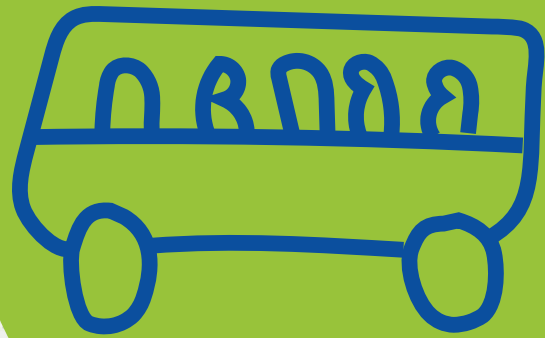




sum⁺



New and Shared Mobility Services

Intervention Guide



Co-funded by
the European Union



The objective of the SUM project is to transform current mobility networks towards innovative and novel shared mobility systems Integrated with public transport in more than 15 European Cities by 2026, reaching 30 by 2030.

Intermodality, interconnectivity, sustainability, safety, and resilience are at the core of this innovation. The outcomes of the project offer affordable and reliable solutions considering the needs of all stakeholders such as end users, private companies, public urban authorities.



All of the results of the project are available at:

WWW.SUM-PROJECT.EU



Legal Disclaimer

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.



Table of Contents

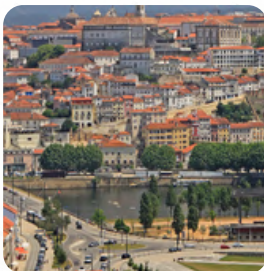
03	Introduction
05	Combining Mobility Modes and Enablers through SUMN NMS Interventions
11	NSM Interventions Implementation guide approach
009	Conclusion
010	References

Introduction

Urban mobility in Europe is at a turning point. Rapid technological change, evolving infrastructure and ambitious policy reforms are reshaping how people move around cities, yet the private car remains dominant, accounting for more than 80% of total passenger kilometres travelled across Europe (Eurostat, 2024). The consequences are well documented: congestion, emissions and an urban transport system that falls short of its potential.

Addressing this requires more than incremental improvement. It calls for a coordinated shift towards sustainable, multimodal and user-centred mobility, one that makes shared mobility not just available, but genuinely attractive.

This NSM intervention guide draws on the experience of the Horizon Europe project SUM, Seamless Shared Urban Mobility, which tested a wide range of technological innovations, co-creation approaches and policy instruments across nine Living Labs. The aim was to reduce dependence on private car ownership and accelerate the adoption of new shared mobility modes through a combination of push and pull measures.



COIMBRA



FREDRIKSTAD



GENEVA



JERUSALEM



KRAKOW



LARNACA



MUNICH



PENTELI



ROTTERDAM

The SUM New Shared Mobility (NSM) interventions are identified as the SUM NSM main business activities of MaaS, demand- responsive transport , mobility hubs, and integration of them into the mobility ecosystems. These business activities were investigated during the project and are the basis for the SUM **SUMP integration guidelines and our policy recommendations.** They combine different mobility modes and mobility enablers implemented by the SUM living labs, and respond to their mobility transition goals.

The lessons learned from the SUM living labs are brought together in this guide, which is intended for follower cities, transport authorities and relevant stakeholders looking to implement NSM solutions in their own contexts. The guide presents our business activities, as holistic urban mobility interventions that have been implemented within the Living Labs, and the policy recommendations that have been developed throughout the project. Additionally, it provides a check list on how to incorporate the NSM interventions into broader urban mobility planning frameworks, including Sustainable Urban Mobility Plans (SUMPs).



Geneva Living Lab has developed a network of mobility hubs as well as TPG flex, an on demand service. Source: Lenka Navratilova

Combining Mobility Modes and Enablers through SUM NMS Interventions

The concept of **business activities** is used in SUM to identify and assess shared mobility solutions in real-world settings, with the goal of informing their potential integration into urban mobility. These business activities serve as a central framework for understanding how new shared mobility services across nine Living Labs can contribute to more accessible, sustainable, and integrated urban mobility systems.

