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Implementation of a Clean Air Zone in Birmingham's City Centre Green Travel District

Birmingham

Good Practice Factsheet

Source: Ana Dragutescu

Implementation of a Clean Air Zone in Birmingham's City Centre Green Travel District

City	**Birmingham**
Population size	1 million, lying at the heart of a conurbation of over 3 million
SUMP experience	Intermediate/advanced city
What is the good practice?	An effective and socially-fair Clean Air Zone that is based on a comprehensive modelling of traffic and distributional impacts

SUMMARY

The vision of Green Travel Districts (GTDs) is one that consists of a concentration of people, living, and working in an environment in which people are put before cars and in which residents, workers, and visitors can safely walk, cycle, or take public transport. The city centre is one of eleven GTDs identified in Birmingham. The city centre is one of the most active GTD locations and has been the focus of Clean Air Zone (CAZ) proposals that seek to address the air quality challenges faced by the city. It has been decided that a Clean Air Zone will be introduced in in the city centre in the summer of 2020. With the Clean Air Zone, the most polluting vehicles that drive into the city centre will be charged. This measure will be supported by additional measures to manage parking demand and improve the sustainable transport network.

DESCRIPTION

Birmingham Connected, the city's Sustainable Urban Mobility Plan, first introduced GTDs. The idea behind the **Green Travel District** concept is to support long-term sustainability in specific locations, help people and businesses travel sustainably, and contribute towards Birmingham's air quality targets. Within these areas, a package of initiatives can be brought together to influence travel behaviour at the local level.

The following principles are behind GTDs:

- **Walkable & Cycle Friendly** – where non-motorised transport modes are prioritised;
- **Permeable & Connected** – a network of connected streets for non-motorised transport;
- **Sustainable Transit Led & Low Carbon** – where there is access to high quality public transport;
- **Mixed use and compact** – a plan for multi-modal, shorter commutes has been developed.

An important factor behind the success of the GTD concept is that GTDs involve local residents and business communities. Engagement has been undertaken within a number of Green Travel Districts in order to encourage sustainable travel and to identify accessibility and connectivity issues.

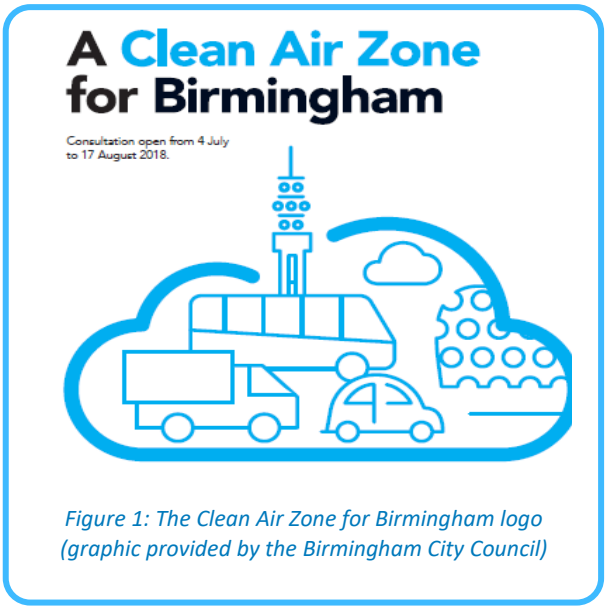

Figure 1: The Clean Air Zone for Birmingham logo (graphic provided by the Birmingham City Council)

A GTD group was set up in partnership with a Business Improvement District in the city centre and consultation was undertaken to identify key concerns.

Traffic created by new developments and poor air quality are two of the most important sustainability challenges in Birmingham's city centre GTD. Currently, the Snow Hill Development in the city centre is identified as one of the city's most valuable assets, creating thousands of new jobs and becoming a principle transport hub. However, the adjacent highway network is constrained by the current level of traffic and is at risk of affecting the development of the area.

Also, Birmingham has some of the highest levels of nitrogen dioxide (NO2) exceedances in the UK and it is estimated that poor air quality is responsible for around 900 premature deaths in the city each year. Since the city does not comply with legal NO2 limits, the UK government was forced to issue a Ministerial Direction in 2017, which requires Birmingham to introduce an air quality scheme.

Birmingham City Council is committed to improving air quality and there has been an initial focus on the city centre (incorporating the GTD area), which experiences the highest levels of air pollution. Implementing the Clean Air Zone in the city centre is expected to improve air quality, enable the reallocation of road space, and increase the capacity of the network, all of which would help to foster economic growth and support a healthy environment.

A Clean Air Zone is an area into which the most polluting vehicles are discouraged from entering. The Birmingham CAZ will achieve compliance with defined, United Kingdom air quality standards by reducing the amount of journeys that need to be made, especially within locations that have the poorest air quality; shifting a proportion of journeys to public transport, walking, and cycling; and reducing the emissions linked to essential trips by stimulating the take up of cleaner vehicles.

Starting in Summer 2020, non-compliant buses, coaches, taxis, Light Goods Vehicles (LGV), Heavy Goods Vehicles (HGV), and private cars will be charged to enter Birmingham city centre. Cars, taxis, and LGVs will be charged £8 per day, while HGVs, coaches, and buses will be charged £50 per day. Cameras will be positioned around the city to monitor vehicles that enter the CAZ. Individuals who drive non-compliant vehicles within the zone will be expected to pay a fee through an online facility, otherwise a fine will be issued. Any income raised as a result of these fees and fines will be used to fund sustainable transport.

The Council commissioned an investigation into the behavioural responses to the CAZ charges. The feedback received during a public consultation helped to inform the final decision that was made concerning the charging levels. The modelling work that has been undertaken additionally shows that the charges are likely to act as a significant incentive to upgrade vehicles. The CAZ charges will be applied daily, forcing non-compliant vehicle drivers to pay once for the day, but then allowing them to drive in the CAZ area without limit on that respective day. CAZ charges are based on the type of vehicle and engine, and not on the individual driving, passengers inside, or goods being carried.

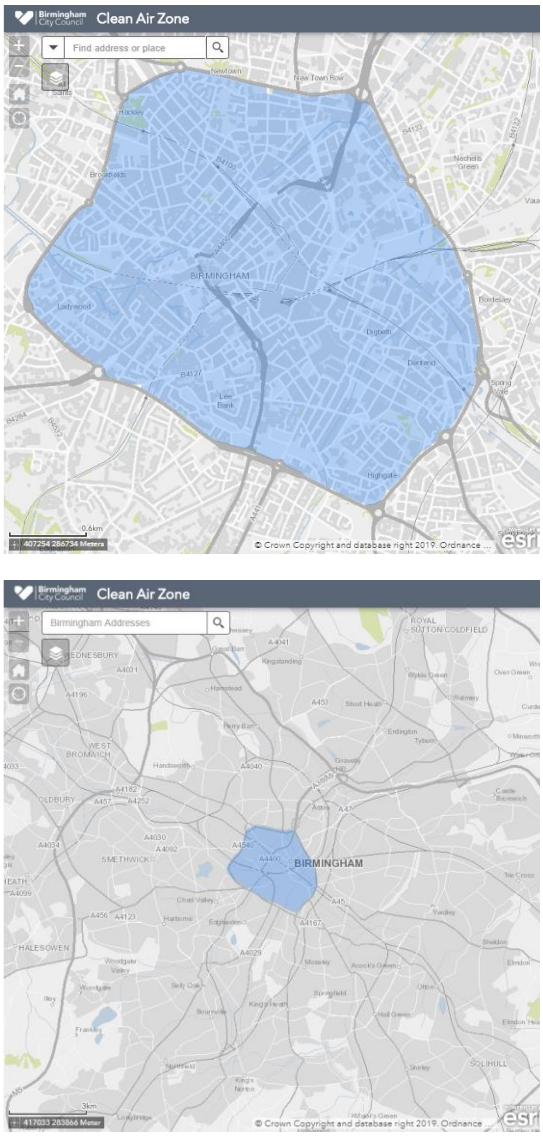

Figure 2: Maps of the Clean Air Zone in Birmingham (graphic provided by the Birmingham City Council)

The CAZ forms part of the Brum Breathes Air Quality programme. The programme is designed to be the overarching Council programme to direct air quality interventions, with the aim of delivering health improvements to citizens, workers, and visitors to Birmingham, all within the context of sustainable growth.

The Brum Breathes Programme incorporates a number of additional projects that offer benefits to the GTD:

- CAZ-supporting measures, in the form of on-street parking controls and network changes.
- Development of infrastructure to support alternative fuel sources, e.g. hydrogen refuelling stations, retrofit schemes, electric vehicle infrastructure, etc.;
- Promotion of behaviour change initiatives relating to air quality.

More information: https://www.birmingham.gov.uk/info/20076/pollution/1763/a_clean_air_zone_for_birmingham

IMPACTS AND EXPECTED RESULTS

With regards to the Green Travel Districts, it is important to mention that while they have been used in planning and transport scheme development, their success has varied since some GTD locations have proven to be more challenging to engage. With regards to the Clean Air Zone, on the other hand, the full business case that has been developed for the relevant CAZ has included comprehensive modelling work.

The modelling work shows that the CAZ charges that are being proposed will act as a significant incentive for individuals and companies to upgrade their vehicles. Once the CAZ is introduced, a notable reduction in the total number of vehicles that are entering the proposed zone is expected. The modelling work further indicates that the number of non-compliant vehicles entering the proposed zone will reduce by more than 50,000 vehicles per day by 2020. Such results will help Birmingham to comply with air quality legislation within two years.

LESSONS LEARNED

Good progress has been made within a number of GTDs. The experience has highlighted some of the key elements to consider when developing and delivering a successful Green Travel District:

- **Coordination and integration** are central to the GTD approach. Communication with GTD members, partners, and others is important in order to make them aware of what is happening and to engage them in activities;
- **Senior level buy-in** is essential to ensure that any identified actions are adequately resourced and delivered;
- **Wider engagement of a variety of stakeholders and the local community** is extremely beneficial;
- **Ownership of taking forward** GTD activity is best placed with a group that can advance this as part of a wider assignment or focus;
- **Creating links with infrastructure programmes** serves as a great opportunity for a local GTD to influence these developments.

The wider Brum Breathes programme has been essential in supporting the development of the Clean Air Zone. It has provided businesses and individuals with the necessary information to prepare for the CAZ and has ensured that the city has the required facilities and infrastructure to support greener vehicles.

COSTS AND KNOW-HOW REQUIRED

Staff resources were required to undertake the initial community engagement work for the GTDs and the CAZ. The cost of the feasibility study to develop the full business case for the CAZ was approximately two million Euro. This work included traffic modelling, air quality modelling, and economic modelling. Birmingham City Council received a total of 16 million Euro in government funding to implement the CAZ. These funds are being used for detailed design work, the city-wide marketing campaign about the Brum Breathes programme and additional measures, signage, cameras, IT, and project management.

In order to **mitigate the impacts of the CAZ on certain socio-economic groups**, a package of mitigation measures and exemptions have been proposed. These have been developed in light of a distributional impact analysis that was conducted as well as the record number of responses received during public consultation (10,000 responses). Mitigation will be targeted at those groups who are least able to cope with the changes that are brought by the CAZ. The types of mitigation measures that are under consideration include exemptions, discounts, and sunset periods. Financial incentives to support businesses and enhanced infrastructure to support the transition to compliant modes of transport will be funded from the Clean Air Fund (CAF).

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Transport space allocation in Birmingham: A new road space allocation policy

Birmingham

Good Practice Factsheet

Source: Ana Dragutescu

Transport space allocation in Birmingham: A new road space allocation policy

City	**Birmingham**
Population size	1 million, lying at the heart of a conurbation of over 3 million
SUMP experience	Intermediate/advanced city
What is the good practice?	Using an evidence-based approach to reallocate road space in a way that puts all transport modes on an equal footing

SUMMARY

Transport Space Allocation (TSA) provides designers of transport schemes in Birmingham with a means of taking decisions concerning the allocation of highway space to different uses and users. It provides a means of **balancing competing demands for space** and allows for an appropriate consideration of policy objectives (e.g. the need to improve public transport services along a given corridor or to improve amenity for pedestrians and cyclists), whilst also allowing for a reasoned consideration of existing patterns of travel behaviour. TSA furthermore provides highway design practitioners with an effective means of taking and justifying decisions concerning the allocation of scarce highway space and capacity in a way that appropriately prioritises a variety of user needs.

DESCRIPTION

The combination of increased travel demand, ongoing growth pressure, and increasing concern for the environment have highlighted inadequacies within and limitations to Birmingham's conventional approach to designing its highways and transportation systems.

Over the course of the past 100 years, Birmingham's outward expansion has largely been characterised by largescale residential development in medium- and low-density areas. Enveloping numerous outlying settlements as it has grown, the resulting development is characterised by a dispersed pattern of settlement that is difficult to serve with frequent public transport services and is, therefore, overly reliant upon car travel. Much of Birmingham's highway network was not constructed to a standard or at a scale that is suited to accommodate significant volumes of traffic.

As a consequence, much of the network is currently operating at or over capacity and is suffering from congestion and delay. The existing congestion makes it even more difficult to plan for efficient and effective sustainable travel solutions due to the fact that it impedes the operation of public transport services and compromises walking and cycling routes.

Figure 1: Ashted Circus – an example of how road space is being reallocated in Birmingham

USER GROUP	LOS TYPE	LOS MEASURE
Pedestrians	Mobility	Footway width, Footpath congestion (applies to 'Place' status C or above only).
	Access	Distance between formal crossing opportunities, number of arms of junctions along route served by crossing facilities
	Access	Average walking distances to identified community facilities, possibly including key bus/Sprint/Metro stops from crossing points.
Cyclists	Mobility	Facility type required, relating to the speed/flow of traffic on shared roads.
	Mobility	Width / type of facility provided, crossing facilities provided at junctions.
	Access	Parking provision in mediumto high 'Place' function areas.
Public Transport (Bus, SPRINT, Metro)	Mobility	Service Schedule Reliability
	Mobility	Operating speed relative to policy minimum (set at different levels for Bus, SPRINT, Metro).
	Access	Distance from stops/stations from key origins or destinations (including crossing points). **
Freight/ Deliveries	Mobility	Travel time reliability.
	Access	Level of delivery access to shops and businesses: Loading bay or ability to stop available within distance of destination.
Private motorists	Mobility	Congestion (Variance to 30 mph). *
	Access	Parking provision at shopping areas (applies to 'Place' A to C and D where appropriate).

