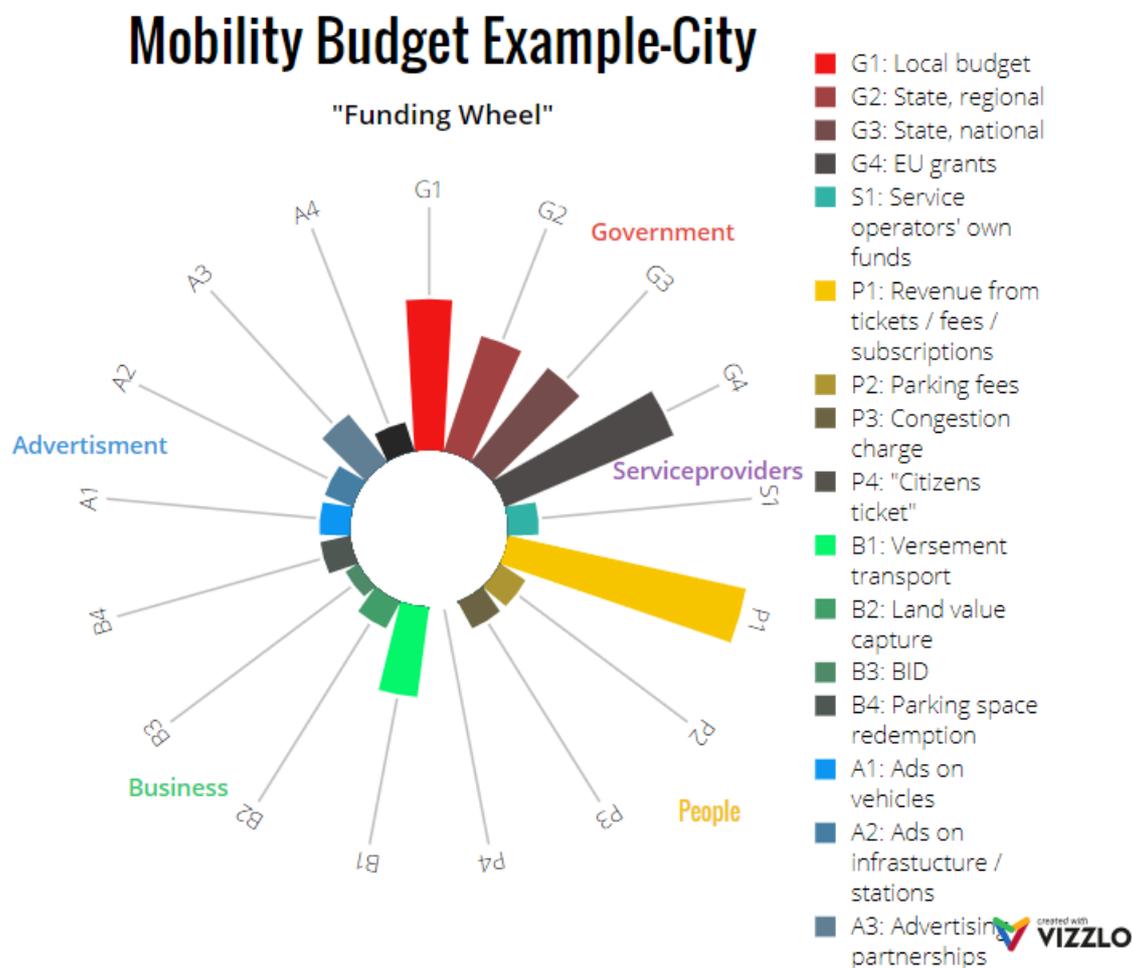


As an integral element of Step 3, and drawing on the work on business models and partnerships presented in this deliverable, the role of private sector operators to contribute to SUMP delivery will be assessed. To provide one example, the implementation of a car-pooling platform is identified as a measure in the Klaipeda SUMP. Comparison of business models indicates that viable platforms have been implemented that rely on customer revenue, as well

as B2B approaches where either companies/large employers or the public authority pays in order to support the system. In the context of the COVID-19 pandemic carpooling initiatives have been particularly hard-hit, but identification of opportunities to work proactively with solutions providers in the future can be undertaken now. The Financial Framework Tool will therefore involve investigation of the framework for mobility partnerships as set in further detail below.