Rather than focusing on isolated services or commercial products, SUM defines business activities as **ecosystemic configurations**. These bring together mobility modes, enabling tools, governance models, push and pull policy measures, and specific urban policy objectives defined in SUM. By doing so, they are designed to reflect the **interdependent roles of public and private actors**, with a strong emphasis on co-creation, inclusiveness, and transferability. This also allows them to be understood as holistic urban mobility interventions.

Below are the **business activities** identified, which in the project correspond to the strategic domains around which new mobility services are structured and that relate to different modes and enablers. These are:



Business activities make it possible to translate the complex and often experimental configurations tested in Living Labs into actionable planning elements. They allow cities to draw lessons from real-world cases involving diverse actors, territorial scales, and governance settings, and to embed these learnings into the structured planning and implementation cycle of a SUMP. In this way, business activities serve as a bridge between innovation and long-term policy integration.

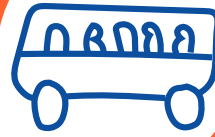
In the following subsections, we classify these business activities into three interlinked pillars: **mobility modes, mobility enablers, and policy objectives**. This structure conveys all the different SUM cities interventions and associated pull and push measures.

Mobility Modes

Bike
Sharing



Demand
Responsive
Transport
(DRT)



Public
Transport



Car
Sharing



Mobility Enablers

Mobility
as a Service
(MaaS)



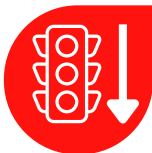
Mobility
Hubs



NMS
Integration



Policy Objectives



Reduction of
Congestion



Reduction of
Emissions



Noise Hindrance
Reduction



Improved
Accessibility



Improved Mobility
Services



Enhanced
Multimodality



Improved
Safety



Improved
Public
Transport

Business Activity



Integrated Mobility Service Platform (MaaS)



How are the Living Labs improving their mobility environment?

Modes

Enablers

GENEVA

- Improving MaaS to foster intermodal trips using sustainable modes by bundle tickets and digital support.
- Optimize combination of PT and NSM



PENTELI

MaaS platform connecting ride-hailing services with the interface of the bike-sharing app enabling users to combine bikesharing with existing taxi services



ROTTERDAM

The MaaS platform integrates real-time prediction, APIs, RET ticketing, support, FAQs, and personalised accounts, combining PT with shared bikes and e-mopeds



LARNACA

The PAME app integrates real-time bus info and journey planning, expands with NEXTBIKE booking, and is upgraded with LPT and stakeholders



COIMBRA

Integrating shared mobility into PT ticketing, offering frequent bus services, real-time info, and travel planning, while targeting elderly users with call centre support



Policy objectives



Business Activity



Demand-Responsive and On-Demand Mobility



How are the Living Labs improving their mobility environment?

Modes

Enablers

GENEVA

Develops an on-demand mobility solution combining the existing passenger service tpgFlex with a new goods transport service, linking public transport and shared mobility. Optimize combination of PT and NSM



JERUSALEM

Introduces an oriented ride-pooling service, offering demand-responsive mobility that matches passengers with similar routes to increase vehicle occupancy



KRAKOW

Develops a van-based demand-responsive mobility service to improve accessibility and support multimodality, particularly for citizens and students



FREDRIKSTAD

Introduces demand-responsive ferry services integrated with public transport, using apps, sensors, and smart signage to enhance passenger experience



COIMBRA

Develops integrated on-demand minibus services for peripheral areas, offering fixed-route PT during peak hours and flexible, bookable transport during off-peak times



Policy objectives



Business Activity



Mobility Hubs Development



How are the Living Labs improving their mobility environment?

Modes

Enablers

GENEVA

Develops mobility hubs to improve intermodal travel by integrating shared and PT, and increasing the visibility and sense of place



PENTELI

A central mobility hub with PT, ride-hailing, e-bike and e-scooter sharing, with trackable QR codes to monitor use and enhance intermodal travel, reduce travel time



COIMBRA

Explores the development of a mobility hub with initial focus on stabilising the on-demand transport system before progressing to hub implementation.



Policy objectives



Business Activity



New Shared Mobility into Ecosystem



How are the Living Labs improving their mobility environment?

