CIVITAS

Sustainable and smart mobility for all

Solutions that Tackle Congestion and Improve Goods Distribution:

Success stories and results from CIVITAS Research and Innovation Actions

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Abstract

This publication makes use of short stories – based on in-depth interviews with site managers – to demonstrate key results and best practices from (R)IA projects, achieved during ELEVATE's lifetime. This publication covers successful lessons from CIVITAS in the field of "tackling congestion" (MOMENTUM, SPROUT, and ReVeAL), and on "improving goods distribution" (SUMP-PLUS, and HARMONY).

The backbone of this publication is two feature articles. Each feature article focuses on a broad topic: tackling congestions, and improving goods distribution, respectively. The two feature articles are themselves made up of a collection of short stories, which each illustrate the local context in which impactful measures have successfully been implemented.

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About CIVITAS

CIVITAS is one of the flagship programmes helping the European Commission achieve its ambitious mobility and transport goals. Since its launch in 2002, CIVITAS has advanced research and innovation in sustainable urban mobility and enabled local authorities to develop, test and roll out measures via a range of projects.

Legal disclaimer

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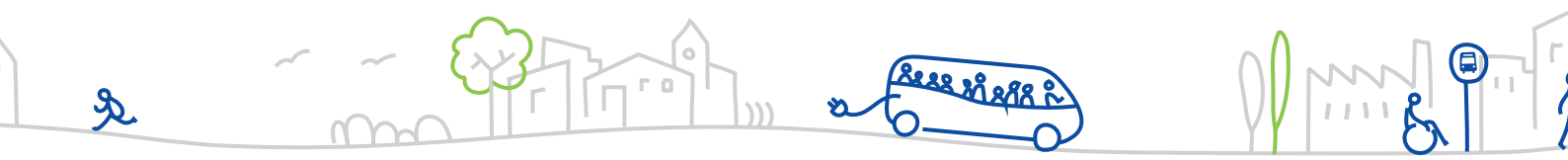


Unsplash / Jamshed Khedri

Highlighting successes in tackling congestion and improving goods distribution

For over twenty years, the CIVITAS Initiative has acted as a leading European mobility initiative for cities, made up of cities. CIVITAS' successes and legacy are arguably best understood by closely looking closely at local level impacts of CIVITAS projects.

CIVITAS Results Publications tell these local stories, based on in-depth interviews with site managers who implemented CIVITAS projects in their cities. These cities' success stories serve not only to demonstrate CIVITAS' impact locally, but also to clarify universally-applicable lessons learnt.

This publication marks the third CIVITAS Results Publication, and tells five CIVITAS impact stories: three that relate to tackling congestion, and two on improving goods distribution. These stories complement those in the first two ELEVATE Results Publications, which dove into the impacts of projects working on sustainable urban mobility plans (SUMPs) and neighbourhood-level projects, as well as e-mobility and innovation uptake.

The stories are complemented by a podcast episode, in which site managers from Lucca (Italy) and Madrid (Spain) discuss the importance of – and keys to success in – convening diverse stakeholders, and ensuring that sustainable mobility solutions reach peripheral areas.

The five stories highlighted in the sections that follow, when examined together, illuminate overarching lessons. These are illustrated in an infographic on the next page of this publication. These shared insights can be summarised as: the power of the pilot; data delivers; engagement elevates; and flexibility first.

Figure 1: Infographic to illustrate four overarching insights that emerged from all five short stories explored in the remainder of this publication.

Dreamstime / Ruslan Sifarchuk

1 Tackling congestion

Mobility solutions that reduce congestion from private cars to improve sustainability and well-being

Congestion is a major problem in cities across the world, exacerbated by increases in private car use. There is a huge diversity of measures that can tackle or reduce congestion, from regulations that restrict motor vehicles from accessing certain areas, to measures that increase use of shared mobility in ways that complement (rather than compete with) other sustainable modes.

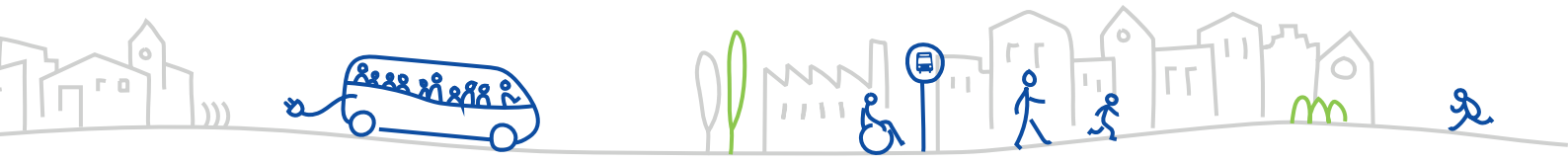
Several CIVITAS projects are bringing cities, researchers, and other experts together to find ways to successfully and sustainably tackle urban congestion. **This feature article presents three examples of creative, effective and potentially long-lasting interventions that help reduce congestion in cities.**

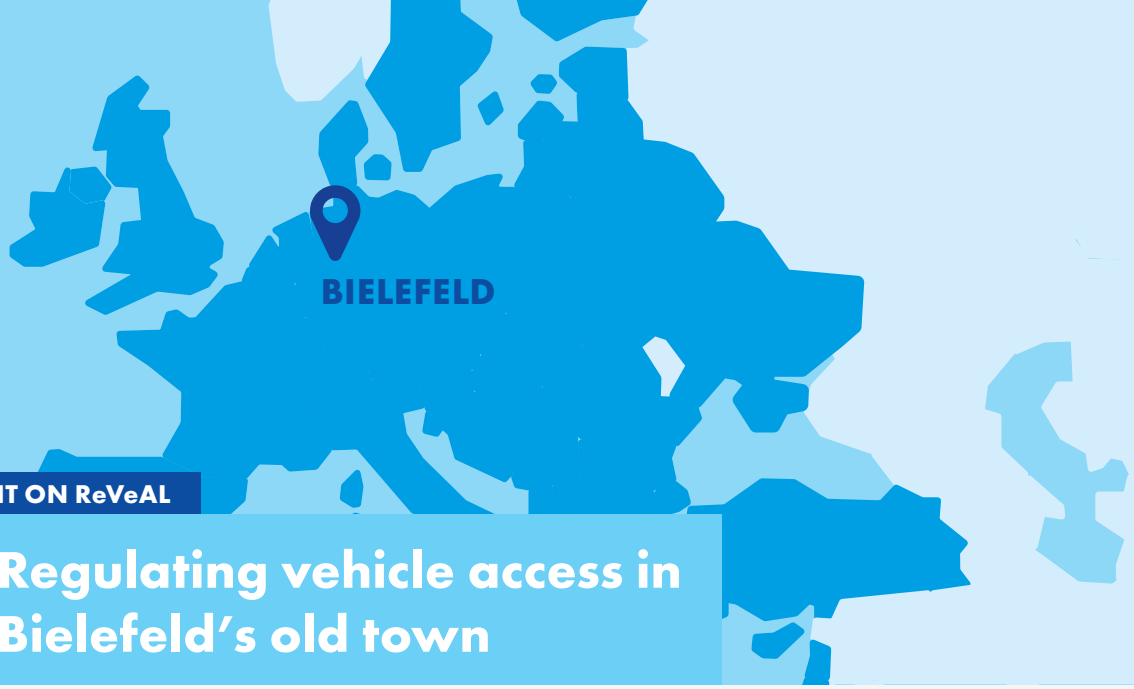
The first short story describes an example from the ReVeAL project, which worked to make urban vehicle access regulations a core part of cities' approaches to sustainable urban mobility. The City of Bielefeld (DE) is on a journey to make its Old Town more liveable. To this end, the city worked in ReVeAL to pilot a variety of vehicle access regulations alongside diverse Old Town stakeholders.

