MORE
Multimodal Optimisation of Roadspace in Europe

D1.1

Incorporating user needs in the design of major urban TEN feeder route corridors

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Revision and history sheet

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Abbreviations

Abbreviation	Definition
C-ITS	Cooperative Intelligent Transport System
GHG	Greenhouse gas emissions
GLOSA	Green Light Optimal Speed Advisory
ITS	Intelligent Transport System
PO	Project Officer
T- TEN	Trans-European Transport Networks
WP	Work Package

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1 Executive Summary

MORE is a European funded project aiming to develop and implement procedures for the design of urban corridor roads and streets. MORE will test these procedures in five urban nodes of the Trans-European Transport Network (TEN-T). It will deliver tools to assist cities in their roadspace redesign process.

This deliverable presents collected data regarding the current user needs in urban areas. To collect this information, the first step was to design and disseminate a web-based survey. The second step was to organise an online workshop to gather experts' point of views representing different user groups.

The goal of the survey was to obtain data for analysing the needs of the various user groups on main roads and streets in the urban areas. The main focus of this survey was to identify and map the needs of all users on busy urban streets in the peak and off peak hours. Initially, it was agreed to obtain ca. 500 replies from representatives of various group users. However, in the course of the project it was decided to modify this approach. It was proposed by the project consortium partners that the survey should target different associations that represent the interests of various users groups, such as pedestrians, cyclists, logistics services providers, bus, coach and truck operators, in order to cover a greater number of various road users across Europe, not in terms of individual user numbers but in terms of the number of members and a better balance of views represented. In addition to the replies received from the associations, the survey received a number of individual replies. Please refer to section 3.1 for the details of the number of stakeholders represented in the response of the survey.

After having gathered structured data via the online survey, a main goal was to complement it with richer, qualitative data. In order to collect this type of data, an online workshop was organized with experts representing the following user groups: (i) pedestrians, represented by the International Federation of Pedestrians (IFP); (ii) cyclists, represented by the European Cyclists' Federation (ECF); (iii) commercial vehicles, including bus, coaches, and trucks, represented by the International road transport organisation, (IRU), (iv) cities represented by Polis, a network of European cities and regions. ECF presented the point of view of the cyclists and gave examples of good practices from Mechelen in Belgium and Copenhagen in Denmark. For the pedestrians, IFP highlighted the danger of vehicle speeds. Regarding the commercial vehicles, some of the main challenges were underlined; such as diesel bans, entry fees and low emission zones. And finally, the point of view and role of cities was presented including examples from several European cities such as Amsterdam and Umea.

Considering the results of the survey and following the online workshop, two elements came up as common challenges shared by different group of users:

- The first one is *safety;* as any *improvements of traffic flow* in the urban area should not decrees safety of its users, but contrary it has to increase their safety.
- Also, many of the respondents indicated that one of the biggest hindrances in the improvement of traffic flow is a *lack of information* on traffic itself. Sharing the information on traffic flow among various users can improve the traffic, increase efficiency, better planning, improve safety, etc. in the urban areas.

2 Introduction

The project MORE aims to develop and implement procedures for the design of urban corridor roads and streets.

The project will test these procedures in five urban nodes of the Trans-European Transport Network (TEN-T). It will deliver tools to assist cities in their roadspace redesign processes.

Corridor roads are under pressure from increased mobility. Delays and variable travel times result in time losses for road passengers and freight deliveries. This requires a more efficient use of road space, applying multimodal design. At the same time, developing safe and attractive cities demands transport and city planners to encourage street activity and reduce traffic dominance. MORE will develop design concepts that acknowledge such variety in economic and social interests, considering the needs of all road users.

MORE concentrates on the urban feeder-roads of the TEN-T. Their efficient functioning is vital to the local and national economy and the success of the TEN-T. But higher traffic volumes might also lead to increased air and noise pollution, accidents, congestion and CO_2 emissions – affecting the economic efficiency and the health and well-being of the population, demanding counter measures.

MORE will develop and review tools and procedures in five nodes of the TEN-T: Budapest, Constanta, Lisbon, London, and Malmö[1].

This report is the result of Work Package 1 (WP1 – Task 1.1) activities that deal with user needs, policies, guides and indicators. WP1 sets the ground for the subsequent work packages in the MORE project. Relevant material will be researched and prepared to be used later in the project and the various road users' needs will be compiled.

The key objectives of WP1 are to:

- Provide information about road users' needs, in order to purposefully target the subsequent work packages on meeting those user needs;
- Review the methods and guidelines for road function classification and urban road design;
- Provide a comprehensive compilation of objectives and performance indicators for the design of urban roads.

[1] MORE Project, website.

This WP is divided into four tasks, and this report covers the first task about the current user needs. The urban corridor feeder roads analysed in the MORE project serve various functions for various user groups, including sections with both high level 'link' and 'place' functions.

This first task collects information about all these different users' needs considering at least the following user types and usages:

- Transport users, including pedestrians, cyclists, cars, vans, trucks, buses, trams, public transport passengers, intermodal travellers;
- Transport service providers, such as public transport companies and taxis;
- Users serving the buildings adjacent to the road, this is e.g. parking, delivery;
- Place users staying in the road e.g. for eating, chatting, waiting, strolling, working, looking at shop windows;
- Owners of houses and businesses adjacent to the road;
- Asset maintenance and management, devices under the roads including the various utilities such as electricity, sewage, potable water, heating pipes, gas or internet.

Furthermore, the project looks at user's needs from several perspectives, namely it places them in a time frame (trying to identify the needs at different times on weekdays, as well as at weekends). At the same time, the project endeavours to locate these needs in space and identify the destinations and main purposes of the various user groups. Finally, the key objective is to look at various soft measures or solutions that can improve traffic flow in the urban areas.

This research is part of the first work package of the MORE project and is complemented by the other deliverable of this work package D1.2. This complementary deliverable deals with urban corridor road design: guides, objectives and performance indicators. The desktop research carried out as part of T1.1 is incorporated into the second deliverable; D1.1 focuses on survey/discussion results.

3 Methodology

This section will present the methodology used to gather and analyse data regarding the needs of different road users. Firstly, a survey was elaborated and submitted to a wide range of stakeholders. Then, an expert group, including different groups of users, was organised to reflect on the data and increase the amount of information.

3.1 Survey

In order to obtain a sufficient and appropriate amount of data for analysing the needs of the various user groups in urban roads and streets, it was decided to design a survey[2]. It was decided that the survey will target different associations that represent the interests of different users groups, e.g. pedestrians, cyclists, logistics services providers, bus, coach and truck operators, residents, etc.

The survey (see Annex for the full questionnaire) consists of several blocks of questions:

1. **Introduction** – here general information about the respondent is asked, i.e. name of the company/organisation; country of residence; type of organisation as well as to which group of road users the respondent belongs to.
2. **User's activities on the street** – this section asks the questions regarding the timeframe of a specific group's activities. Here the users are asked to provide information on their peak hour's activity within the day of the week and week-end. Another question of this section asked a respondent to indicate the least intense slots during the day. Finally, a question on main purposes during the peak hours of user's activities is asked here. A respondent is asked to choose 5 out 16 possible activities and rank them from 1 the most important to 5 the least important.
3. **Identification of problems** – this section contains 4 main questions and each of them is a multiple-choice question. In this section, the survey looks at impacts of Urban Vehicle Access, its advantage or disadvantages, the type of restriction. Then the survey asks about the main reasons for the usual disruption of traffic flow where a respondent is asked to choose 5 out 24 potential reasons and rank them from 1 the most important to 5 the least important.
4. **Identification of needs and solutions** – this section contains 5 questions, where the first question asks about general needs such as, cohesion, comfort, environment, efficiency, etc. The next question inquiries about possible 'soft' improvements that can be made in terms of infrastructure, traffic rules, Intelligent Transport Systems (ITS), etc. Then the survey looks closely at road infrastructure needs where a respondent is asked to choose 5 out 24 possible responses and rank them from 1 the most important to 5 the least important. The next

[2] Survey transcript of questions can be found in Annex 1

question of the survey asks about possible ITS solutions. And, finally, the respondent is asked about traffic rules, signage and marking which of them should be addressed in priority in urban areas.

The online survey on user needs was open for several months (from February until May 2019) to collect the data. 53 respondents and organisations provided answers to the survey: 11 organisations responded on behalf on their members, 16 from cities and 26 individual replies. Hereunder you can find the table of the results of the survey including the numbers of stakeholder represented.

	NAME	Number of stakeholders represented (average)
ORGANISATIONS	IRU, Belgium	166[3]
	The Swedish Pedestrian Association, Sweden	100
	The Chelsea society, UK	940[4]
	Associations of Pedestrians in Zurich, Switzerland	137[5]
	Stowarzyszenie Spoleczny Rzecznik Pieszych w Bydgoszczy, Poland	N/A
	Catalunya Camina, Spain	N/A
	Austrian Federation of Pedestrian, Austria	N/A
	MENSenSTRAAT, The Netherlands	N/A
	International Federation of Pedestrians, Belgium	45
	Associação pela Mobilidade Urbana em Bicicleta (MUBi), Portugal	1116
	UITP, Belgium	1600[6]
CITIES	Lisbon, Portugal	10

[3] https://www.iru.org/who-we-are/members/members-directory

[4] http://chelseasociety.org.uk/

[5] https://en.fussverkehr.ch/list-of-city-members/

[6] https://www.uitp.org/all-members

	Constanta, Romania	2
	City of Malmö, Sweden	1
	Budapest, Hungary	3
INDIVIDUALS	Institute for Transport Studies, Austria	3
	Traffic and Transport solution, Australia	1
	Ministry of infrastructure, Slovenia	1
	La linea spa, Italy	1
	johanna.be, Belgium	1
	Private Public Transport Operator, Italy	1
	EMEL, Public Transport Operator, Portugal	1
	Cork Cycling Campaign, Ireland	2
	Private cyclist, Ireland	1
	Malmö Stad Fastighets och Gatukontoret, Sweden	1
	ITS Vienna Region, Austria	1
	UCL, UK	1
	PMC, Romania	1
	Science Po, France	1
	Commuter from the city of London, UK	1
	PTV group, Germany	2
	Lisbon Resident, Portugal	1
	Total	**4141**

Figure 1: Replies per stakeholder group

The main purpose of the survey was to provide a sufficient amount of quantitative data in order to be able to reconstruct a picture of the busy urban street, in which the main groups of users are represented. Therefore, this data was of central importance for the project and was intended to be used not only for this deliverable but also in the analysis of other WPs.

A key target of this survey, as it was already mentioned above, were the organisations that represent various groups of users of urban streets. The main purpose of it was to map of road users' needs from different perspectives: from a *top-down* or *vertical approach* (from a micro to a macro level) and *from a temporal-spatial* or *horizontal approach*.

The horizontal approach looked at users' needs on three levels:

- ***Macro-level*** which focuses on all users' needs that are seen as common needs across all urban transport. On this level needs such as safety, security, priority, sustainability, environment, efficiency, are considered.

  The vertical analysis of this level is complemented by a horizontal approach, in order to identify how these needs are influenced by other parameters, such as time. For example, we tried to study how traffic flow changes during the week-ends and working days in certain determined area(s); how it could be impacted by the introduction of new technologies, new ways of transportation; would there be an impact on safety, environment, efficiency, etc. and how it is connected with general transport needs.

  Questions to be answered at this level were:
  - What are the main needs of entire urban flow on this level?
  - How these needs are changed during a short period of time?
  - How these needs could be shaped in the future under certain conditions?
  - How these needs are related to certain special conditions?

- ***Meso-level*** which looks at users' groups that may have common needs. On this level, the aim is identify the common needs between the users e.g. transport service providers: taxi, buses, coaches; freight transporters, etc. This allows us to see to which extent and how the needs of various groups are inter-connected.

  Here again, from a horizontal perspective, we aim to understand how these needs change with time, i.e. linear time perspective: for example, with introduction of new technologies and "pendulum" time perspective: days and nights, week-end and working days, seasonal (working months and holiday period), etc. This level helps us understand how these needs fluctuate and influence the traffic flow at a macro level. Here we will also try to identify some main patterns and conditions under which these trends are produced.

  The key questions to be answered were:
  - What are the main needs of specific groups of users?
  - Which are the factors for creating these common needs?
  - How the groups' needs are interrelated?
  - Which needs can be seen as common to which groups?

- ***Micro-level*** focuses on the unique needs of each particular user. On this level the main goal is to define a road usage pattern need of each particular user group and compare it with other patterns in order to identify where these needs overlap and where there are discrepancies as well as future opportunities in order to align these needs.

  From a horizontal perspective, the need pattern of each user are put in two different time perspectives: the linear time perspective, (e.g. whether new technology can influence the user's needs on a longer run) and the "pendulum" time perspective (e.g. the pattern of delivering goods to the same place every week can be changed and how it can be influenced by other users' needs). At the end we will try to see how the micro-level influences and shapes the needs on the meso- and macro-levels.

  The key questions to be answered were:
  - Which are the needs of each particular user?
  - How the need pattern varies from a "pendulum" time perspective and from a linear time perspective?
  - What are the key factors for a change in patterns of needs?
  - Which consequences have these particular changes on the meso- and macro-levels?

The figure below schematically represents the three levels of users' need in the urban area and how the needs can potentially overlap on meso- and macro-levels.

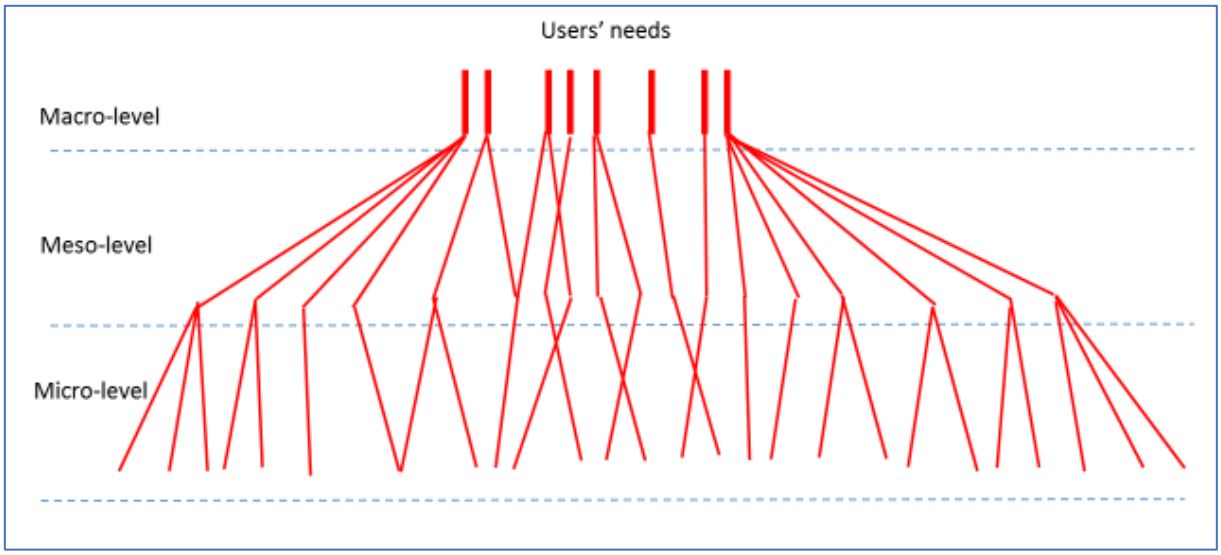


Figure 2: Users' need – macro-, meso- and micro-levels

As a step further, yet not within the original scope of this deliverable, possible solutions were examined at the meso- and macro-levels. On the meso-level, solutions can be common for some groups of users,

e.g. vulnerable users' detection for cyclists and pedestrians; some groups of solutions can be diametrically opposite, or even contradictory/excluding, e.g. more dedicated places for cars to park and less more space reallocation for walking, which can be at the detriment of pedestrians. On a macro-level the solutions are of a slightly different type. They are regarded from a more general perspective, such as environment, safety, comfort, etc. and are common to a wider number of users.

3.2 Expert Group Discussion

The second type of data that was targeted in T1.1 was qualitative data. To collect this information, it was decided to run an online workshop on 7th June 2019. Experts and representatives of different user groups were invited to join the workshop and present their views, offering a wider content for the group they represent. The resulting information was used in preparation of this deliverable.

During the workshop the results of task 1.1 (IRU) were presented, on current user needs, as well as initial findings from the work being done in task 3.2 (EIP) about designing for future road user needs. Several speakers presented their view on a specific user group, i.e. the pedestrians, the cyclist, the cities, and the commercial vehicles. A collected input provided by the speakers was used to complement the data that was gathered in the survey collecting quantitative data.

The relevant user groups represented during this expert online workshop were as follows:

- Pedestrians, represented by the International Federation of Pedestrians (IFP)[7]; IFP is a network of non-profit associations and individuals from all over the world, working for pedestrians and liveable public space.
- Cyclists, represented by European Cyclists' Federation[8] (ECF); ECF was founded in 1983, its goal is to promote cycling as a sustainable and healthy means of transportation and recreation.
- Commercial vehicles, including bus, coaches, and trucks, represented by the World road transport organisation, (IRU)[9]; IRU is the global industry association for road transport.
- Cities represented by Polis, a network of European cities and regions working together to develop innovative technologies and policies for local transport[10].

Each speaker had to provide the following information regarding the group they represented:

- An introduction to the organisation;
- An introduction of the user group;
- A presentation of the main problems they are confronted with, in the context of a busy street during peak hours;

[7] https://www.pedestrians-int.org/en/

[8] https://ecf.com/

[9] https://www.iru.org/who-we-are

[10] https://www.polisnetwork.eu/about/about-polis

- Providing an overview of their actual and future needs, in the context of a busy street during peak hours;
- To identify the main factor that will produce a major change in the future of your members' modus vivendi/operandi such as for example new technology, a lifestyle change, new operation / business model, etc.
- To propose the most suitable solution to support the user group represented, to prepare for the future challenges irrespective of the type of change that they will face;
- To give an example of good practices in a city where the needs of the user group you represent are taken into account.

4 Results of the survey

In this section of the deliverable the results of the quantitative survey are presented. Due to a big quantity of information that was provided by the survey on user needs, which is relevant not only for this deliverable, but also can be used in other deliverables, it was decided to present just a snap-shot of the collected information. The analysis of the survey can be expanded further by combining together the results from different questions, e.g. results from needs and solutions can be combined together; time frame related questions can be combined with the destinations of different users in order to reconstruct a typical pass for a specific group of users and then overlap it with other group(s) of users to see where common solution can be found, etc. However, the main focus of this section is on the presentation of the general results from the survey.

This summary of the main results of the survey starts with a general presentation of the respondents, then the second part is about the timeslots, the third part is about destinations, the fourth part deals with the question of infrastructure, the fifth part is about the existing barriers, and finally the last part is about the solutions.

4.1 General information on respondents to the survey

After the closure of the survey, we received 53 replies, from organisations and individuals, of which 51 were 100% completed. Therefore, for our analysis we used only these 51 completed files.

In terms of replies collected per country, top three are Portugal (31%), Austria (10%) and Romania (10%). We have another 5 countries with 6% of replies, which are Ireland, UK, Belgium, Sweden and Hungary. A summary of the results of collected per country you can find in Figure 3.

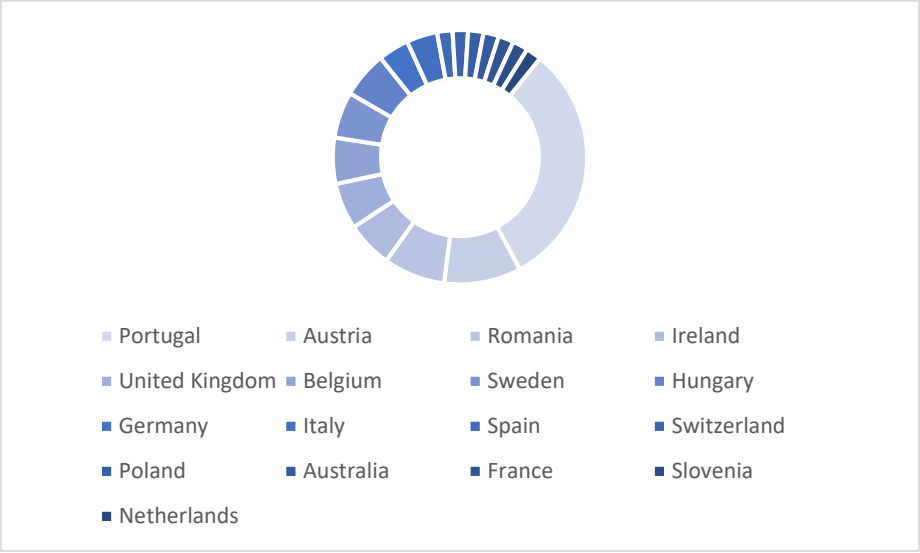


Figure 3: Response per country

The second question asked in the survey regarded a type of organisation that replied to the survey (see Figure 4). We have received 51% of replies from a public sector; 20% from private companies; 25% from NGOs and 4% left this question unanswered.