Modes

Enablers

MUNICH

Expansion of the carsharing infrastructure and integrating shared mobility with public transport to promote multimodal travel



PENTELE

Introducing a free shared e-bike system connected to local buses and ride-hailing services. By integrating these modes into one app, it supports short multimodal trips and reduces private car use



LARNACA

Deployment of bike-sharing service in partnership with Nextbike and the local PTO, expanding cycling infrastructure and station placement and potential subsidies aim to boost affordability, access



Policy objectives



Building on these four business activities, the NSM Interventions Implementation Guide translates this framework into practical guidance for cities through two complementary parts: policy recommendations for each business activity structured around the PESTE framework, and a step-by-step checklist for integrating these activities into the SUMP planning cycle. Both are presented in the following chapters.

NSM interventions implementation guide approach

The NSM Interventions Implementation Guide is structured around two complementary parts, which together provide practical guidance for cities looking to implement new shared mobility solutions:

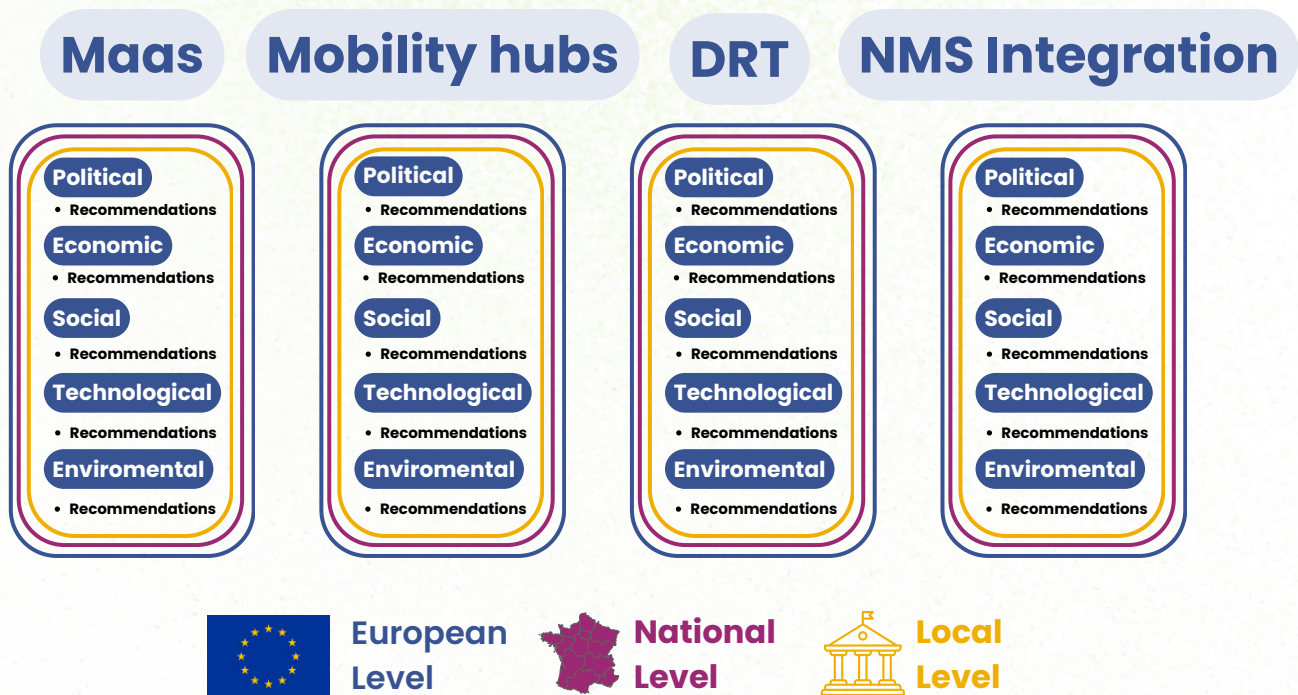
The first part provides policy recommendations for each of the four main business activities: MaaS, DRT, mobility hubs and the integration of NSM into public transport. These recommendations are structured around the PESTE framework: political, economic, social, technological and environmental dimensions, and offer concrete guidance on the conditions, measures and enabling factors that support successful NSM implementation across different urban contexts.