The second story digs into the MOMENTUM project, which used innovative data and modelling tools to drive urban sustainability policy-making. Madrid (ES) has an extensive and well-used public transport system. Through MOMENTUM, Madrid used data to navigate how to expand its shared mobility services in such a way that would complement and not compete with this strong public transport culture.

Lastly, this article presents experiences from the SPROUT project in Budapest (HU). SPROUT worked with cities to address emerging mobility patterns with data-driven policies. In Budapest, this translated to using data to implement traffic-calming zones and to set-up micromobility points, both of which would reduce car traffic and support sustainable mobility options.

In all of these cases, cities worked with diverse stakeholders to ensure that their pilots met local contexts, and were acceptable to those who would be most directly impacted. Their stories shed light on how to bring about lasting change to make our cities more liveable for all.





SPOTLIGHT ON ReVeAL

1.1 Regulating vehicle access in Bielefeld's old town

Introduction

Cities across Europe are using a wide variety of approaches to implement sustainable urban mobility transformations. The ReVeAL project worked to ensure that urban vehicle access regulations (UVARs) are a standard part of these transformations, and a key approach in cities' tool belts. To do this, ReVeAL made use of conceptual and case study research, alongside hands-on UVAR implementation pilots in six cities, and systemic stakeholder interaction, all the while extracting lessons to support wider roll-out of smart UVAR approaches across Europe.

New, integrated packages of urban vehicle access policies and technologies enable cities to optimise urban space and transport network usage. After all, such policies can lead to fewer emissions, less noise, and improved accessibility and quality of life.

Welcome to Bielefeld

Bielefeld is the economic centre of the German region of East Westphalia-Lippe, and is home to 340,000 inhabitants. It is an important urban node in Europe, and a popular location for science and university education in Germany, making it quite a young city with 37,000 students.

Bielefeld is growing. The city's population has increased by about 10,000 people since 2010, and forecasts for the future predict that it will grow by a further 6% by 2025. This trend poses challenges to housing, traffic flows, air pollution, and noise. Bielefeld needs a path to transform its inner city to meet the interests of its diverse user groups, who hold varied, and sometimes contrasting, views on the ideal inner city.

To address these challenges, in January 2021 Bielefeld started the "altstadt.raum" project – which translates to 'old town space' project. The main objectives were to strengthen the functions of the Old Town as an attractive and liveable space for socialising, leisure, culture, trade and gastronomy, by putting in place traffic calming measures, access regulations, the removal of on-street parking spaces, support to sustainable mobility modes, and the creation of green and open spaces with games and seating arrangements. The altstadt.raum project builds on Bielefeld's plan for an Emission-Free City Centre.

ReVeAL the potential of UVARs in Bielefeld

As part of the ReVeAL project, Bielefeld prepared a low-emission redesign of the horseshoe-shaped old town in the centre of the city, and implemented a coordinated suite of pilot measures to make this redesign a reality.

Low-emission zones touch on sensitive topics. To ensure that local voices could be heard, Bielefeld placed the project within the frame of an intensive participatory process, through which pilot measures could be proposed.

The first phase of the participatory process began in 2020 and consisted of workshops, individual meetings, and a public survey all of which tapped the knowledge of a large variety of stakeholders in order to develop a list of pilot measures, along with locations where these could be tested. Next, a second participatory phase served to discuss initial results from pilots with key stakeholders, such as retailers, and trade and commerce associations.

Ultimately, the pilot measures were located in six different areas of the Old Town and included restricting access for certain vehicles according to daily time frames, blocking streets with bollards, putting in place new parking management measures, and the introduction of permit-based access regulations.

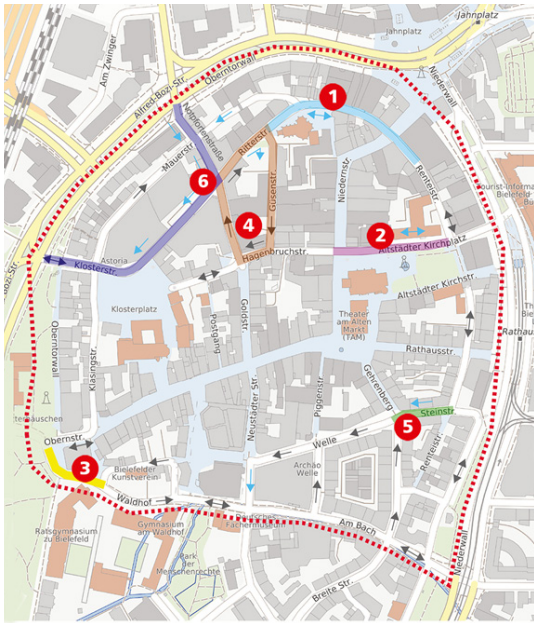


Figure 2: The six locations targeted by ReVeAL pilot actions in Bielefeld.

After running for three months, the pilot activities were evaluated by the public through an online survey. To this end, members of the public were grouped into specific user groups, including residents, retailers, visitors and passers-by, to better understand the views and opinions of different users.

Overall, the results of the evaluation revealed mixed reactions. Car users expressed concern about lessened access to their homes, while pedestrians and cyclists rated access as 'good' or 'very good' and added that road safety conditions had improved. Most residents said that quality of life in the Old Town had increased thanks to the pilot actions. However, a majority of retailers reported that the pilot activities had a negative effect on the accessibility of their stores, the number of customers, and their turnover.

In October 2021, a third participatory phase was launched to refine the pilots. Pilot results so far were discussed within an extended working group, aiming to define improvements to the activities, clarifying ideal locations for more permanent measures, and details regarding the nature of the measures. This all contributed to developing proposals for final measures to be implemented permanently. The proposals that resulted from this third phase of stakeholder engagement were presented in three location-specific workshops throughout November 2021.

This led to a final phase of piloting, during which time the following measures were put in place in the Old Town:

- greening measures,
- more support to outdoor eateries,
- more outdoor seating,
- more bicycle parking,
- an extended pedestrian zone,
- a general increase in the extent of open space areas,
- easy-to-understand traffic flow regulations, including clear access regulations for residents, retailers and other stakeholders,

- access restrictions for motorised vehicles,
- a parking search guidance system,
- increased accessibility to an Old Town school,
- conversion of streets into one-way streets with less on-street parking, and
- the redesign of streets for lower traffic speeds.