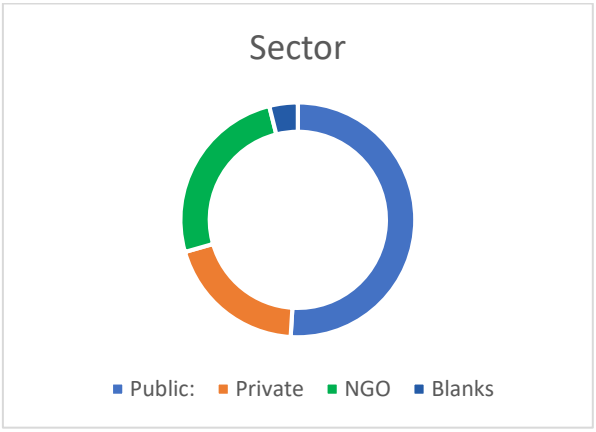


Figure 4: Type of organisation replied to the survey

The following question asked to which group of users a respondent belongs to. As is shown in Figure 5, the top 5 are pedestrians – 21%, cyclists – 15%, passenger – 11%, private vehicle users – 9% and passengers – 8%.

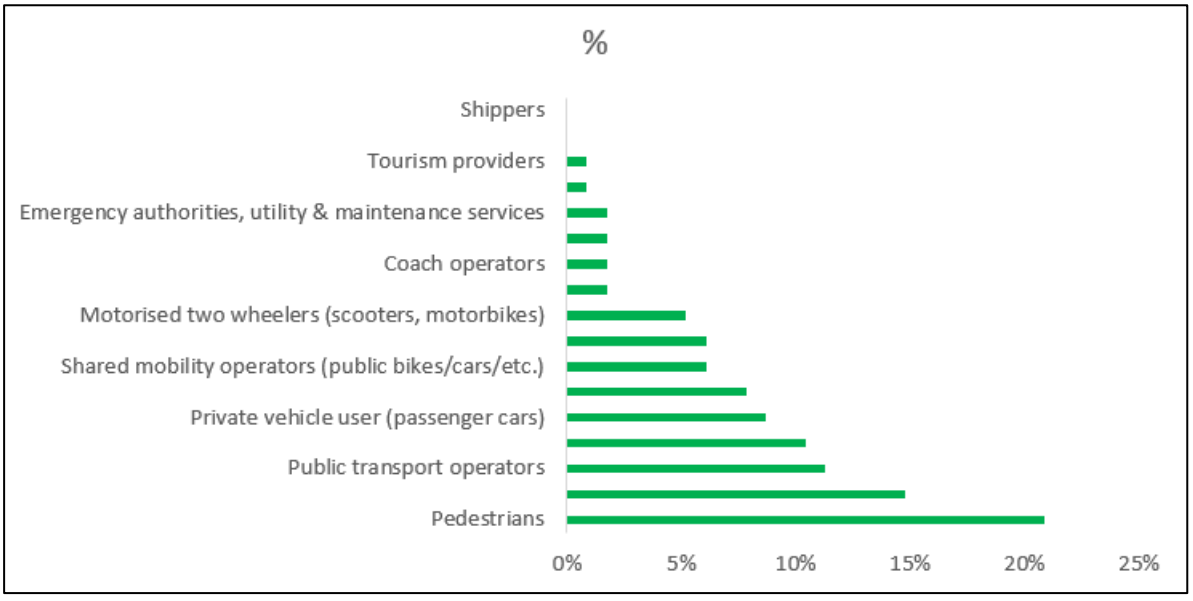


Figure 5: User type replied to the survey

4.2 Timeslots

In this sub-section we look at the results on users' time frameworks of activities. In the survey respondents were asked to indicate the peak travel hours during the day on a weekday and at the weekend. The results of the survey were combined into four pie charts (Figures 6 and 7).

The peak hours during the weekdays are between 8-10am (60%) and 4-6pm (49%); and the least intense are between 2-4am (31%) and 10-12am (35%). The peak hours during the weekend are the same as for week days, whereas the least intense times during the weekends are 2-6am (26%) and 10-12am (38%).

Having identified the peak hours for all users, it is also important to look at each individual user group and find out a degree of flexibility of those hours. It can help to find some solutions later when hours of some of user groups can be shifted from peaks to the hours with less intensive users' activities.

Time slots, weekdays

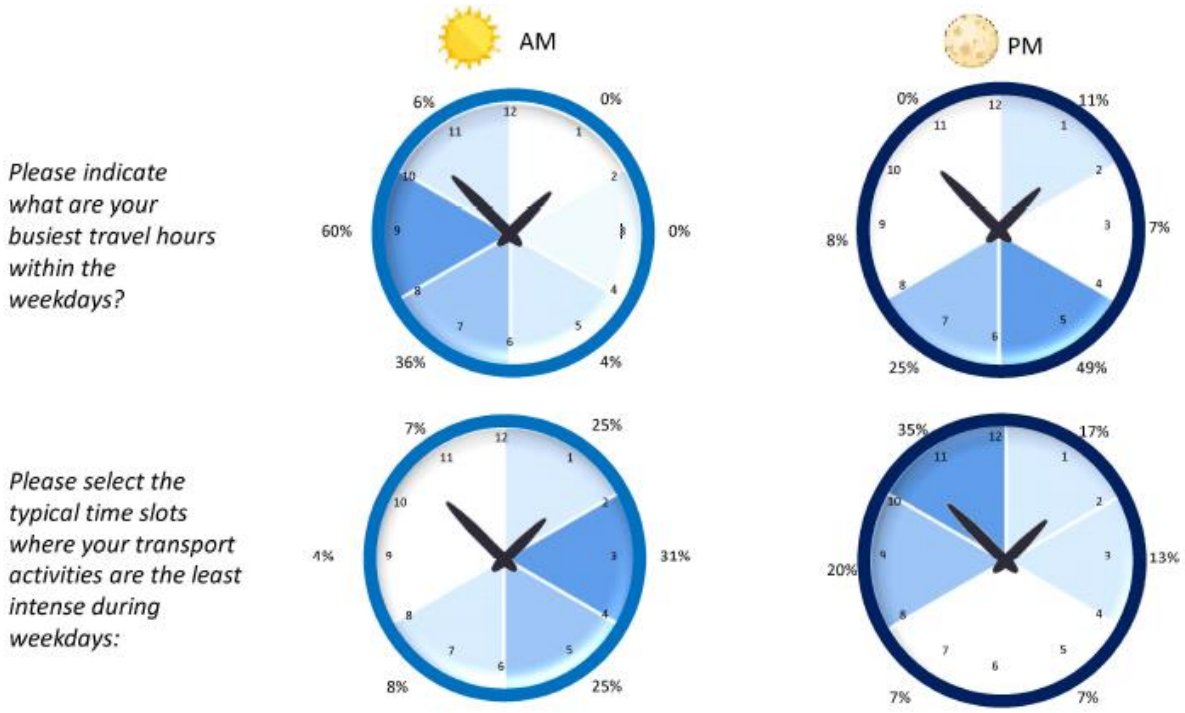


Figure 6: Time slots during the week

Time Slots, weekends

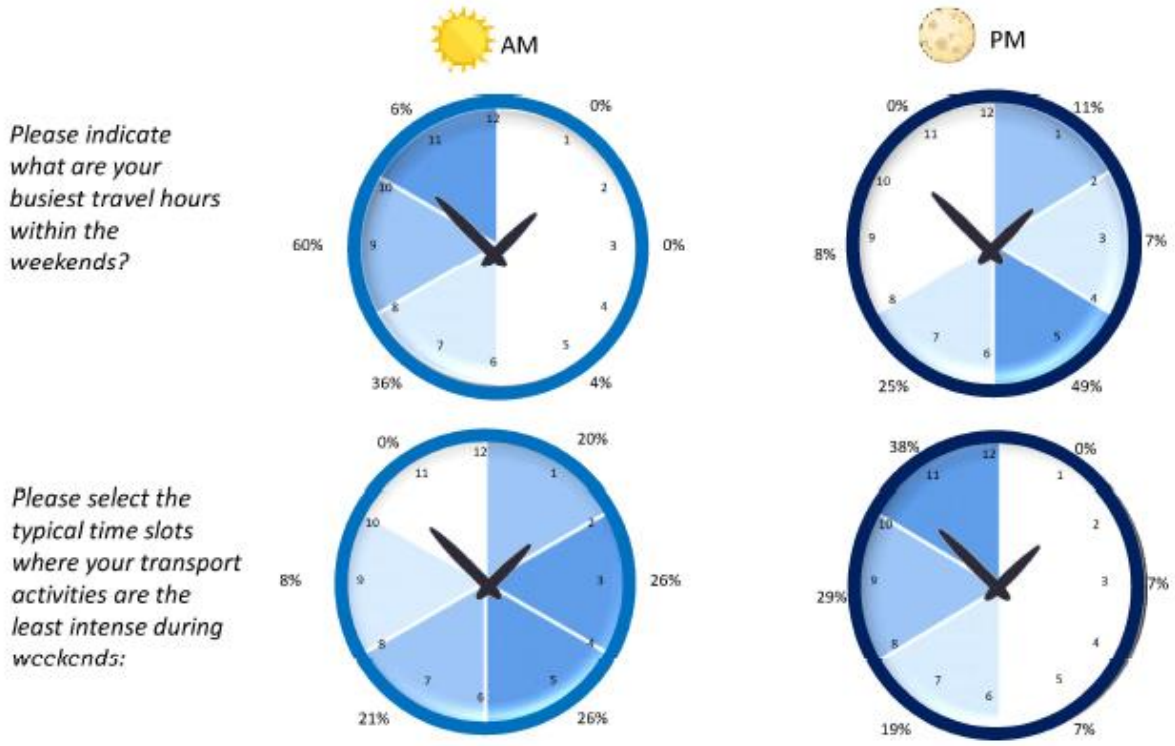


Figure 7: Time slots during the weekend

4.3 Destinations

According to the respondents, the top 5 destinations during the peak hours (see Figure 8) are:

- Education centres;
- Business district / offices / workplaces;
- City hall & administrative centres; hospitals and other emergency centres; and
- Malls / shopping centres / supermarkets.

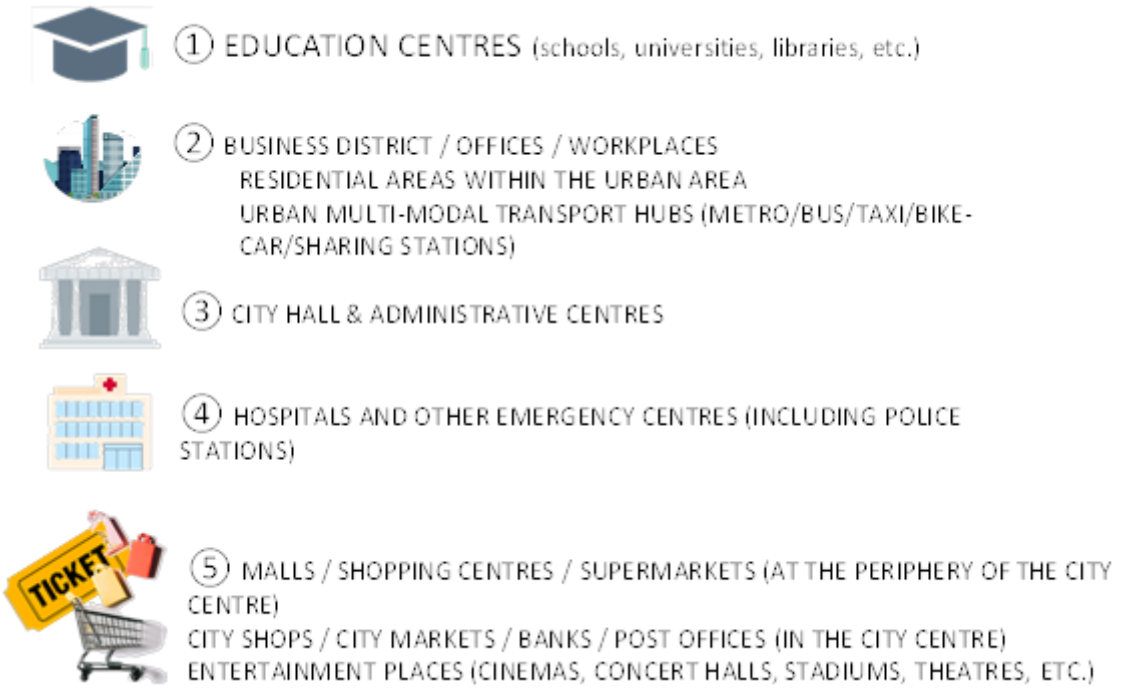


Figure 8: Top 5 destinations during the peak hours

The analysis of destinations can further be broken down for each user group, to see where the overlaps between various road users occur, in order to look for possible solutions. It can also be combined with information on the peak hours per each group of users in order to see the patterns and possible solutions for it.

As the two graphs of Figure 9 show, such groups of users as citizens, visitors and local businesses share some common destinations:

- City shops, banks, markets for coach operators, cyclists and local government;
- Cyclists with local government and mobility planning departments have common destinations in residential areas;
- Residents with public transport operators, private vehicle users and pedestrian have common destination to emergency centres;
- Shared mobility operators together with taxi operators and citizens, visitors share the same destinations to multi-warehouses in the outskirts of the city.

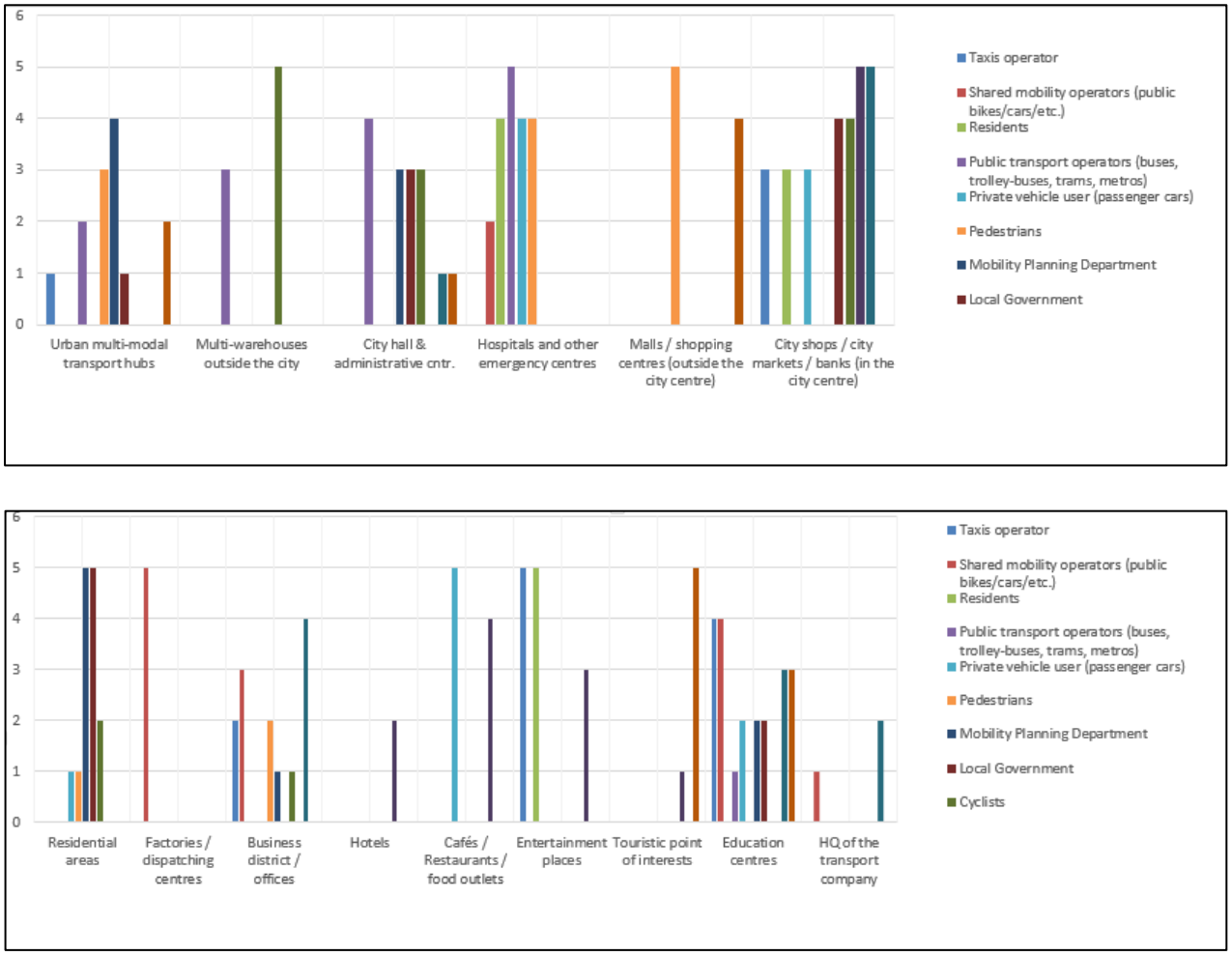


Figure 9: Common destinations during the peak hours

Figure 9 also indicates the levels of importance per each user group. Since there many smaller overlaps, we have focussed only on those that were marked with high importance (level 5) by the respondents.

4.4 Infrastructure

In this section we look at the survey results regarding the improvements that could be made in order to facilitate a better traffic flow in urban areas, according to each group of users. First of all we look to the general road needs (Figure 10) and then we look at more specific infrastructure needs (Figure 11).

Figure 10 summarises the results about general needs in urban areas in order to improve a traffic flow. For instance, improvement in quality of roads is of paramount importance for shared mobility operators, cyclists, public transport operators, coach operators; safe road crossing are important for cyclists, shared mobility operators and public transport operators; separated cycle lanes are of high importance for cyclists, pedestrians, mobility planning departments and residents; ITS are important for coach operators, private vehicle users and public transport operators.