Figure 2: Summary of Level of Service measures

Figure 3: Illustration of pedestrian Level of Service

LOS TYPE	LOS MEASURE	A	B	C	D	E	F
Mobility	Footpath congestion	< 8ppmm	9 to 17ppmm	18 to 26ppmm	27 to 35ppmm	> 35ppmm	
Access	Distance between formal crossing opportunities	Level of Service weighted by distance and the number of people affected. See separate tables below					
Access	Average walking distances to identified community facilities from crossing points						

Figure 4: Measures for pedestrian Level of Service

The starting point for TSA is to identify the **key strategic transport policy objectives along a given corridor** or within a given area. The identification of the key strategic objectives is based on an evaluation of existing and future priorities that have already been identified.

For example, a given highway corridor may have simultaneously been identified as a priority route for general traffic, public transport, and cycling.

Following the establishment of an initial user hierarchy, the project working group uses a set of pre-determined, objective measures to determine the Level of Service (LoS) the existing environment provides for each user group. The working group further sets the desirable and minimum levels of service that are to be achieved in the future.

Typical measures used in the LoS assessment include measurements of vehicle speed and delay, footway congestion, and the dimensions of the facilities provided.

The resulting minimum LoS measurement is used to assist and inform the approach to scheme design, thereby helping to develop a balanced approach to the needs of all users.

Where it is not feasible to achieve an appropriate **minimum LoS for all priority user groups**, the LoS assessment also allows the design team to identify shortcomings and deliver alternative arrangements.

Alternative arrangements can be made, for example, by upgrading a parallel or nearby route or by adopting manoeuvre and/or parking restrictions to operate at sensitive peak periods of the day.

IMPACTS AND EXPECTED RESULTS

Although it is only in the beginning stages of its application, TSA has already proven its capacity for allowing designers to adopt a policy-based approach to identify user and network priorities early on in the design process. It is not a design tool as such, but it provides a clear and coherent path for justifying interventions in a structured and transparent way. It also ensures that all user and network priorities are considered appropriately in the scheme design process, requiring that designers seek viable alternatives in cases where the delivery of all priorities is not feasible.

LESSONS LEARNED

Key success factors include the need to ensure ongoing commitment to the policy from all stakeholders, particularly those involved in the design process. A collaborative working environment has been established in Birmingham and has proven vital to ensuring the successful implementation of the policy. By its very nature, TSA is a tool used to assist designers in navigating their way through a challenging decision-making process. As such, there will always be spatial and cost pressures that are difficult to overcome. However, even in circumstances where it is not possible to deliver the desirable LoS for all users, the TSA process has proven extremely effective in at least delivering the minimum level of improvement necessary, which would probably not have been achieved without it.

COSTS AND KNOW-HOW REQUIRED

Approximately 100 hours were required to prepare the TSA guide, with this number including also hours used for consultation. The costs linked to the application of guidance vary from scheme to scheme, depending on size and complexity. For a small scheme, it is reasonable to estimate that time costs equalling 10 – 15 hours are required to apply the guidance. For larger schemes, on the other hand, the application of guidance may require approximately 40 hours.

It is worth noting that the TSA guidance document that has been prepared by Birmingham City Council has been designed in such a way so as to ensure that the **required scale of assessment can be adjusted according to the size and scope of the scheme** under consideration. For smaller schemes, designers are able to adjust the LoS measures used in order to ensure the process does not become prohibitively onerous. In this way, the City Council has been able to ensure that TSA is a process embedded within all scheme designs and that it is not likely to get overlooked in cases where small schemes are proposed.

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Interactive two-way communication with decision makers

Budapest

Good practice factsheet

Source: BKK

Interactive two-way communication with decision makers

City	**Budapest**
Population size	1.75 million
SUMP experience	Intermediate/advanced city
What is the good practice?	A new method of awareness raising and two-way communication involving high-level decision makers

SUMMARY

In the SUMPs-UP project activity "interactive two-way communication with decision makers", BKK, Budapest's public transport company, worked with high-level decision makers in the Hungarian capital. Their main target group was members of the highest-level institutional cooperation forum for the Budapest Mobility Plan, BMT. This was done to explore and deepen their knowledge of sustainable urban mobility planning and encourage their engagement in the process.

BKK conducted in-depth interviews with the members about SUMPs, organised a study tour to Vienna to learn about other European SUMP processes and best practices, and held further interviews after the visit to explore lessons learned. This marked the first time a SUMP-themed study tour and interviews had been organised involving high-level decision makers from Budapest, and provided the opportunity for direct, interactive two-way communication.

DESCRIPTION

In the SUMP planning process, BKK gives all stakeholders the opportunity to participate: both public consultations and institutional cooperation form crucial parts of the process.

As part of the SUMPs-Up activity "interactive two-way communication with decision makers", BKK targeted high-level decision makers (members of the "Balázs Mór Committee" - the highest-level institutional cooperation forum related to the SUMP) to ascertain and then improve their knowledge of sustainable urban mobility planning and to stimulate engagement in the BMT process.

The Committee is the first official board set up in Budapest to support SUMP development. Prior to its establishment, communication between the institutional and city level was conducted via ad-hoc meetings and emails.

The SUMPs-Up activities have fostered interactive two-way communication between committee members of the committee and BKK. These have enabled BKK to understand what decision makers think, whilst the members involved could share their thoughts and learn about SUMP best practice through interactive activities.

Initially, BKK chose 10 committee members and conducted a detailed interview with them on sustainable urban mobility planning. Questions covered general SUMP-related issues and more specific BMT-related topics, for example:

- *How can a SUMP aid a decision maker's work?*
- *What strengths and weaknesses does the SUMP process have?*
- *Which sustainable development-related measures do you find the most important in the BMT?*
- *What kind of solutions do you think would make Budapest more liveable?*
- *How do you imagine Budapest will be by 2030?*

Following these interviews, five members joined a one-day, SUMP-themed study tour in Vienna, Austria, in May 2019. This allowed them to learn first-hand about other European SUMP processes and best practices. They also met representatives of the Municipality of Vienna and Wiener Linien representatives (the city's public transport authority), as well as the operator of a local e-scooter sharing scheme. The hosts presented their SUMP-related work, which provided opportunities for intense discussions on sustainable urban mobility planning.

The study tour also included a site visit; participants visited the Vienna Mobility Point that integrates different mobility services for active and sustainable modes.

The site visit served as a good example of an implemented sustainable urban mobility measure. It was of particular interest and use to Budapest as the city's first mobility point was being piloted at the same time.

After the study tour, BKK interviewed participants about the lessons learned and any changes in their points of view.

Members talked about their experiences of the study tour, whether they found it useful, and if they can apply the lessons learned in their everyday work. All the members mentioned that the involvement of high-level decision makers in SUMP-related study tours is useful and is an initiative that should be continued.

Figure 1: Mobility point site visit during the SUMPS-UP study tour

They found it inspiring to see a similar (although slightly more advanced) sustainable urban mobility planning process in another European city – this confirmed to them that Budapest is on the right track. Members also found that being involved in the strategic, operative and actual implementation phases of planning is highly useful.

It is important to remember that SUMP planning is a continuous process and not a one-off activity. Awareness raising and educating stakeholders via interactive two-way communication is a constant necessity.

The interviews were held in the offices of the members and BKK, with colleagues from the SUMPs-Up team present. BKK drew on previous work-related connections to organise the study tour. Participants travelled from Budapest to Vienna by train and used public transport when in the city.

IMPACTS AND EXPECTED RESULTS

Interactive two-way communication among stakeholders can help all parties better understand the others' motivations and thoughts, and by bringing them together also facilitates better cooperation.

Having knowledge of what high-level decision makers think concerning urban mobility planning helps SUMP experts understand leaders in their cities more and then ensure that this is taken into account in SUMP development. When such stakeholder input (not just necessarily from those at higher levels) feeds into the planning process, it ultimately leads to a better SUMP that is reflective of various needs.

Improving city leaders' knowledge of planning principles and showing them SUMP planning and implementation best practices enables them to pick up the process easier. Indeed, all forms of awareness raising activities contribute to gaining the buy-in of decision makers.

During the study tour, decision makers could elaborate on the SUMP planning process by discussing the topic with the hosts, BKK's SUMP experts, and sharing their experiences with each other.

As a result, BKK expects city leaders to become even more committed to the city's SUMP and use the document as an everyday tool. BKK expects and plans to continue its awareness raising and educational activities, with the involvement of more decision makers foreseen in the future.

LESSONS LEARNED

The key success factors for involving high-level decision makers in awareness raising and educational activities are to communicate the action points related to the activities clearly; emphasise the benefits and expected results; and shape the interactive two-way communication process in a way that fits the needs of all parties. It is important to set up an interesting and informative programme for a study tour and (ideally) to involve high-level leaders from the host city. One challenge was to fit the planned interviews and study tour into the schedules of participants, but planning well ahead ensured the task was manageable.

BKK would advise other cities to consider involving high-level decision makers in interactive educational and awareness raising activities and provide opportunities for them to learn about sustainable urban mobility planning in other European cities.

A study tour can be a good way for city leaders to discuss planning with mobility experts without any institutional boundaries. Involving high-level decision makers in sustainable urban mobility planning is key to gaining political engagement and a good way to raise awareness of and inform about innovative solutions.

COSTS AND KNOW-HOW REQUIRED

Figure 2: Photo from meeting at Stadt Wien, urban development and planning office, as a part of the SUMPs-Up study tour

BKK organised the study tour and conducted the interviews using its own resources in the SUMPs-UP project. In total, about 360 hours were invested in the activity. The travel costs of the study tour, which came to about 400 EUR in total for eight people, were covered from the project as indirect costs.

BKK's SUMP experts were involved in the development of the interview questions and conducting interviews, and also participated in the study tour.

During the study tour meetings, BKK's experts could lead the discussions with questions to help participants cover all topics relevant for Budapest.

The actual results of the educational and awareness raising activities could be presented in the long term, by involving more high-level decision makers, making them more engaged in sustainable urban mobility planning and making such activities a regular happening, bringing best practices and cities that are more experienced closer to Budapest.

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Development of an integrated transportation demand management (TDM) framework proposal for road users

Budapest

Good practice factsheet

Source: BKK

Development of an integrated transportation demand management (TDM) framework proposal for road users

City	**Budapest**
Population size	1.75 million
SUMP experience	Intermediate/advanced city
What is the good practice?	Supporting new methods of mobility management, considering transport demand and mobility behaviour

SUMMARY

Budapest's public transport company, known as BKK, has developed a proposal for an integrated Transportation Demand Management (TDM) framework. This will serve as a decision-making support tool, whilst BKK has already started integrating the TDM methodology into Budapest's mobility planning. The aim of this is to ascertain potential areas for mobility policy and measure development and transferable TDM-related good practices.

In addition, this will help develop effective TDM measures and measure packages in accordance with the objectives of the Budapest Mobility Plan (BMT), Budapest's first UMP based transport development strategy for Budapest. The proposed TDM strategy embeds transport demand and mobility behaviour management in the city's mobility planning, thereby supporting the realisation of its SUMP.

DESCRIPTION

As the integrated mobility manager of Budapest, BKK focuses not only on infrastructure development, but also on managing transport demand and citizens' mobility behaviour, and reducing urban traffic congestion and reduce the need for additional transport infrastructure investment. The recognised TDM method and measures improve transport outcomes, helping to mitigate congestion, make more efficient use of transport infrastructure, and overall to create a more reliable transport system.

By managing and understanding transport demand and user mobility behaviour, travel in Budapest can be made more efficient for all. This might involve people changing their mode, time of travel, or simply travelling less.

Firstly, BKK benchmarked TDM internationally by looking at literature and identifying best practice related to implementation methods and barriers to and drivers of TDM - this involved analysing related economic, environmental, and social factors. Alongside this, measures in the Budapest Mobility Plan were categorised using the main TDM method categories - push, pull, complex and focused.

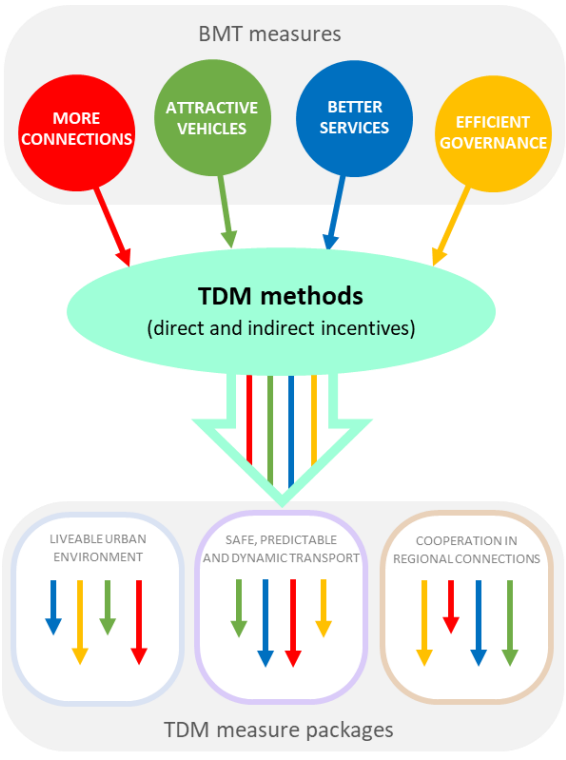

Figure 1: BMT measures grouped into TDM measure packages based on TDM methods (taken from the TDM strategy proposal for Budapest)

These measures were then grouped into TDM measure packages, with direct measures paired with complementary indirect or complex measures, so measures can complement and support each other when applied. All TDM measure packages align with the BMT's main strategic objectives: Liveable urban environment; Safe, predictable and dynamic transport; Cooperation in regional connections.

With the help of the TDM measure packages, the impact of a measure can be multiplied, as implementing a supportive measure-pair can enhance the effect of a single measure. For example, a direct measure to improve walking conditions would benefit from being paired with an indirect awareness raising campaign on the positives of walking.

All suggested measures and packages were ranked in order of supposed difficulty of implementation and considering TDM best practice and existing BMT measures. The document also helps decision makers become easily familiar with the concept and benefits of TDM and managing mobility behaviour and aids them to make decisions on implementing new measures and packages.

The proposed TDM strategy is closely connected to Budapest's SUMP, which has been approved by the city's General Assembly. Linked with step seven of the SUMP cycle "Select measure packages with stakeholders", it helps identify the most effective measures, facilitates exchange among stakeholders, whilst considering the best value for money.

During the strategy's development, BKK utilised no external tools and used only the resources allocated to it from SUMPs-UP. Internal discussion rounds helped harmonise and find consensus on proposed measures. For such a strategy to be successful, it needs to be approved by decision makers, tested on a smaller scale, and eventually widely implemented. When applying the strategy, an initial pilot phase may also be considered.

Awareness-raising activities for citizens and BKK colleagues are conducted following the principles of sustainability, environmentally conscious lifestyle and mobility behaviouEvents have focused on active mobility, for instance a cyclists' breakfast, whilst activities have also been organised in the context of European Mobility Week.