In February 2022, the pilots ended and all installations were removed to restore the public space to its original set up, although for a limited time only. During this time, traffic counts took place to demonstrate the differences in traffic volumes and modal choices while the pilot actions were running. By comparing traffic-count data, the city had a basis to define permanent changes to be made to the Old Town areas.

What's next

The City of Bielefeld is carrying on its participatory approach in order to continue to define the details of permanent measures in the Old Town, always in close cooperation with neighbourhood stakeholders. In the meantime, the city administration has created a database of public space installations, such as urban furniture and greenery, which are suitable as permanent solutions, and has already made the extension of outdoor gastronomy a permanent part of the new Old Town redesign.

The experience of the pilot phase in Bielefeld clearly demonstrated that stakeholder groups have vastly varied points of view, opinions and perceptions of UVARs, depending on a variety of factors. Clearly capturing, assessing, and discussing all perspectives is crucial to develop a broadly-accepted mix of measures.

Between knowledge gathered through ReVeAL, as well as the ambitious "altstadt.raum" project, the City of Bielefeld has been able to establish a list of localised measures ready for permanent implementation. It has furthermore raised awareness and prompted public discussion on the future of its Old Town area. These are significant steps in the right direction towards achieving its ambition of radically changing travel choices and behaviour in Bielefeld.

Further readings

- https://civitas-reveal.eu
- https://civitas-reveal.eu/resources-overview/publications
- https://civitas-reveal.eu/wp-content/uploads/2021/06/ReVeAL-webinar-User-needs-acceptance-Bielefeld-participation-process.pdf
- https://civitas-reveal.eu/wp-content/uploads/2021/06/ReVeAL-Webinar-UVAR-development-process-2021-05-18-Bielefeld.pdf

Photo Credits

Stadt Bielefeld

Local Contributors

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Olaf Lewald, City of Bielefeld, Head of Office for Mobility

SPOTLIGHT ON MOMENTUM

1.2 Madrid: a shared mobility living lab

Background

The MOMENTUM project developed new data analysis methods, transport models and planning support tools to capture the impact of new transport options on urban mobility and to support cities in the task of designing the right policy mixes to exploit the full potential of emerging mobility solutions. Such solutions include technologies such as Mobility as a Service (MaaS), connected automated vehicles (CAVs), shared mobility services, and demand-responsive transport (DRT).

The MOMENTUM methods, models and tools have been integrated in a Decision Support Tool (DST) that provides transport planners with the ability to test different mobility scenarios, to explore alternative futures, to better guide the deployment of emerging mobility solutions, and to assess conventional interventions in the light of these new modes.

MOMENTUM demonstrated the potential of newly developed methods and tools by testing the impact of a variety of policies and innovative transport services in diverse European cities, namely Madrid (ES), Thessaloniki (GR), Leuven (BE), and Regensburg (DE).

Local Context

Madrid is the most populated city in Spain, home to around 3.2 million inhabitants, which also makes it the third most populated Functional Urban Area in the European Union.

Madrid has an extensive public transport network that covers all the municipalities that make up the wider metropolitan region. In the inner city, the system is based on a metro system composed of 13 lines and a widespread urban bus network. This is complemented by the city's cycling network, made-up of 349km of dedicated lanes, including the Green Cycling Belt, a recreational cycle path that connects green areas in the outskirts. It is, at least in part, thanks to this strong sustainable mobility infrastructure that Madrid's modal split is relatively equally distributed between private cars (30%), public transport (40%), and walking and cycling (30%).

Among the city's priorities, as laid-out in its 2019 environmental sustainability strategy titled "Madrid 360", is to reduce air pollution caused by private car traffic by disincentivising the use of private cars, promoting public transport, actively encouraging a shift to cycling, and by introducing new mobility solutions.

This helped Madrid to become one of the European cities with the widest offer of shared e-mobility services. The city hosts a large and well-functioning public bike-sharing scheme, as well as several additional privately operated shared electric car, electric moped, and e-scooter systems.

Using MOMENTUM tools to make shared mobility work for all

Madrid was an early adopter of shared mobility services, which are provided according to a wide variety of service models: a large station-based public bike sharing service, many free-floating e-scooter and e-bike companies, a fleet of shared e-mopeds, and several round-trip and one-way car sharing offers. This has multiplied the available alternatives to private cars; however, it has also raised concerns about potential impacts on public transport ridership, on parking challenges associated with free-floating fleets, and the implications of micromobility on road safety.

With this context in mind, the team in Madrid focused on using MOMENTUM tools to shed light on answers to three questions:

1. How can shared mobility services complement public transport in providing an attractive alternative to car users, especially in light of the city centre becoming increasingly restricted to cars?
2. As these novel services begin to expand beyond the city centre, how does their adoption vary across different population groups?
3. How should shared mobility options be implemented in peripheral areas to maximise their contribution to sustainable mobility?

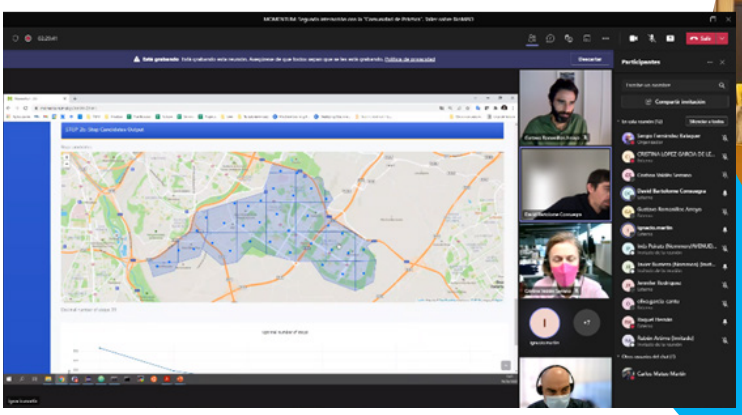
Putting tools to the test

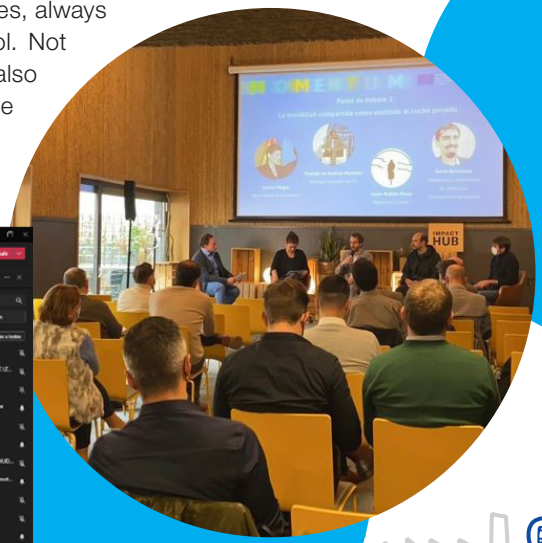
Through MOMENTUM, the public transport operator EMT Madrid worked with Nommon (a Madrid-based technology SME specialised in mobility data analytics), and Aimsun (a company that develops transport simulation software tools) to launch stakeholder engagement to guide the process of addressing these questions.