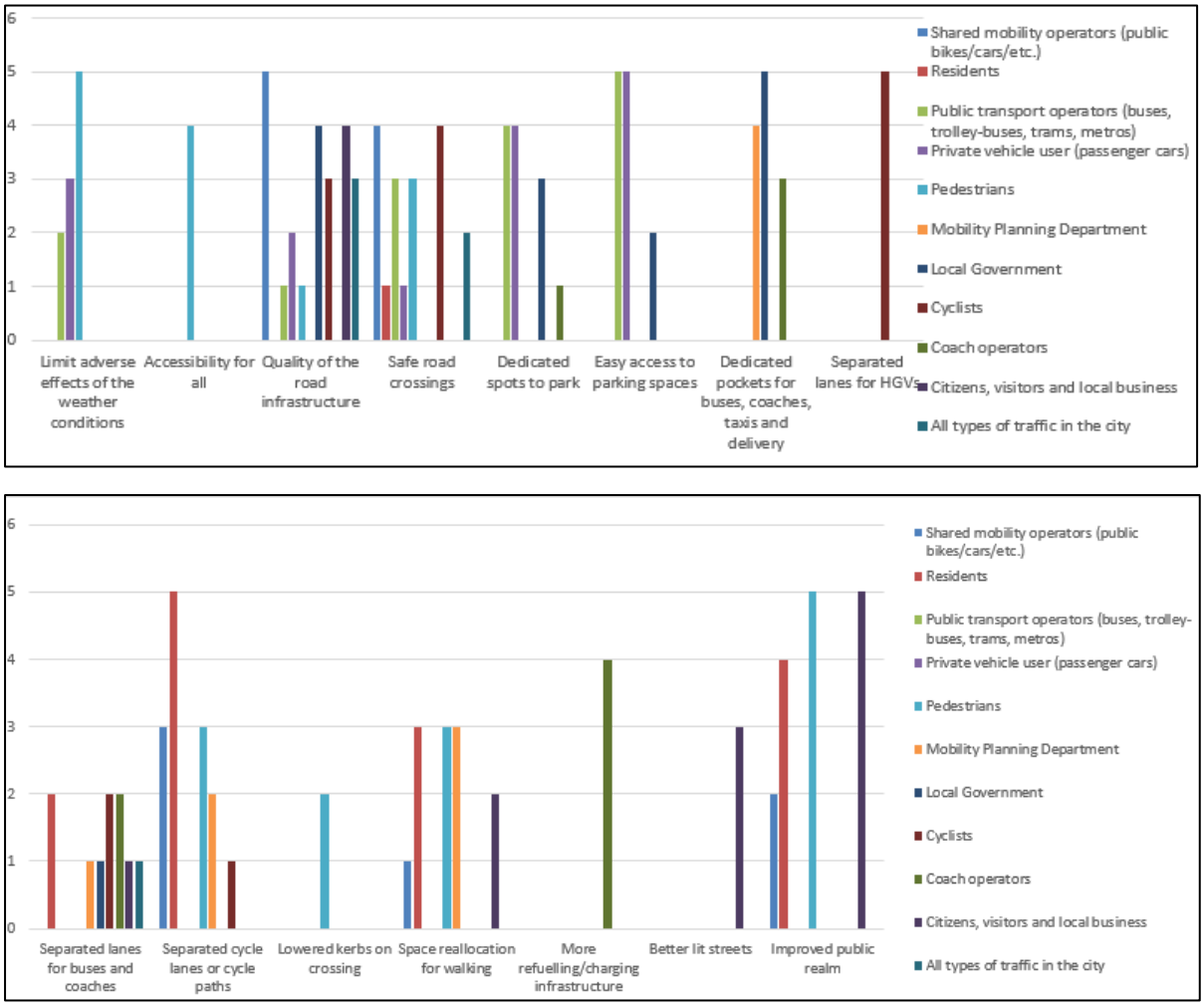


Figure 10: General needs

Figure 10, with two bar-graphs, illustrates the level of importance of various improvements for different groups of urban road users in terms of road infrastructure needs, to be addressed in priority order, in order to improve traffic flow.

As the two bar graphs show, some solutions were selected by several groups of users but with different degrees of importance, such as the quality of the road infrastructure, safe road crossing facilities and

separate lanes for buses and coaches. The least attention received for such infrastructure solutions was accessibility for all, separate lanes for HGVs (yet with high importance for cyclists), more refuelling / charging infrastructure (with high importance for bus and coach operators) and lower kerbs on crossing (only pedestrian indicated it as important solution, yet with lower priority).

Regarding the road infrastructure priority needs to be addressed, different groups of users opted for different solutions; however, some overlaps can be identified here (Figure 11). As an example, we take improved public transport supply as one of the solutions. It is very important for public transport operators, pedestrians, shared mobility operators and citizens for this to be given a high priority. However, traffic rules, signage and user awareness, for instance, are of great importance for citizens, visitors, local businesses and coach operators.

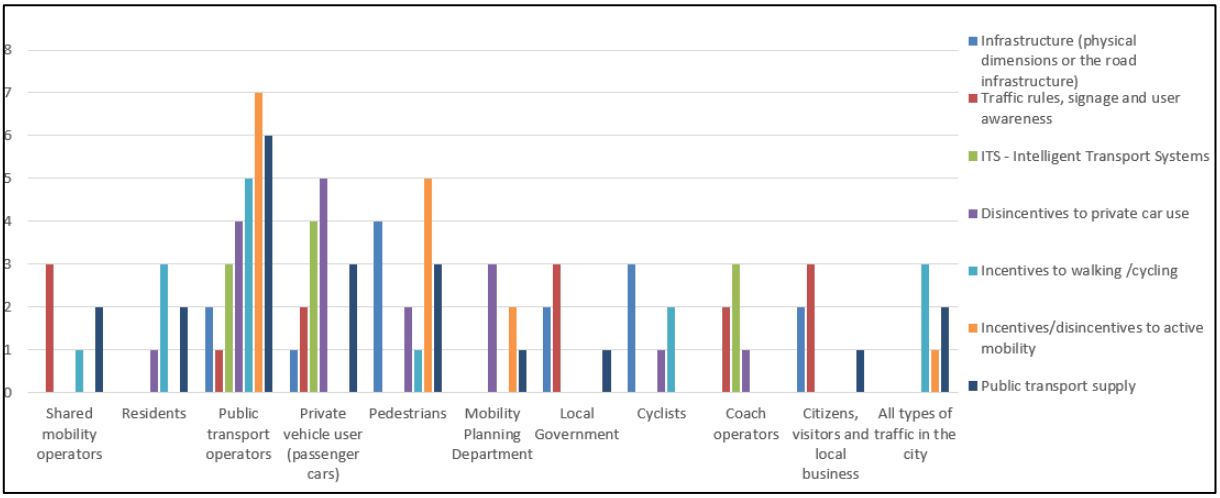


Figure 11: Road infrastructure needs to be addressed by priority

4.5 Barriers

In this sub-section we briefly present the main reasons for traffic disruption according to various urban road users. For instance, traffic lights are seen as the main cause of traffic disruption for pedestrians, shared mobility operators, mobility planning departments, pedestrians and public transport operators, yet with different degrees of importance, as it can be seen in Figure 12; too many road junctures and roundabouts are one of main barriers for pedestrians, private vehicle users, local government, private vehicle owners, and public transport operators; pedestrian, local government and mobility planning department indicated illegal parking as a main impediment for a traffic flow in urban areas. According to the survey results, some reasons do not influence traffic flow in the urban areas, or have less impact. These reasons are long waiting times to cross the street, impact of weather conditions, not enough place to cross the street.

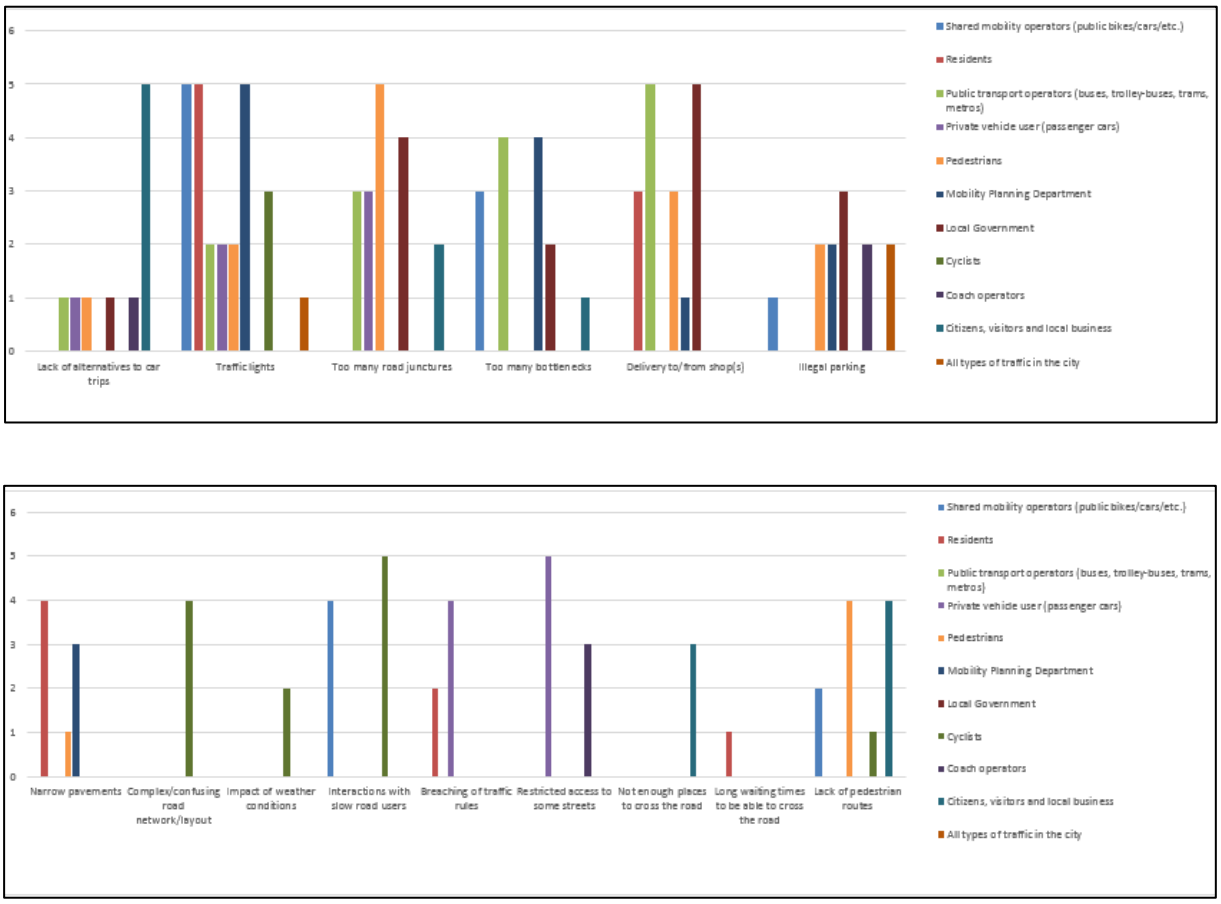


Figure 12: Main reasons for traffic disruption

The next two graphs (Figure 13) present summary findings regarding vehicle access restrictions, their types and advantages in general. The top 4 benefits are:

- more space and for walking/cycling (50%)
- reduction of emission (ca. 18%)
- safety on the street (ca. 16%), and
- faster travelling times by public transport (ca. 12%).

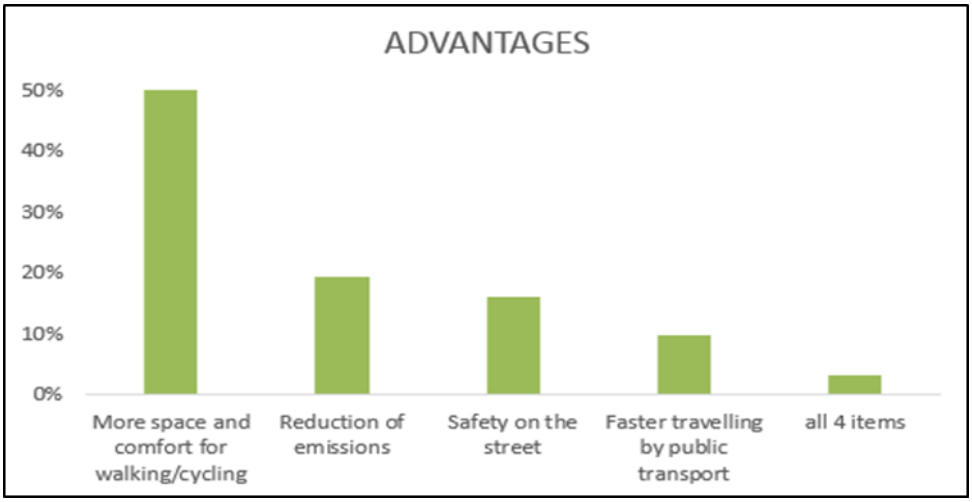


Figure 13: Vehicle Access Restrictions

The second graph in Figure 13 summarises results on which type of urban vehicle access regulation applies in the urban area(s) with which you are familiar. Slightly more than 20% of respondents indicated location based restrictions. In second place is low-emission zones with ca 10% and the third place is time based restrictions with ca. 6%.

4.6 **Solutions**

The last sub-section of the survey on road user needs focusses on potential 'soft' solutions which do not entail any major changes to the road infrastructure, but are effective solutions that can be implemented with a small budget. The survey proposes seven types of solutions, namely:

- Infrastructure
- Traffic rules, signage and user awareness, control
- ITS - Intelligent Transport Systems
- Incentives to walk/cycle
- Disincentives to private car use
- Incentives/disincentives to active mobility
- Public transport supply.

As it is indicated in Figure 14, infrastructure solutions are of high priority for pedestrians, cyclists, and public transport operators; traffic rules and signage are of paramount importance as a solution for cyclist, local government, coach operators and citizens and shared mobility operators; disincentives to private care use are important for private car user, public transport operators, mobility planning department, coach operators and cyclists; public transport supply is important for pedestrians, private vehicle owners, cyclists, shared mobility operators, mobility planning department, citizens and visitors; as for the ITS solutions, only private vehicle users, public transport operators and coach operators indicated this as an important solution.

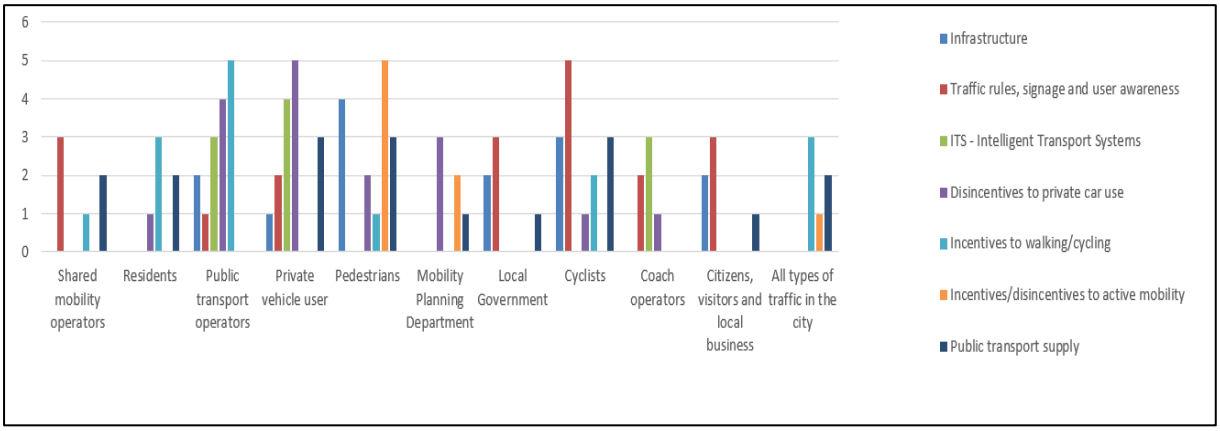
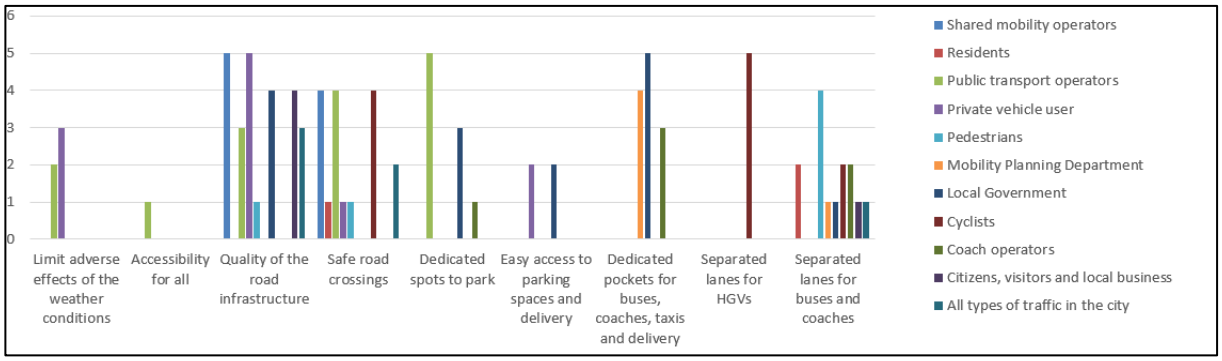


Figure 14: Solutions for improvement of traffic flow

The next graphs (Figure 15) presents solutions that are related to the provision and use of road infrastructure. The survey results show that there are several solutions that are commonly shared by several road user groups. For instance, improving quality of road infrastructure is selected as a key solution to improve traffic flow by shared mobility operators, citizens, visitors, and private vehicle users. Local government and mobility planning departments find dedicated spaces for bus and coaches as the most important solution to be made in the infrastructure; public transport operators, pedestrians and private vehicle owners indicated that improvement needs to be made in safe road crossings. If we look closer at Figure 14, the level of importance of various infrastructure solutions is different for different group of users. However, the graph below shows where the interests of different groups overlap. It provides designers with information on where the first steps need to be made in order to improve a traffic flow.



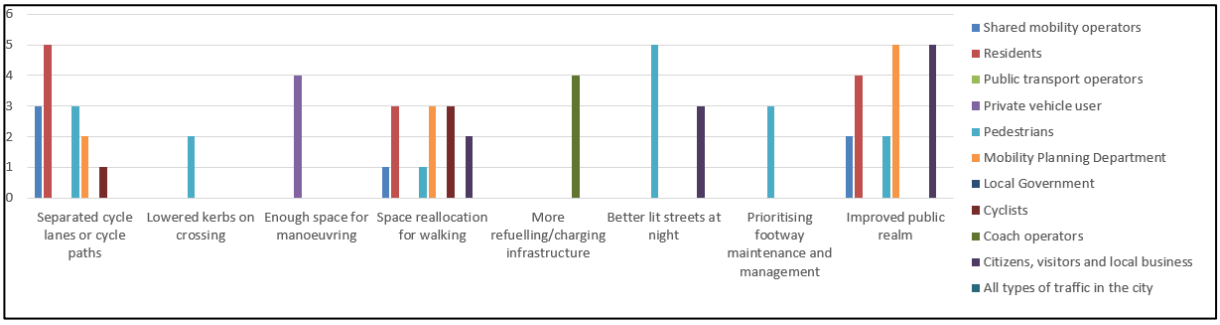


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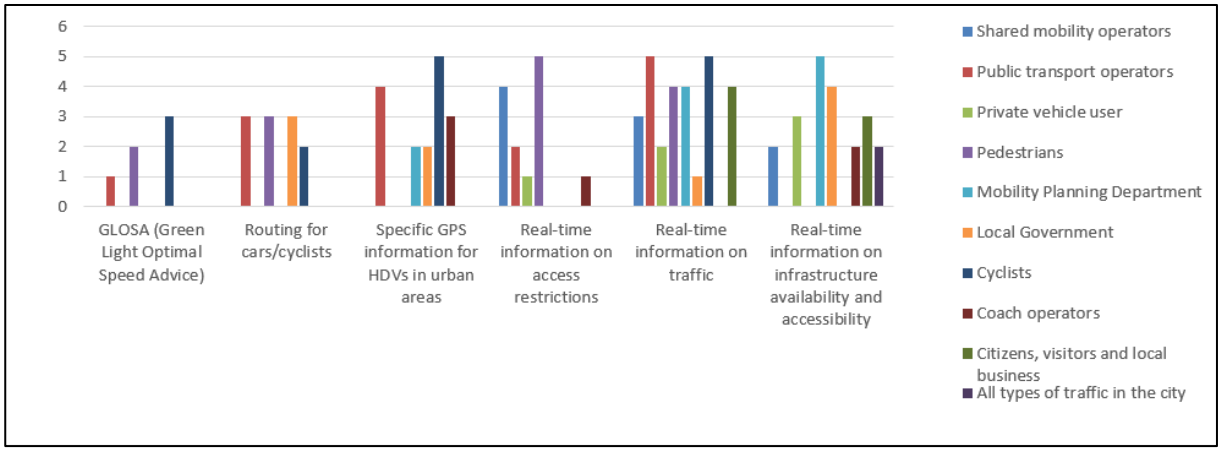
Figure 15: Road infrastructure solutions

Regarding potential ITS solutions to improve traffic flow in urban areas, the questionnaire proposed 19 services, yet only 12 of them are included in Figure 16. Green Light Optimal Speed Advice (GLOSA), is of high priority for public transport operators, pedestrians, mobility planning departments and shared mobility operators. While real time information on infrastructure availability and accessibility, it is of paramount importance for mobility planning departments, citizens, visitors, local businesses and shared mobility operators; as for advanced reservation and booking schemes it is an important solution for citizen, visitors, local businesses, mobility planning and coach operators. Real time public



transport information was selected by 5 groups of users, i.e. pedestrians, mobility planning departments, cyclists, citizens, visitors and local businesses.