The second part focuses on how to integrate NSM into broader planning frameworks such as SUMP. It follows the four-step SUMP planning process and provides, for each step, a checklist covering the four main business activities. This part is designed to help cities embed shared mobility considerations into their existing planning cycles rather than treating them as standalone initiatives.

Policy recommendations for the implementation of New Shared Mobility Services

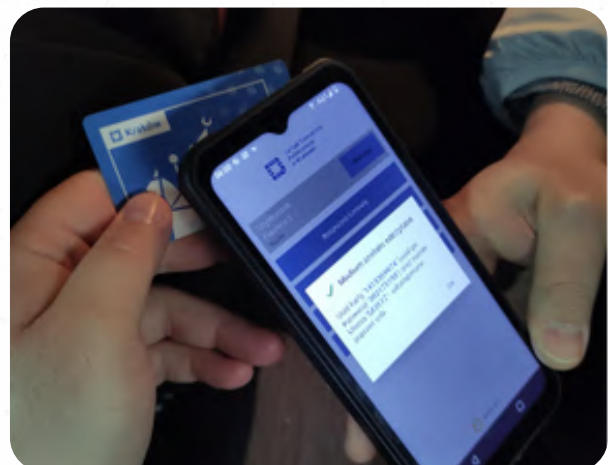
The PESTE framework is a strategic analysis tool used to examine the macro-environmental factors that may affect an ecosystem's/organisation's performance and decision-making. In the SUM case, we talk about the urban mobility ecosystem. It encompasses five dimensions: political, economic, social, technological, and environmental factors, allowing organisations to identify external opportunities and threats in their operating environment (Johnson et al., 2017). Following this approach, POLIS collected and validated the necessary information to draft the policy recommendations following the structure in the image next page.

Policy Recommendations Structure



The SUM policy recommendation's structure is the framework used by POLIS to present the recommendations to experts from the consortium and outside the consortium in the validation workshops.

The SUM policy recommendations methodological approach, guided by the PESTE framework, included a detailed process of collecting key information from the SUM living labs' implementation experiences, linking this information to previous project findings, and then validating the information with experts from the consortium and relevant external stakeholders. The results are the SUM policy recommendations presented below.



Krakow Living Lab developed the service LajkBus to offer convenient and affordable on-demand mobility.
Source: Łukasz Gryba

Policy recommendations | MaaS

Integrated Mobility Service Platform (MaaS)



Build early, formal collaboration and secure political backing, ensure policy alignment as a foundation, and avoid working in silos

Local

National

European

Plan and allocate resources in line with real demand and reduce risk through demand assessment

Local

Phase delivery while strengthening the digital foundations

Local

Stimulate uptake while protecting equity of access

Local

Avoid underestimating costs and anticipate the challenge of funding non-core structural investments

Local

Embed user-centred design and continuous improvement and deliver access through multi-channel support and capability-building

Local

National



Policy recommendations I MaaS

Drive awareness, multimodality and behaviour change through sustained engagement

Local

Communicate effectively to different groups

Local

Use previous knowledge and real-world demonstrations to accelerate uptake

Local

National

European

Address uneven access to shared mobility proactively

Local

Design platforms that work for users and operators

Local

Build in scalability and interoperability from the start

Local

Standardise data exchange and user experience expectations

Local

National

European



Policy recommendations I MaaS

Maintain continuous improvement through updates

Local

Improve system transparency through visualisation tools

Local

Address GPS and technical failures proactively to protect confidence

Local

Embed low-emission and active modes

Local

Align MaaS delivery with broader policy objectives

Local

National

European

Set clear environmental targets and measures, report and manage their performance

Local

National

European

Make the environmental value visible and credible to users.