The stakeholder involvement process used MOMENTUM modelling tools in practice, demonstrating how decision-support tools could contribute to evidence-based decision-making processes, while also facilitating discussions among a diversity of stakeholders. The focus of this exercise was on how to implement an extension of the public bike sharing service to the city's peripheral district of Villa de Vallecas.

Villa de Vallecas is located at the southeast of Madrid, and is home to about 100,000 inhabitants. It has six metro stops and two commuter trains, but does not yet host a shared mobility service. EMT, Nommon and Aimsun thereby launched stakeholder engagement to explore: how many shared mobility stations are needed; where; how many vehicles should be part of the fleet; and what benefits this service would bring to citizens.

The Villa de Vallecas Community of Practice (CoP) gathered local stakeholders comprising a wide range of entities, including public authorities such as Madrid City Council and the metropolitan transport authority (CRTM); mobility operators; cyclist associations; and local community representatives. This CoP acted as a stable group of people representing different views, who met three times to discuss the possible expansion of shared mobility services, always guided by modelling and data generated with MOMENTUM tool. Not only did the CoP meetings draw on MOMENTUM tools, but they also contributed in parallel to modelling processes employing those same tools.





The first CoP meeting served as a kick-off for the group, and an opportunity to determine together which hypotheses should be evaluated using MOMENTUM tools. For example, the group decided to explore the possibilities of prioritising certain areas for shared mobility service expansion and to investigate the existence of potential demand segments with different interests. The meeting also helped identify what additional information was needed regarding the various implementation scenarios, such as data on potential accessibility improvements and operational efficiency of the service.

In the second meeting, the MOMENTUM Decision Support Tool (DST) was presented to the CoP, as well as estimated demand for the shared mobility system based on the MOMENTUM models.

The DST is organised according to three levels of complexity. Level 1 uses only basic sociodemographic data to offer information on preliminary transportation design functionalities. Level 2 offers data-driven recommendations for how to configure mobility services based on higher-level mobility data. Finally, Level 3 provides full transport simulation capabilities for advanced scenarios.

The second CoP meeting focused on selecting the input parameters that should be used in Level 2 of the DST, such as expected total demand in the district, ranges for the number of bike sharing stations to be included, maximum walking distances to any station, etc. Debates on parameters stimulated the discussion among stakeholders on the various alternatives implementation of the bike-sharing service in Villa de Vallecas, exploring questions like: should it cover the entire district with less station density, or focus on a particular neighbourhood within the district?

The DST is an online tool, making it possible to use in real-time during the CoP meeting to test the effects of these different options on the optimal location of stations. The result of the meeting was the identification of three scenarios to be fully simulated in Level 3 of the DST.

The third CoP meeting focused on presenting the results of these three simulations. For each scenario, the MOMENTUM team explained how the service would be used in that case (e.g., average trip distance, percentage of travel time dedicated to the bike trip itself, etc.) and the performance achieved by the service (e.g., satisfied trip requests, daily number of trips per vehicle, etc.). Villa de Vallecas stakeholders provided their feedback on the results and justified their preferred implementation scheme.

Overall, this process clearly validated that MOMENTUM tools effectively facilitated discussion and improved understanding of a variety of different positions on the matter.

Main outcomes

In the Villa de Vallecas case, experiments with the DST show that certain shared mobility options can complement public transport modes in two ways: offering better alternatives in areas with less public transport connectivity, and covering the last mile of journeys taken primarily with public transport.

In particular, the analysis of the potential penetration of bicycle sharing in Villa de Vallecas showed that, generally, travellers prefer public transport when there is a direct connection, but would use shared mobility when they have to change lines. The experiments showed that a low-cost, station-based bike-sharing service seems to be more complementary with public transport than a free-floating moped-sharing service.

Thanks to MOMENTUM, more than 300 new bike-sharing stations and 3,000 new bikes are set to be deployed in Madrid's streets over the course of the next few years!

Overall, the policy assessment procedures in Madrid showed that the tools developed in the framework of MOMENTUM can be valuable to help in planning of shared mobility services. They bring clarity about the impacts of bike sharing system deployment, helping city planners to better address the location of bike stations according to different parameters and multimodal considerations.

Further readings

- MOMENTUM Final Brochure - 'The Way Forward'
- MOMENTUM Decision Support Tool
- SUMP Topic Guide: Planning for More Resilient and Robust Urban Mobility

Photo Credits

EMT Madrid. Nommon, Connected Mobility Hub

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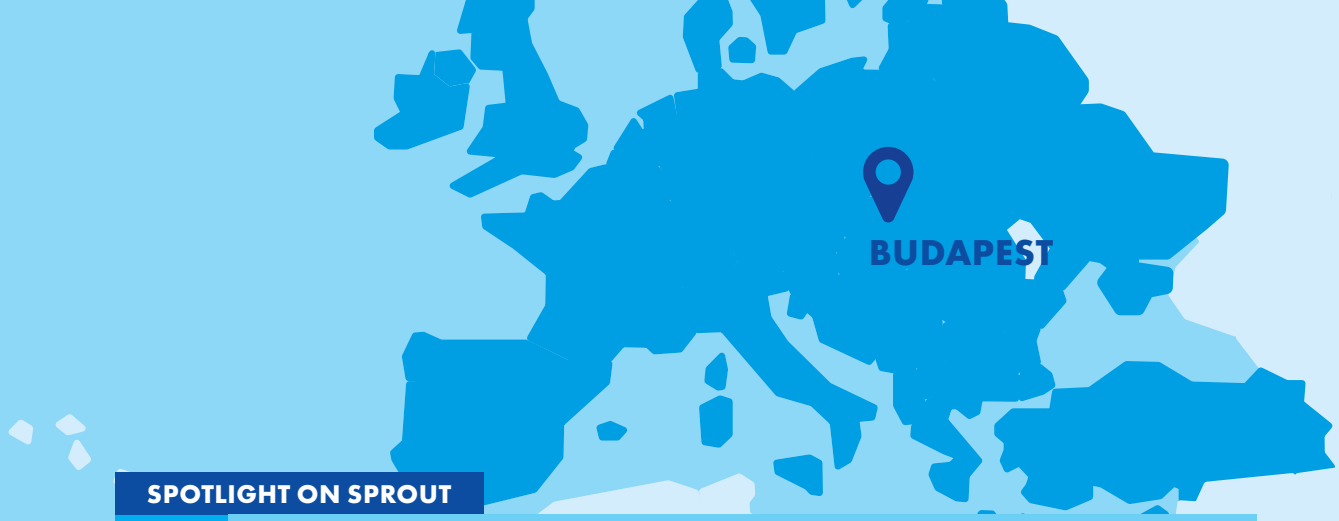


SPOTLIGHT ON SPROUT

1.3 Budapest and its push towards shared and active passenger mobility

Objectives of SPROUT

The SPROUT project team has worked to pioneer and develop city-led, innovative, and data-driven policy responses to address the impacts of emerging mobility patterns, digital operating and business models, and transport users' needs. The project mapped out and defined the impacts of mobility transitions on sustainability and on policy. It then harnessed this knowledge to cultivate city-led, innovative policy responses.