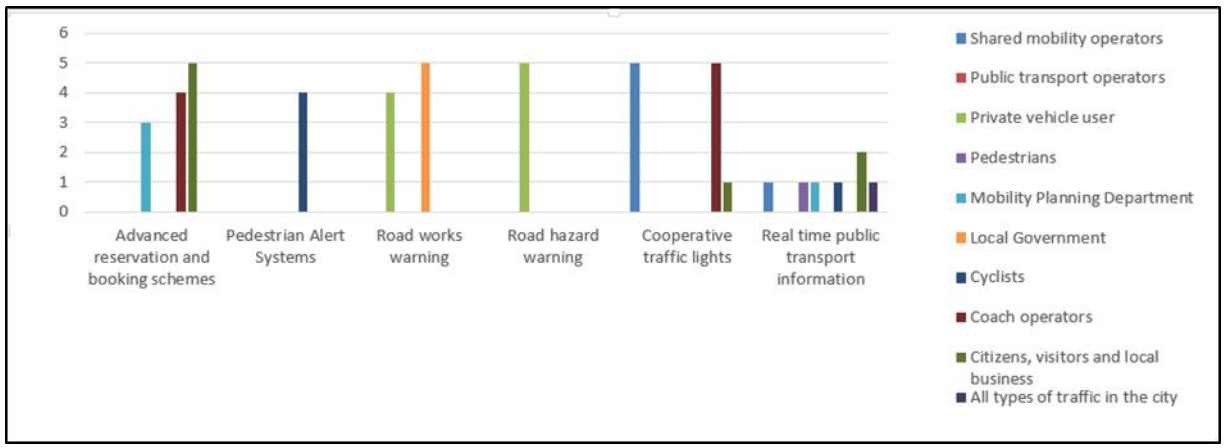
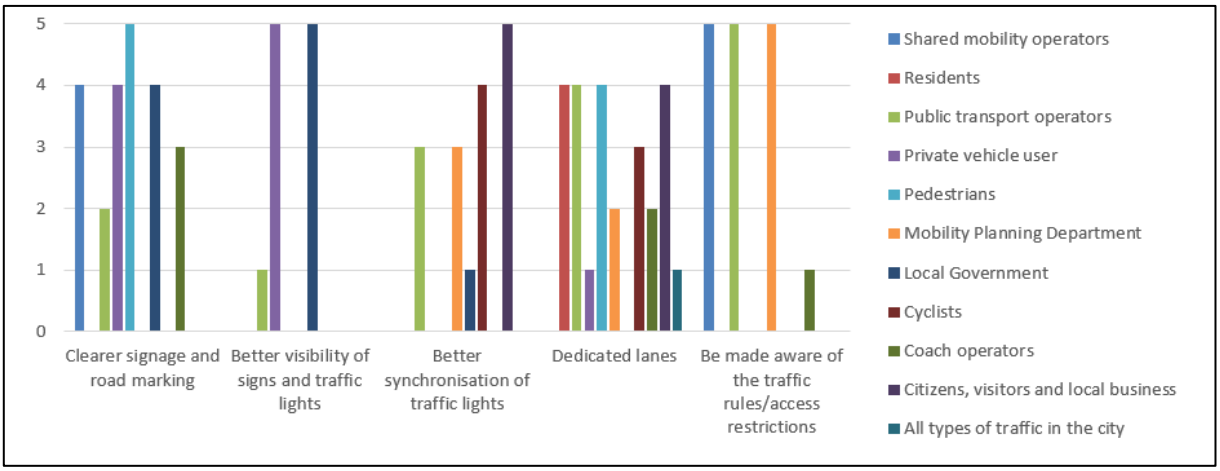


Figure 16: ITS services solutions

The final question in the survey concerned which traffic rules/signage/road marking needs should be addressed as a priority in urban areas; findings are summarised in the Figure 17. The survey proposed ten possible solutions.

Several overlaps between the user groups were detected; for instance, clear signage and road markings is of high importance for pedestrians, public transport operators, citizens, visitors, local businesses, coach operators, as well as cyclists and private vehicle users; speed limits to improve the traffic flow are crucial for mobility planning departments, local governments, cyclists, private vehicle users and pedestrians. Better visibility of signs and traffic lights was indicated as less important by private vehicle users, local governments with high priority and public transport operators with the lowest priority; safe and more frequent road crossings were selected by citizens, visitors, pedestrians, residents and shared mobility operators.



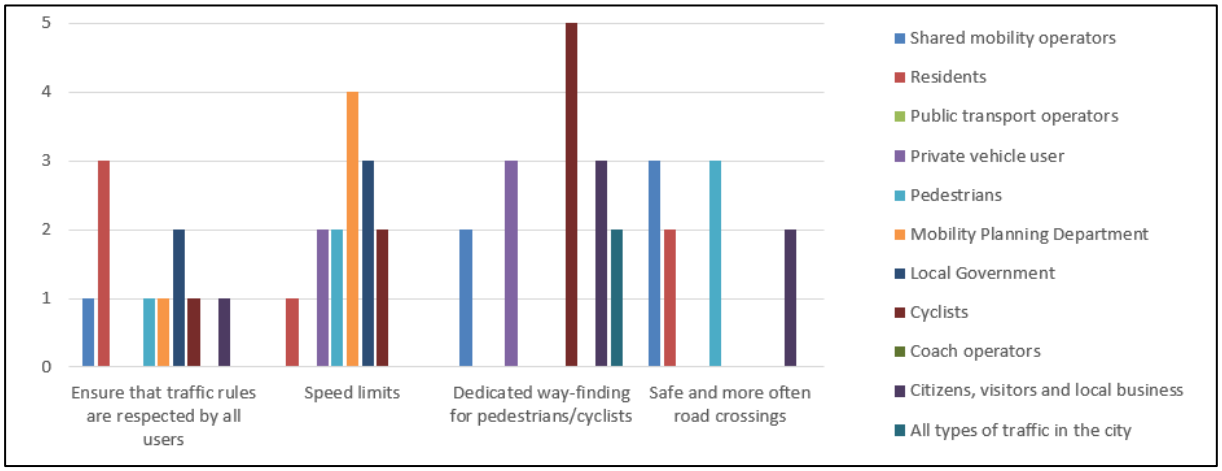


Figure 17: Traffic needs solutions

5 Expert group discussion

This section presents the content gathered during the online workshop organised by IRU Projects in order to gather the required qualitative data. The goal of this workshop was to collect inputs and relevant information from experts representing different user groups, as well as to verify the data collected from the survey.

The collected data is of a great importance for other WPs in MORE, where a deeper analysis of these results will be performed with a focus on finding possible solutions for various road user groups, preparation and modelling of different scenarious for some user groups in order to facilitate traffic flow in peak hours, as well as investigating further possible improvements that can be introduced in the busy urban areas.

The online workshop consisted of three parts, namely:

1. Presentation of the survey results and their preliminary analysis (as set out above);
2. Presentation by various road user groups of their needs, concerns and possibile solution(s) to improve traffic flow in the urban areas;
3. General discussion of the collected results from the survey as well as the presentations, and drawing conclusions from the session.

The online working shop lasted for around 3 hours. It was moderated by the IRU Projects' team.

Before the workshop, the participants received a set of questions to structure their short presentations and to help them collecting the necessary data. Among other questions the experts were asked to :

- briefly present themselves and introduce their organisation;
- indicate the key problems they are confronted with in the context of a busy street during peak hours and outside peak-hours;
- provide a snapshot overview of actual and future needs of the user group they represent in the context of a busy street during peak hours;
- provide examples of good practice.

The users groups who took part in the online workshop were the cyclists, pedestrians, commercial road transports operators (bus, coaches, and trucks) and, finally, the cities.

5.1 Cities

As previously mentioned, Polis is a network of European cities and regions working together to develop innovative technologies and policies for local transport. Since 1989, European local and regional authorities have been working together within Polis to promote sustainable mobility through the deployment of innovative transport solutions.

The aim of Polis is to improve local transport through integrated strategies that address the economic, social and environmental dimensions of transport. Polis supports the exchange of experiences and the transfer of knowledge between European local and regional authorities. It also facilitates the dialogue between local and regional authorities and other actors of the sector such as industry, research centres and universities, and NGOs.

Polis fosters cooperation and partnerships across Europe with the aim of making research and innovation in transport accessible to cities and regions. The network and its secretariat actively support the participation of Polis members in European projects. Polis participation in European projects allows us to create a framework which facilitates dialogue and exchange between local authorities and the transport research community.

In Polis, decision makers are provided with the necessary information and tools for making sustainable mobility a reality. Within the Political Group of Polis, they formulate recommendations to the European institutions[11].

Figure 18: POLIS Network

5.1.1 Rethinking urban space and shifting towards less polluting transport modes

Cities can expect a steady increase in urban transport demand with an ever-growing urban population and dramatically different urban mobility systems are required. For this reason, city-level policy is becoming increasingly important: one sustainable urban mobility action can address multiple problems, like reducing CO_2-emissions, achieving much needed improvements in the field of air quality, reducing traffic jams and road safety risks, improving quality of life, and public health.

According to recent studies, urban environments have reached peak car[12]. An historical legacy of car centric urban planning, car-friendly policies and urban sprawl have brought the personal car use to surge. Cities are now fighting to undo this by implementing measures to avoid and contain the demand for motorised transport. They are prioritising public transport and active travel, innovating and testing new mobility concepts and services, procuring cleaner fuels and rethinking urban space.

[11] https://www.polisnetwork.eu/about/about-polis

[12] CIVITAS CREATE, Project Summary and Recommendations for Cities, 2017, Available from: Urban Mobility: Preparing for the Future, Learning from the Past: http://www.create-mobility.eu/create/Publications/Reports

However, modal shift to less polluting transport modes also needs ambitious politicians who have the courage to go against the grain and take unpopular measures such as reducing car traffic capacity, regulating access, redesigning streets or removing parking spaces. Protecting pedestrians and cyclists also determines modal shift. Less cars also mean safer streets, and as acute safety concerns are one of the main reasons for not cycling, attention at these inter-related policy areas is needed.

5.1.2 Sustainable Urban Mobility Policy

Cities want to be places that are nice to live and work in and to visit. That means giving more space to and creating streets for people instead of for vehicles. Prioritising cycling and walking are therefore a growing trend, through pedestrianisation, bold circulation plans that lead cars out of the city centre, bike sharing schemes, etc. Cities are more and more capitalising on the health benefits of active travel, combining sustainable mobility gains with the personal gains of being physically active through walking and cycling. Cities also look into cleaning up fleets and making sure that the cars that are still driving around in their centres are less polluting, e.g. through investments in electro mobility and the introduction of access regulations and low-emission zones. However, local authorities must also take into account and promote the vitality and the productivity of the industrial and commercial sector: therefore, also the economic sustainability of the measures must enter into the calculation of an appropriate cost-benefit analysis.

A proper stakeholder engagement process[13] involves all transport users taking advantage of the urban space (both citizens and business), so as to carry out effective and shared policies. Since no one solution fits all, it is important for local governments to identify a clear relationship between citizens, stakeholders, urban (transport) system, on the one hand, and different types of measures, on the other, to determine the optimal combination of the best policies with respect to the peculiarities of each specific context. To facilitate the adoption of a more shared approach, the European Commission encourages cities to develop a long-term vision and objectives for urban mobility. In 2013 it released the Urban Mobility Package *Together towards competitive and resource-efficient urban mobility*, providing an overview of possible actions, including guidelines on Sustainable Urban Mobility Plans (SUMPs), currently under revision[14]. SUMPs represent an innovative approach for city planning, fostering effective, coordinated and consistent initiatives: local authorities have to define long-term objectives, and ensure their achievement within a sustainable framework: the type of corrective action shall be defined through a long-term planning process that takes into account the principles of participation, evaluation and integration.

[13] http://www.sump-challenges.eu/content/participation

[14] https://www.eltis.org/sites/default/files/guidelines_for_developing_and_implementing_a_sustainable_urban_mobility_plan_2nd_edition.pdf

5.1.3 Regulate to innovate

A local authority typically has several different transport functions, ranging from contracting transport services and managing traffic to providing travel information. Originally the preserve of the public sector, these tasks are seeing an expanding role for the private sector and other third parties. For instance, the growth in connected mobility means that local authorities are no longer the primary data holders – service companies, the telecoms industry and vehicle manufacturers often have a better picture of the state of the transport network than the transport authorities themselves.

Cities are open to exploring the potential of new and innovative mobility solutions developed by the private sector, to the extent that these can help them to reach their sustainable mobility policy goals. What is crucial however, is that cities put the right regulatory frameworks in place to make sure such new solutions serve their policy agenda and for example don't take customers away from public transport or take people off their bikes. That's why they also need better insights into the actual impact of such new services coming to the market, for which data sharing between public and private parties is crucial. Polis members believe that a key factor in sustainable urban mobility is effective integration of planning and services. To the extent that new mobility services are developed by the private sector, Polis members would like to ensure that these are developed collaboratively with local and transport authorities and support city and regional transport priorities and policies.

In an age where EU policy is increasingly deregulating mobility service provision, the role of local authorities is changing: this requires an even stronger need for public sector oversight, to ensure a confidence space and stakeholder platforms where it is safe to share data and valuable to bring different perspectives for private operators from the new mobility services, urban freight and other commercial sectors. To best interpret this new role, cities should anticipate trends and build understanding of possible impacts, to identify where innovation can deliver positive outcomes and where there are risks. When they define new measures, these should encompass policy, financial, regulatory aspects to maximize opportunities and minimise disbenefit.

The public authority as an urban space manager : The ultimate objective of cities is to be liveable and citizens-friendly. In order to achieve this objective, local governments should take back control of urban space and have a vision regarding what they want to be and therefore what they want to look like. According to this view, public authorities become urban space managers. One of the most expensive and valuable assets in the mobility system is urban space: cities and metropolitan regions do not only account for the road network as transport infrastructures; also structures to manage intermodality (interchanges, stations, park and ride, …) and stationary vehicles (on- and off street parking) should be subject to the principles of user-pays and polluter-pays[15]. European cities have an

[15] https://ec.europa.eu/transport/modes/road/road_charging/charging_private_vehicles

interesting portfolio of experiences of taxing or pricing mobility to curb congestion, improve air quality and liveability.

- **The example of Brussels**

Figure 19: Transformation of square in Brussels

- **The example of Los Angeles**

Figure 20: An example from Los Angeles

- **The transformation example of Umea**

Figure 21: The example of Umea

- **The example of Rotterdam**

Figure 22: Examples from Rotterdam

5.1.4 Urban space management tool box

The last decades, urban space management has moved from measures at street or square level to district level projects and, more recently, projects that implement a vision for the entire city (or SUMP), with examples such as Rotterdam City Lounge[16], the Amsterdam 'Autoluw programme'[17] and the Oslo mobility policies[18]. Prioritisation of modes can be done through space allocation and space pricing. Measures include among others parking pricing, low emission zones and congestion charging, public space management and streets design.

The following paragraphs report a non-exhaustive list of categories of innovative measures that have had or are having positive effects in some European cities.

Urban Vehicle Access Regulations (UVARs)

Cities prefer to focus on incentives and voluntary cooperation, to make public transport more attractive and to promote walking and cycling. However, governing sometimes implies taking unpopular measures such as urban vehicle access regulations (UVAR), not a popular and a politically sensitive measure, often defined as "war on cars" by local media and opposing political parties.

There are different reasons for local authorities to implement UVARs, namely to improve:

- Air quality;
- Safety;
- Congestion;
- Livability.

In considering such an option, it is extremely important for a city to understand what measures promise the most success in what contexts, how to implement such a plan successfully, what areas of transition need to be taken into account, what sort of effects one can expect from the implementation and how resilience can be built in so measures can continue to be effective in the future.

[16] City Lounge Concept, available at: https://www.rotterdam.nl/wonen-leven/binnenstad/City-Lounge-english-concept-v3-liggend.pdf

[17] Thinking Cities magazine #12 "Finding balance in the Thinking City", June 2019 (Page 20): https://www.polisnetwork.eu/uploads/Modules/PublicDocuments/tc-june2019.pdf

[18] https://www.polisnetwork.eu/uploads/ModuleXtender/MembersEvents/130/7-_Portvik_Olso.pdf

If implemented as part of a wider mix of measures and with a clearly defined objective, the instrument is effective[19], and enables changes and transition towards a more sustainable transportation system. However, the variety of approaches in which they are implemented has led to a fragmentation of UVAR schemes across Europe. With this comes the risk that possible benefits relating to economies of scale will be limited, whilst achieving Europe-wide compliance with UVAR standards also becomes more difficult, especially for logistics operators and service providers.

In this context, the European Commission recently published a study on Urban Vehicle Access Regulations (UVAR)[20] that aims to assist policy makers in their implementation, and to create a more common approach amongst cities and Member States. This is a vision Polis members support and work together to *"create a more common approach amongst cities and Member States to issues such as vehicle categories, enforcement, exemptions, pricing, and information provision"* (EC Non-binding guidelines UVAR), through:

- Facilitating exchange of best practices and capacity building for cities;
- Making real time traffic information available to users;
- Increasing transparency of the schemes and make relevant information available;
- Collecting the evidence on existing schemes and assess their effectiveness;
- Addressing fragmentation of the schemes while respecting subsidiarity.

In particular, local authorities are working on fundamental questions for the future, regarding the different governance levels involved in the urban mobility policy and regulatory context, and how they affect the local level:

Governance level	Comment
What vehicles for the EU?	Industrial policy, Mobility Package II
What vehicles sold in Member states?	▪ Norway: fully electromobile by 2025 ▪ Walloon Region plans diesel ban from 2030 onwards ▪ UK and France ban conventionally fuelled vehicles sales from 2040 onwards
What vehicles in my city?	UVAR: non-binding guidelines
What vehicle in my street? … at this charging point, at this parking spot?	Even if propulsion / AQ is solved! Kerb side access/management C-ITS could play an important role in the future

Figure 23: Fundamental questions for the future

[19] https://www.eltis.org/discover/news/brussels-and-londons-access-regulations-show-signs-success

[20] https://ec.europa.eu/transport/sites/transport/files/uvar_final_report_august_28.pdf

Public space management and streets design

Other solutions imply regulations based on area planning and design and physical interventions on urban roads, in city streets or more general in the public realm. The ReVeAL project[21] addresses process-related issues as well as design concepts aimed at regulating access through spatial intervention. It focuses on interventions on at least the district scale, but also includes road-level or even smaller scale interventions (parklets, safe school streets, living streets, city corridors, etc.) that can be considered the building blocks for spatial intervention for vehicle access regulation. One example is the 'superblock' approach in Barcelona[22], as described in the Pedestrians section. This affects not only traffic and personal mobility but connections to aspects like urban logistics will be made (e.g. bike streets and cycle logistics, hands-free shopping).

Cities should consider making use of parking spaces in a smarter way. Several local authorities are working towards removing parking spaces (Amsterdam has announced removing 11,000 parking spaces in the next years[23]) and creating mobility hubs where a variety of new mobility services (including bike and car sharing) can be booked by travellers.

Figure 24: Shared space, Amsterdam train station

[21] http://www.civitas-reveal.eu/

[22] https://energy-cities.eu/best-practice/superblocks-free-up-to-92-of-public-space-in-barcelona/

[23] https://www.citylab.com/transportation/2019/03/amsterdam-cars-parking-spaces-bike-lanes-trees-green-left/586108/

In this regard, the new EU-funded project eHUBS[24] is going to test different on-street locations that bring together e-bikes, e-cargo bikes, e-scooters and/or e-cars, offering users a wide range of options to experiment and use in various situations. The idea is to give a high-quality and diverse offer of shared electric mobility services to dissuade citizens from owning private cars, resulting in cleaner, more liveable and pleasant cities. In this context, the city of Leuven will install 50 eHUBS, to trial a hybrid system with no free-floating allowed in areas with high parking pressure.