The **SUMP PLUS Action & Budget Tracker** will provide a 'live' means for planning and monitoring the ongoing implementation of SUMP measures, including the availability of funding from different sources. By combining this with a mapping interface and project 'dashboard' (via GIS) it is intended that the Tracker will also provide a means for communicating with other sectors and elected officials.

Figure 20 - Exploring funding sources utilised and new options using the Financial Framework Tool



6.3 A framework for urban mobility partnerships and demonstrating B2B mobility solutions and business models

Drawing upon the discussion of multi-level SUMP funding chains, the business models of new mobility solutions, and the ways in which city authorities are developing mobility partnerships, we have sought to present a framework that presents these key elements and their interactions

(as introduced in Section 4.5) together. Through the SUMP PLUS City Laboratories, various aspects of this overall framework will be investigated further and applied in order to identify opportunities for solution development in partnership with the private sector mobility operators and other key stakeholders.

Within Section 3.2 we distinguished three main factors for characterising business models: the value proposition – i.e. as an individual mobility service, or as an ‘aggregator’/integrator of mobility services; the customer/client segment and whether the service reaches out to employers/businesses or direct to consumers; and the revenue stream/s selected. There is a wide diversity of mobility solutions that fall in these categories and it is not possible for SUMP PLUS to look in detail at each of these. As a result, the focus will be on B2B mobility services, observing also the implications of the COVID-19 pandemic within this field. The City of Antwerp has highlighted the buying power of companies procuring services for their staff as an important means for achieving SUMP objectives and it is apparent from the initial investigation of mobility solutions delivered by the private sector in other SUMP PLUS cities that there is great scope for exchange and transfer of good practice and lessons learnt.

The Antwerp Marketplace for Mobility has been identified as a proactive means for encouraging entrepreneurship and the formation of partnerships between the city authority and solutions providers. Within the frame of the Antwerp mobility City Lab, a call was launched through the Marketplace for Mobility aimed specifically at Business 2 Business models geared towards work-related travel (home-to-work travel, movements between workplaces). These are summarised and categorised in the Table below and include three MaaS/aggregator MaaS schemes, three individual mobility solutions, as well as a reward scheme that incentivises sustainable mobility. They are also shown in the overall framework table – Table 15.

Table 14 - Mobility solutions and business models piloted through the Antwerp City Lab

Reward schemes B2B		AllRide provides an app that uses gamification, rewards and campaigns to encourage smarter and more sustainable mobility
MaaS B2B		Whim will be connected with Commuty (smart parking management) and Vaigo (simple mobility management) to offer a complementary package to organisations
		The Olympus MaaS scheme offers: firstly, all-in-one app access to train, tram, bus, waterbus, car-sharing, carpooling, bike-sharing and bike-rental; secondly, easy management of mobility budgets
		Skipr aims to offer Antwerp's employers access to its mobility service which consists of: the Skipr MaaS app, a payment card and web platform. Employers can activate and manage different budgets, depending on their mobility policy.

Mobility Solutions B2B		<p>Cambio will provide a trial offer to companies in Antwerp, in order that they can trial the benefits of car sharing</p>
		<p>Huur een Stuur is collaborating with Olympus Mobility to offer affordable, collective and direct transportation to companies or areas that are difficult to reach using the public transport network</p>
		<p>Zingi offers companies and organisations a complete package of shared bikes, including management software, maintenance and breakdown assistance. Companies will be able enjoy a 3-month trial offer.</p>

Table 15 - SUMP PLUS City Lab activities in relation to the framework of mobility partnerships, solutions and funding streams

PUSH: Control & Incentivise sustainable mobility	Multi-level funding chain KLAPEDA, ALBA IULIA and PLATANIAS Implementation Strategy & Management			FULL: Provide for sustainable mobility														
	Funding	Partnership formation	Funding	AVOID (Localise)	SHIFT Modes							SWITCH fuels						
Switch company car subsidies to zero (tailpipe emissions) Shift company car subsidies to MaaS	Increased PT and shared mobility revenue ➔	EJ & National Government	Grant funding Loan financing ➔														Energy Utility	
Urban Access Restrictions (UAR) Low Emission Zones Car Parking charges Car Parking Levys	Charges and fines ➔	City-region Gov't	Land Value Capture Business rates ➔															Charging station & smart-grid infrastructure
		Property Developer	PT subsidies Long-term contracts / subscriptions ➔	ANTWERP Coworking spaces / local meeting hubs	ANTWERP - Business to Business (B2B) MaaS    													
		Employers	PT subsidies Subscription Travel cards Pay-as-you-go Advertising ➔															
		Household needs, desires, budget			Business to Consumer (B2C) Travel Assistance Services / MaaS / Journey Planners   													
				3 rd Places	Active mobility	Public transport	DRT / Ride-pool	Mobility Hubs	E-scooter sharing	Bike-sharing	Moped-sharing	Car-sharing	Car-pooling	Owned vehicle	Vehicle 2Grid			
					Private sector operators: Collective and shared mobility business models													