Overall, the project has built cities' capacities to use data to identify, track and deploy innovative urban mobility solutions and to support future policy making. SPROUT created an Open Innovation Community on Urban Mobility Policy, and has launched six city pilots – accompanied by seven validation cities – which explore real-life policy challenges faced as a result of urban mobility transition in both passenger and freight transport.

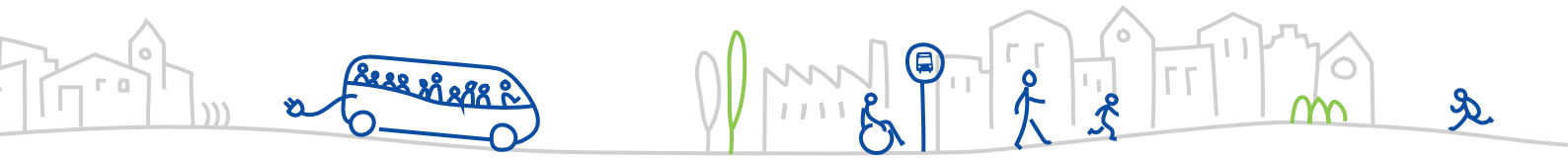
Spotlight on Budapest

With a population of over 1.7 million inhabitants, Budapest is one of the largest cities in the European Union and the capital and most populous city in Hungary. The city is also a very popular tourist destination, with around 12 million international tourists per year!

The city is facing a series of challenges and changes in the field of transport and in its urban mobility environment. To address these, in 2019, the General Assembly of the Municipality of Budapest approved the so-called Budapest Mobility Plan, based on sustainable urban mobility planning (SUMP) guidelines. The overall goal of the plan was to increase the competitiveness of the public transportation system to improve liveability and sustainability in the city and of its surrounding areas.

To ensure people in Budapest rely less on private cars, and to promote active and shared mobility, it is necessary to modify public space distribution. This means replacing crowded streets with traffic-calming zones enriched with green spaces and street furniture; and converting space currently used to park private cars to instead serve micromobility modes.

To this end, Budapest worked in SPROUT to put in place two traffic management pilots in an area of its popular city centre, which is home to tourist rental properties, hotels, restaurants, and pubs. A number of major metro, bus, and tram lines can be found around the pilot area. However, it is still very car-centric, with parking spaces on both sides of the streets, overcrowded and narrow sidewalks, and frequent traffic jams along the residential streets. In addition, the district prohibits leaving shared mobility vehicles in public areas.



Within this context, two SPROUT use cases were piloted. The first introduced traffic management changes, such as the reorganisation of some streets' directions-of-travel, in order to understand the impact of reallocating public space for leisure activities. The second case focused on developing modal shift opportunities that enable travellers to seamlessly switch between using public transport and shared mobility services by setting up shared service points (parking sites) in strategic spots.

Traffic regulation changes in Kiraly utca

The first use case consisted of restricting car traffic along Kiraly utca (Kiraly street), on a short section between Rumbach Sebestyén utca (a residential street within the pilot area) and Károly körút (a major road at the border of the pilot area). General road traffic was banned, with only authorised traffic, and freight traffic permitted within the new zone. This made it largely a pedestrian zone. In addition, approximately 40 parking places were removed. Physical barriers were not installed; rather, through-traffic was restricted using traffic signs. These measures led car traffic to significantly decrease within the pilot area, and helped increase the number of pedestrians and cyclists.

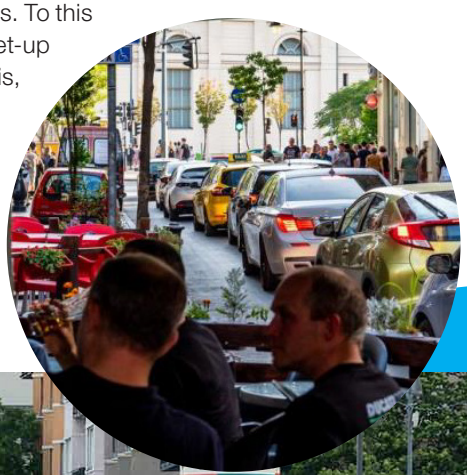
The changes were made in August 2020 and were supposed to be temporary, running only as a pilot project. In the beginning, the implementation of traffic calming measures was criticised by some residents due to longer travel times for those using private cars. However, after several public hearings and some minor modifications, the number of complaints reduced significantly and the street started to attract vulnerable road users from surrounding streets.

In the end, due to the overall positive impact of the measure, the City of Budapest not only decided to maintain the implemented changes, but also to scale-up the measures to three additional areas in Budapest! Each of these areas share similar layouts, featuring public space, green areas, and now traffic calming and/or pedestrian zones.

The creation of micromobility points

One of Budapest's strategic mobility goals is to develop modal shift opportunities that enable travellers to switch between using public transport and shared mobility services. To this end, BKK, the Budapest public transport company, developed a system to set-up mobility access points, inspired by international examples from London, Paris, and Tel Aviv.

These points serve to ensure that shared mobility services are reliably available, and increase the density of the network of mobility points, with a maximum 1-2 minute walking distance between points in the core area, and 4-5 minutes in so-called transition zones.



The city differentiated between three types of mobility points:

1. **Micromobility points** in densely populated areas, at a distance of 150 meters from each other and dedicated to micromobility vehicles only (bicycle, scooter, cargo bikes, etc.)
2. **Mobility points** in densely populated areas, dedicated to car-sharing and shared scooter parking, and spaced 250-300m apart; and
3. **Mobility stations**, located at larger intermodal transport hubs, featuring additional services like delivery pick-up points, luggage lockers, etc.

The implementation of the mobility point network faced two main barriers. First, it operated over an area governed by multiple municipalities and districts, each with their own specific contexts, needs and demands. Second, newer types of micromobility vehicles (e.g. e-scooters) are not defined in the National Road Code, and as such there are no current regulations regarding collecting and monitoring shared mobility user data.

Despite these difficulties, the city managed to increase the number of shared micromobility service users, creating less chaotic public spaces and providing safer mobility options. As of 2022, 600 micromobility points have been created throughout the City of Budapest, leading to an estimated increase in use of shared mobility modes by 11.9%. This is, in fact, even greater than the estimated impact calculated before SPROUT's pilot implementation.