More informed and data-driven policy making help cities improve the knowledge about urban space and managing their street. Brussels "Ping if you care"[25] and Bikeprint[26] apps provide for data collection and analysis to better understand the use of urban space. They:

- Report issues, suggest improvements, identify black spots
- Actively engage citizens in city planning
- Visualise cycled routes

Figure 25 Data collection apps

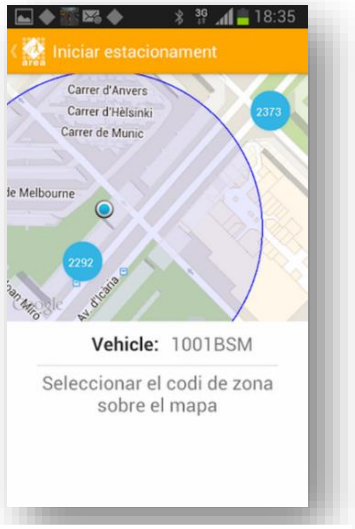


Figure 26 Management and enforcement of delivery area app

As for urban freight and logistics, many Spanish cities, including Bilbao, Barcelona[27], Madrid, have implemented apps for management and enforcement of the delivery areas, also collecting data on delivery behavior. Barcelona's Distribució Urbana de Mercaderies (DUM) scheme has been recognised by the European Parking Association (EPA) with the award for the best project in the on-street parking category of the European EPA Awards 2015[28].

Cities should take ownership to steer consolidation measures (nudges, information, incentives, and regulation) and/or imposing some efficiency constraints. For example, they could optimise consolidation through procurement of their own goods and services,

[24] https://www.nweurope.eu/projects/project-search/ehubs-smart-shared-green-mobility-hubs/

[25] https://www.mobiel21.be/campagnes-en-projecten/ping-if-you-care

[26] http://app.cycleprint.eu/

[27] https://www.areaverda.cat/en/areadum

[28] https://www.barcelona.cat/mobilitat/en/news-and-documents/news/barcelona-receives-an-award-for-its-new-coordination-of-loading-areas_241788

or require a minimum number of deliveries per stop (supported by adequate ITS systems). Given the expected increasing of logistics movements and fragmentation of deliveries, partly due to e-commerce,[29] cities could consider measures for dynamic management of space, including loading and unloading zones, and reserving and defending space for logistics and land use (warehousing), for example when operators use zero-low emission vehicles.

Tactical urbanism

Even if innovation often implies a technology component, also low-tech innovation comes into view for access and urban space reallocation. 'Tactical Urbanism' fits into this context. It is a type of low-cost, temporary changes to the built environment, usually in cities, intended to improve local neighbourhoods and city gathering places[30]. One of the best-known examples is that of the Living Streets[31] in Ghent[32] and Rotterdam.

Born a decade ago in North America, Tactical Urbanism has provided a proactive response to a sometimes-cumbersome administrative bureaucracy, but has also helped local communities to develop immediate solutions to the increasingly difficult economic conditions brought by the global financial crisis. Driven by the need to find ways to do a lot with little, by directly involving local communities, citizens and administrators around the world have sought new ways to develop and implement low-cost, rapid-making projects that promote the quality of urban life.

The SUNRISE project[33] specifically aims its *co-creation processes* at the initiation of solutions that are conducive to the involvement, ownership and maintenance of and by neighbourhood stakeholders. The Metamorphosis project[34] compiled a catalogue of potential measures and activities[35] to provide best practice-type case studies that may be used to develop further ideas to those seeking to transform their local neighbourhoods in a child-friendly way and to increase the quality of life for all citizens.

[29] See MORE D3.2 Future Road Users' Needs

[30] Pfeifer, Laura. "The Planner's Guide to Tactical Urbanism" (PDF). *Regina Urban Ecology*. Regina Urban Ecology.

[31] https://energy-cities.eu/project/life-living-streets/

[32] https://stad.gent/ghent-international/living-streets

[33] https://civitas-sunrise.eu/

[34] http://www.metamorphosis-project.eu

[35] http://www.metamorphosis-project.eu/sites/default/files/downloads/Metamorphosis_D2.2_v1.1.pdf

C-ITS and Geofencing: new opportunities to manage access and pay for use

Intelligent Transport Systems (ITS)[36] interventions by local authorities generally aim to optimise infrastructure use, generating space and time savings in order to improve services, and reduce costs and impacts. ITS-related activities for a city could be implemented for access restrictions and automatic enforcement, route optimisation (guidance and prioritisation), dynamic delivery space booking, data collection and real time information on traffic and parking conditions. As regards traffic management, there is still a need for better integration of urban traffic management systems and urban freight management systems in order to exchange information in both directions.

In C*ooperative Intelligent Transport Systems (C-ITS)*, stakeholders exchange data – enabling local authorities to make better decisions, and leading to improvements how local traffic works. It's a kind of "smart city" concept. The CIMEC project[37] has identified eighteen city-relevant "use cases", including providing priority for public transport at traffic signals; helping freight vehicles manage their speed, fuel usage and emissions; and supporting alter systems than could help forestall accidents with pedestrians and cyclists.

Geofencing is a technology based on telematics and satellite positioning which allows remotely monitoring a geographic area surrounded by a virtual fence (geofence) and automatically detect when tracked vehicles enter or exit these areas[38]. Sensors are being installed on the vehicles, communicating with satellite systems delimiting specific urban zones. This technology provides a possibility to enable an intelligent access to the specific zones, automated data collection and monitoring process as well as establish digital enforcement mechanisms.

Figure 27: Geofencing and C-ITS

[36] https://ec.europa.eu/transport/themes/its_en

[37] http://cimec-project.eu

[38] Reclus Fabrice, Drouard Kristen, (2009) Geofencing for Fleet & Freight Management, IEEE

Figure 28: Complete parking management system

5.1.5 **Conclusions**

There is a need for a holistic approach by and towards local authorities, which are the ones holding the broader overview of all users' needs and perspectives. They are in the best position to coordinate stakeholder cooperation and engagement activities, and they must consider the interests of all actors involved. In doing that, they should define long-term goals, to make sure all actors develop a common understanding of each other's challenges, needs and expectations, and based on these they define a shared strategy (taking account of the SUMP Guidelines).

It is key to develop an evidence-based regulatory system to ensure transparency and knowledge about the impact and effectiveness of the measures to reduce congestion, improve air quality and the liveability of the city. For example, local authorities could develop an actual baseline of emissions and other key performance indicators, to prove that the measures implemented are really improving the local situation. Transparency of revenue use is key to gain trust from citizens and stakeholders.

All administrative levels should act in synergy, to simplify local regulations to which citizens and local players are subject. EU regulations and guidelines can help, but cities should keep clear their own specificity and needs.

As for UVARs, there are more reasons than just poor air quality to manage access in cities. Local authorities should clearly define which are the challenges they are addressing through a participated development of a new access regulation. They should also set common principles, by exchanging good practices and discuss with all stakeholders about the approach for further regulation and operation of

urban space. However, a strict legislative approach to UVARs at the EU level will not be enough to solve the problem of the variety of regulations, since each city has to refer to its local context.

There is a pressing need to support the upgrade of local policies and regulatory frameworks to keep pace with and frame innovations, i.e. make them policy responsive. A need to make policies more data-driven has also emerged, requiring capacity building in city administrations for developing data-sharing protocols, mobility data collection and data driven policies.

Digitalisation, new transport modes, new shared mobility service providers, new market players, new partnerships, and new business models, can potentially help transform mobility in a sustainable and inclusive way, provided they are introduced in the right context and steered towards reaching policy objectives, and are integrated in the transport offer of the city in an accessible and equitable way. At the same time, we need to ensure that public transport and active travel remain the backbone of our mobility in cities.

5.2 Cyclists

The point of view of the cyclists was presented by the European Cyclist Federation (ECF)[39] . ECF is an umbrella federation for national cycling organisations representing individual citizens from 45 countries worldwide. ECF promotes and encourages cycling for daily transport, leisure and tourism worldwide while working to improve policies and legislation impacting conditions for cycling at the European level.

ECF runs numerous EU co-funded projects, with 118 project partners in 25 countries and co-ordinates the development of 80,000 km of the EuroVelo cycle route network. As a community, ECF involves also:

- Cities and Regions for Cyclists (CRC), a network of local and regional authorities promoting bicycle use. The aim of the network is putting cycling at the centre of urban planning and political thinking, at the same time inspiring more cities to take concrete action in promoting cycling.
- Scientists for Cycling (S4C), a global network of academics and individuals actively engaged in research, teaching and dissemination interested in cycling-related topics.

ECF's Velo-city conferences every year bring together over 1,000 practitioners involved in policy, promotion and the provision of cycling facilities and programs: engineers, planners, architects, social marketers, academic researchers, environmentalists, business, industry representatives and government at all levels.

[39] https://ecf.com/

5.2.1 Cyclist needs

The needs of cyclists as road users are usually classified into 5 main categories:

- **Coherence** – cycle routes are continuous, cycle network links all trip origins and destinations
- **Directness** – avoid detours and delays
- **Attractiveness** – aesthetics, minimise exposition to noise/pollution, social safety
- **Safety** – minimise risk of accidents and their potential consequences
- **Comfort** – minimise nuisances: vibrations, exertion, interruptions

The criteria were originally defined by CROW (Dutch technology platform for transport, infrastructure and public space),[40] but since then have been adopted into numerous national, regional and local guidelines with minor variations.[41]

Deliverable D1.2 provides examples how the general user needs translate into specific technical requirements and infrastructure parameters.

5.2.2 Example: safety

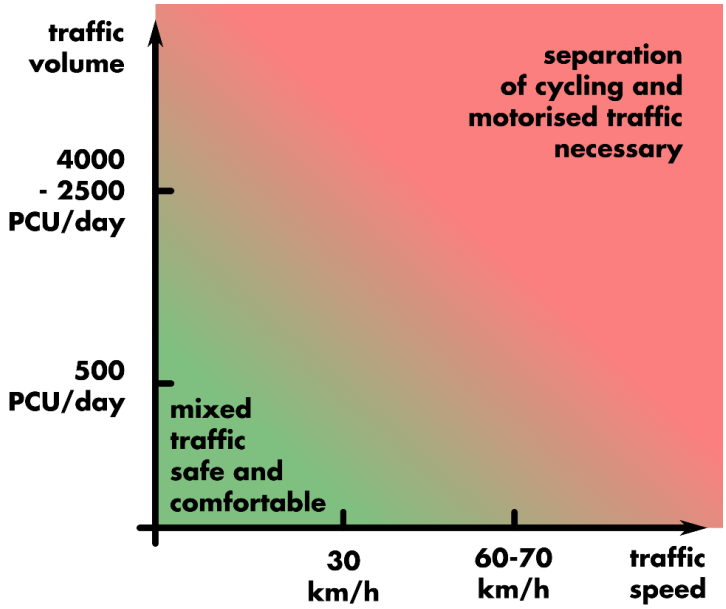
One of the basic issues of particular interests for the MORE TEN-T urban node corridors is the necessary degree of separation between cyclists and motorised vehicles. In terms of user needs, this is a part of the "safety" category. The higher the volume and speed of motorised vehicles, the bigger the need for segregation and the stronger segregation is needed, as presented in figure 27.

Exact thresholds vary between different countries and guidelines, but generally it is considered acceptable to mix cycle traffic with motorised vehicles on local streets with low volumes of cars, no heavy vehicles, and speeds up to 30 km/h[42] (bottom left corner of the graph). However, the MORE urban corridors are more likely to fit in the top middle part of the same graph (motorised traffic volumes above 4,000 personal car units/day and speeds probably between 40-70 km/h), where segregation is needed.

[40] "Design manual for bicycle traffic", most recent version available from: https://www.crow.nl/publicaties/design-manual-for-bicycle-traffic

[41] E.g. "Manual for the design of cyclepaths in Catalonia" separates coherence into accessibility (network density) and continuity (on route level).

[42] Some guidelines or standards consider also the volume of cyclists, see D1.2 for details.



- Separation from fast and heavy traffic
- Thresholds vary between countries and guidelines

Figure 29: Acceptability of mixing cycling and motorised vehicles as a function of traffic volume and speed, from the point of view of safety.

5.2.3 Solutions

From the user experience across different countries and cities, the following solutions have been successfully applied in contexts similar to MORE corridors:

- **Cycle paths** (also called **cycle tracks**): dedicated space for cyclists, physically separated (e.g. by a dividing verge, curb, safety barrier, bollards) from other transport modes.

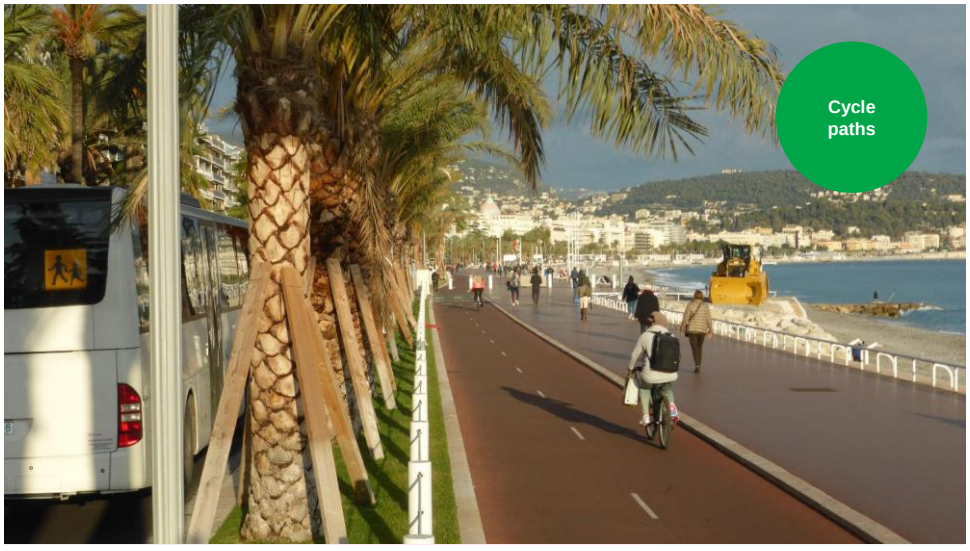


Figure 30 : Cycle paths

- **Service roads:** additional carriageways parallel to main carriageways and physically separated from them, with lower speed limit and motorised traffic reduced to vehicles specifically servicing the adjacent building (deliveries to local shops, parking for inhabitants). Traffic calming elements are desirable and it is necessary to ensure that the service roads are not used for "rat running" (bypassing traffic jams or traffic lights on the main carriageways). If the corridor is also a major cycle route, service carriageways should be organised as cycle streets – where cars are allowed, but cyclists have priority.

Figure 31: Service Road

- **Cycle lanes:** dedicated space for cyclists, separated from other parts of the carriageway by painted lines only. This is seemingly a simpler, but more controversial measure, requiring careful consideration of the local context before application. From the safety point of view, cycle lanes usually ensure better visibility of cyclists on crossings, but can also be very dangerous in combination with turning heavy good vehicles. In "starter" countries cycle lanes are often ineffective due to illegal parking; while cities with already high levels of cycling often prefer other solutions that are safer and cater to wider range of users.
-

Deliverable D1.2 provides specific requirements and parameters for each of these solutions.

Figure 32: Cycle Lanes

The following seemingly promised solutions have been tested and turned out to not fullfil their purpose in contexts similar to MORE corridors:

- **Part time cycle lanes** – space on the carriageway that is reserved for cyclists only in specific hours or days of the week (e.g. peak hours on weekdays) and can be used for other purposes (e.g. parking) outside them. On top of the general problems with cycle lanes, it means that no form of segregation is provided outside peak hours or on weekends. In major urban corridors the traffic volumes do not drop to levels acceptable for mixing cycling and motorised traffic also outside peak hours. Also, the speeds outside peak hours are higher rather than lower, increasing the safety hazards of cycling in mixed traffic.

Figure 33: Part time cycle lane

- **Slow lanes** – selected lanes on the carriageway where speed is limited to e.g. 30 km/h, separated from other lanes by painted lines only. The intention was to provide safer environment for cycling, but with the motorised traffic volumes in major urban corridors the sole reduction of speed (even if efficient) is not enough, especially in combination with complexity of manoeuvres on streets with multiple lanes in one direction.

Figure 34: "Slow lanes"

5.2.4 Major changes

One of the key trends that determine changes in user characteristics is growing popularity of Electrically Assisted Pedal Cycles (EPACs) – bicycles that add a small electric boost to a pedalled bicycle. They constitute currently 10% of the EU bicycle sales market with systematic 15–20% growth each year.[43] See Figure 33.

[43] http://www.conebi.eu/facts-and-figures/

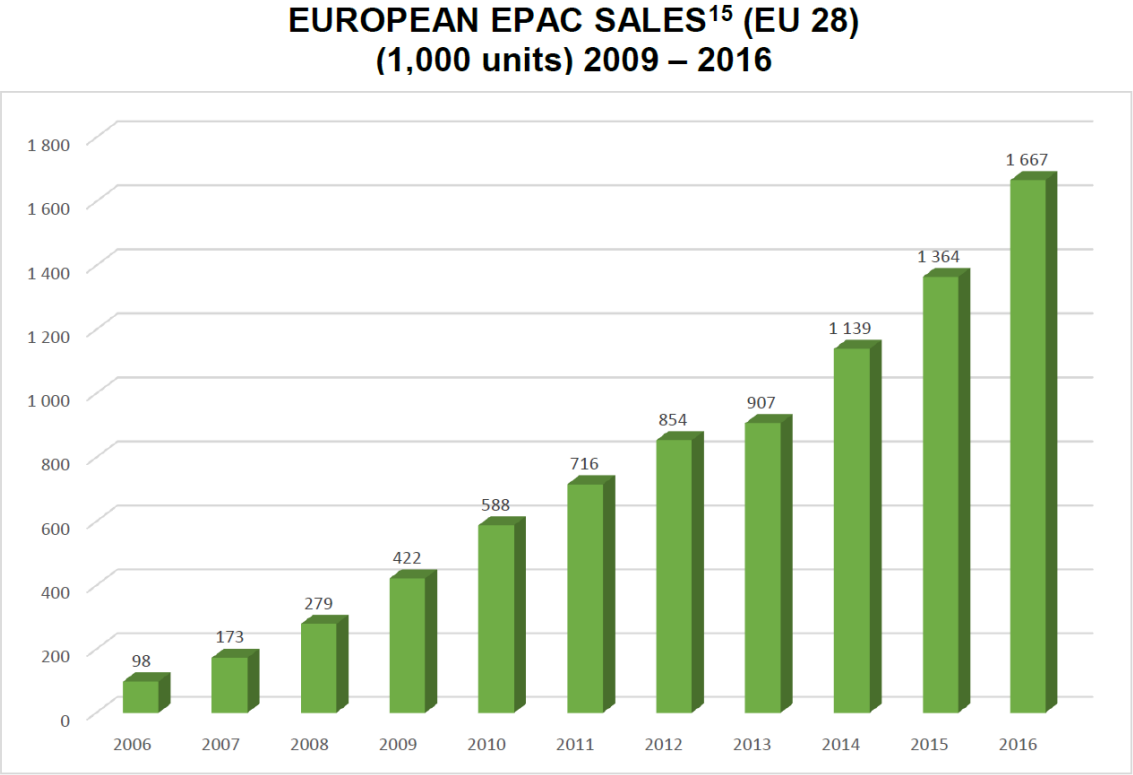


Figure 35: European sales of Electrically Assisted Pedal Cycles 2006-2016.

EPACs affect public attitudes and infrastructural needs in several ways:

- Eliminate many of the traditional barriers to cycling by providing an extra push on uphill or in headwind.
- Allow to cycle faster and with lower energy expenditure, making cycling a viable option for commuting also on longer distances. This means that cycle networks need to expand from core urban areas into suburbs or whole regions. A new, higher standard of infrastructure is needed on main routes (cycle highways) to accommodate faster speeds and safe co-existence of different subtypes of users.
- Allow elderly to continue cycling. This also necessitates better quality of infrastructure to accommodate longer reaction times (stopping sight distance) and lower contract sensitivity (quality of lighting, signage, horizontal markings).