IMPACTS AND EXPECTED RESULTS

Figure 2: Awareness raising activity during European Mobility Week 2018 in Budapest, September 2018

The proposed TDM strategy introduces transport demand and mobility behaviour management to Budapest in a new way. The document lays the foundations for a common understanding and acceptance of TDM and can serve as the springboard for better collaboration with stakeholders and interest groups. Furthermore, it encourages better understanding of sustainable mobility among different stakeholders.

More specifically, it familiarises policymakers with the concept and benefits of TDM and mobility behaviour management, whilst supporting decision-making processes concerning measures, measure packages and new TDM-related projects.

BKK has planned various measures and TDM-related projects. These include a public transport map with walking times; a workplace mobility plan; curb management; awareness raising among and education of high-level decision makers; sustainable procurement plans; and sustainable construction logistics plans. These were inspired by examples of TDM best practice.

Overall, fostering a behavioural shift towards sustainable mobility and better transport demand management, results in a liveable and active city with healthy and environmentally conscious citizens. It also encourages more cost-effective and efficient use of the transport network.

LESSONS LEARNED

When developing strategies to complement a SUMP, it is important to be aware of opportunities to improve mobility in the city and engage decision makers, as well as to have a common understanding of planning objectives. It is also crucial to ensure political support for measures and to comprehensively benchmark the topic against international examples. Internal discussion rounds help reach consensus on strategy content and proposed measures.

BKK would advise other cities to implement a TDM strategy and measures alongside their existing SUMPs. By familiarising themselves with transport demand and citizens' mobility behaviour, cities can use existing infrastructure more efficiently, reduce traffic congestion, and better gauge the need to invest in transport infrastructure.

Involving high-level decision makers in sustainable urban mobility planning is key to gaining political engagement and a good opportunity to raise awareness of and inform about innovative solutions.

COSTS AND KNOW-HOW REQUIRED

BKK , as a competence centre devised the strategy using its **own resources** within SUMPs-UP, which covered personnel costs. In total, strategy development took approximately 550 hours. BKK SUMP experts provided extensive knowledge of existing SUMP measures and objectives and for a morea clear idea of possible supplementary measures and projects.

Although other stakeholders were involved in benchmarking, BKK advises developing strategic documents in-house, i.e. within the public transport authority or relevant municipal departments, instead of outsourcing them.

SUMP planning should be considered as a continuous process and not as a one-activity, the development of supporting strategies forms part of the SUMP cycle. A centralised budget covers regular awareness raising activities, such as e.g. European Mobility Week participation or the cyclists' breakfast.

Figure 3: BKK SUMPs-UP team working on the TDM strategy proposal

Any proposed TDM strategy needs to be approved by decision makers and tested in real life (both on a small- and large-scale). It also serves as tool to support decision making in managing transport demand and changing mobility behaviour of the citizens to a more sustainable direction.

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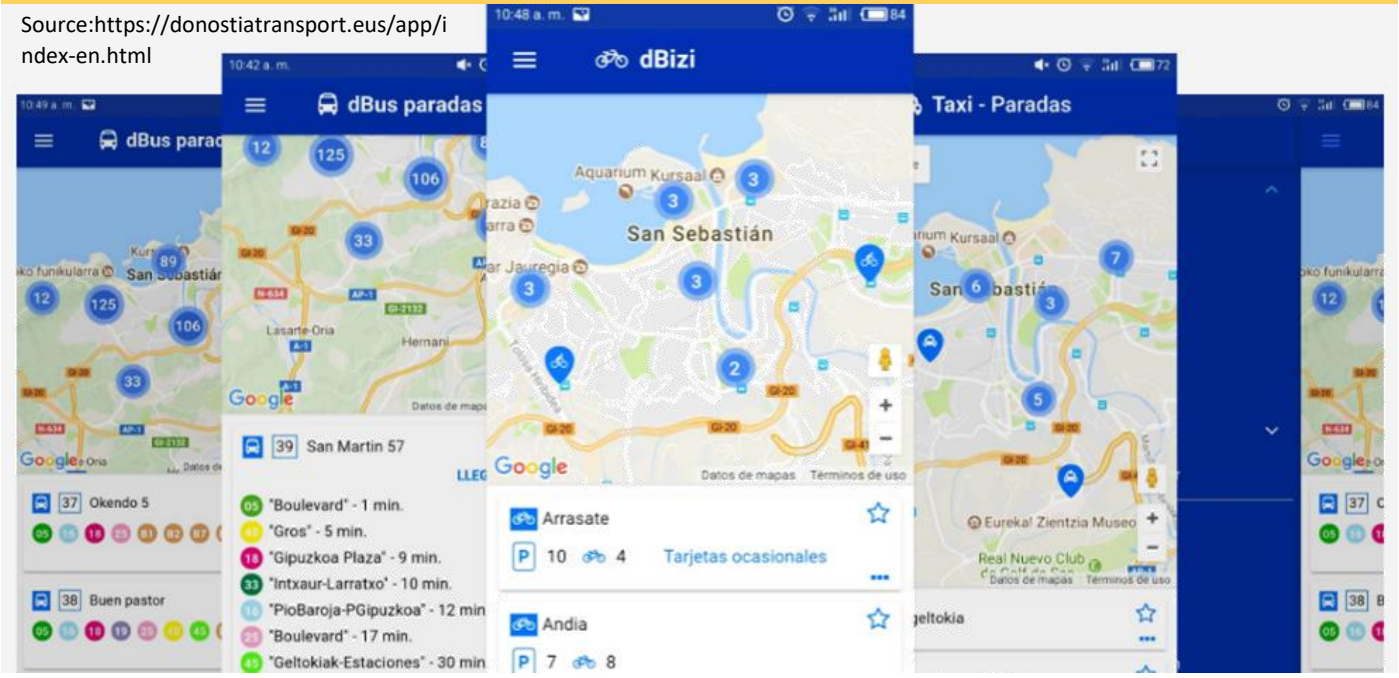
Interactive maps for cycling and walking

Donostia-San Sebastian

Good practice factsheet

Source:https://donostiatransport.eus/app/index-en.html



Interactive maps for cycling and walking

City	**Donostia-San Sebastian**
Population size	186 000
SUMP experience	Intermediate city
What is the good practice	All information about the transport services in the city gathered in one digital tool, including features to search for a travel journey.

SUMMARY

The idea of creating interactive maps aimed at both pedestrian and cyclist mobility arises, on the one hand, from the city's strategic commitment to prioritising active mobility over other means of transport and, on the other hand, from the desire to take advantage of the vast possibilities that are offered today by information technologies with the aim of offering its users real-time information and route options.

DESCRIPTION

The demand for information from society has become a challenge for service providers and that is why cities, as providers of information on different areas of urban activity, have had to restructure their communication policies in order to provide citizens and visitors with quality information that meet their expectations.

In the field of mobility, there are countless sources of information and this has led to a very interesting opportunity for the city to complement the usual printed information that is typically provided with other means. The traditional way of distributing information has the disadvantage of providing information that is static and that needs to be updated periodically when improvements or changes are implemented.To be in accordance with the mobility strategies that are defined in the city's Sustainable Urban Mobility Plan and to take advantage of the new way of handling information for the purposes of sustainability, an initial proposal was made to create interactive maps for both pedestrian and cyclist mobility.

These interactive maps would consider the existing and constantly evolving cyclist network as well as the pedestrian itineraries proposed from the city's sports centres, which offer a great deal of information on tourism, culture, first aide, and emergency services. By contacting relevant advertising agencies and discussing options for the proposal, Donostia-San Sebastian quickly learned that today's society has a very localised demand for information and is focused on the use of mobile devices. Therefore, instead of offering just interactive maps, the project decided that the development of a mobile application would be better suited to reach residents and visitors.

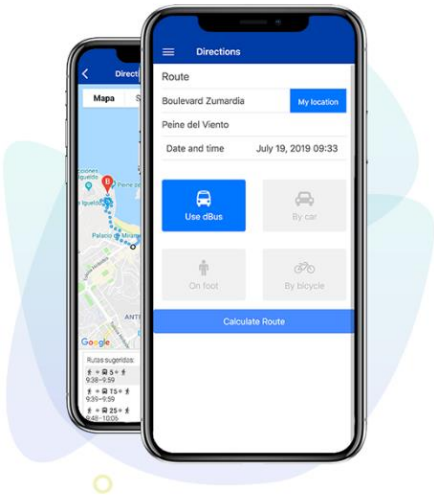


Figure 1: The Donostia Transport application user interface

There was also consideration of the many applications available today, often in the same city, for each mode of transport (bus, train, taxi, etc.). In order to get information on the various modes of travel, a user must install applications related to the means of transport they plan to use, which could require several applications if the user plans on taking more than one mode of travel.

The idea of Donostia-San Sebastian was to provide the user with a single mobility tool that included all of the most sustainable means of transport in the city. The city would thus also be fulfilling the initial idea, to provide the user with access to up-to-date information. Being an official application of the City Council, this would guarantee to the future user that the application, by using municipal information sources, presents data that is both accurate and reliable. The application started by providing information from real-time data sources and it expanded to include also the provision of information about the public bus transport. The bus system has an integrated Exploitation Support System (ESS), which monitors the public service of bicycles and their partnered, electrified docking stations so that it can provide real-time information concerning the state of the stations.

At the same time, information about the public taxi service as well as the occupation status of the city's underground parking garages has also been incorporated into the application. Priority has been given to information relating to the city's peripheral parking garages in order to dissuade the use of more central parking garages, the use of which would increase the car traffic and congestion in the city centre. The application is constantly evolving and is currently under development to offer users also the possibility to request a taxi using the same application. With this feature, a user could set their destination and journey in order to get updated information about the price of the planned itinerary in advance.

IMPACTS AND EXPECTED RESULTS

The first objective of the application is to respond to the increasing demand from citizens and visitors for municipal mobility services and to create a communication link between the City Council, on the one hand, and residents and visitors, on the other hand, by assisting the latter, with the provision of real-time data about mobility services, for their planned activities within the city.

Figure 2: Dbus provides users with reliable bus transportation that can be tracked on the application

At the same time, the application serves as a tool to reflect the municipality's prioritisation of not only urban mobility, but also active travel, such as walking and biking. In general, the application is another means of communication in that it is an effective tool for both citizens and tourists to learn about the means of travel that are promoted by the City Council. Finally, given the proliferation of applications that are continuously launched, the aim is to offer users a single application that includes all of the necessary information regarding mobility in the city, and to thereby make it easier for users to respond to their mobility needs through an official and reliable application.

LESSONS LEARNED

Regardless of the method used to reach out to residents, any action can be seen as communication as well as a showcase for the City Council to promote the city's priorities, such as sustainable forms of travel. From the technical point of view, it is necessary to carry out a study of the available data sources that will feed into the application. To identify the data sources that meet the needs, the study must first define goals for the application and its use. At the same time, it is necessary to identify if the information sources are internal or external sources in order to specify the connection and integration mechanisms for the export of the data, especially in the case of external databases.

COSTS AND KNOW-HOW REQUIRED

- Analysis of information and mobility indicators available in open data. EURO 10.500
- Design and realization of the APP Donostia Transport. EURO 17.500
- Design and realization of the web version of the APP Donostia Transport. EURO 2.500

It is considered important to identify the medium through which citizens and tourists demand information. Although new generations are large consumers of technology and mobile devices, there are groups that continue to appreciate information on paper for short (or long) visits. It is therefore important not to neglect the media channels that were already offered previously, as doing otherwise may generate a feeling of neglect by specific groups.

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Flexible use of streets

Donostia-San Sebastian

Good practice factsheet

Flexible use of streets

City	**Donostia-San Sebastian**
Population size	186 000
SUMP experience	Intermediate city
What is the good practice?	Working method on the reorganisation of a street towards more flexible uses, according to specific needs.

SUMMARY

The flexible use of streets is an innovative concept that has been introduced in the city of Donostia-San Sebastian to guarantee an equitable use of public space by all actors involved in the daily activity of the city, or of the street in this case. The measure, independent of the civil work required depending on the need to pedestrianise the street, establishes time slots for the different uses that have been identified to take place during a normal day.

DESCRIPTION

Pedestrianisation projects have become a key tool when it comes to urban planning in cities. Beyond the positive effects they have in drastically reducing vehicle traffic, pedestrianisation projects also provide a series of benefits that, taken together, lead to an improvement in the quality of life of the city and its citizens. The reduction of motorised traffic within a city not only improves the environmental and acoustic conditions of the city, but it also helps to improve road safety, reduce the risk of accidents, and lower travel speed. In short, the reduction of motorised traffic leads to the improved health and protection of people living within the city.

The city of Donostia-San Sebastian, through its Sustainable Urban Mobility Plan (SUMP), has been carrying out pedestrianisation projects for some time now, with the aim of recovering public space and offering it to the city's residents and visitors.

The main objective of pedestrianisation is to create liveable places and environments that encourage people to spend their time in public spaces. Although pedestrianisation projects have the common denominator of reclaiming space from the private vehicle, they can arise from different urban needs: revitalise areas in the city that have been degraded from little use, reactive economic activity in the area, improve pedestrian traffic in specific areas, or to eliminate critical spots.

Parallel to these processes, the city has also been undergoing a transformation in the area of service in recent years.

As a result, streets that had previously been used only for residential purposes are now incorporating uses linked also to the service industry like hotels and restaurants. This process has intensified the daily demand for public space.

Figure 1: Landscape plan for Carquizano street after the street's uses were analysed and new street layout was decided upon.

It was concluded that the usual configuration of pedestrianisation projects was not sufficient to handle the large demand. Instead, it was decided that a better street arrangement was necessary in order to establish more order with regards to the different uses of the public space.

The first step in approaching this type of project was to identify the different uses of the street. In order to identify the uses, in the example of the Carquizano street, several participative processes were organised with both neighbours as well as with the different businesses located on the street.

The participative processes, in addition to the collection of direct information from actors who participate in the day-to-day activities of the street, allow different stakeholders to collaborate with one another and are thus a key factor in ensuring that the street is reconfigured in a way that satisfies the needs of everyone.

Three main uses of the Carquizano street were identified, which then led to the city's decision to distribute the street activities in the following ways:

- *In the morning, the street is organized to facilitate the distribution of goods and to supply the businesses located on the street;*
- *In the afternoon, the street takes a configuration aimed at leisure. For this reason, it becomes closed for traffic and takes the appearance of a pedestrian street; and*
- *At night, the street offers residential parking.*

The identification of street uses is of vital importance when designing the layout of a street. This is due to the fact that the same layout must allow for a shift from one use to another without requiring that any modification be made to the equipment that has been arranged to differentiate one use from another. Therefore, it must be kept in mind that the appearance of the street must be similar at any time of the day, so that its character does not suffer changes that could confuse its users.

IMPACTS AND EXPECTED RESULTS

This type of innovation undoubtedly has a direct positive impact on the activity of the street where it is implemented.