Lasting conclusions

The implementation of the Budapest pilot reinforced two key messages. The first is that the introduction of traffic calming zones, and their acceptance, takes time and requires political commitment. However, this is well worth the effort, as these interventions showed real benefits across Budapest, enhancing green spaces, installing street furniture, and leading to more permissions being granted to install terraces.

The second lesson gleaned from the SPROUT pilots is that Mobility Points play a crucial role in curbing problematic micromobility parking practices, and thereby fostering widerspread acceptance of micromobility vehicles.

Further readings

- Budapest Mobility Plan
- Sprout narrative scenarios: Budapest
- Impact assessment and city specific policy response/Budapest pilot

Photo Credits

Sprout project, BKK, City of Budapest

Local Contributors

Andras Vagany, Centre for Budapest Transport (BKK), Budapest Pilot contact

Unsplash / Minh Tran

TACKLING CONGESTION

Conclusions and lessons learnt

The three stories showcased in this article provide just a small glimpse of the incredible breadth of possible initiatives to tackle congestion. They point to the power of pilot demonstrations, the importance of regular stakeholder engagement, and the need to stay flexible to adapt based on stakeholder inputs.

In Bielefeld, piloting and knowledge gathered through ReVeAL helped establish a portfolio of localised measures ready for permanent implementation. Plus, stakeholders in the Old Town are now more engaged in city-level discussions about the area's future.

Similarly, Madrid's work in MOMENTUM demonstrated clearly that data and modelling can help advance conversations and shape mobility decision-making for less congested and more liveable cities – including in peripheral areas. And, in concrete terms, it helped the city kick-start the roll-out of more than 300 new bike-sharing stations.

By working in SPROUT, Budapest substantially increased the number of shared micromobility service users. Furthermore, the city's car restriction pilot was so successful that it was made permanent and was even scaled-up to other areas.

In all of these stories, pilots enabled cities to test out solutions, iteratively consult with stakeholders, and adapt pilots according to stakeholder inputs. This template has been validated time and time again in CIVITAS projects as a way of implementing effective and accepted sustainable mobility solutions. This is particularly important in fields like tackling congestion, which are often sensitive and controversial.

Unsplash / Mika Baumeister

2 Improving goods distribution

Using innovative technologies and collaboration methods to improve urban logistics

Since the onset of the COVID-19 pandemic, e-commerce has become more and more popular, posing distinct challenges to urban logistics and goods distribution. Traditionally, logistics vehicles are large and loud, contributing to decreasing liveability in neighbourhoods. However, CIVITAS projects demonstrate that there are alternative, more sustainable options to move goods into and around cities.

A number of CIVITAS projects support cities to improve the sustainability of urban logistics, freight and goods distribution. Two such projects are SUMP-PLUS and HARMONY.

SUMP-PLUS helped cities move from drafting Sustainable Urban Mobility Plans (SUMPs) to actually implementing them. For Lucca (IT), this work focused on strengthening the logistics component of the city's SUMP, and improving goods distribution throughout the Province of Lucca in an integrated way.

HARMONY helped cities to use spatial planning tools to support their transitions to low-carbon mobility. Rotterdam (NL) engaged in the project to test out the use of self-driving robots to improve last-mile logistics.

Neither of this projects worked exclusively on logistics. And yet, they demonstrate the ways that all mobility topics – from sustainable urban mobility planning, to uptake of new and innovative technologies – can be leveraged to tackle growing challenges arounding goods delivery.

SPOTLIGHT ON SUMP-PLUS

2.1 Integrating a SUMP and SULP in Lucca

Introduction

Sustainable Urban Mobility Plans (SUMPs) are key ways to help cities ensure that their urban mobility and transport plans and policies are sustainable, inclusive and integrated. To this end, the City of Lucca (IT) first adopted a SUMP in 2018 – this plan was actually preceded by a Sustainable Urban Logistics Plan (SULP), adopted in 2014. To maximise impact, Lucca then turned its attention towards integrating these processes, and strengthening the logistics component of the city's SUMP.

Lucca worked with the CIVITAS SUMP-PLUS project to set up a City Lab in which they could experiment with SULP and SUMP integration, in order to improve sustainable logistics throughout the whole Province of Lucca – of which the City of Lucca is the capital.

The Lucca City Lab hosted activities that defined guidelines and recommendations for the coordination and integration of the city's SUMP and SULP, at both the local and provincial levels. They examined partnership models and incentive schemes that could support working with the logistics sector, all in order to deliver new and expanded urban freight solutions within and around the city.

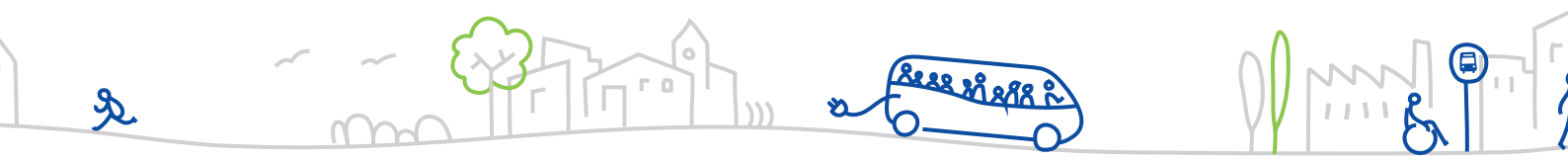
City Lab activities demonstrated that stronger collaboration among city councillors, city administration offices, and administrations of neighbouring municipalities lead to more effective management of mobility processes. Furthermore, executing such collaboration was aided by the fact that the municipalities have already been working together on other topics, and had simply not yet extended their cooperation to mobility.

Context

For years, Lucca has used regulatory initiatives and infrastructure to support local and provincial sustainable development. For example, when the city recognised the urgent need to improve air quality, it implemented measures to reduce emissions from urban mobility, strengthening its Limited Traffic Zone, developing services for sustainable goods delivery, and extending its network of cycling paths.

However, with exponential increases in online order and home deliveries, Lucca recently faced a key challenge in this work, namely: the integration of its SUMP and SULP. This is why Lucca turned to SUMP-PLUS for support.

The CIVITAS SUMP-PLUS project helped cities of all sizes, and at various development stages, to enhance their SUMP implementation processes. By working within six co-creation labs (City Labs), the project helped equip cities to develop the next generation of SUMPs, which put mobility at the heart of sustainable urban transformation.



Activities and key results

As part of the SUMP-PLUS project, the city drafted a City Laboratory Plan, which culminated in the development of a Technical Report and Recommendations for coordinated integration of the city's SUMP and SULP at both the municipal and provincial levels. This work was supported by insights from scientific and technical partners, as well as exchange with the Cities of Antwerp (BE), Alba Iulia (RO), Klaipeda (LT), Platanias (GR), and Manchester (UK).

The City Lab coordinated highly successful activities that: clarified citizens' willingness to accept new logistics solutions; improved coordination among logistics stakeholders; began the process of expanding logistics solutions beyond the urban centre; and bolstered local efforts to keep logistics traffic outside of the city centre.