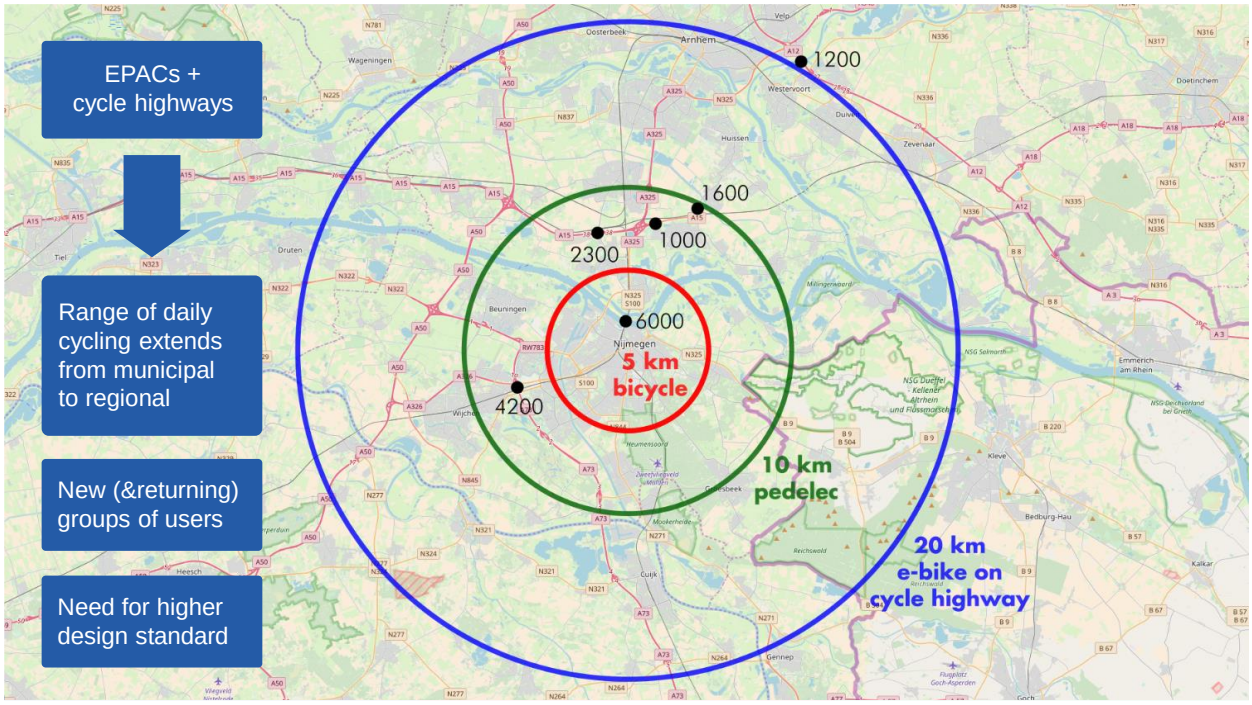


Figure 36: Comparison of range of typical journeys on traditional bicycles, pedelecs and speed pedelecs on cycle highways.

5.2.5 Good practices

5.2.5.1 Mechelen, Belgium

Brussels and Antwerp, two biggest Belgian cities, are connected by railroad (both high-speed and conventional TEN-T lines), A1 motorway (part of the North Sea – Baltic and North Sea – Mediterranean core TEN-T road corridors), national road N1 and cycle highway F1 (in development). All of the aforementioned corridors meet in the southern part of the city of Mechelen, creating a particular challenge for retrofitting the cycle highway into a complex knot of existing TEN-T infrastructure.

To meet the challenge, two interesting solutions have been planned and designed in the area, as shown in Figure 35:

1. On the bridge of the N1 road over the A1 motorway, the carriageway width is reallocated to create space for bidirectional, 4-meter wide cycle path on the eastern side of the bridge. This will be the main cycle highway. It is bidirectional to avoid the need of crossing N1 by through bicycle traffic, thus providing a more direct and faster route (see *directness* in section 5.1.1) with less conflict points (*safety*). On the western side, existing cycle lane is rebuilt into a 2-meter wide cycle path to maintain a local connection (*coherence*).
2. Between the bridge and the centre of Mechelen, the cycle highway is planned to be decoupled from the N1 road and to follow the parallel railroad line instead. This will allow

avoiding conflict points (*safety*),[44] especially with vehicles entering and exiting parkings of retail stores located between the road and the railroad line. At the same the main cycle route will be less exposed to pollution and noise from cars (*attractiveness*).

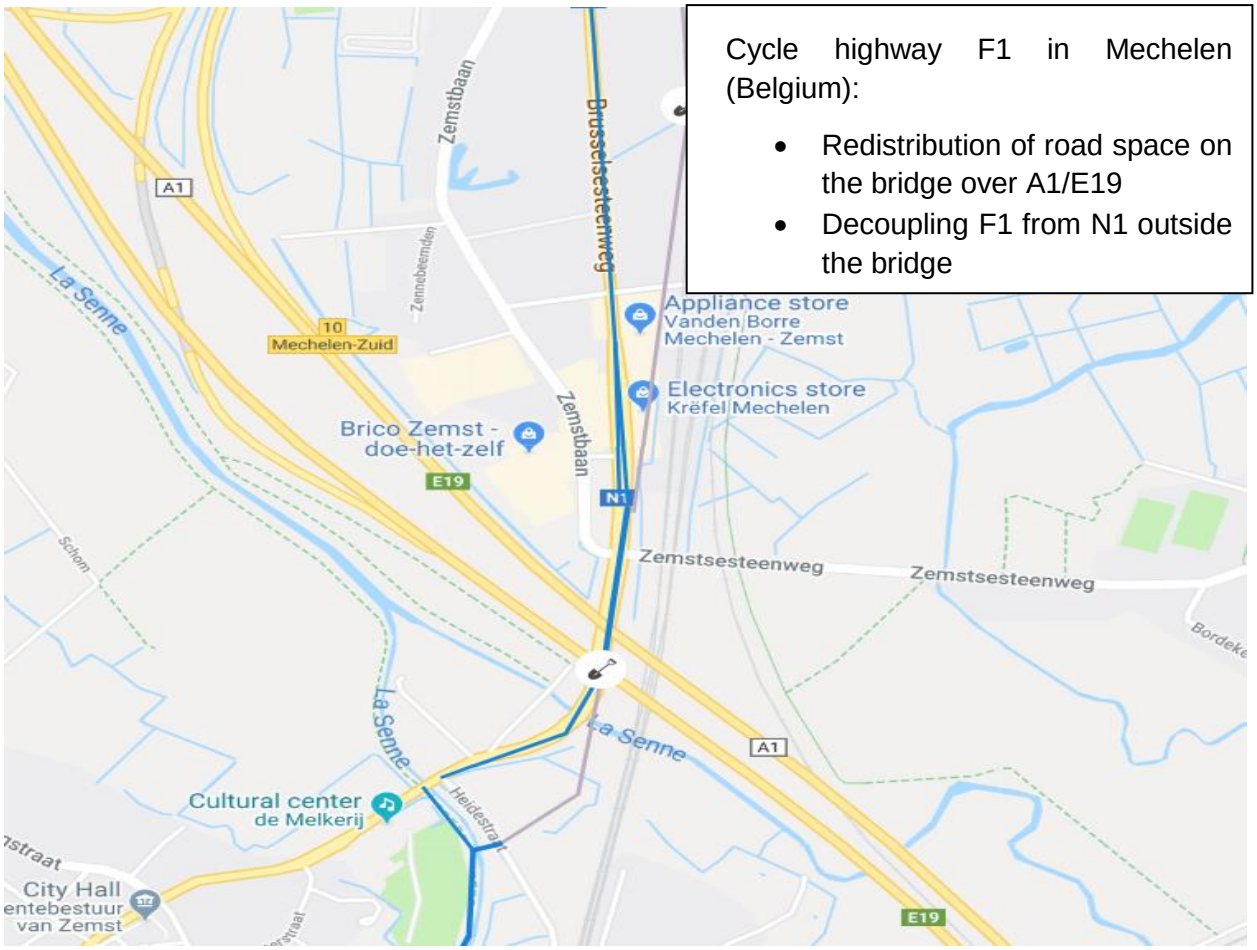


Figure 37: Elements of the planned improvements on the F1 cycle highway in southern part of Mechelen, Belgium. Map credit: Google Maps, fietssnelwegen.be.

[44] A potential conflict point in the new corridor would be a crossing with local street Geerdegemstraat, with limited visibility as a safety hazard. Solutions for the crossing were analysed and camera counts showed that 80% of traffic in the street had no destination in the street. The local inhabitants convinced the municipality to cut the street to eliminate the through traffic (application of filtered permeability, a principle further discussed in the Copenhagen case study). This is a win-win solution: safe cycle route and improved quality of life for local inhabitants.

Figure 38: Retrofitting of the F1 cycle highway on the N1 road bridge over the A1 motorway. Continuation towards the centre of Mechelen along the railroad line in the bottom right corner.

It is worth noting that the section crosses the border of provinces – the bridge, currently under reconstruction (1), is located in Flemish Brabant; while the municipality of Mechelen where the further works are planned (2) belongs to the province of Antwerp.

Why is it an interesting case study and what can we learn from it?

- Old national roads that do not need to carry long distance traffic anymore because of a parallel motorway or expressway can be redesigned in order to better accommodate cycling traffic. Of particular interest are bridges and tunnels, where reusing existing structures can bring substantial savings. Redistribution of road space can also serve to discourage induced traffic.
- Railroad corridors usually include a buffer space next to the tracks that because of safety reasons, vibrations or noise is not suitable for any buildings or planting trees, but perfect for cycling infrastructure. Key advantages include low gradients and limited number of crossings with road network (and the easiness of integrating grade-separated crossings for cyclists at the locations roads cross a TEN-T railroad). The cycle path can also serve as access for maintenance of the railroad.[45]
- Different approaches (e.g. redistribute road space vs decouple main cycling and car routes, road vs rail corridor etc.) can be mixed along one corridor in order to best fit user needs in the local context.

[45] On the other hand, the rail line can be also a barrier (but this can be remedied by sufficient density of safe and comfortable crossings).

- Growing range of cycling necessitates thinking about cycle routes and networks at larger scale. Good co-operation and co-ordination are needed across municipal or even regional borders.

5.1.5.2 **Copenhagen, Denmark**:

While the Mechelen case study tackled a challenging situation in commercial area on the outskirts of a city, the section of the C95 cycle highway can be an interesting example how to deal with tight space in core urban areas in the centre of agglomeration. Nørrebrogade (North Bridge Street) is a continuation of road number 211 from Frederikssund into the very centre of Copenhagen. It is also a busy shopping street, important public transport corridor and a part of cycle superhighway C95, bringing in cycle traffic from north-western suburbs up to Farum, 20 km away.

One of the key measures applied on Nørrebrogade was the integration of a whole range of different and seemingly conflicting user needs through **filtered permeability**. Cars and motorcycles are "filtered out" on two short sections of the street (between Borgmestervangen and Nordre Fasanvej next to the Nørrebro train station, and 2 km further, between Elmegade and Fælledvej). Those section are closed to all motorised traffic except buses. Housing and businesses along the street can still be reached by car, but the whole route became unattractive for through traffic. This greatly reduced the volume of motorised traffic. As a result, space was freed to improve conditions for walking and cycling, and buses are not stuck in traffic jams.

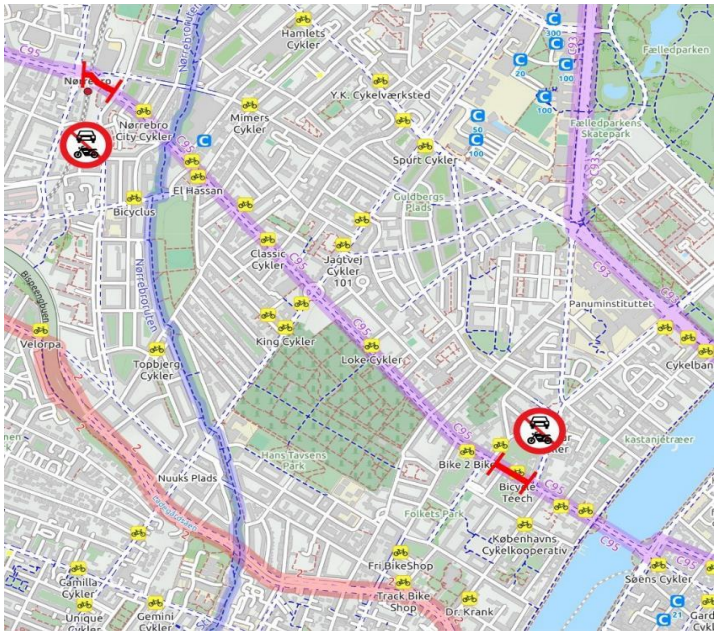


Figure 39: Left: location of the cycle highway C95 and sections of Nørrebrogade closed to private motorised traffic; background map © OpenStreetMap contributors. Right: implementation of filtered through obligation to turn right with exception for bicycles and busses.

Nørrebrogade ends with Dronning Louises Bro (Queen Louise Bridge). Because of the measures applied on the street, between 2008 and 2016 the number of cars driving across the bridge dropped by nearly 60%, but the total number of people using the bridge increased by 16,000 per day. The number of

cyclists grew by 60% (up to 48,000 per day) and bus passengers by 5%. An interesting side effect is that the number of people spending time on the bridge – hanging out, sitting on the benches – increased as much as 15 times.

5.3 Pedestrians

5.3.1 International Federation of Pedestrians

The International Federation of Pedestrians (IFP) is a network of non-profit associations and individuals from all over the world, working for pedestrians and liveable public space. IFP was founded as an UN-accredited NGO in 1963.

The key focus of a pedestrian association it to motivate politicians and planners to think positively about walkability in their community and carry this approach through to all their decisions. This includes the structure of the public space, vehicle speed and parking (and the enforcement thereof) and genuine accessibility considerations, with appropriate status given to the different transport modes in the community.

Vision of IFP: A world that is inviting, safe and comfortable for all to walk.

Mission of IFP: Walking is not only a natural right. Walking is a legitimate use of public space and people should be supported and encouraged to choose to walk. Being an essential part of sustainable mobility, walking improves health and liveability of communities.

5.3.2 IFP objectives:

- **Facilitating exchange of experience and expertise between members worldwide.** IFP's membership consists of a wide range of organisations, from small local voluntary groups to large professionally organised entities. They learn from and are inspired by each other. Collaboration is an important element for IFP. We facilitate the exchange of information by means of communication enhancers such as IFPedestrians.net and social media such as Facebook, Twitter and Instagram.
- **Formulating policy statements** based on input from members. While IFP has been indirectly influencing policies through its work with the international community, we develop policy statements helping our members to create a common international front for pedestrian rights.
- **Inspiring/engaging grass roots capacity building**. IFP stimulates pedestrian activities and building of local organisations. The possibility to be part of a broader worldwide movement strengthens early developing NGOs. We deliver international workshops (the last one was focusing on sharing experiences and network building) to reach that goal.
- **Stimulating local, national and international initiatives.** IFP supports its members' initiatives either by allowing them to frame their goals / actions in a broader worldwide picture by

positioning it with best practices around the world, or by writing to local governments to support their positions or projects.

- **Working with international organisations.** IFP actively contributes to global policies and actions to the benefit of pedestrians such through the United Nations Road Safety Collaboration, Sustainable Mobility for All and the International Transport Forum. IFP will increase its participation in the Global Forum for Road Traffic Safety (former Working Party 1 / UNECE).

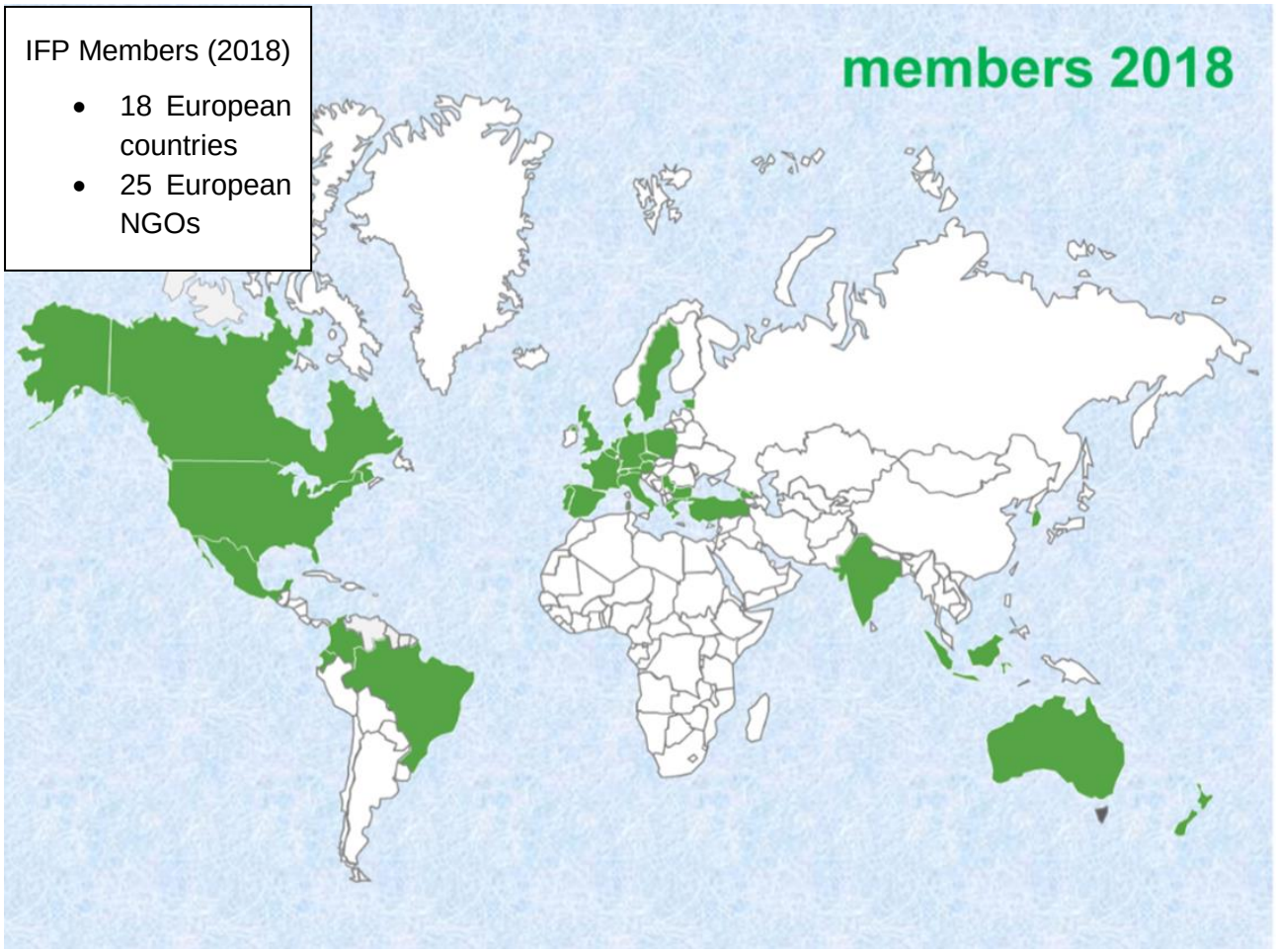


Figure 40: IFP members

5.3.3 Who is a pedestrian?

Pedestrian[46]
/pɪˈdɛstrɪən/
Noun
1. A person walking rather than travelling in a vehicle.

Even if a relative straightforward and easily understood by most, there are some characteristics worth noting:

- **Pedestrian / walker**: the word pedestrian does have a pejorative meaning. Pedestrian comes from the Latin *pedester* meaning "going on foot" but also "plain" - as an adjective it means "lacking wit or imagination". Therefore, some authors prefer the word walker.
- Non-motorised mode / **Active Mode**: for many years in Transport literature, cycling and walking were named as non-motorised modes. More recently, the expression Active Mode is preferred to turn the name positive (instead of being named for what is not) and to underscore the fact that both cycling and walking have a central role in the promotion of physical activity and public health in general.
- **Universality and Vulnerability:** the condition of pedestrian is Universal (everyone is one and does not need a permit) and it is vulnerable to collisions with vehicles (motorised or bicycles). These two conditions are key for granting them more rights of protection than any other mode of transport. It should be noted that persons in wheelchairs are usually classified as pedestrians.
- **Taken for granted (100%)**: the fact that everyone is a pedestrian is a strength and a weakness. Pedestrian sociological identity is weaker and therefore pedestrian advocacy is also weaker (than motorised vehicles and bicycles). Paradoxically its universality can be the explanation why is very often forgotten during the planning process or the management of infrastructure.
- **Safety:** in a collision, energy is transferred between the objects that collide. Pedestrians do not have an exoskeleton like most motorised vehicles. They have a lower mass and speeds. These characteristics make them particularly vulnerable in public space. The condition of universality exacerbates this vulnerability – children and elderly do not have the reflexes to evaluate danger, calculate speed and breaking distances as an average adult. People with disabilities often cannot “cross the eye with the driver”, “hear a traffic light”…
- **Walkability**: In simple terms Walkability is a measure of how friendly an area is for walking. In professional, research and public debates the term “walkability” is used to refer to several

[46] Oxford Dictionary

quite different kinds of phenomena[47]. In order to understand walkability, it is important to consider how pedestrians are defined and the discourses that shape the development of pedestrian space.[48] The definition of walkability is not specific but can be explained as attempt to measure the suitability that the urban road environment offers to pedestrians. It is usually one or several indicators with the objective to measure this "suitability".