More specifically, the innovation allows the configuration and character of the street to be revitalized both from the strategic point of view of the city, which is linked to measures to improve the quality of life and air, and from the social perspective, which considers the availability of more pleasant public spaces for people.

Adapting a street to enable it to accommodate different uses allows for the creation of a more pleasant environment for all the actors who are part of the daily activity of the city. Ordering the street in such a way allows each actor to make use of the street in one of the established ways, while sharing the space with others in a respectful way.

Figure 2: Carquizano street after the reconstruction redistribution of urban space.

Although they cannot be considered as negative impacts, it is necessary to foresee the influence this type of action may have on nearby environments. Reorganising a streets towards flexible uses may cause the traffic that was once in that specific street to be diverted to the nearby streets or it may result in a need to rearrange other mobility services in nearby areas.

LESSONS LEARNED

Throughout the development and implementation of such a project, it is important to establish participatory processes since ensuring consensus among all is vitally important. The interaction between allows for the generation of synergies as well as for the exchange of first-hand knowledge regarding each activity that is established for the street.

When implementing this type of measure, it is necessary to give users a sufficient amount of time to adapt to and to assimilate the redistribution of the public space that has occured.

These types of measures work best when carried out as part of a larger city plan, preferably a SUMP. This should support the process of presenting it to neighbours, store owners, and freight delivery operators not only as a measure that benefits the street but as one that also serves as a pilot test for the entire city, as it may be replicated to other areas of the city if it is successful.

COSTS AND KNOW-HOW REQUIRED

- Project drafting: EURO 5.000
- Project execution budget: EURO 120.000
- Work management, quality, environment and safety management costs (internal resources)
- Participatory process/sessions (internal resources)

A city might consider, following the consensus of all relevant street actors, to carry out a pre-test. A pre-test could, for example, consist of closing the street to traffic on public holidays in order to see what the level of user acceptance would be and how quickly users would be able to adapt to the change. Although this type of action is punctual and has no continuity in time, and therefore would not have the degree of impact necessary to attract visitors, it is nonetheless a good test for all actors who are directly affected by the change.

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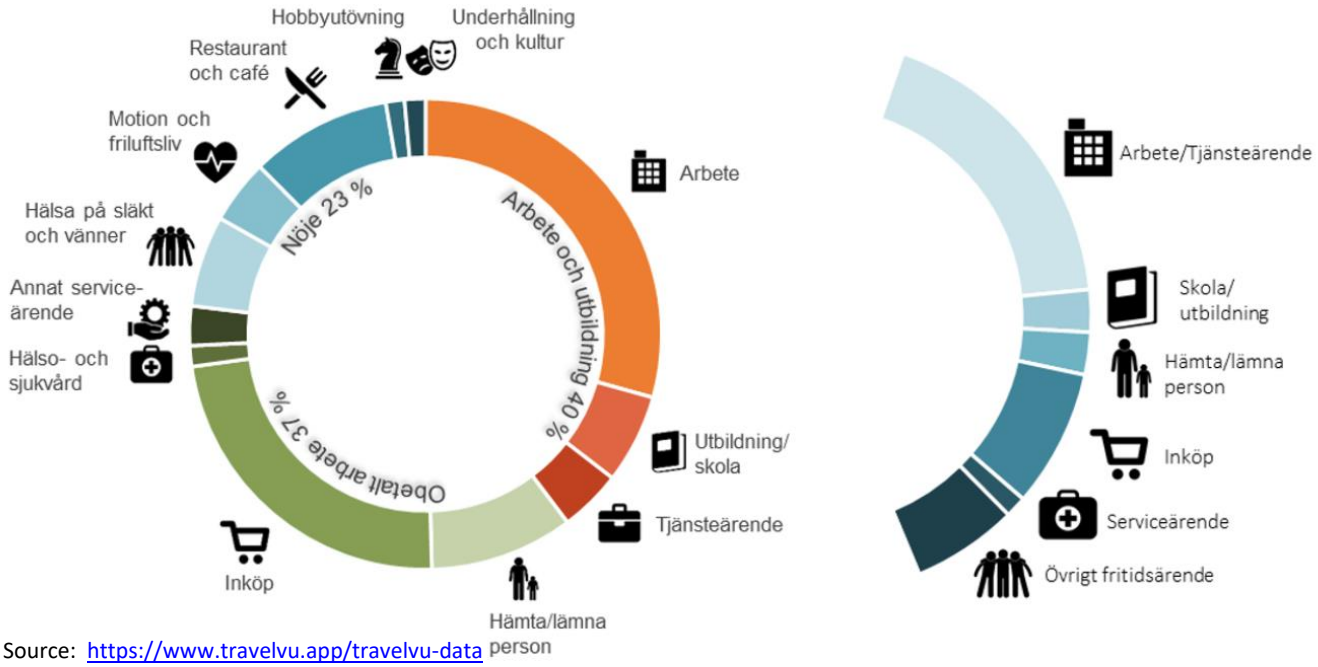
Traditional vs. digital – a new travel survey technique in Malmo

Malmo

Good Practice Factsheet



Source: https://www.travelvu.app/travelvu-data

Traditional vs. digital – Malmo's new travel survey technique

City	**Malmo**
Population size	330,000
SUMP experience	Intermediate/advanced city
What is the good practice?	A comparison between a traditional paper-based and an app-based travel survey

SUMMARY

In order to know how effective the SUMP and implemented measures have been, it is important to monitor trips in the city. The aim is to make this reliable and economically efficient. In parallel to its traditional paper-based travel survey, Malmö has also been using a new app-based survey since 2018 that collects data via an application on participants' mobile phones. The surveys were compared to highlight differences in results depending on the data collection method. The aim is to facilitate surveys by using an app and keep the historical survey data valid. Based on the analysis, the comparison concludes that the mobile app provides higher quality information than the traditional paper-based survey.

DESCRIPTION

To understand travel behaviour in the city and monitor the results of measures and policies, the City of Malmö collects data on trips by doing surveys. This is one of the most important indicators used to ensure that traffic is developing in a sustainable way and according to the city's SUMP goals.

A travel survey is held every five years in Malmö. 2018 marked the first year that both a traditional paper-based and app-based survey were held.

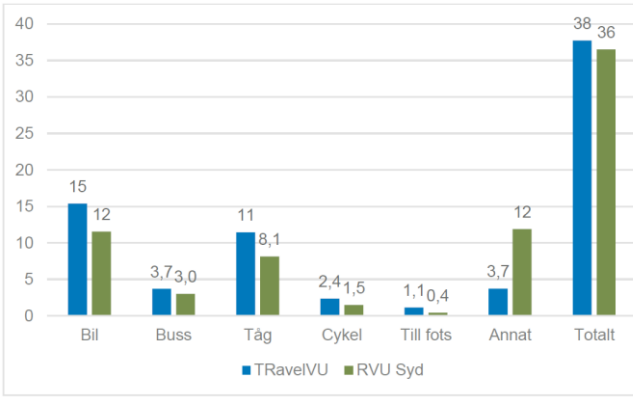


Figure 1: Kilometres travelled per person and day with different modes of transportation in the app (TRavelVU) and paper survey (RVU Syd)
(graphic provided by the City of Malmö)

The app-based survey lasted for six weeks and participants were active for two or more weeks. The paper-based survey lasted for two months with a reminder after two and four weeks. The collection of data from the app produces a larger amount of data and far more details on how the trips were made. Some of this data is hard to estimate for the participants in the paper survey. This relates to both distance and duration of the trips. The app also provides information on waiting time, parking time, route choice and more.

When comparing the surveys, the number of trips made every day is higher in the app, presumably because all trips are registered automatically by the app. Aside from this, the following conclusions were also drawn:

- The distribution between destinations is similar.
- The number of kilometres travelled is similar.
- The average length of travel is almost double in the paper survey, mainly caused by several long flights increasing the mean for the paper survey.
- The average length for trips on foot is longer in the paper survey. This is likely caused by shorter trips sometimes being forgetten in the paper survey.

- The average duration of the trips varies. Exercise-, family-, leisure-, work-related and trips for 'other' reasons take longer in the paper survey, while trips to school or other educational facilities, public services and home are longer in the app-based survey.

Based on the analysis, the comparison concludes that the mobile app is of a higher quality than the paper survey. This is because the (data) logging facilitates the respondents to correctly specify time, distance, route and actual stops and travel patterns.

However, problems remain regarding the representativeness of the respondents (for both methods), as well as incorrect data. With mobile apps, almost four times as many trips are captured than with paper surveys, even though the number of individuals responding is significantly fewer.

Above all, more but shorter trips on foot are registered with a mobile app than with a paper survey. The total travel per person and day does not differ much between the methods, but this is mainly because the travel length with 'other means of transport' is so long in the paper survey. Apart from the trips made with other means of transport, the journey length is considerably greater with the app survey. As the app registers more trips on foot, it gives a different modal split compared to the one obtained with the paper survey.

IMPACTS AND EXPECTED RESULTS

Changing the survey method makes it difficult to make comparisons with the past, which in turn makes it challenging to follow up on the identified developments. In fact, a new "starting point" emerges.

The paper survey does not contain information about the route, while the app manages to capture this in most journeys. The ability to consider route choices makes it possible to pinpoint vital links and less used links in the transport system.

For follow-up on previous surveys, the paper survey is valid, but if one is to be prioritised it should be the app-based survey based on the amount and quality of data.

The app-based survey is also expected to be economically better and easier to build on as the technique is developed. The data gathered for Malmö will be compared and added to a database where traffic counting and public transport data is collected.

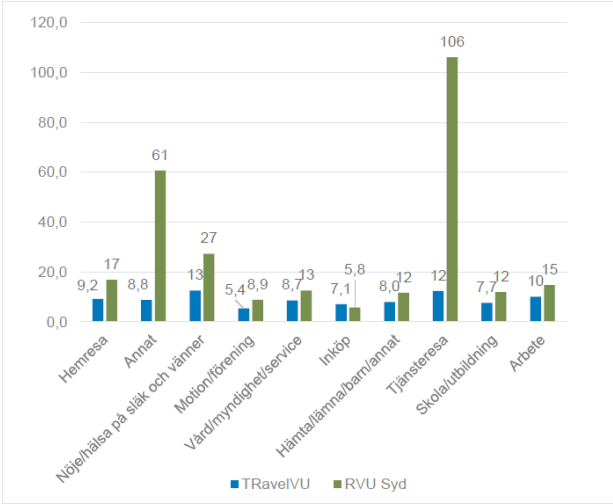


Figure 2: Average length in kilometres per travel for different errands. The app (TRavelVU) and the paper survey (RVU Syd) (graphic provided by the City of Malmö)

LESSONS LEARNED

Both travel length in kilometres and minutes per trip have a lower variance in the app than in the paper survey, whilst the variance for the number of trips per person is greater in the app than in the paper survey. In the case of a partial non-response of geocoded target points, travel length and travel time, the differences between the survey methods are big and the app is significantly better.

The difficulty of getting reliable results for trips made on foot is solved by changing to the app-based survey.

Before changing the travel survey method, it is important to consider what data will be made obsolete. In some cases, this might validate a paper survey as a follow-up measure.

It can be difficult to reach older people with an app-based survey. Among senior citizens (those aged 65-84), the total response rate was 1.5% (44 responses) in TravelVU (the survey app), compared to a general response rate of 3.7% (653 responses). Both are below the response rate to the paper-based (postal) survey, which was 29% (5,824 responses out of 20,000 mailings). In addition, many older people (65-84 years) contacted the city during the course of the study and wanted to contribute with answers, but felt excluded from the technology.

Apart from that, representativeness was good. The highest response rate was registered among 30-44 year olds, whilst women are overrepresented and men underrepresented in the survey. The pattern that women have a higher response rate is repeated across all age groups.

COSTS AND KNOW-HOW REQUIRED

The mobile phone application was developed by a private company specialised in intelligent transportation systems. Approximately 500 staff hours were required to develop the application.

App-based surveys are a new way to collect data for travel surveys – this is based on the collection of GPS data through smartphones. Such applications collect data using individuals' mobile phones. By using the technology that is available in today's smartphones and advanced software algorithms, they can register both trips and activities between trips.

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Regional cooperation to develop a PolySUMP in the MalmöLund region

Malmö

Good Practice Factsheet

Source: Strukturplan för MalmöLundregionen

Regional cooperation to develop a PolySUMP in the MalmöLund region

City	**Malmö**
Population size	330,000
SUMP experience	Intermediate/advanced city
What is the good practice?	Collaboration with a diverse set of neighbouring municipalities to create Sweden's second regional SUMP

SUMMARY

More than 100,000 commuters travel in the MalmöLund region every day. Malmö, which is the region's largest city, serves as the hub for most of these journeys. In total, 11 municipalities cooperate in the MalmöLund region. To reach municipal climate goals, maximise employment, increase effectiveness of land use, and enhance the attractiveness of public transport, it was decided that a common strategic transport plan was required. The resulting PolySUMP describes facts related to and the preconditions and potential for sustainable regional mobility, creating a mutual understanding of and foundation for joint planning in the region.

DESCRIPTION

The MalmöLund region consists of 11 municipalities that are working together to achieve the common vision of an economically, environmentally and socially sustainable region. The PolySUMP for the MalmöLund region elaborates what this means for mobility. It describes the mutual challenges, preconditions, facts and potential for transportation in the region. Some of the main challenges relate to climate goals, employment, land use and sustainable travel modes. The population prognosis for 2018-2027 states that the regional population will increase from 730,000 to 800,000 - this increase of almost 10% will pose a major test for the region.

Most cities in the region's 11 municipalities have a SUMP or equivalent document. To gain acceptance for an overarching PolySUMP, the joint potential for improving sustainable mobility was chosen as the starting point and focus of the report. The potential travel shift from cars to bikes and public transport has been mapped. The maps make for a powerful and simple communication tool. The report also compares planning documents across the municipalities. In conjunction with different scenarios for future travel development, it provides guidance for regional development. To monitor associated health impacts, the scenarios have been assessed using the Health Economic Assessment Tool produced by the WHO.

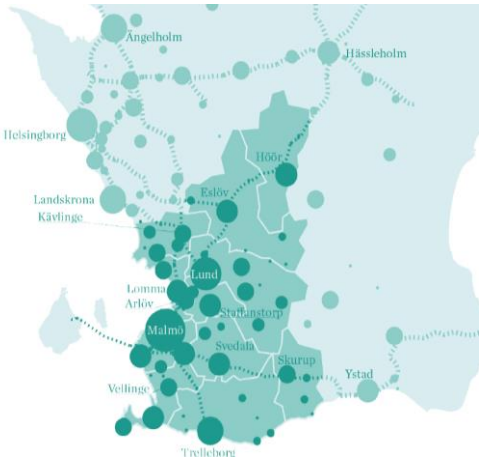

Figure 1: Regional map of nodes and cities with over 500 inhabitants (figure provided by the City of Malmö)

Although the PolySUMP has not yet been politically adopted, it provides facts and data that help the region to plan proactively and outlines areas where cooperation is needed. It list a number of priority areas, including:

- Making a good public transport system the basis of regional development;
- Strengthen the region as a bicycle region;
- Engaging in joint Mobility Management efforts;
- Starting working with leisure travel in the region to a greater extent; and,
- Implementing goal-oriented planning for regional infrastructure.