Legend: ● individual mobility service/solution; ➔ funding stream

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6.4 A framework for urban logistics partnerships and demonstrating business models and solutions

Recognising the importance of freight partnerships for agreeing pragmatic approaches to achieving sustainable urban logistics, this Deliverable has presented a framework for policy measures and solutions. The table below combines this structure with information on the SUMP PLUS activities, including the piloting of consolidation and cargo-bike solutions that result from an Antwerp Marketplace for Mobility call. During the course of the project it will be possible to add further information also in relation to solutions identified through the Lucca logistics innovation call.

It is apparent from the table that SUMP PLUS will involve activities relating to the majority of segments within this framework, including the testing of freight consolidation solutions and business models in Antwerp, and the expansion of sustainable logistics partnerships and policy measures to the Lucca sub-region.

Table 16 – SUMP PLUS City Lab activities in relation to the framework of urban logistics policy measures and solutions

Freight partnerships <i>Open constructive dialogue with stakeholders to jointly further the sustainability agenda</i>			
ANTWERP – Logistics City Integrator (WP4) ANTWERP – Marketplace for Mobility Urban Logistics Call LUCCA – Strengthening and expansion of the Logistics Roundtable (WP4) LUCCA – Logistics Innovation Call			
Digital information and monitoring <i>Utilise technology to facilitate the ‘virtual city walls’ approach, regulating and rewarding urban logistics operators</i>			
Guide and inform	Control and regulate	Deploy the ‘right’ vehicle	Optimise delivery vehicle load factor (consolidation)
ANTWERP Development of Antwerp Transport Region Freight Route Network and Journey Planner	ANTWERP Pilot for HGV Access Restriction		ANTWERP – ON TIME Logistics consolidation at source and use of cargo-bikes
			ANTWERP – Velopack consolidation in time and bicycle courier service
			ANTWERP – Trivizor consolidation at source and delivery location
			ANTWERP – CityDepot and Mobile Locker consolidated delivery location at lockers

7 Conclusions

This Deliverable sets out to provide conceptual frameworks for the business models of urban mobility and logistics solutions, as well as the mobility and logistics partnerships formed between public authorities and the private sector entrepreneurs and businesses introducing new services in our cities. Importantly, this deliverable has sought to set the concepts of business models and partnerships within a broader framework for SUMP implementation planning and the development of a SUMP Financial Strategy. As presented in Section 6, the questions raised in this deliverable, and the conceptual frameworks established, will be further investigated, applied and developed through the co-creation processes in the SUMP PLUS City Laboratories. The overall aim in this regard is to develop a Financial Framework Tool and linked Action and Budget Tracker that will assist cities in identifying opportunities for partnerships and funding streams that will support the delivery of solutions and SUMP (and Sulp) delivery.

With respect to the business models of new mobility and logistics solutions, it has been highlighted that the financial sustainability of services remain uncertain in these relatively new markets. In some cities these new services are subject to high degrees of competition and a degree of consolidation can be anticipated. Even in those cities that have attracted multiple companies to launch services, city authority support in terms of funding (e.g. for bike-sharing), promotion and/or provision of enabling regulation and infrastructure, are highly beneficial if SUMP goals are to be achieved. It is also clear from this analysis in this report that the distribution of new mobility services remains very uneven across Europe, with smaller cities not presenting such large and lucrative markets, although signs of a slow spread of new mobility solutions to new cities can be detected. As city authorities seek to update their SUMP (and Sulp) and shape their regulations, streets and open spaces to facilitate new mobility and logistics solutions, understanding the robustness of business models and the approaches for forming mutually beneficial partnerships will be highly beneficial.