- **The benefits of walking:** walking is inexpensive, efficient[49], and healthy.[50]

5.3.4 Main problem

Having to choose one problem that most hinders the safety and comfort of pedestrians, it has to be the speed of vehicles[51].

Apart from the fact that mass and speed have important roles in transferring energies during a crash incidence (kinetic energy), there are many indirect effects of speed on the real and perceived risk of a pedestrians but also the perception of comfort (higher speeds increases noise levels, for example).

The picture below illustrates how the field of vision reduces with the increase of speed. Also the probability of a pedestrian surviving for various speeds (reduces exponentially after 30 km/h).

[47] Forsyth, A. (2015). What is a walkable place? The walkability debate in urban design. *Urban design international*, *20*(4), 274-292.

[48] Lo, R. H. (2009). Walkability: what is it? *Journal of Urbanism*, *2*(2), 145-166.

[49] Litman, T. A. (2017). *Economic value of walkability*. Victoria Transport Policy Institute.

[50] Lee, I. M., & Buchner, D. M. (2008). The importance of walking to public health. *Medicine & Science in Sports & Exercise*, *40*(7), S512-S518.

[51] Leaf, W. A., & Preusser, D. F. (1999). *Literature review on vehicle travel speeds and pedestrian injuries*. US Department of Transportation, National Highway Traffic Safety Administration.

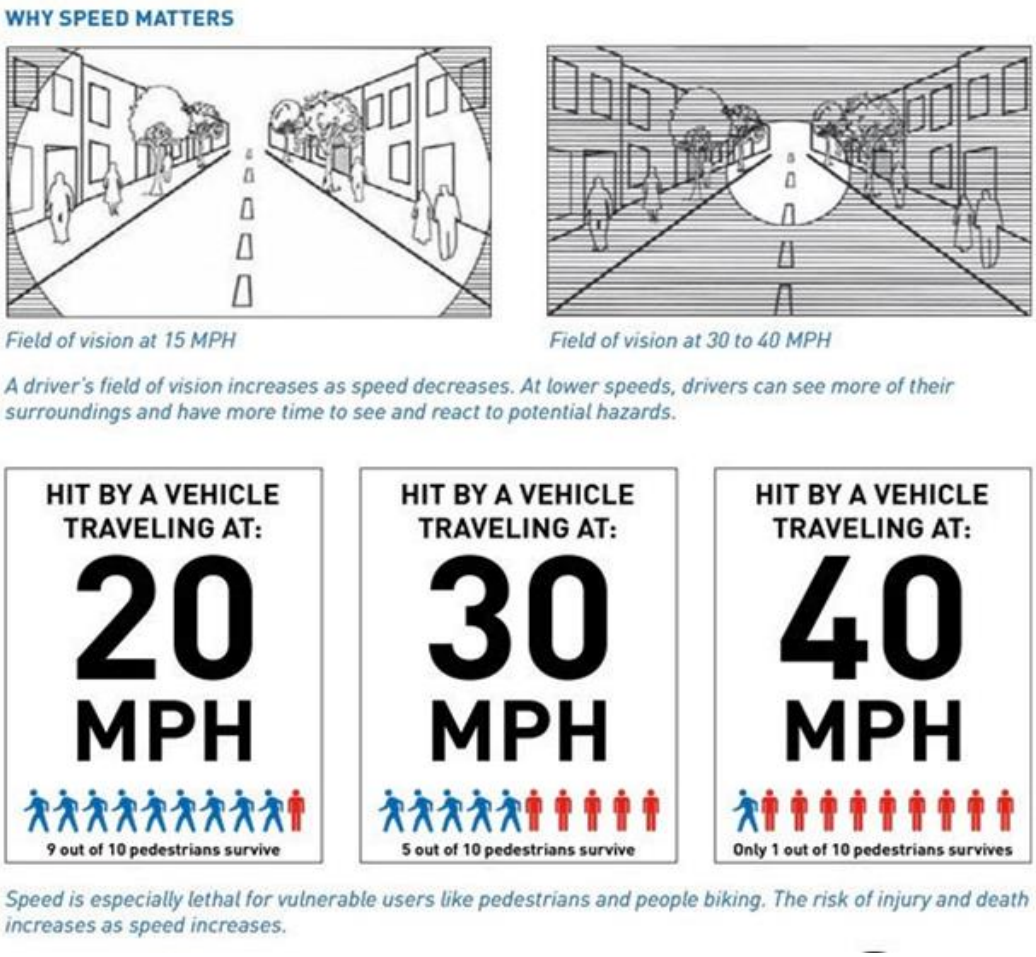


Figure 41: Vehicle speed and pedestrians (SAFE STREETS)

5.3.5 Actual and future needs

Most actual and future needs of pedestrians can be addressed by improving these four items:

- **Quality of public space** – good pavements, trees (shade), benches, active frontages[52]
- **Safety** – lower speeds, abundant and safe crossings[53]

[52] Gehl, J. (2011). *Life between buildings: using public space*. Island press.

[53] Campbell, B. J., Zegeer, C. V., Huang, H. H., & Cynecki, M. J. (2003). *A review of pedestrian safety research in the United States and abroad* (No. FHWA-RD-03-042; HRDS-06/01-04 (1M) E). United States. Federal Highway Administration. Office of Safety.

- **Air Quality** – vehicle emissions are a major source of air pollution in urban areas[54]
- **Noise reduction** – noise is a key a factor for low pedestrian perception of quality of space.[55]

5.3.6 Major future changes/challenges

- **Autonomous vehicles (carriageway and footway)**

Pedestrians pose very complex challenges to autonomous driving. Approaching the autonomous vehicle debate we need more than taking into account all relevant users - a well-designed system should prioritise the safety of the most vulnerable. On the road system this should be walkers, and particularly the elderly, vision impaired, people with disabilities and children first. Therefore, the safety of the most vulnerable should be yardstick to measure the quality of an ethically acceptable automated transport system and should be the centrepiece of the debate.[56]

Note that there are also tests of autonomous vehicles for deliveries, which circulate on the footways/pavements/sidewalks – posing new dangers for pedestrians.

- **Micromobility**

There has been an explosion in the past few years of new micromobility devices. Until now mainly e-scooters, but the trend will be to include many other kind of small personal vehicles, such as e-scooters. These create potential clashes with pedestrians on footways and when crossing roads. Also vehicle parking on footways (official or illegal) is already eroding pedestrians' space. And creating clutter and obstacle especially for blind pedestrians.

5.3.7 Best solutions

- **Vision Zero**

Vision Zero is a road traffic safety concept that was approved by the Swedish parliament in October 1997 that aims to achieve a highway system with zero fatalities or serious injuries.

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[54] Rakowska, A., Wong, K. C., Townsend, T., Chan, K. L., Westerdahl, D., Ng, S., & Ning, Z. (2014). Impact of traffic volume and composition on the air quality and pedestrian exposure in urban street canyon. *Atmospheric Environment*, *98*, 260-270.

[55] Sheng, N., & Tang, U. W. (2011). Spatial analysis of urban form and pedestrian exposure to traffic noise. *International journal of environmental research and public health*, *8*(6), 1977-1990.

[56] Alves, M (2017) Driven by distraction: sustainable road safety and the impact of autonomous driving on vulnerable users, Walk21, Calgary.

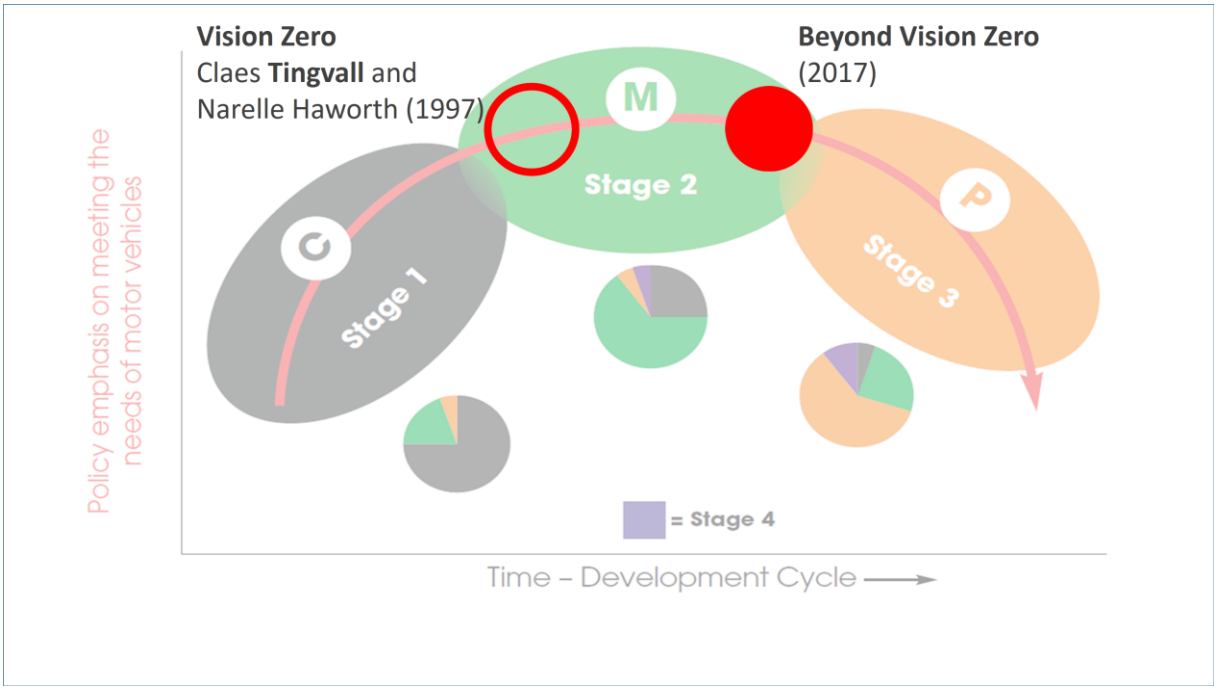

Figure 42: City of Places and Vision Zero [11]

According to one of its main proponents Claes Tingvall, Vision Zero is based on an underlying ethical principle that "it can never be ethically acceptable that people are killed or seriously injured when moving within the road transport system."

Since its adoption in Sweden, the concept has spread around the world: many cities in Canada and USA have adopted it officially. Moreover, many advocacy groups throughout the world have defended Vision Zero to be adopted for their countries and cities.

Vision Zero is ethically sound and transformational. However, the original Vision Zero concept did not challenge the possibility of people keeping on using their cars and just tried to minimize the deaths and injuries in traffic. But the urgent need to reducing health damaging air pollution, reducing carbon emissions in line with national climate change targets and stripping out fear and danger in the road traffic environment will imply significant increases in walking, cycling and Public Transport.

Therefore, there is a need to go beyond and start to think of a Vision Zero 2.0 where mode shifts are the main and primary objective. Reduction fatalities to zero is a very valid but ultimate poor objective - you can have measures that might help to move towards that goal but are unacceptable (like pedestrian uncomfortable barriers between lanes, hi-viz for pedestrians, and on and on).

The stage 3 “City of Places”[57] might need an update of Vision Zero[58]:

Vision Zero	Beyond vision Zero
Focus fatalities	Focus on Modal shift
Road safety	Road danger reduction
Traffic calming	Liveability
Ethical imperative	Political choice

5.3.8 Cities demonstrating good practices

In recent years, we have been observing the following trends and good practices that favour pedestrians and walkability. Here are some examples:

- Tactical Urbanism: Salzburg
- Space-Wise Planning: Barcelona (Superblocks)
- Small-Mid-sized city: Pontevedra
- Public Space: Parklets (several)
- Classic Traffic Calming: (Pedestrian refuge)

Tactical Urbanism (presented earlier under city perspectives) is an approach to public space that uses short-term, low-cost, and scalable interventions and policies to catalyse long-term change. Hereunder is a temporary, fast and low cost intervention in **Salzburg**, Austria (see Figure 41). It is a demonstration of a “*what if*” situation and also a conversation starter.

[57] Jones, P., Anciaes, P. R., Buckingham, C., Cavoli, C., Cohen, T., Cristea, L., ... & Pickup, L. (2018). Urban mobility: preparing for the future, learning from the past-CREATE project summary and recommendations.

[58] Alves, M (2018): Beyond Vision Zero, Bogota, Walk21.

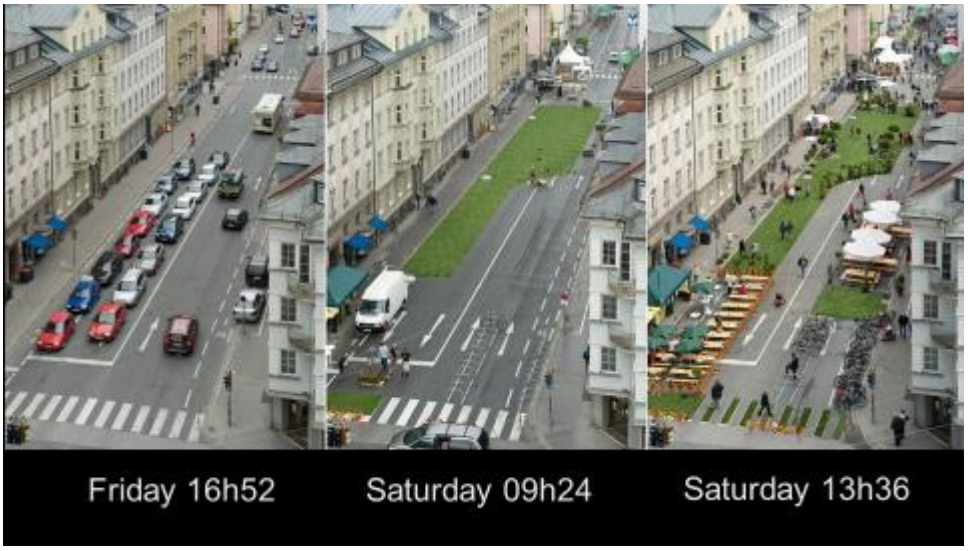

Figure 43: Salzburg, Austria

Based on the idea of Environmental Areas of Buchanan[59] **Barcelona** is creating what it calls "citizen spaces". The plan is based around the idea of superilles (superblocks) – mini neighborhoods around which traffic will flow, and in which spaces will be repurposed to "fill our city with life".

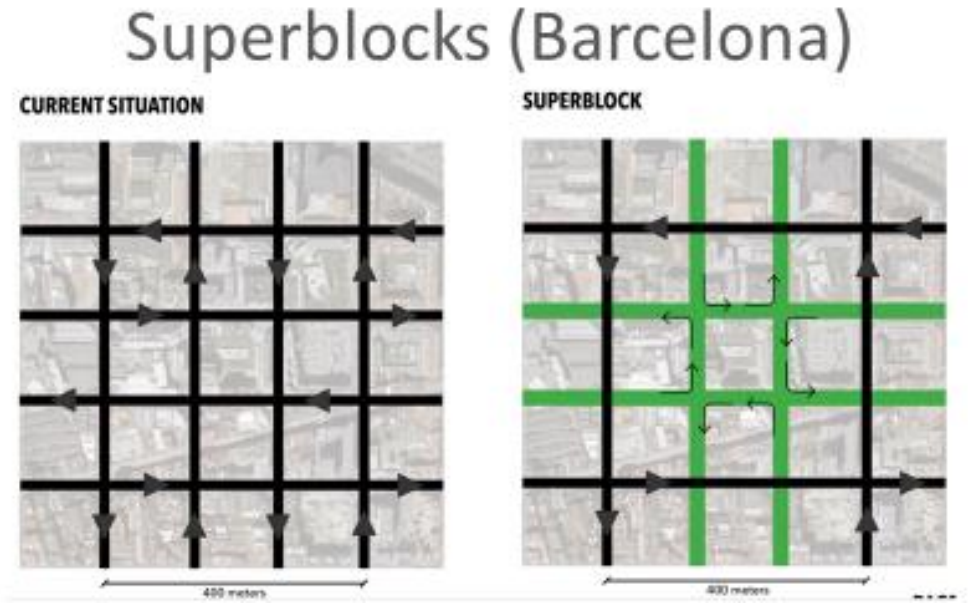

Figure 44: Superblocks Barcelona (BCNecologia)

[59] Buchanan, C. (2015). *Traffic in Towns: A study of the long term problems of traffic in urban areas*. Routledge.

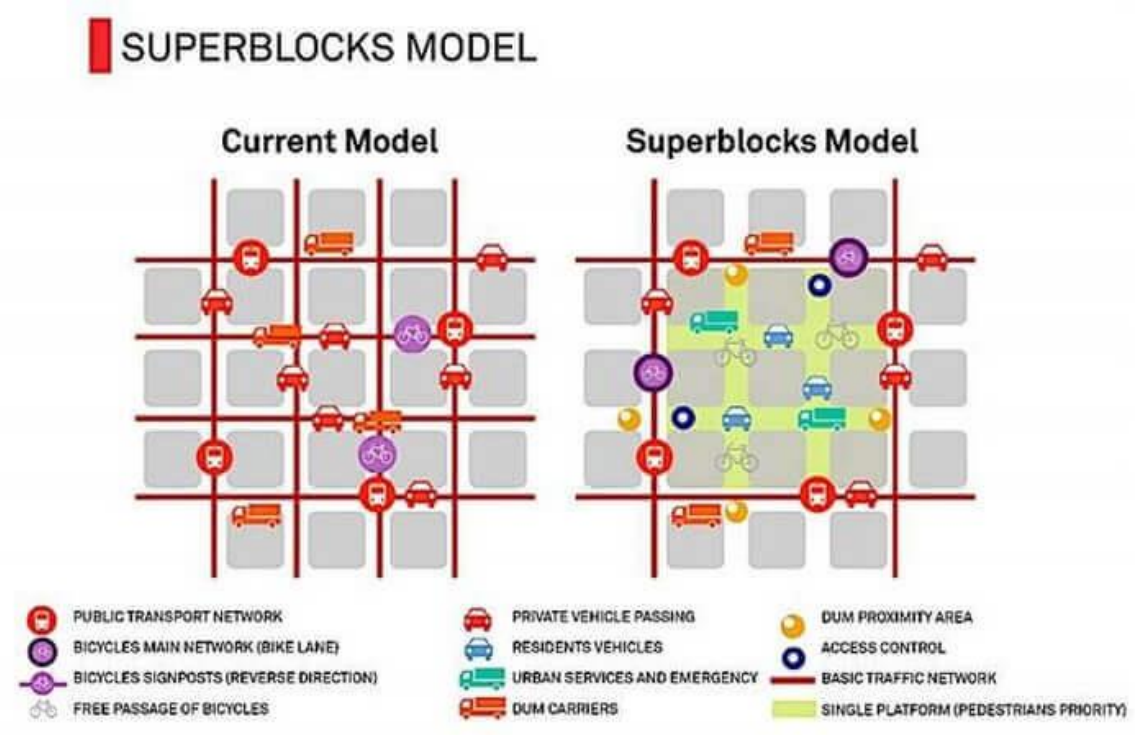

Figure 45: Superblocks model (BCNecologia)

Pontevedra became known in the last decade as what could be a good example of "pedestrian city". Their model defends the idea that the total number of cars that are needed for the city to function properly is far lower than people think. Suppressing indiscriminate parking in central streets was, and still is, one of the key measures that makes it possible to mitigate the effects of traffic

Parklets (small seating area or green space created as a public amenity on or alongside a pavement, especially in a former roadside parking space) have been one of the promising tools for cities to take over public space usually previously dedicated to car parking.