Local

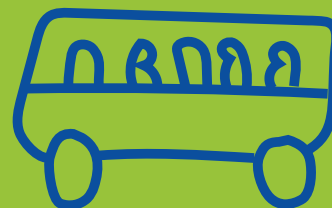
National

European



Policy recommendations | DRT

Demand-Responsive and On-Demand Mobility



Position on-demand mobility as a complement to public transport

Local

National

European

Make the public-value case

Local

National

Support strategic decision-making and set realistic KPIs that reflect public service objectives, not profit

Local

National

Use lessons from past failures to strengthen planning and reduce risk

Local

Manage expectations through transparent, evidence-based communication

Local

Align service supply with population needs and balance efficiency with responsiveness

Local

National

European



Policy recommendations | DRT

Reduce early-stage financial risk, control operating costs, and enable integrated payments. Secure long-term operational capacity

Local

National

Avoid underestimating costs

Local

Embed community partnership and inclusion

Local

Tailor the service to local context and evolving demand

Local

Build an evidence base for demand and affordability.

Local

National

European

Treat communication as a continuous acceptance-building tool

Local

Build (or adapt) a demand-management and user-communication application

Local



Policy recommendations | DRT

Use data to drive continuous technical and service optimisation

Local

Integrate payments for seamless multimodal travel

Local

National

Protect service continuity

Local

National

Enable real-time operational flexibility

Local

Anchor on-demand services within public transport networks

Local

National

Align fleet transition with national low-emission targets

Local

National

Reduce transport emissions through smarter operations, e.g., by reducing empty running vehicles

Local



Policy recommendations | Mobility Hubs

Mobility Hubs Development



Set long-term strategy for intermodal and multimodal public transport

Local

National

European

Create an enabling regulatory and planning framework for mobility hubs and manage land-use and parking trade-offs through transparent planning and engagement

Local

National

European

Plan the hub network strategically, not as isolated sites, and create coherence through a defined hub hierarchy and expansion pathway

Local

Reduce administrative drag as a delivery risk

Local

Address political constraints early and explicitly

Local

Secure durable commitment backed by stable funding

Local

National

European



Policy recommendations I Mobility Hubs

Secure long-term funding and investment capacity

Local

Broaden user choice through integrated multimodal offers

Local

Ensure viability in low-demand areas

Local

Design mobility hubs around user needs from the start

Local

Provide a genuinely useful multimodal offer to increase choice

Local

Make transfers frictionless to minimise passenger loss

Local

Promote multimodality via sustained marketing and communications

Local

Policy recommendations I Mobility Hubs

Implement strong wayfinding

Local

Maintain hubs as a long-term public asset

Local

Manage public-space trade-offs proactively.

Local

Strengthen data-sharing readiness through provider commitments

Local

Coordinate modes through integrated monitoring and real-time information and Plan for multimodal integration from the outset

Local

National

European

Enable seamless digital integration across services

Local

Use hubs to prioritise sustainable modes and reduce car dependence

Local

Policy recommendations | NMS Integration

Integration of New Shared Mobility into the Ecosystem



Create a coherent strategic vision

Local

National

Build supportive and adaptive regulatory environments

Local

National

Strengthen coordination and infrastructure

Local

National

Regulatory flexibility must support service quality

Local

National

Enable scalable and sustainable business models

Local

National

European

Stimulate market uptake through accessible and attractive pricing strategies

Local



Policy recommendations | NMS Integration

Establish robust financial planning frameworks

Local

Embed user-centric design

Local

Encourage long-term behavioural change through education and incentives

Local

Address uneven access to shared mobility proactively and promote equity through proactive and inclusive outreach