These five areas are addressed in upcoming planning processes and will be evaluated along the way. This process is not finished, and will therefore be evaluated periodically.

IMPACTS AND EXPECTED RESULTS

The PolySUMP's biggest impact was finding a mutual understanding of local needs and regional potential. In this way, the report lays a solid foundation for joint planning in the region and gives it a stronger and unified voice when applying for national funding. It also enhances administrative cooperation, planning involving public transport providers, and residential planning across the region, whilst making it easier to pinpoint regional needs and flaws.

A disadvantage of regional planning is the time it takes to reach political agreement(s). This remains an issue after the plan's introduction, although the PolySUMP should speed up the process over time. Finally, by using the PolySUMP as a common planning tool, the region has a good chance of reaching its modal split goals.

LESSONS LEARNED

Getting all municipalities involved in the process was challenging. Letting the biggest city in the region (Malmö) be in charge of preparing the PolySUMP proved successful. This made it easier to involve smaller municipalities as they did not have to put as much effort into preparing the plan, but could still be active project partners (insofar as they wanted and were able to).

Another challenge is achieving political adoption, as the political landscape varies across municipalities. In MalmöLund, this was overcome by having the report point out preconditions and potential and indicate different scenarios, rather than setting a fixed goal for which it would have been hard to gain common buy-in.

Making political adoption a secondary objective can thus aid the plan and process, as their success is not dependent on and defined by municipalities politically endorsing it.

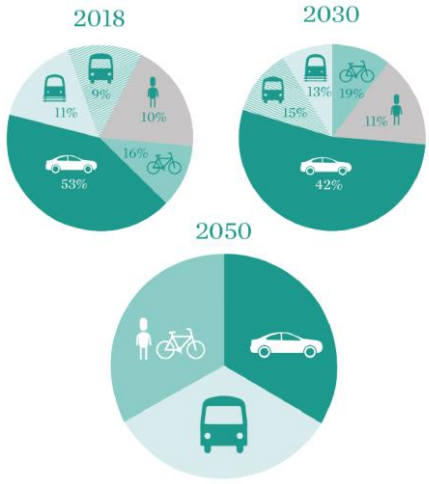

Figure 2: Regional goals for modal split (figure provided by the City of Malmö)

COSTS AND KNOW-HOW REQUIRED

Staff working on the PolySUMP invested 800 hours in completing the plan, with traffic planners, data management experts, and regional planners involved. Each municipality participated to the extent that it felt able to do so. Two workshops were held to mobilise partners and find the key questions for each municipality.

The PolySUMP document outlines the framework for the region's future sustainable transport model. When implementing it, the allocation of resources and identification of expertise will be vital. This is the next step in the planning process in order to make the most of the significant potential identified in the region.

The work and cooperation leading up to the end result is worth as much as the actual finished document. The PolySUMP led to **reasonable and constructive discussions** in the region regarding sustainable mobility. Indeed, the different scenarios are a good foundation for continued discussion and will be considered in future local SUMPs.

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Traffic forecast model – Malmö's SUMP

Malmö

Good Practice Factsheet

Source: Malmö SUMP - *overview of infrastructural and physical measures influencing the traffic system*, March 2016,

Traffic forecast model for Malmö's SUMP

City	**Malmö**
Population size	330,000
SUMP experience	Intermediate/advanced city
What is the good practice?	Pushing the boundaries of modelling with goal-oriented traffic forecasting to ensure that infrastructure projects are in line with SUMP goals

SUMMARY

Malmö's traffic forecast model is based on the Swedish national forecast model. The model uses the modal split goals found in Malmö's Sustainable Urban Mobility Plan (SUMP) to predict future traffic distribution. This helps in strategic planning and allows decision makers to check if large infrastructure projects are in line with the SUMP. This modelling innovation is based on four main pillars:

- A traffic forecast grounded in the desired SUMP scenario for Malmö (goal-oriented modelling);
- A model showing traffic distribution across the road network;
- The increases and decreases in flows depending on future development areas in the city; and,
- Bicycle flows and car flows being modelled separately.

DESCRIPTION

In recent years, the City of Malmö has used this innovative traffic model to forecast passenger and traffic flows. The flows of cars and bicycles are mapped in separate models. The models are based on the Swedish Transport Administration's forecast model *Sampers*, with various adjustments made to better match Malmö's needs regarding modelling of travellers and road traffic. The computer model forecasts how to reach the ambitious goal(s) set in Malmö's SUMP and how this will affect traffic distribution in Malmö.

The traffic forecast is based on Malmö's SUMP scenario, with the forecast in the Swedish National model made according to the goals set in Malmö's SUMP. The SUMP sets out modal split goals for the city, which is also broken down into 15 specific goals for different parts of the city. These parts feed place-specific data into the model.

Normally, a traffic model is used to predict the traffic in the city given a certain growth. This model works the other way round, instead focusing on what is needed to reach the goals in the SUMP for the year 2040.

The model is used in strategic planning connected to larger infrastructural projects.

It has been developed in two stages. Firstly, a working model was developed based on SUMP goals.

Then it was refined and reprogrammed to better reflect known preconditions and changes in the infrastructure.

Figure 1: The difference between SUMP goals in 2040 and today at the 24-hour level from the new model. Red = increase in traffic, green = decrease in traffic (graphic provided by the City of Malmö).

IMPACTS AND EXPECTED RESULTS

The model has been used as a support mechanism for checking if projects and investments are in line with Malmö's SUMP. Mainly, it is utilised to analyse large-scale projects and gather knowledge for ascertaining strategic priorities.

It also shows decision makers what is needed to reach SUMP's goals. If Malmö reaches the modal split goals set out in its SUMP, it will go a long way to helping the city achieve its economic, environmental and social sustainability targets.

LESSONS LEARNED

It is important to have expert in-house staff to work with and update the model. Major or several minor changes of plan can affect the model and make it obsolete unless it is updated regularly.

A barrier is that surrounding municipalities do not have a model of their own and rely on figures provided by the national model. Planning according to the national level results in a higher number of trips made by cars since that model increases the number of car trips with population growth. This conflicts with the SUMP goals of a sustainable, reduced amount of car trips.

Noise pollution is also an aspect that needs to be considered when the plan is developed for specific levels of traffic. Precautions might need to be taken precautions in case wrong decisions result in a higher amount of traffic and hence higher amount of noise pollution.

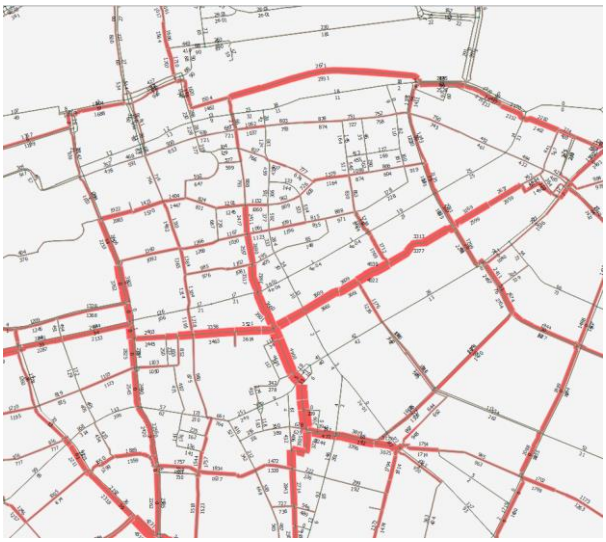

Figure 2: An example of the output from the bicycle model that shows today's cycle flows based on today's cycling network. The bandwidth is proportional to the traffic flow (graphic provided

COSTS AND KNOW-HOW REQUIRED

Work related to the model comprised two phases. Creating the initial model required approximately 200 hours and its subsequent refinement around 100 hours.

Producing a new SUMP forecast was initiated by the need for a **goal-driven forecast** that would show what effect implementing the SUMP would have on traffic flows. This forecast clarifies the SUMP and increase the level of detail at the same time. In addition, the process gave insights into how a goal-driven forecast can/cannot be handled by models that are designed for more traditional methods.

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European Platform
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Mobility Plans

Active citizen participation platform

Sofia

Good Practice Factsheet

Active citizen participation platform

City	**Sofia**
Population size	1.32 million
SUMP experience	Starter/ intermediate city
What is the good practice?	Creating the first interactive citizen participation platform in Sofia for use in the SUMP development process.

SUMMARY

A dedicated website called Sofia Mobility - www.sofiamobility.bg/en - has been developed. It provides citizens with information on the purpose of the city's SUMP and the progress of its development, whilst allowing them to submit opinions, suggestions and proposals. An interactive map of the city enables citizens to locate their submitted proposals. This measure aims to maximise citizen participation in SUMP development and to feed the SUMP process with constructive proposals.

DESCRIPTION

The Sofia Mobility website offers citizens (users) different functionalities, information about SUMP development, and the opportunity to put forward specific proposals using an interactive map of Sofia Municipality. The main goals are to bring the SUMP to the widest audience possible and enable citizens to participate in the SUMP process of Sofia Municipality.

The interactive website presents the main steps for citizens to submit SUMP-related project proposals. These are submitted in specific categories, which users select by means of a drop-down menu. Using the interactive map, citizens can then mark where in the city they would like their initiative to be realised.

The ultimate goal is to develop a sustainable and effective SUMP that puts into practice a durable model of public participation in which citizens, non-governmental organisations and other relevant actors are involved from the beginning of the planning process.

Setting up and maintaining the website included:

- Regularly posting news about the progress of SUMP development;
- Publishing information about stakeholder meetings and results;
- Announcing future public discussions; and,
- Setting up an interactive map of the city that allows citizens to propose and locate different ideas related to the mobility measures in the plan.

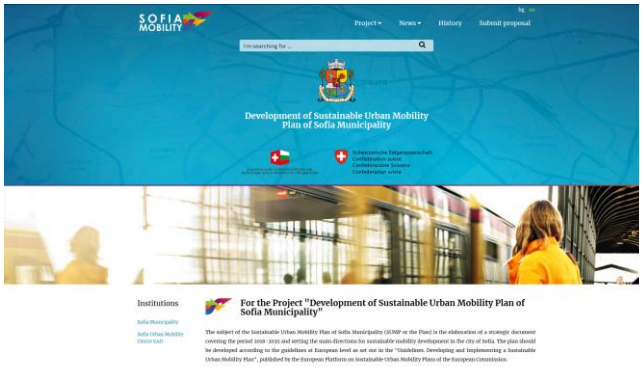

Figure 1: Landing page of the Sofia Mobility website (www.sofiamobility.bg/en/)

Once registered on the online platform, users can submit their suggestions for projects or activities in one or several categories and locate them on the city map (linked to Google Maps). The categories listed include classic mobility topics like public transport, parking, cycling and pedestrian infrastructure, and the road network, alongside newer ones such as intelligent transport systems, park and ride, and electric vehicles.

Sofia Municipality and Sofia Urban Mobility Centre are promoting the platform through their communication channels, as well as at public events like those of the EUROPEANMOBILITYWEEK campaign. This platform offers a far more transparent and accessible way for citizens to participate in the urban mobility planning process.

IMPACTS AND EXPECTED RESULTS

Through the implementation of this measure, Sofia Municipality ensured:

- broad citizen participation in the SUMP development and adoption processes, with over 60 proposals received in total from citizens;
- openness in the SUMP preparation process;
- dissemination of up-to-date information to a wide range of citizens and partners;
- improved understanding of sustainable mobility among different stakeholders; and
- the possibility for constant updates.

LESSONS LEARNED

The **majority of the proposals received so far are at micro (neighbourhood) level** and concern topics such as the signal cycles of particular traffic lights, issues with public transport timetables and stops, road network problems, and poor infrastructure. Very few proposals and comments have been made concerning policy-related issues and SUMP goals.

Although the comments regarding specific problems do not relate to the "visionary" part of a SUMP, they do show commitment and **demonstrate citizen engagement**. In order to separate these 'off-topic' responses, a filter could be integrated that offers further options, e.g. report a problem and make a suggestion.

A separate map could also be created that is dedicated to recording problems. Thus, comments regarding current, specific (localised) issues with Sofia's transport network will not interfere with more general and strategic proposals.

Figure 2: Poster description of the innovation by Sofia

COSTS AND KNOW-HOW REQUIRED

The website was developed by an external expert and required approximately 160 working hours to be built. Additional costs are planned for future activities, such as creating a version of the website for mobile devices, indexing it in search engine results like Google, Yahoo or Bing, and for maintenance.

The definition of SUMP objectives and measures is a complex and long-term process which often takes place in a dynamic environment. If done well, actively involving a wide range of stakeholders, non-governmental organisations and citizens helps to achieve decisions that have a broad consensus. A website for public information and participation, such as the Sofia Mobility website, can form an important element of a successful engagement process. However, it should be combined with public discussions, focus groups, meetings with various stakeholders, information campaigns and public debates.