With support from SUMP-PLUS, Lucca now better understands locals' willingness to accept new mobility solutions. The city involved stakeholders and citizens in evaluating current mobility and logistics solutions, and determining the extent to which innovative solutions are seen as acceptable. Residents and logistics operators provided inputs using online surveys, while retailers and their trade associations were engaged in Logistics Roundtables.

These Roundtables convened the City of Lucca, different logistics stakeholders, freight operators and trade associations. This proved invaluable in helping to identify sustainable logistics solutions, adopting these in the city centre, and applying them in areas beyond the city walls.

The City Lab helped Lucca explore possible scenarios for the expanding logistics' solutions already in use (or being piloted) in the city centre to the *Piana di Lucca* – an area of flat plains that extends around the city itself. It helped to evaluate the need to boost sustainable industrial logistics and transport, including outside the urban centre, which led to a call for coordinating a common approach to goods transport across the wider area.

Lucca has in place urban vehicle access regulations that restrict vehicle traffic in the city centre. The city thereby used SUMP-PLUS as an opportunity to revise access policies with, for instance, the introduction of Radio Frequency Identification (RFID) antennae, which enable the city to collect data about vehicles entering and leaving the city. With this technology, the city can verify if vehicles in the city centre are meeting its rules, and can better encourage delivery services to change their practices.

This is complemented by a rewards scheme based on logistics operators' duration of stay in the city centre, whether they used available parking docks, cargo bikes, etc. This resulted in the development of a ranking of operators, and a prize given to the resulting 'best' logistics operator.

Even within the SUMP-PLUS project, the city was looking to the future and what could come next. That is why Lucca launched an Innovation Call, inviting stakeholders to propose the next inspiring solutions for logistics in the city centre.

Challenges

Implementing new tools, especially engagement tools, was challenging. This extended to engaging administrations, citizens, and logistics operators.

For example, Lucca hosted City Forums to bring administrators from different municipalities and political parties around the same table to agree on common logistics objectives. This ultimately produced great results, but was nonetheless a particular challenge to implement.

Furthermore, engagement – especially citizen engagement – must be meaningfully taken into account in policy-making in order to be effective. This is a persistent challenge, which demands political will.

Finally, diverging views between public administrations, shopkeepers, logistics operators, and other stakeholders could make private sector engagement difficult. Logistics operators are also not uniform, with many having different types of fleets – some electric, some new, and some older fleets.

Lasting impacts

Several logistics solutions were proposed as part of SUMP-PLUS and then implemented in the context of the ASPIRE project. This includes the RFID antennae system, new load and unload parking docks, and a cargo bike sharing system.

During the SUMP-PLUS pilot, the city noted a change in the mentality among its operators and its citizens as a whole, including both those living in the city centre and those entering the city centre on a regular basis. Operators started to consider alternatives to the car, which helped meet one of the city's main SUMP-PLUS goal: improving the environmental quality of the city centre.

The optimised data provided by the RFID technology also supported the drafting of a new city centre Access Plan, which has been integrated into the official national act on access to city centres.

All in all, when considering the immense strides achieved in Lucca throughout SUMP-PLUS, there is no doubt that the city met its project goals of improving integration between their SUMP and SULP, and extending sustainable logistics solutions beyond Lucca's city limits.

Legacy and key learnings

The City of Lucca is continuing on the path of implementing innovative logistics solutions and engaging stakeholders. Results from SUMP-PLUS project are part of guidelines for the new (June 2022) city administration, and the city is continuing to monitor the impact of the measures in place.

Various engagement tools developed in SUMP-PLUS, like the Logistics Roundtables for operators, will continue. Much of this engagement work is structured around a "City Integrator", a new engagement method set-up by the City of Lucca, which involves different offices working together towards the same objectives. This cooperation will continue, as demonstrated by the development of common projects, and the continuation of the City Forums.

During SUMP-PLUS, logistics operators proposed re-thinking a new consolidation centre, following the closure of a less successful one several years ago. Operators made proposals for new loading stations outside the city, and suggested only entering the city with smaller and electric vehicles. This is a path that could be followed moving forward.

In conclusion, SUMP-PLUS enabled the City of Lucca to acquire a good scientific basis upon which to develop mobility policies. It also taught the city to better engage stakeholders in all stages of mobility measures.

Cooperation between administrations, operators, retailers, citizens and stakeholders that took place during the project made it possible to integrate logistics and mobility planning in Lucca – both in terms of establishing common objectives, and in the ways to achieve these objectives.

Further readings

- https://sump-plus.eu
- Carbon Reduction Strategy support tool – example outputs: https://sump-plus.eu/fileadmin/user_upload/Resources/Reports_and_publications/Carbon_Reduction_Strategy_Support_Tool_graphs.pdf
- www.life-aspire.eu/2021/10/

Photo Credits

City of Lucca

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SPOTLIGHT ON HARMONY

2.2 ROSIE 2.0

Context

How can self-driving robots help make urban deliveries more sustainable and efficient? This question was explored in Rotterdam with help from the HARMONY project.

HARMONY supported authorities to lead the transition to a new, low-carbon mobility era using spatial and multimodal transport planning tools. The project team integrated these tools into a harmonised Model Suite that helps local authorities update their SUMPs with dedicated training sessions and capacity building activities.

HARMONY's work and tools were developed alongside six cities and metropolitan areas, which tested and demonstrated mobility solutions using drones and autonomous vehicles (AVs). Rotterdam, for example, tested the use of self-driving delivery vehicles for last mile logistics. This pilot studied the functions, role and impacts of self-driving robots; if and how they might improve the city's urban freight transport; and collected enough data to represent the robots in transport simulators.

Rosie getting rolling

Meet **Rosie 2.0**: an autonomous robot that rolls through Rotterdam completing last mile deliveries. Rosie 2.0 was tested in multiple traffic situations, including with pedestrians, mopeds and cars, both in a closed environment and on a section of public road in Rotterdam.

The pilot looked into how automation with robots may change the city logistics components of the Rotterdam Mobility Approach and its zero-emission mobility plans. It analysed what can be expected from new self-driving robots in cities, and the role of cities in accommodating these solutions.

Activities and results

Rotterdam's Erasmus University Campus had tested a delivery robot known as "Rosie 1.0" at the end of 2021, focusing their research on people's reactions to the robot. As part of HARMONY, Rosie became Rosie 2.0, and research expanded to focus on the impacts of AVs for last-mile delivery on multiple traffic situations. From August to November 2022, Rosie 2.0 was tested in the Future Mobility Park of Rotterdam (FMP), as well as on a section of public road.

Rosie 2.0 was able to perform well in mixed traffic situations at the FMP site, and performed in part on the public road. The robot recognised different vehicles, like mopeds and cars, even though their moving speeds are significantly higher than Rosie's (approx. 15 km/h). Rosie slowed down within a second when a moving object was visible and approaching within a one-meter radius from its side, front or back. When a moving object was not clearly visible due, for example, to its high speed, Rosie 2.0 did not slowdown in advance, but did break when the object was closer than 0.5 meters. Rosie 2.0 could climb and descend curbs and hills, and navigate different weather conditions, as well as a variety of road users. At crossings, however, tele-operated activity was still required.