Local

National

European

Strengthen community responsibility

Local

Ensure interoperability through open standards

Local

National

European

Integrate NSM into MaaS ecosystems as standard practice

Local



Policy recommendations | NMS Integration

Plan for technological scalability and adaptability

Local

National

European

Secure early and structured data access

Local

Invest in real-time data capabilities

Local

Plan for operational and system integration requirements

Local

Develop integrated, low-emission mobility infrastructure

Local

National

European

Accelerate the transition to zero-emission and energy-efficient fleets

Local

National

European

Establish environmental monitoring and long-term targets

Local



Policy recommendations | NMS Integration

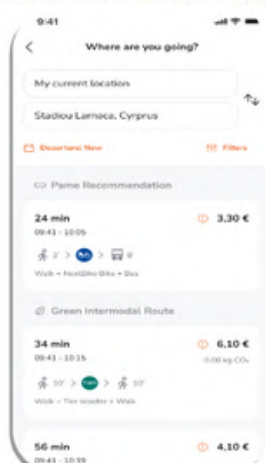
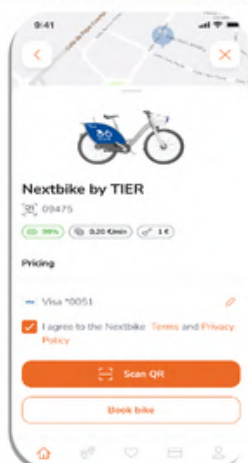
Apply strategic spatial planning to maximise environmental benefits

Local

Regulate operations to prevent rebound effects

Local

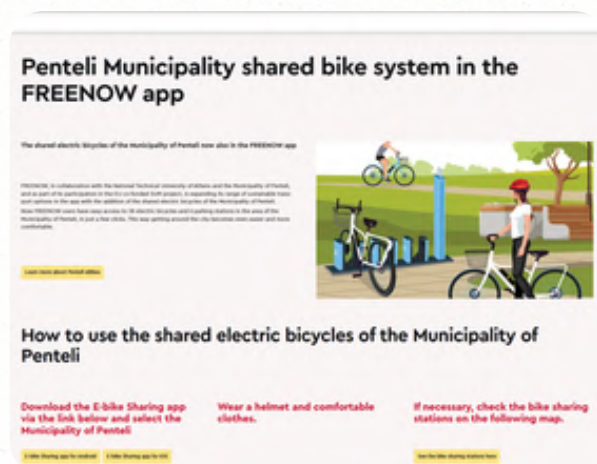
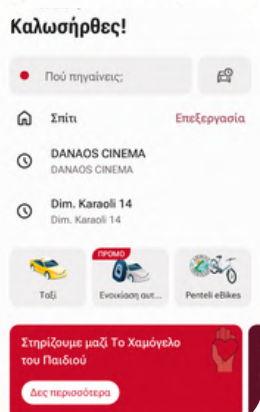
National



ibility



Larnaca Living Lab PAME app offer the opportunity of combining a multimodal trip of bus and shared bike in a single ticket. Source: Andreas Demetriades



Penteli has included their new shared e bike system in the FreeNow app, combining the possible of using Ride hailing and bike-sharing on the same digital app. Source: Stefanos Tsigdinos

Integrating New Shared Mobility into Sustainable Urban Mobility Plans (SUMPs)

Following the processing of the SUM living labs' main findings into policy recommendations and lessons learned, POLIS included the key takeaways of integrating the SUM business activities into SUMPs presented in [Deliverable 5.6](#). The steps show these key takeaways classified by SUMP phase:

CHECKLIST for preparation and analysis

- Form a small, **multidisciplinary core team** (planning, IT, operations, finance, legal).
- **Map legal & procurement constraints** early (national law, permits, procurement timetables).
- **Create a market map** with existing operators, fleet size, permit renewal cycles).
- **Run targeted analytics** with surveys to select pilot areas.
- **Define realistic scope** and start with limited modes or areas if capacity is limited.
- Plan governance for scale with **inter-municipal coordination** where FUA spans different permit regimes.
- **Design simple data agreements initially** (e.g., availability/minutes accounting) with stepwise escalation to richer data sharing.



Coimbra Living Lab started their On-Demand service to provide first/last-mile access to the PT system.
Source: Melissa Gama

CHECKLIST for strategy development

- Develop **2–3 realistic scenarios** per business activity (minimal pilot, phased scale-up, full integration).
- **Base scenarios on actual readiness:** infrastructure timelines, contracting cycles, data availability.
- **Align scenario milestones with major mobility projects** (PT rollout, bike-lane delivery, hub construction).
- **Bring all key actors into a structured scenario workshop** (PT operator, shared mobility providers, tech partners, planners, legal).
- **Clarify roles** for each scenario (who provides data, who operates, who maintains infrastructure).
- **Engage cross-municipal partners** early if the FUA includes multiple permit regimes.
- Document cooperation terms (data access, branding, responsibilities) in **simple MoUs or governance sheets**.
- Build a **shared long-term vision** stating how business activities support PT and sustainability goals.
- Ensure **accessibility and inclusion are explicit** components (e.g., non-digital booking options where relevant).
- Define **5–10 year strategic goals with 2–3 year stepping stones** that reflect institutional and technical reality.