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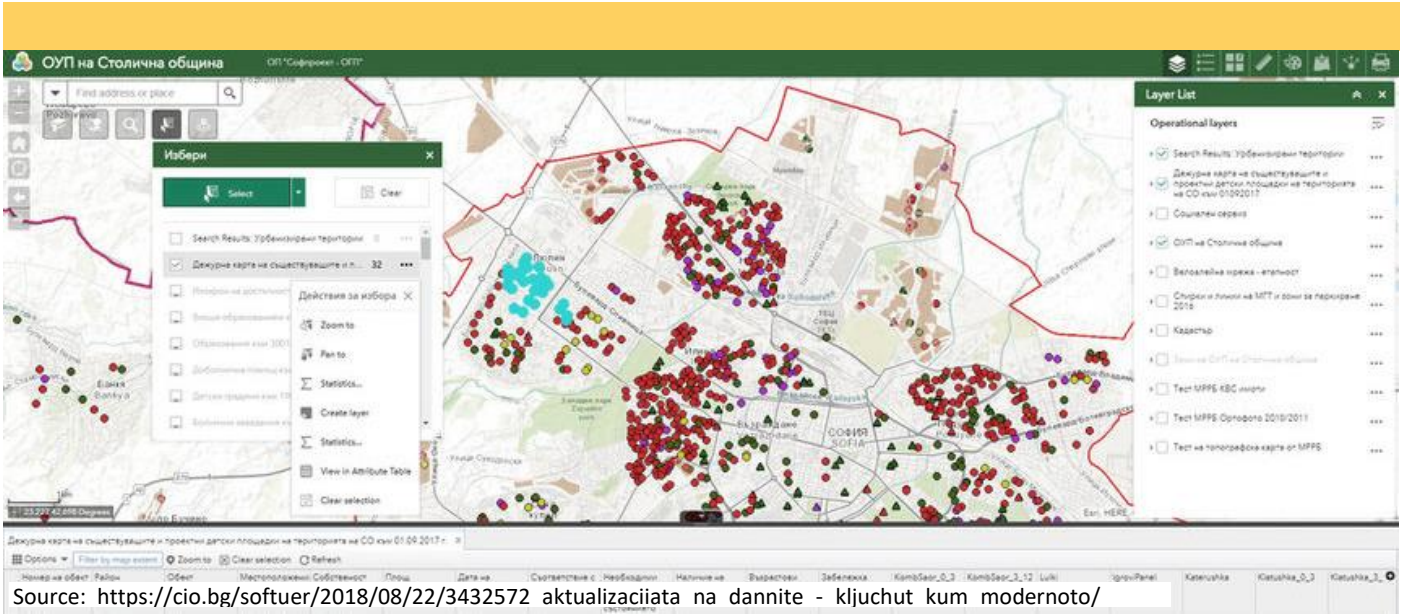
Data collection and exchange platform

Sofia

Good Practice Factsheet



Source: https://cio.bg/softuer/2018/08/22/3432572 aktualizaciiata na dannite - kljuchut kum modernoto/

Data collection and exchange platform

City	**Sofia**
Population size	1.32 million
SUMP experience	Starter/ intermediate city
What is the good practice?	Using an integrated online internal platform for data collection within the SUMP development

SUMMARY

Sofia has applied a new methodology for collecting mobility-related data and created a database that supports the development of medium and long-term (mobility) strategies in the city. A lack of timely, comprehensive and relevant data can become a challenge for mobility planning, in particular the monitoring and assessment of SUMP measures. Sofia's measure establishes and applies a systematic data collection approach that remedies this and facilitates the development of a comprehensive transport model including all transport networks, modes and modelling demand.

The new internal online data collection and exchange platform being created enables interaction between the relevant planning and operational bodies within the municipality, including professionals in the fields of mobility, urban planningenvironmental protection, and architecture. By summarising all existing data, the platform will create an efficient mechanism for interaction and exchange between the different planning teams. Regular inter-team meetings are used to draw conclusions on ongoing work and advise on further research needs.

DESCRIPTION

Collecting data for mobility planning can be challenging. With input gathered from a variety of sources, there are numerous issues concerning the availability and integrity of data. Sofia's data collection platform aims at creating a new approach based on multi-stakeholder cooperation.

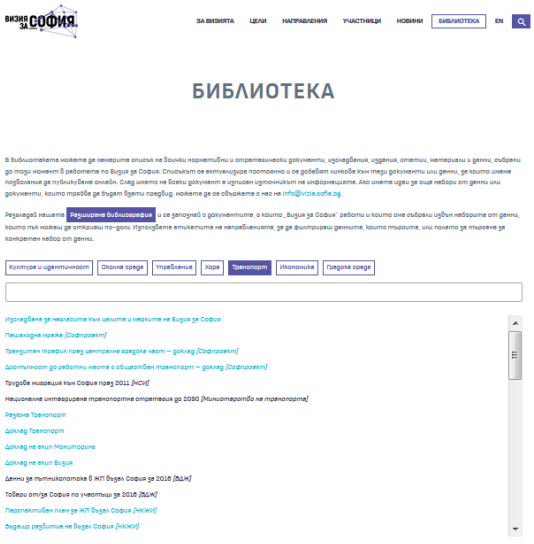


Figure 1: Screenshot showing different types of data collected from stakeholders (photo provided by the City of Sofia)

Previously, urban development and mobility planning processes involved only the expertise of the departments strictly responsible for the respective sector. Yet the new understanding of such planning processes is that they should instead be cross-sectoral. Over the past couple of years, several strategic plans have under development in parallel in Sofia, namely the amendment of the General Master Plan, the strategy "Vision Sofia 2050", the Sustainable Urban Mobility Plan 2035, the Programme for Sofia – Green Capital, the programme for air quality management, and more.

As most of the teams involved in these were collecting similar and inter-related data, the decision was made to unite the data collection process and create a "data pool" (or "data lake") in order to facilitate the collection and exchange of information and ensure coherence between the different plans.

The first step was to identify the related strategic plans under development and determine how they linked to each other. Next, the teams responsible for the particular plans and programmes started to meet. This gave them the opportunity to update each other on their progress, exchange on data collection activities, and present their planned next steps.

By sharing their experiences, they could also identify methods to collect missing data and avoid duplicating in collecting the same data.

As a temporary step, an internal online platform (a Google-based cloud structure) was created to share the available information - this process is still ongoing. The idea is to store files with information that is of use for all planning teams. These files were then divided into different thematic subfolders - an expert was assigned responsibility for each of these and its coordination with other teams. The basic data tables were supplemented with a file for remarks, data confidentiality requirements (where applicable), and information on data ownership and conditions of use.

IMPACTS AND EXPECTED RESULTS

The most valuable results of this measure were the acceleration of the data collection and planning processes and avoiding the duplication of work among different planning teams. Repeated enquiries to the same data source were eliminated - such repetitions had sometimes caused sources to be unwilling or even refuse to provide the requested information. The costs associated with data collection are also expected to fall.

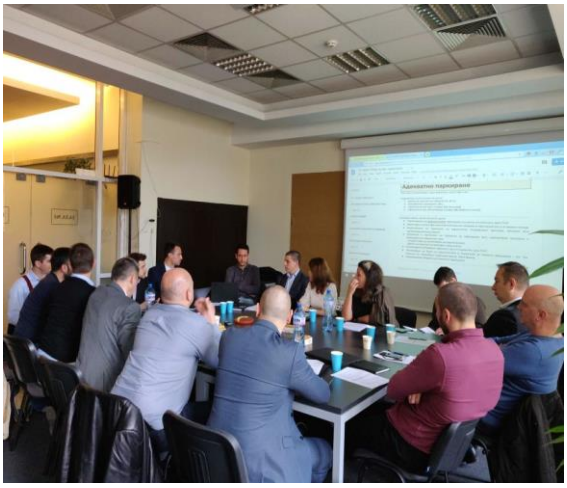


Figure 2: Photo showing a regular meeting between different planning teams exhanging updates in the data collection process (photo provided by the City of Sofia)

LESSONS LEARNED

Databases, even when using readily available services such as Google, are not simple. All teams were aware that no immediate results could be achieved, but the new approach was expected to work when no other ways of coordination and sharing could deliver the necessary results on time.

COSTS AND KNOW-HOW REQUIRED

This measure is expected to achieve synergies that reduce the overall costs and time required for the completion of all teams' tasks. The initial cloud structure for the platform required 15 GB of storage space.
The amount of time required for developing the data exchange platform has varied depending on the step:

- Approximately one month was required to set up and structure the platform and identify the most relevant existing data to be uploaded.
- The uploading of data is a gradual, ongoing process that first started two-and-a-half years ago. New data is being added regularly.

Regardless of the type of data needed and how it is collected, an online data exchange platform can only be successful if the relevant stakeholders understand the limitations of both data complexity and of the gathering and processing methodology. At the same time, it is a much faster way of creating and maintaining the necessary database needed for a mobility strategy than alternatives.

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Innovative ways of funding SUMP measures through private entrepreneurship

Thessaloniki

Good practice factsheet

Source: https://openlivinglabdays.com/2019/07/29/local-visit-okthess/

Innovative ways of funding SUMP measures through private entrepreneurship

City	**Thessaloniki**
Population size	1,1 million
SUMP experience	Intermediate/advanced city
What is the good practice?	New ways of funding mobility-related measures by incorporating and encouraging private entrepreneurship

SUMMARY

Hoping to tackle the limited availability of funds, new and innovative ways of funding are needed in order to realise mobility-related measures and projects. Incorporating private entrepreneurship into the funding process will allow for more opportunities and will add a pioneer spirit and willingness to experiment, which are sometimes lacking from the public realm. As part of an effort to facilitate the organisation of such a process, the Transport Authority of Thessaloniki (TheTA), in cooperation with other stakeholders, hosted a "Weekend of Innovation on Urban Transport". The start-up weekend was organised in a way so that participating teams were provided with the appropriate space, tools, and mentoring to develop their ideas. The ideas that excelled were promoted and supported by the organisers and sponsors of the event in order to further develop the ideas and help them to enter the market.

DESCRIPTION

Mobility practitioners from TheTA and the CIVITAS SUMPs-Up consortium organised, in collaboration with other stakeholders, a "start-up" weekend dedicated to innovation in the urban transport environment. Young practitioners coming from different scientific backgrounds (e.g., mobility practitioners, computer scientists, etc.) were invited to participate. In addition to TheTa, the other co-organizers of the event were:

- OKThess, which is Thessaloniki's leading start-up hub as well as a pre-incubator that offers all types of support to new innovative entrepreneurs. OKThess further provided mentors, shared know-how relating to event organisation, offered its premises, and helped to promote the "start-up" weekend;
- Link Technologies S.A., which is a leading telematics company in Greece that provides fleet management software for the two major bus operators in Thessaloniki and Athens. Link Technologies S.A. sponsored the prizes and provided mentors for the purposes of the start-up weekend.

As mentioned above, OKThess premises where used to host the event. The goal was to attract 40 to 60 participants, who would come as individuals and then formulate teams during the weekend. However, teams that were already established were welcomed to participate and compete as well.

The format of the event was as follows:

Friday afternoon: 1st day of the event	Registration, welcome addresses and inspiration pitch, one-minute introduction from each participant, expert presentations on the themes of urban transport, mobility, and innovation, discussion, formulation of teams, light lunch, end of the day;
Saturday: 2nd day of the event	Idea and project formulation and planning, appointment of and discussion with mentors, lunch, project realization, light dinner, end of the day;
Sunday: 3rd day of the event	Continuation with project realization, project refinement through discussion with mentors, lunch, preparation of presentations, presentation of the projects to the jury (comprised of one representative from TheTA, OKThess, and Link Technologies S.A.), announcement of the results, award ceremony, end of the event.

The event was planned for the weekend of 28-30 September 2018. The choice of date is critical for the success of the event. An effort was made to select a date that would not overlap with university exams, major social events, competing events, or public holidays. There was a 900 Euro prize that was awarded to the winning team, and two 300 Euro prizes that were awarded to the teams that placed in second and third place.

Additionally, participants had the chance to present their ideas and projects to potential financiers, and had the opportunity to find a workspace as well as to receive business development mentoring by becoming a team that was supported by OKThess.

On the event's website, nine thematic areas of interest (along with their short descriptions) were defined. The nine thematic areas were Smart Signs, Smart Parking, Smart Traffic Management, Smart Mobility, Virtual Loading Bays, ITS, Interchanges, Charging, Social Enterprises. The thematic areas were indicative and non-restrictive and aimed to function as stimuli for the participants.

The media methods and channels that were used to promote the event consisted of traditional methods and channels (press releases, radio, flyers distributed at universities, etc.), an online webpage on the OkThess website, and social media (Facebook), etc.

However, due to poor communication, parallel events that were only announced later, and warm weather, only 6 participants joined the start-up weekend event. This meant that more mentors attended than actual participants. Prizes were adjusted accordingly, but the rest of the event continued as scheduled. Two teams formed and two project ideas were subsequently developed:

Team A (4 participants, formed during the event) came up with "Datalytics". The project aim was to provide personalised adverts inside public transport vehicles, according to passenger profiles derived from data on travel patterns that was collected by the operator.

Team B (2 participants, had already formed a team before the event) came up with "Electrio". The project aim was to develop an algorithm to automatically choose the optimal locations for charging stations, based on certain indicators (such as population density, number of electric vehicles, land use, etc.).

During the event, the team produced an actual test run, based predominantly on demographic data, for the Thessaloniki city-centre.

The jury decided, by a majority vote, that Team B was the winner. During the months following the event, the two team members continued to further develop their idea and an energy provider and a telecommunications company expressed their interest to fund "Electrio".

IMPACTS AND EXPECTED RESULTS

The idea behind the start-up weekend was to explore the potential to encourage innovative and out-of-the-box thinking in a specific field (in this case, urban transport) through a structured event while simultaneously also allowing for opportunities for teams to connect with potential investors.

Although participation was lower than expected, the outcome of the event is considered successful. With very limited resources and a very short timeframe, considerable results were produced.

One can only imagine what more could be achieved with greater support and resources.

On the other hand, it is important to mention that such initiatives, by default, include a great degree of uncertainty with regards to their success. It would be an oversimplified conclusion to state that more participants would mean more ideas that are worth maturing. However, the cost-benefit ratio of the start-up weekend example in Thessaloniki has proven that the idea of "innovative ways of funding SUMP measures through private entrepreneurship" is worth exploring further in order to produce more solid evidence about its worth.

Figure 1: Photo taken from the event

LESSONS LEARNED

The key lessons learned were:

- Ensuring sufficient participation is a challenge but also key for success;
- If the event focuses on sustainable mobility, then this needs to be reflected in the event's setup and communicated to participants;
- Traditional promotional methods are not fully suitable;
- Potential participants must be found through targeted actions, such as by disseminating leaflets at specific university faculties and departments;
- The reputations of event organisers and sponsors are key for success;
- The selection of a date for an event is critical and must be carefully chosen to avoid overlaps with other significant events; and
- More effort is needed to attract the attention of industry.

Overall, the start-up weekend was a successful event, at which promising ideas were further developed.

COSTS AND KNOW-HOW REQUIRED

The organisation of the start-up weekend was quite a straightforward procedure and one that capitalised on existing skills and know-how. The innovative part was namely how all of the different skills and know-how of the different co-organisers were combined to organise a single event.

In terms of actual costs, as a result of the cooperation with other co-organisers, only a couple of hundred Euros were needed to organise the start-up weekend. Even without other co-organisers, the total cost of organising such an event would be a couple of thousand Euros (for the venue, publicity, travel expenses of the mentors, catering, etc.).

The required staff hours constited the most expensive element as two to six person months were needed (based on the number of co-organizers) to organise the event. However, if such an event was organised on a regular basis, it is likely that fewer staff hours will be required for these purposes.

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Innovative ways of measuring the development, implementation, progress and impact of SUMPs

Thessaloniki

Good Practice Factsheet

Source: freepik.com

Innovative ways of measuring the development, implementation, progress and impact of SUMPs

City	**Thessaloniki**
Population size	1,1 million
SUMP experience	Intermediate/advanced city
What is the good practice?	A new way for Greek municipalities to perform surveys as well as gather and exchange data and ideas

SUMMARY

Greek Municipalities have recently developed or are in the process of developing their first generation of SUMPs. The challenge they face is finding innovative, qualitative, and unchallenging ways of measuring the development, implementation, progress, and impact of SUMP measures with the limited resources they have in terms of available personnel, equipment, and funding. The question that arises is namely what types of methods, tools, and key performance indicators are available that match the above requirements? The initial idea in Thessaloniki was to create a dynamic online platform that hosts surveys regarding user satisfaction with measures, provides services, and offers a virtual meeting point where the exchange of data, ideas, and good practices could be engaged and facilitated.