From these tests, it became clear that self-driving robots have potential to help in-city logistics, especially for shorter distances (0-3 km), and over areas without many crossings. Rosie 2.0 may, therefore, help with deliveries in various locations throughout the city centre and even in the suburbs.

Challenges

Rotterdam was initially interested in testing self-driving electric vans for freight delivery; however, they had to amend the pilot due to the last-minute withdrawal of a key partner. This led the city to pivot to piloting Rosie 2.0 for deliveries.

Major challenges encountered during the project relate to the legal frameworks and rules surrounding testing AVs. The national road traffic service is the main authority responsible for AV regulations in the Netherlands, and AV operators have to obtain permissions from them through a long application procedure before conducting any pilots or testing of AVs. The extent of Rosie 2.0 testing had to be scaled-back somewhat, since the process of getting these permissions could not be completed within the pilot project lifetime.

Key learnings and legacy

Working with HARMONY helped Rotterdam to compile a series of recommendations to follow before investing in self-driving robots for last-mile deliveries.

First, the added value of self-driving delivery robots or vehicles should be assessed not only in terms of public acceptance, but also in terms ability to reach policy goals for efficiency and sustainability of urban freight transport. Second, it is important to have a solid understanding of the rules around AVs, both from operators and from governments, before rolling out tests. This will prevent roadblocks, and improve coordination among stakeholders. Finally, a city should have a clear idea and 'pitch' regarding the expected function of role of delivery robots.

Cities may have important roles to play to support uptake of AV innovations, but this depends on national legislation. There is currently no legislation for delivery robots, since these robots have not yet been defined as a vehicle or a machine. Therefore, the scope of what cities can do to support rolling-out these robots remains uncertain.

Before investing in regulatory measures to accommodate self-driving delivery vehicles in traffic management, cities should have a strong case for their contribution to sustainable and efficient freight policy goals. To this end, Rotterdam analysed how using Rosie 2.0 for deliveries would compare to using an electric van with respect to transport and energy efficiency. This showed that the relative performance of the robot does not yet justify its active promotion.

At present, AVs remain quite costly, and their acceptance is not yet well known. Without this information, it is difficult to motivate public administrations to prepare for their wide introduction. It will be nonetheless important to continue to monitor their uptake by logistics' stakeholders, especially as the technology becomes cheaper. And, in Rotterdam, partners in the Future Mobility Park will continue to investigate new applications for Rosie 2.0 that can help usher in a more sustainable mobility future.

Further readings

HARMONY project: https://civitas.eu/projects/harmony

Photo Credits

City of Rotterdam

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IMPROVING GOODS DISTRIBUTION

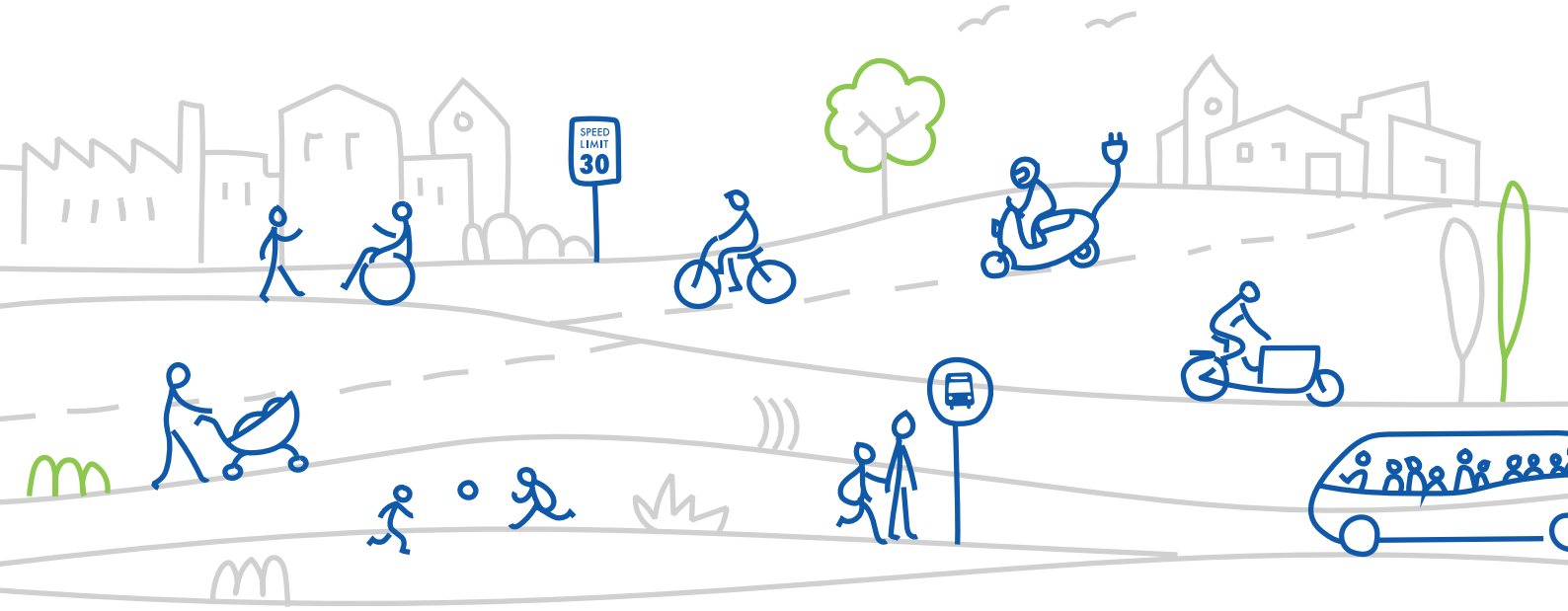
Conclusions and lessons learnt

Urban logistics pose complex challenges – many of which are exacerbated by the growing popularity of e-commerce – which demand diverse solution. This is precisely why measures to make urban logistics more sustainable are being explored across CIVITAS projects that span many mobility fields and topical focuses.

In Lucca, the SUMP-PLUS project helped to source an array of ready-to-implement logistics solutions. Furthermore, thanks to the city's SUMP-PLUS work, the city noted a marked change in mentality among local logistics operators, whereby operators became more open to considering alternatives to traditional cars. And, the city itself left the project feeling more confident in effective stakeholder engagement.

Working in the HARMONY project helped Rotterdam to better understand the steps needed before investing in wide roll-out of self-driving robots for last-mile deliveries. The city doesn't yet have all the answers, but have made great strides in understanding how self-driving robots can be part of European cities' sustainable mobility futures.

These are just two examples of the many ways that CIVITAS projects have successfully explored and implemented solutions to address a diversity of logistics challenges. Using pilots has been hugely helpful to test out solutions, plan next steps, and determine acceptability of measures.



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