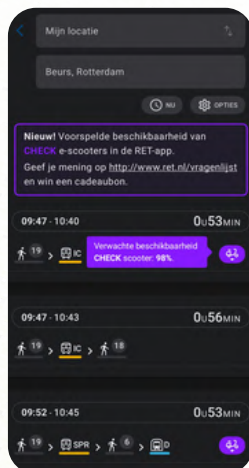
Fredrikstad Living Lab set up an autonomous electric ferry that was combined with an increase of push and pull measures, including an increase of bike lanes and park and rides in the city. Source: Tom Mauno

CHECKLIST for planning & co-design of solutions

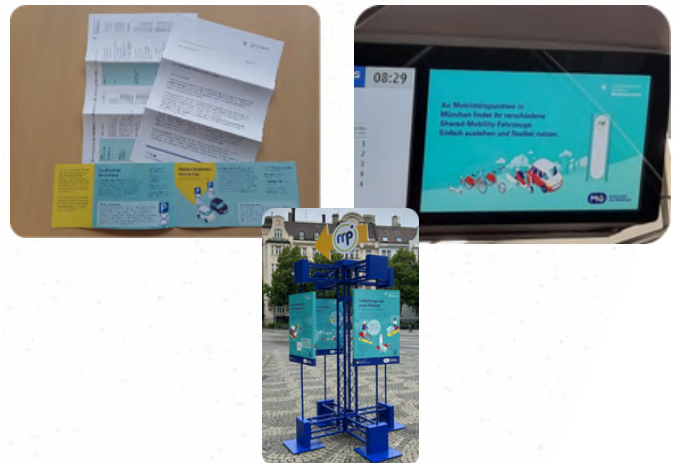
- **Translate scenarios** into concrete, deliverable measures per mode (MaaS, DRT, hubs, shared mobility).
- **Bundle measures** so that shared mobility reinforces public transport (not competes).
- **Ensure spatial feasibility:** confirm station locations, kerbside allocation, hub footprints.
- Evaluate **technical feasibility:** integration level, API readiness, data standards, ICT needs.
- **Incorporate user feedback** and pilot data into final measure selection.
- Define **accessibility and inclusion requirements early** (digital + non-digital access).
- **Map responsibilities** clearly across departments (planning, traffic, IT, legal, operations).
- Define **data-sharing duties:** who provides data, frequency, format, permissions.
- **Coordinate with procurement teams** to ensure legal compliance (permits, tenders).
- Identify **funding sources for each measure** (municipal, regional, EU, PPP, operator fees).
- **Prepare operator obligations** (performance standards, reporting, customer service).
- Produce an **implementation roadmap** with milestones and dependencies.
- Develop a **communication and stakeholder plan** (political briefings + public messaging).

CHECKLIST for implementation, monitoring and evaluation

- Set up **automated data feeds** (usage, availability, KPIs) in agreed formats.
- Collect both **quantitative** (usage, availability, emissions, waiting times) and **qualitative data** (surveys, feedback).
- **Monitor performance against targets** weekly/monthly depending on the service.
- **Track unintended impacts** (parking conflict, safety issues, street clutter).
- Use **dashboards or shared tools** for real-time performance tracking.
- Maintain **continuous dialogue with operators** to quickly resolve operational issues.
- **Engage vulnerable users and communities** to ensure inclusiveness.
- Check whether **implementation follows the SUMP action plan** (timelines, budgets, roles).
- **Adjust service parameters based on data** (fleet size, virtual stops, station placement, pricing).