DESCRIPTION

As part of Thessaloniki's first metropolitan SUMP, which is also the first SUMP that was developed in Greece, the Transport Authority of Thessaloniki (TheTA) established an informal "SUMP Assembly" two years after the formal adoption of the SUMP. Within the SUMP Assembly is all of the findings regarding the progress, monitoring, and implementation of the SUMP and its measures were presented and debated among the various stakeholders. It was during that time that the idea was proposed to create a platform that would act as both a source for data as well as a place where ideas and good practices could be exchanged.

TheTA, through its involvement in the CIVITAS SUMPs-Up project, proceeded with its plan to create the exchange platform and contacted an important research organisation in the sustainable urban transport sector with whom it frequently collaborates. While discussing about various mobility-related issues, it was revealed that one of the institutes within the research organisation had already created an online Open Data Exchange platform onto which stakeholders could upload data sets and thereby make them available for other stakeholders to download.

TheTA initiated discussions with the organisation in order to modify the existing platform in a way that would fulfil the aims that were envisaged in TheTA's initial concept. In the meanwhile, a central government initiative focusing on open data exchange was launched. As a result of this, interest in TheTA's initiative faded and cooperation with the research organisation ended. However, the central government's platform does not meet Theta's vision of a platform through which methodologies, data, and knowledge focused on sustainable urban mobility would be exchanged.

The lifetime of the CIVITAS SUMPs-Up project did not allow TheTA's concept to mature, especially when considering that getting the different stakeholders to cooperate and the development of a supporting framework proved to be a lengthy process.

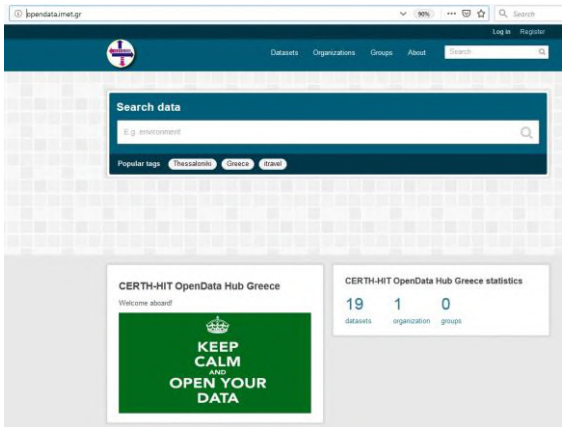

Figure 1: Screenshot of CERTH's open data platform

IMPACTS AND EXPECTED RESULTS

The impacts and expected results cannot be presented as the platform was not launched. The other initiative lacked the necessary promotion and it hence cannot be assessed. In addition, the initiative does not include certain elements that would attract more interest from the local authorities' point of view.

LESSONS LEARNED

A greater degree of coordination and transparency is needed when developing innovative initiatives. This is also a lesson in terms of risk prevention. Cooperation among different stakeholders sometimes takes time to mature, but a rushed planning process increases the risk of failure for initiatives that depend on such cooperation. As huge data sets are collected and vast databases created, the need for fast, reliable, responsible, and adequate data administration and exchange becomes apparent. Key questions that arose when thinking about the development of a platform were:

- What kind of platform would optimise the measurement of SUMP implementation?
- Is it better to have many local GIS-based platforms from every local authority, which often tend to vary in terms of interface, available services, data availability, etc.?
- Is it better to have a nationwide platform that might lack the necessary degree of detail?
- Finally, is it better to have nationwide guidance that specifies the characteristics that the GIS platforms of the local authorities should meet?

COSTS AND KNOW-HOW REQUIRED

The cost of developing a basic electronic platform is quite modest. The platform was developed in-house and required only 2-3 person months. However, the cost of maintenance should also be included, especially as more modules and capabilities are added to the platform and as the platform becomes more complicated and expensive.

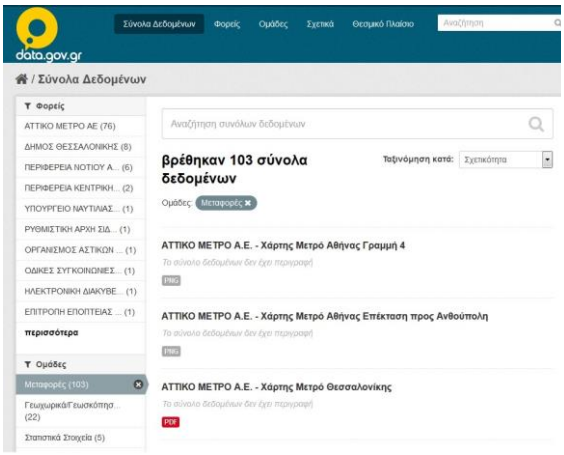

Figure 2: Example of the national open data share point

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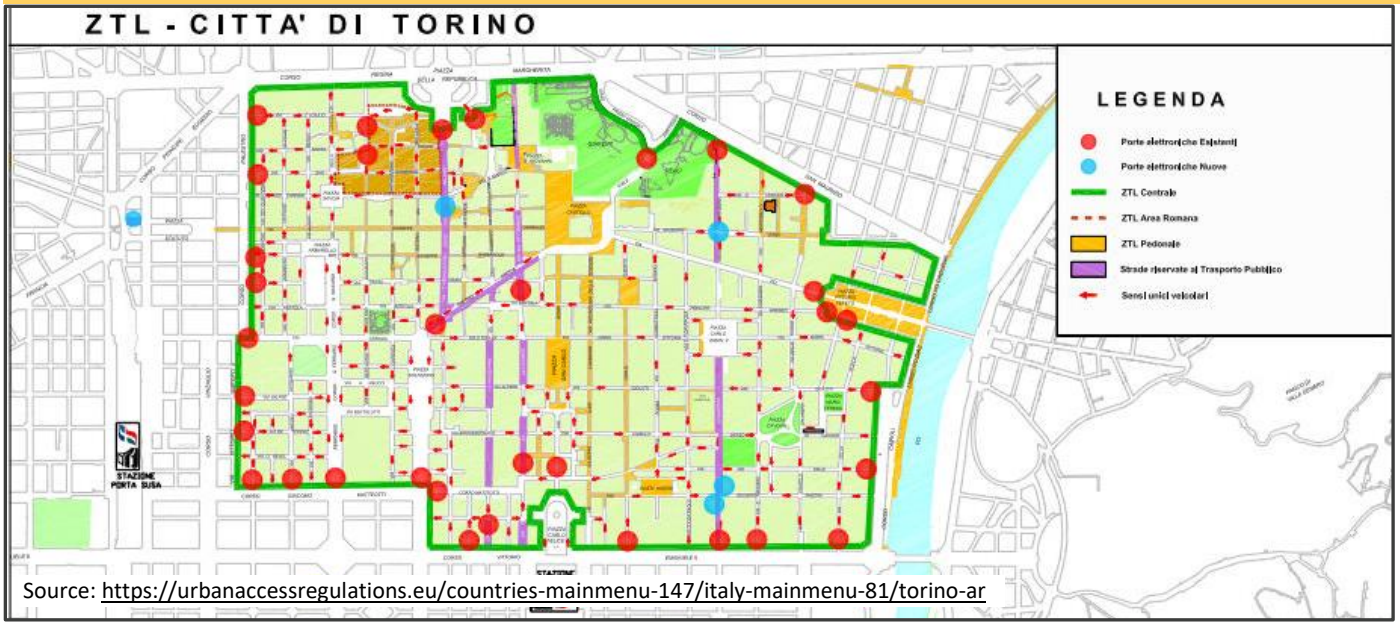
European Platform on Sustainable Urban Mobility Plans

Urban Freight Logistic measure implementation

Turin

Good practice factsheet



Source: https://urbanaccessregulations.eu/countries-mainmenu-147/italy-mainmenu-81/torino-ar

Urban Freight Logistic measure implementation

City	**Turin**
Population size	900 000
SUMP experience	Intermediate/advanced city
What is the good practice?	A new way to use the infrastructure (reserved bus lanes) as a mean to reduce congestion for all categories of road users without affecting the public transport system negatively.

SUMMARY

Turin's Urban Freight Logistic (UFL) measures aim to analyse and model a more efficient and eco-friendly mobility paradigm for freight transport by using new mobility pricing schemes and discount policies, restricted zones to control access, as well as integrating different transport modes. For this purpose, a flexible use of public infrastructures incorporating Information Technology Systems (ITS) and recognition schemes are integrated into the new regulatory framework. Since 2012, the mobility offices of the city have been engaged in developing a plan for last-mile delivery inside the Limited Traffic Zone (LTZ) by following the guidelines set by Turin's SUMP. The City of Turin has been developing and implementing interdependent UFL policy measures since 2014 in order to achieve the 2030 EU Objectives.

DESCRIPTION

In order to achieve the 2030 EU Objectives, the City of Turin has designed and has had in place, since June 2016, a *Pull Measure* that is dedicated to incentivising the replacement of highly polluting vehicles. Action Pilots were implemented to provide a *new permission scheme* to identify logistic operators who are available and ready to replace their vehicles with new Zero-Emission Vehicles (such as natural gas, electric, or hybrid vehicles) that are equipped with ITS equipment.

In order to compensate for the replacement of highly-polluting vehicles, a mix of incentives has been included within the permission scheme: (i) Free access to the LTZ (no restrictions for two years); (ii) A dedicated and reserved network of parking lots within the LTZ; and (iii) Multi-users Lanes, which are shared with public transport.

In particular, the City of Turin implemented the Multi-users Lanes concept, which involves the effective access management of recognised freight vehicles in public transport bus lanes while, at the same time, maintaining an acceptable level of service for the whole public transport system. The main goal of these activities is to reduce emissions for freight traffic. Multi-users Lanes can be considered a pull measure that is aimed at managing access to reserved bus lanes, including freight transport. This measure represents an added-value for freight mobility services, as it enables logistics operators - specific recognised commercial vehicles (mostly light commercial fewer polluting vehicles) - to have access to reserved bus lanes without affecting the public transport system and as it helps to reduce congestion for all categories of road users.

These lanes have been selected among the ones connecting urban and peripheral urban areas of Turin with restricted areas (e.g., LTZ, pedestrian areas, etc.) and which are useful for freight delivery services by allowing for goods drop-off and pick-up locations to be reached in a more convenient, safer, faster, and cheaper way compared to what is possible when using the common road transport network (characterised by significant traffic patterns and congestion caused by conflicts between passengers and freight transport).

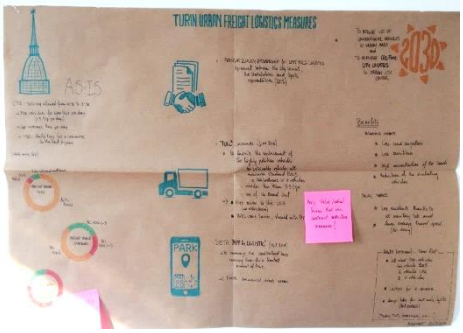


Figure 1: Image from workshop on Urban Freight Logistics in Turin

The identification of reserved lanes has been led as a joint effort involving the key actors that signed the Freight Quality Partnership (FQP), namely freight transport operators and the Italian Ministry of Transport.

The Multi-users Lanes measure has been implemented in a second Pilot and as part of which a total of 43 vehicles were been monitored during the observation period (January – September 2018). As of February 2019, these vehicles have been replaced by new eco-vehicles that are used by FedEx, UPS, TNT, Bartolini, DHL, as well as part of the fleets of vans that are used to deliver goods all around the city and in the central area of the LTZ, and that have received the NOVELOG permit. Thanks to the Pilot, it has been possible to analyse the collected data and to evaluate the measure dedicated to Multi-users Lanes that are shared with public transport.

Step 1: Data Collection	Data from Turin City Council, while 5T collects the traces of the vehicles that are part of the Pilot through the On-Board Units (OBU). Data has also been collected directly from the involved vehicle drivers, who have been asked to complete three questionnaires, with the aim of gathering information about their daily delivery journeys around the city, monitoring the use of the permit during the logistic operations, identifying critical issues as well as the preferred and more efficient reserved lanes, and to compile their qualitative evaluations of the policy
Step 2: Data elaboration and modelling	It has been possible to analyse the data collected on the ground. Proper calculations and studies allowed for the development of an environmental model that was implemented specifically for the Pilot in order to evaluate the effectiveness of such a measure.
Step 3. Evaluation	The analysis of the information collected through the surveys completed by the vehicle drivers has been strictly connected with the results obtained from the OBU dataset. Doing so has made it possible to associate as well as to validate the perception and opinion of the drivers with the observations that were derived from the available dataset. Such an approach could provide an added value for the implementation of the measures since it allows for the evaluation of their effectiveness both from a 'declared' and 'observed' point of view.

IMPACTS AND EXPECTED RESULTS

Thanks to Multi-users Lanes for freight transport measure, the City of Turin aims to:

- Encourage the renewal of the fleet of urban freight logistic operators.
- Reduce the traffic circulation and the delivery time of urban logistic vehicles, and thereby obtain an overall advantage in terms of daily operations, especially at peak times, by allowing operators to use traffic lanes reserved for public transport.

According to the logistic operators involved in the Pilot, there is a high level of satisfaction with the policy on the use of lanes reserved for local public transport. As a result of the policy, a number of strengths have been identified:

- Increase in the efficiency of urban logistics.
- Improvement of traffic conditions for urban logistic vehicles.
- Successful implementation: all operators make regular use of the permission reserved for them and consider the policy very useful for improving their daily operations.
- On the other hands, some weaknesses have also been identified: Risk of slowing down the local public transport service in the event of frequent or an increased use of lanes by transporters.

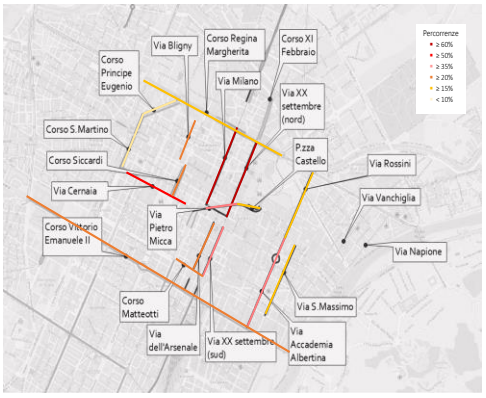


Figure 2: The frequency of use of reserved lanes in the central area, as reported by the surveyed vehicle drivers. Elaboration by Torino Wireless.