Rotterdam Living Lab has created a prediction tool for available e-scooters at your PT stop. Source: José van der Plaats



Munich Living Lab generated more than 14 million contacts through their campaign on mobility hubs and car sharing. Source: Pauline Klanke

Conclusion

This guide summarises the lessons from the nine Living Labs of the SUM project, providing cities and transport authorities with an intervention guide for implementing new shared mobility solutions. Starting with the four business activities identified and tested across the Living Labs, the guide provides two complementary outputs: a set of policy recommendations structured around the PESTE framework and a checklist for incorporating these solutions into the Sustainable Urban Mobility Plan (SUMP) planning cycle.

Different cities face different contexts, resource constraints and political realities. The recommendations and checklists presented here are therefore not prescriptive blueprints, but rather a structured starting point based on real deployment experience across Europe.

Further information, including the detailed SUMP integration guidelines, the business model analysis and the full impact evaluation from the Living Labs, is available on the SUM project website at www.sum-project.eu.

References

- Arias-Molinares, D., García-Palomares, J. C., & Gutiérrez, J., 2022. Micromobility services before and after a global pandemic: impact on spatio-temporal travel patterns. *International Journal of Sustainable Transportation*, 17(9), 1058–1073. <https://doi.org/10.1080/15568318.2022.2147282>
- Aydin, N., Seker, S., Özkan, B., 2022. Planning Location of Mobility Hub for Sustainable Urban Mobility. *Sustainable Cities and Society* 81, 103843. <https://doi.org/10.1016/j.scs.2022.103843>
- Johnson, G., Whittington, R., Scholes, K., Angwin, D., & Regnér, P. (2017). *Exploring strategy: Text and cases* (11th ed.). Pearson.
- NTUA. 2024. KPI review. SUM project, Deliverable 1.2. https://sum-project.eu/wp-content/uploads/2025/07/SUM_D1.2_KPI-Review.pdf
- Ramos, É.M.S., Bergstad, C.J., Chicco, A. et al., 2020. Mobility styles and car sharing use in Europe: attitudes, behaviours, motives and sustainability. *Eur. Transp. Res. Rev.* 12, 13. <https://doi.org/10.1186/s12544-020-0402-4>
- POLIS. 2025. Guidelines for successful integration of new and shared modes into SUMP. SUM Project, Deliverable 5.6. https://sum-project.eu/wp-content/uploads/2026/05/D5.6_Updated-SUMP-TOPIC-Guide_Final.pdf
- Polydoropoulou, A., Pagoni, I., Tsirimpa, A., Roumboutsos, A., Kamargianni, M., Tsouros, I., 2020. Prototype business models for Mobility-as-a-Service. *Transportation Research Part A: Policy and Practice* 131, 149–162. <https://doi.org/10.1016/j.tra.2019.09.035>
- VEDECOM. 2025a. First version of validated Business models. SUM Project, Deliverable 5.4. https://sum-project.eu/wp-content/uploads/2025/07/SUM_D5.4_First-version-of-validated-Business-models.pdf
- VEDECOM. 2025b. KPIs and Methodological Framework. SUM Project, Deliverable 5.1. https://sum-project.eu/wp-content/uploads/2025/07/SUM_D5.1-KPIs-and-methodological-framework.pdf

Credits

Authors

This guide was developed by:

- Daniel Herrera Meek (POLIS)
- Fanny Boccioli (POLIS)
- Jorge Manso García (POLIS)

Based on the findings and recommendations presented in:

- [Deliverable 5.6: Guidelines for successful integration of new and shared modes into SUMPs](#)
- [Deliverable 5.7: SUM Policy Recommendations](#)

Contributors

The authors would like to thank all project partners, Living Labs, stakeholders and experts who contributed to the development, review and validation of this guide.

Design and Layout

Design and layout: Jorge Manso García (POLIS)

Suggested citation

POLIS (2026). NSM Interventions Implementation Guide. SUM Project. European Union's Horizon Europe Research and Innovation Programme.

About the Project

The objective of the SUM project is to transform current mobility networks towards innovative and novel shared mobility systems Integrated with public transport in more than 15 European Cities by 2026, reaching 30 by 2030.

Intermodality, interconnectivity, sustainability, safety, and resilience are at the core of this innovation. The outcomes of the project offer affordable and reliable solutions considering the needs of all stakeholders such as end users, private companies, public urban authorities.

Disclaimer

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.