- Low possibility of extension and repeatability, due to loss of speed efficiency within the local public transport lanes.

In terms of impacts, the measure led to a reduction in emissions deriving from urban freight transport. With regards to the 43 vehicles that have been renewed, the CO2 savings per day is equal to (i) 33.6 kg of CO2, which corresponds to a 12% reduction in daily emissions compared to the previously used vehicles, and (ii) 281.2 grams of NOx. This corresponds to a **70% reduction in daily emissions**. Assuming a large-scale implementation involving up to 10% of the delivery vehicles fleet (equal to 250 vehicles), the resulting impact in terms of CO2 emission reduction would be 71 tons per year and 0.6 tons of NOx per year.

LESSONS LEARNED

The policy of access into the LTZ area and on the reserved lanes can be enlarged in the city, but the benefits that come from allowing faster access to vehicles during specific time slots and along reserved lanes reduces if the number of permitted vehicles increases. Considering other areas of application, the policy could be proposed in high-traffic urban contexts and during peak hours that could prevent vehicles from delivering packages in time.

Moreover, it is also applicable in areas where the number of vehicles delivering freight does not produce congestion and where the distribution of packages is spread out evenly throughout the day. If the territory under investigation consists of some areas with a different request of parcels (high request in some and less in others), it is advisable to implement policies more targeted to single routes and paths, with a careful analysis of peak times, in order to be able to agree with the operators on how to properly share city area resources.

COSTS AND KNOW-HOW REQUIRED

The City of Turin is a partner in several H2020 granted projects (NOVELOG , Solez, and SETA), thanks to which it has a dedicated budget to finance and support the implementation of some specific measures of its SUMP; other measures receive specific and dedicated resources from the City of Turin.

Within the CIVITAS SUMPs-Up project, Torino Wireless, as the technical partner of the City of Turin, is in charge of monitoring the activities and results of the overall UFL measures. More specifically, Torino Wireless is responsible for analysing, elaborating, collecting, and disseminating best practices, recommendations, and experiences as well as for facilitating the uptake and implementation of Sustainable Urban Mobility Plans.

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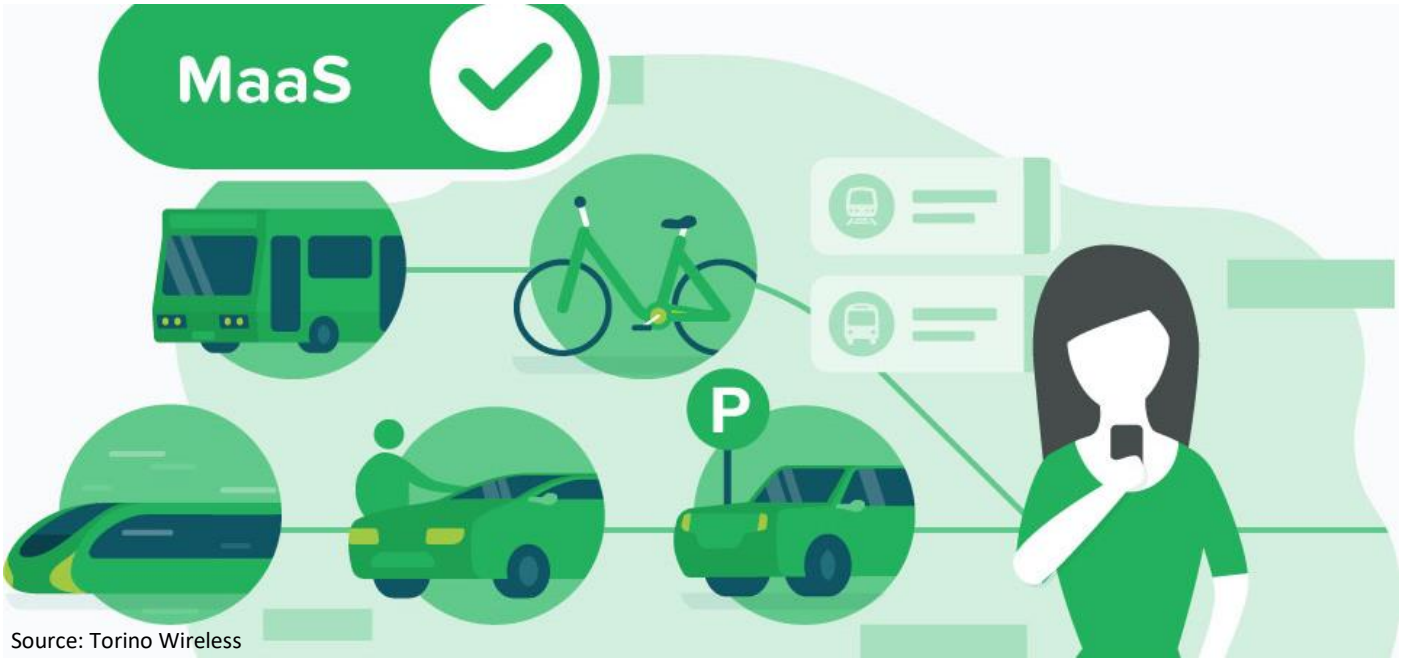
THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

European Platform on Sustainable Urban Mobility Plans

MaaS – Integrated access to city mobility services

Turin

Good practice factsheet



Source: Torino Wireless

MaaS – Integrated access to city mobility services

City	**Turin**
Population size	900 000
SUMP experience	Intermediate/advanced city
What is the good practice?	For the first time in Italy, the City of Turin has tried out an innovative MaaS measure in order to reduce use of private cars and to increase the use of sustainable modes of transportation.

SUMMARY

Mobility as a Service (MaaS) refers to the integration of various forms of transport services into a single, unified mobility service that is accessible on demand. Moreover, MaaS acts as a one-stop-shop when it comes to personal mobility by integrating planning and payment into one platform. With MaaS, the information as well as booking and payment process linked to different mobility offers are no longer confined to the systems of each individual transport mode. In this way, MaaS helps to better address customer transport needs. The advantage of MaaS is that it allows for a more accessible user-experience that will allow economic, sustainable and adaptable choices to different needs: a single application that allows citizens to choose optimal routes, purchase and validate tickets, unlock vehicles, check transactions and travel.

The right implementation of a MaaS leads to a large set of opportunities: reduction of car ownership and promotion of sustainable mobility choices, improved efficiency of existing transport services and public resources, collection of precious insights about citizens' transportation habits and preferences.

DESCRIPTION

The Department of Mobility of the Municipality of Turin supports the implementation of pilot activities and defines policies related to MaaS, developing also guidelines that regulate the entire MaaS implementation process. The City of Turin developed the overall design of the MaaS.

In order to develop the design, the city first carried out a preliminary self-assessment (the analysis of the MaaS Readiness Level is illustrated in Figure 1), shape its MaaS vision (based on the local scenario), identified value chain actors and potential problems, identified and engaged key stakeholders, and developed a customised design for the pilot action.

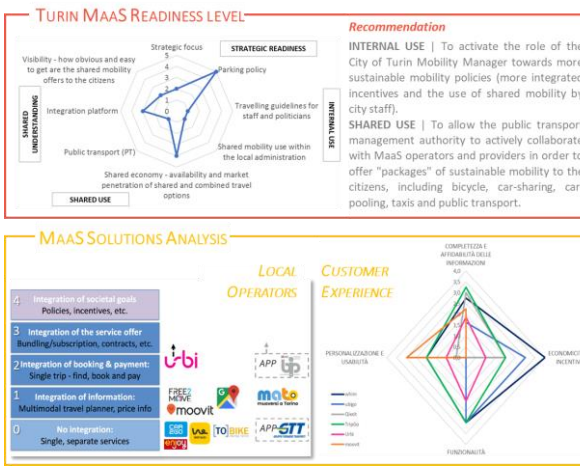


Figure 1: Image of the City of Turin's self-assessment and solutions analysis

A pilot experiment of the MaaS paradigm is currently in progress through the city's participation in three different European projects, namely IMOVE, SOLEZ, and SUMPs-Up.

The objective of the Municipality of Turin is to transform mobility into a service and through that to achieve its goal of obtaining economic and environmental benefits and of improving the city's air quality.

The pilot experiment, "Living Lab MaaS Torino", provides, thanks to a dedicated IT platform, the employees of several local companies with a MaaS mobile app, which is run by a private actor, namely Urbi. The experiment has involved a selected group of employees from General Motors, which has been selected through a public tender.

Employees have been invited by the Mobility Manager to participate in the trial on a voluntary basis.

During the trial period, participating employees have been able to use the app for consuming the services offered by GTT - Gruppo Trasporti Torinese (bus, tram, metro), ToBIKE (bike sharing), WETAXI (official service of the Turin Taxi Cooperative), and MIMOTO (scooter sharing service).

The application, in addition to route planning, booking, and payment, allows users to validate tickets when they are already in a vehicle, open the entrance gates to the subway, and even unlock bikes and electric scooters. Data about user interaction with the app, the mobility choices that are made, kilometres travelled, as well as the location and timing of departure/arrival are collected in aggregated and anonymous form for the purpose of monitoring and constantly improving the service.

To incentivise individuals to use the application, an awards system has been set up. As part of this system, monetary awards are distributed on a monthly basis to reward virtuous and frequent users of the app. The winners of the award are selected based on the distance travelled and the sustainability of the chosen transport means, which is calculated based on emission savings with respect to car-based trips. The points that are allocated among the users are equivalent to the number of trees required to absorb the CO2 that is ultimately produced by each trip.

IMPACTS AND EXPECTED RESULTS

The MaaS service aims not only to increase the mobility demand inside metropolitan areas by providing a higher quality mobility service but it also aims to support more eco-friendly transport modes. For measuring the impact, the following Key Performance Indicators will be used in long run: Private/public modal split; Quality of public transport services; Smart real-time multimodal application; Door to door mobility services; Shift to collective transportation (public/private pooling and sharing) and eco-friendly transport modes.

Outcomes achieved since the beginning of the MaaS experiment:

- The protocol agreement, "BIP4MaaS", to work in synergy together with the Piedmont Region was signed. This will help to save on resources and efforts in implementing and testing MaaS services;
- The public transport provider to design and develop the MaaS services, despite the provider's initial reluctance was engaged;
- The Living Lab, MaaS Torino was kicked-off, in March 2019. Since then, 30 General Motors employees have taken part in the initiative by registering a personal profile with the MaaS application. By July 2019, the number of users who had booked at least one travel was 5, corresponding to 16% of the group, and they travelled a total of 715 kilometres using different transport modes.

Positive results related to the Living Lab, MaaS Torino:

- The preferred mode of transport is the bike, which is the most eco-friendly alternative that is accessible through the app. A total of 72 bicycle rides have been carried out, corresponding to 58% of the total number of all trips. The bus, tram, and metro are in second place, with a total share of 34%. A comparatively low use of electric scooters (6%) and taxis (2%) is registered;
- A reduction in the polluting emissions has been achieved. By avoiding the use of private cars, the users of the app have generated a saving of about 72 kg in CO2 emissions. The reduction in emissions further contributes to an improvement in the air quality of the city.

LESSONS LEARNED

Turin faced several challenges during the development and implementation of the MaaS experiment, in particular:

- The members of the committee who were involved in the definition and execution of the project showed a general lack of advanced knowledge on the topics related to the experiment and the MaaS definition, the implementation process, as well as on the obtainable benefits;

- There was difficulty in engaging mobility operators who are well active in the urban territory and to integrate their different platforms with a consolidated group of users. The main concern of the operators is linked to the fear of losing visitors and potential customers on the applications by allowing the MaaS platform to act as an intermediary in the sale of mobility tickets (due to the direct competition on the same platform);
- The definition of clear and sustainable policies for incentivising a regular and prolonged use of MaaS app services and for stimulating interest around the initiative from potential adopters is critical for ensuring a long-lasting and stable continuation of the project;
- One of the critical success factors of the initiative is represented by the collection of data on the effective use of transport modes, which was generated by the app and which was provided by the individual mobility operators;
- An obstacle has been encountered in the capability of involving participants in the active use of the application Thus, the extractable and workable data is related to a minority of users, reducing the capacity of obtaining valuable information for analysis. One of the main causes for this situation has been identified in the wrong implementation of the incentive system based on the assignment of mobility vouchers to be re-spent on the app. Collecting the necessary financial resources was delayed and the appropriate start of the incentive measure was compromised. In order to extend the project to a larger group of people (not only to the one selected inside the GM company), a definition of clear and reliable funding sources should be carried out;
- Another challenge is related to the difficulty in establishing an efficient communication link with the actors involved in the experiment. The mobility manager of the company represented the contact point between the MaaS project partners and General Motors employees. He has highlighted the latencies problems in the messages exchange between the parties.

COSTS AND KNOW-HOW REQUIRED

The City of Turin is a partner in a number of Horizon 2020 projects (such as NOVELOG, SOLEZ, and SETA), thanks to which it has received a dedicated budget to finance and support the implementation of specific measures of its SUMP. Other measures have been financed from specific and dedicated resources from the City of Turin. The success of the pilot experiment, “Living Lab MaaS Torino”, is strictly linked to the city’s collaboration with two related Horizon 2020 projects, IMOVE and SOLEZ. The SUMPs-Up project has also supported in the overall Living Lab process, starting with the writing of the announcement for the selection of the organisation all the way to the development of the policies to be adopted to encourage the use of the services included in the app.

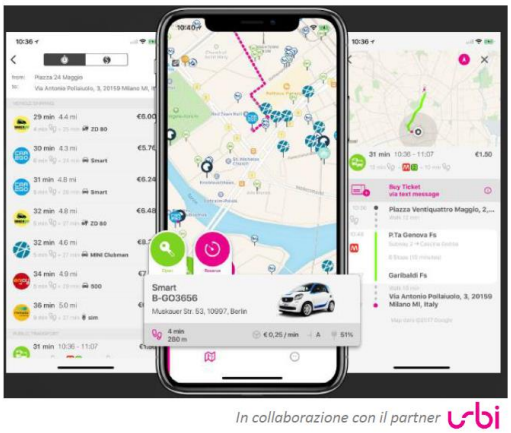


Figure 2: Example of user interface with mobility application started in collaboration with private actors, such as Urbi.

Furthermore, a multidisciplinary team has been created and specific roles have been assigned to support the City of Turin:

• **5T** facilitates the technical systems integration and manages the operation of the Living Lab;

• **Torino Wireless**, a foundation for the promotion and development of technological innovation in the region, addresses barriers to the adoption of MaaS, helps to ensure coordination among stakeholders, and the feasibility and operational implementation of the Living Lab.

• **Urbi**, a startup company that belongs to Telepass, owns the ICT platform and manages the MaaS as well as the user interface (web and / or mobile app), where the various transport modes are visible and the related price information available.

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