Figure 46: Good practice example: 'parklets' (Perfeitura São Paulo)

One of the cheapest and more effective to make a pedestrians crossing safe is to create a pedestrian refuge (Figure 45), especially on main roads like the ones studied in the MORE project:

Figure 47: Good safety design practice (Global Design Cities Initiative).

Medians or refuge islands create a two-stage crossing for pedestrians, making it easier and safer to cross multiple lanes of traffic. They should be installed in all streets where pedestrians have to cross three or more lanes or in narrower streets where speeds and vehicular volumes make single-stage crossings prohibitive or unsafe.

5.3.9 Good practices policy wise

In the last decade, we can underscore policy measures towards car reduction in some city centres. Most are targeting high emission vehicles A low-emission zone (LEZ) is a defined area where access by some polluting vehicles is restricted or deterred with the aim of improving the air quality. But the effect of the reduction of cars has also large benefits for the quality of space.[60]

[60] Nieuwenhuijsen, M., Bastiaanssen, J., Sersli, S., Waygood, E. O. D., & Khreis, H. (2019). Implementing Car-Free Cities: Rationale, Requirements, Barriers and Facilitators. In *Integrating Human Health into Urban and Transport Planning* (pp. 199-219). Springer, Cham.

- **Car-free city centres / Low Emission Zones: Oslo, Madrid, London, Paris**

  The most well-known examples of LEZ are also the largest areas:

  Oslo currently has **130 hectares** with restrictions on car traffic - with the usual exceptions for persons with reduced mobility and public transport. During 2017-18 the municipality eliminated almost 1000 parking spaces, having only kept about 50 for loading and unloading and people with reduced mobility, and taking advantage of the eliminated parking space for tree planting, living areas, small gardens, playgrounds.

  Madrid in 2018 implemented "Madrid Central" (which despite its uncertain future due to the new municipal management) made **472 hectares** of central Madrid accessible only by car to residents and by public transport. Non-residents may enter under special permits, including electric vehicles for parking in public parks -exceptions made for persons with reduced mobility. Although might be reformulated, the recent elected have already promised to support plans for further car restriction plans in the coming months. In the second quarter of 2019, Madrid City Council metering stations recorded the lowest levels of nitrogen dioxide (NO2) pollution in the last ten years.

  In April 2019 **London** created the Ultra-Low Emissions Zone with **2100 hectares**, where pre-2006 diesel and gasoline vehicles have to pay around 11 euros to enter.

- **Congestion Charging**

  London has for over fifteen years had an area of **610 hectares** where vehicles now pay about 13 Euros to enter.

5.4 Commercial Road Transport Operators

IRU represents the commercial road transport sector, namely taxi, bus, coach and truck operators.

IRU is the global industry association for commercial road transport. IRU's work spans more than 100 countries and IRU's core constituents are national road transport associations and road transport operators. But IRU also works closely with businesses, governments, the UN and international organisations. At the heart of IRU are millions of journeys across the planet every day: people and goods moving to where they need to be, in buses, coaches, taxis or trucks, for all, or even just a small part, of their journey.

IRU believes in mobility that supports economies, jobs, security, the environment and communities and in transport networks that are safe, accessible, rapid, efficient and adaptable, reasonably priced, innovative and interconnected. IRU also believes in transport markets that are fair, well-regulated and non-discriminatory to different modes or users.

IRU aims to shape global mobility, to develop knowledge, to build networks, to conduct advocacy and to deliver services. Bringing together operators, associations, industry suppliers and stakeholders, IRU shapes global mobility.

In Europe, IRU represents 1 million companies and 5 million workers that provide 75% of inland logistics and 30% of the collective mobility needs of the European people.

Commercial road freight transport is a key component of efficient logistics chains and is often the only option for urban delivery. The fundamental role of collective passenger transport, namely buses, coaches and shared mobility by taxi, in providing viable, safe, inclusive and environmentally friendly alternatives to the private car and in solving congestion problems must be recognised.

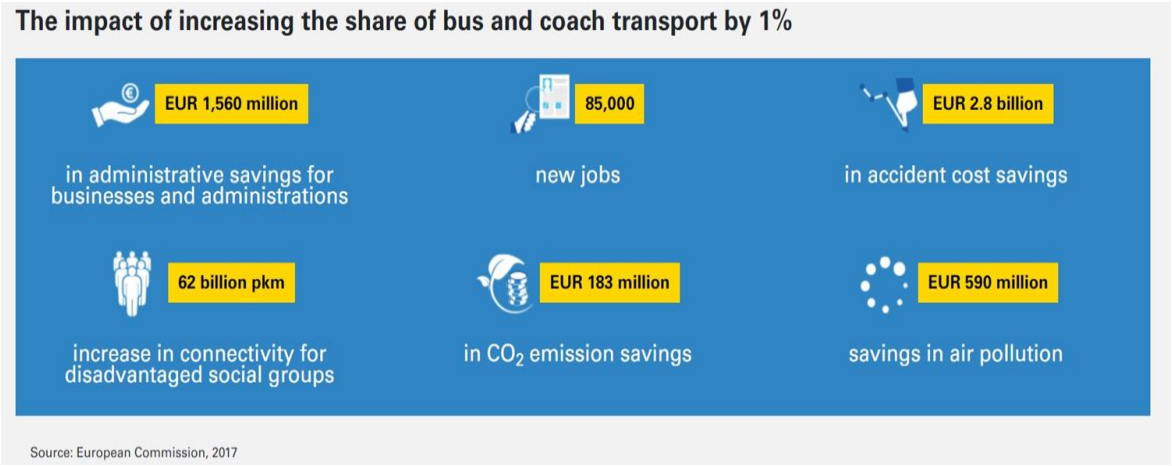

Figure 48: The impact of increasing the share of bus and coach transport by 1%

5.4.1 Main challenges

An increasing number of European cities are unilaterally introducing urban vehicle access regulations (UVARs) which restrict entry. These restrictions can take the form of entry taxes or traffic bans (including the so-called “diesel bans”). Road freight and passenger transport companies active in several municipal areas are facing increasing challenges to meet these highly divergent unilateral measures. Too often, UVARs have a greater impact on commercial road freight and passenger transport companies than on individual passenger car movements. These regulations create barriers to the provision of cross-border and domestic commercial road transport services with no guarantee of solving the challenges they are aimed to address. Additionally, the absence of a harmonised framework for the introduction and operation of UVARs at EU and national level increases costs, creates legal and administrative uncertainty and casts doubt over the economic returns of the investments made. Moreover, the introduction and implementation of UVARs is often done without proper prior consultation of the economic stakeholders or their representative associations. Decisions

are frequently made without a sound and objective impact assessment and are therefore often disproportionate compared to the objectives to be achieved.

5.4.2 Policy Proposals

The commercial road freight and passenger transport industry recognises the major challenges facing European cities in terms of meeting the EU air quality standards, but this should not necessarily lead to restricting commercial road transport movements.

At local level, less restrictive measures should be contemplated such as the wider deployment of ICT and ITS tools to allow optimised itineraries for commercial vehicles, priority at traffic lights and real-time information on infrastructure availability. Such measures have proven to have a potential to reduce the negative environmental impacts of commercial fleets.

At the EU level, IRU considers that streamlining the process leading to the adoption and implementation of UVARs by individual cities at EU level could contribute to more legal certainty for road transport operators who are active in several municipal areas across Europe and could encourage the deployment of more cost efficient solutions. IRU supports the establishment of an EU framework for the introduction of new UVARs and the operation of existing ones by public authorities. Such a future framework should include the following principles:

Impact assessment: before taking any administrative decision, local authorities planning to introduce UVARs should undertake a proper impact assessment involving a cost and benefit analysis from an environmental, social and economic perspective, including the impact of the proposed measures on the local economy, businesses and visitors. Impact assessments should be reviewed at regular intervals in order to assess the effectiveness of existing UVARs.

Consultation, information and notification: before taking any administrative decision, local authorities planning to introduce UVARs should organise consultations with representative stakeholders at all levels (local, regional, national and international). Decisions to introduce UVARs should be notified to the European Commission. Harmonised standards for information and vehicle registration should be developed by the European Commission. Information about new and existing schemes, the related administrative procedures and the transition periods should be available in a standardised, multilingual format via an “EU single window”.

Proportionality: UVARs should be proportionate and fit for purpose without disproportionately disrupting the freedom to provide mobility and logistics services. Before taking any administrative decision affecting collective passenger transport and urban logistics by road, municipal authorities should justify that the envisaged restrictions are necessary, measured and appropriate to solving the identified problems, and show that all other less restrictive alternative measures have been considered and proven inadequate. When restrictive measures can be justified, they should be accompanied with alternatives to ensure that the transport services concerned are not discontinued.

Technology neutrality: the adoption of alternative and renewable fuels will be key in the foreseeable future. Vehicle access standards should be based on performance standards rather than on vehicle age

or the prescription of a given technology. Sufficient economical lead times that take into consideration the rate of depreciation of vehicles used in commercial road transport should be set.

Unrestricted access to cities: unrestricted access to cities should be granted to commercial vehicles which comply with the latest European norms and standards, supply collective or shared mobility services (coaches and taxis, in particular when they are used to service vulnerable users – schoolchildren older people, persons with reduced mobility), use alternative and renewable fuels or load and unload during off-peak traffic periods.

Mutual recognition: all official documents issued by a duly authorised public or private body to certify the vehicle compliance or conformity with relevant EU or national standards should be recognised by the enforcement authorities of any other EU Member State. This includes evidence documents for retrofitting and tailpipe emission tests, periodic roadworthiness testing certificates and entry permits.

6 Conclusions

This research endeavoured to have a preliminary look at urban road user needs and identify their behaviour patterns at peak hours, which are the main reasons for traffic disruption and what can be possible solutions to improve traffic flow in urban areas, from the perspective of each road user group. To achieve this goal, three actions were taken to collect the necessary data; namely, information was provided from (1) desk research, which was conducted to collect basic information on user needs in the urban areas (and reported in D1.2); (2) a web-based survey was designed and conducted to collect quantitative date from various group of users active in urban streets; and (3) an online workshop was organised with representatives of various user groups and experts to obtain more detailed qualitative date. The three sources of information together made it possible, to a certain extent, to reconstruct a pattern for the needs and behaviour of each group on a busy urban street by placing them in space/time framework.

D1.1 looked how these patterns overlap, or complement, or even contradict with each other on different levels. This allowed the team to prepare a solid basis for the next step, which is the identification of solutions to be taken in order address these needs which would lead to an improvement in traffic flow – and other policy priorities - on urban main road and streets that feed the main T-TEN corridors. It also looked at the services that each user group requires from the road and how these services can be improved or combined. It also looked briefly at several types of solutions, namely infrastructure based, traffic rules, signage, and, finally, ITS services. Only 'soft' solutions, which do not require big changes to a street layout, as well as significant investments, were considered in this analysis.

The main purpose of the web-based survey was to map key users' needs and then, on the basis of the obtained results, to identify the areas where these needs overlap in order to find common ground for conjoint solutions for certain groups of users. On the basis of the collected results from the survey, we looked at the areas where the users' needs are different in order to see where some soft measures can be used in order to improve the traffic flow in the urban areas.

User needs were approached from various perspectives. First of all, we endeavoured to set a time frame for those needs for each user group as well as for all groups together, in order to see where the peak activities are during the day/night during the weekend and week days. Then we looked to the purposes of user activities in these hours. Finally, we tried to identify the needs and possible solutions to improve traffic flow and achieve other policy objectives in urban areas.

After completing the survey, an online workshop with experts was organised. The main purpose of the workshop was to present briefly the survey results and collect qualitative data to complement the quantitative data collected from the survey.

During the workshop, two common issues were identified by all users: safety and lack of information on traffic.

- As for safety, any improvement in traffic conditions in urban areas should not decrease safety of its users, but rather it has to increase their safety. Survey respondents proposed several

solutions to tackle the question of safety; for instance, safety of pedestrians while they cross the street by using Green Light Priority for pedestrian and cyclists. The question of safety has to be extended not only to cyclists and pedestrians, but also to bus, coach and taxi drivers and passengers. Their safety needs to be addressed while proposing soft solutions to improve traffic flow. The survey also proposed several solutions that involved using C-ITS technologies, e.g. Blind spot detections, or cyclist detection for professional drivers.

- Many of the respondents indicated that one of the biggest hindrances to improvement in traffic conditions is a lack of information on traffic performance itself. Sharing the information on traffic flow among various users can improve the traffic, increase efficiency, lead to better planning, improve safety, etc. in urban areas.

Modal shift was mentioned by IRU and other experts. Using more efficient modes of transportation at peak times can also be a solution for the improvement of mobility in urban areas. However, how and where it can be done has to be further discussed. Modal shift is also important for the efficient delivery of goods by trucks. In order to reduce the number of big trucks as well as pollution levels in urban areas, last mile deliveries can be done by smaller tracks or small commercial vehicles, or even by electric vehicle as well as drones. In this case, a modal transfer is carried out in hubs that are located outside the urban areas, where loads are transferred to smaller cleaner (electric) vehicles which will bring the goods further to the final delivery points located in the urban areas. It can seriously reduce the number of big trucks in the urban areas and improve traffic flow as well as the quality of the environment.

D1.1 has provided a first helicopter view of road users' needs in urban area. It has mapped these needs and has prioritised them for each user group. It also provides two types of information, namely quantitative and qualitative, on the basis of which a further deeper analysis can be conducted in other WPs to propose sustainable and realistic solutions, model user patterns and see how these patterns can combined together in order to have improve traffic flow as well as safety and other key urban policy objectives.

7 Annexes

7.1 Survey questionnaire

Introduction

1. Name of the organisation
2. Country
3. E-mail address (optional)
4. Type of the organisation:
   a. Public
   b. Private
   c. NGO
5. Which group of users do you represent?
   a. Pedestrians
   b. Cyclist
   c. Motorised two wheelers
   d. Private Vehicle user
   e. Local Businesses
   f. Shippers
   g. Logistic service providers
   h. Freight carrier
   i. Coach operator
   j. Taxi operator
   k. Shared mobility operator
   l. Tourism providers
   m. Public transport operator
   n. Passenger
   o. Emergency authorities, utility and maintenance services
   p. Persons with disabilities

User's activities

6. Please indicate what are your busiest travel hours within the weekdays?
   a. 00-02
   b. 02-04
   c. 04-06
   d. 06-08

e. 08-10
f. 10-12
g. 12-14
h. 14-16
i. 16-18
j. 18-20
k. 20-22
l. 22-24

7. Please indicate what are your busiest travel hours within the weekends?

a. 00-02
b. 02-04
c. 04-06
d. 06-08
e. 08-10
f. 10-12
g. 12-14
h. 14-16
i. 16-18
j. 18-20
k. 20-22
l. 22-24

8. Please select the typical time slots where your transport activities are the least intense during weekdays:

a. 00-02
b. 02-04
c. 04-06
d. 06-08
e. 08-10
f. 10-12
g. 12-14
h. 14-16
i. 16-18
j. 18-20
k. 20-22
l. 22-24

9. Please select the typical time slots where your transport activities are the least intense during weekends:

a. 00-02

b. 02-04
c. 04-06
d. 06-08
e. 08-10
f. 10-12
g. 12-14
h. 14-16
i. 16-18
j. 18-20
k. 20-22
l. 22-24

10. According to you what are the main destinations of the members of your organisation during the busiest hours? Please select and rank the 5 main locations among those mentioned below (from 1 the most important to 5 the less important):

a. Urban multi-modal transport hubs (metro/bus/taxi/bike-car/sharing stations)
b. Multi-warehouses in the outskirts of the city
c. City hall & administrative centres
d. Hospitals and other emergency centres (including police stations)
e. Malls / shopping centres / supermarkets (at the periphery of the city centre)
f. City shops / city markets / banks / post offices (in the city centre)
g. Residential areas within the urban area
h. Factories / dispatching centres
i. Business district / offices / workplaces
j. Hotels
k. Cafés / Restaurants / food outlets (e.g. street food)
l. Entertainment places (cinemas, concert halls, stadiums, theatres, etc.)
m. Touristic point of interests (monuments, parks, museums, etc.)
n. Education centres (schools, universities, libraries, etc.)
o. HQ of the transport company

Identification of problems

11. What kind of impact has Urban Vehicle Access on your street activities in your busiest hours?

a. Positive
b. Negative
c. No impact

12. What are the main advantages of vehicle access restrictions?

a. Reduction of emissions
b. Safety on the street
c. More space and comfort for walking/cycling
d. Faster travelling by public transport
e. Other (please specify)

13. Which types of restrictions impact on your operations?

a. Low-Emission Zones
b. Zero-Emission Zones
c. Time based restrictions
d. Location based restrictions
e. Other (please specify)

14. How has information on these schemes been shared?

a. Signage
b. Leaflet
c. Personalised letter
d. Radio
e. Website
f. Dissemination from organisation representing your user needs

15. Were you consulted during this process?

a. Yes and my views were taken into account
b. Yes but my views were not taken into account
c. No
d. Other (please specify)

Identification of needs

16. What matters to users you represent the most? Please rank the topics below (from 1 the most important to 3 the least important):

a. Accessibility
b. Transport efficiency
c. Environment (sustainability/air quality/noise)
d. Comfort
e. Cohesion
f. Safety
g. Attractiveness (cleanliness, aesthetics/design)
h. Directness

17. What are the main reasons for the usual disruption of movement of the users you represent? Please select 5 reasons and rank them from 1 to 5 (1 being the most important reason and 5 the least important one)

a. Lack of alternatives to car trips
b. Traffic lights
c. Too many road junctures and roundabouts
d. Too many bottlenecks (streets too narrow to absorb the traffic, not enough lanes)
e. Delivery to/from shop(s)
f. Illegal parking
g. Tunnel ramps
h. Narrow pavements
i. Road work and road side fixing/construction
k. Complex/confusing road network/layout
l. Unclear road marking
m. Impact of weather conditions
n. Interactions with slow road users (cleaning services, scooters, bicycles, roller-skates)
o. Breaching of traffic rules
p. Regularly organised fairs (street markets, festivals, shopping areas)
q. Rail level crossings (tram/train)
r. Restricted access to some streets for certain hours
s. Speed reduction measures (speed bumps, low speed zones (>30km/h)
t. Not enough places to cross the road
u. Long waiting times to be able to cross the road and not enough time to cross the road
v. Lack of pedestrian routes (e.g. where an arterial road creates community severance)

18. Where most improvements must be made to facilitate the traffic flow in urban areas? Please rank the topics below (from 1 the most important to 3 the least important).

a. Infrastructure (physical dimensions or the road infrastructure/clearance)
b. Traffic rules, signage and user awareness, control (static/iterative information)
c. ITS - Intelligent Transport Systems (dynamic information and traffic management)
d. Disincentives to private car use
e. Incentives to walking/cycling
f. Incentives/disincentives to active mobility
g. Public transport supply (number of buses/trams, covered area)

19. Which of the following road infrastructure needs have to be addressed in priority in urban areas? Please select 5 needs among the ones listed below and rank them from 1 to 5 (1 being the most important reason and 5 the least important one):

a. Limit adverse effects of the weather conditions on road infrastructure
b. Quality of the road infrastructure (appropriate maintenance)
c. Safe road crossings
d. Dedicated spots to park
e. Easy access to parking spaces and delivery/pick-up points (limit surrounding obstacles)
f. Dedicated pockets for buses, coaches, taxis and delivery/pick-up areas
g. Separated lanes for HGVs
h. Separated lanes for buses and coaches
i. Separated cycle lanes or cycle paths
j. Lowered kerbs on crossing
k. Infrastructure clearance for HDVs (tunnel, bridges, parking entrances)
l. Enough space for manoeuvring (enough road width, wide turning angles, limit dead angles, traffic lights/road signage or trees further away from the road)
m. Space reallocation for walking (e.g. narrower junctions, continuous footways, wider footways)
n. More refuelling/charging infrastructure
o. Better lit streets at night
p. Prioritising footway maintenance and management (cleansing etc.)
q. Improved public realm (public spaces, greening, reducing street clutter)

20. Which of the following ITS (Intelligent Transport Systems) services would suit your needs better in urban areas? Please select 5 of the services listed below and rank them from 1 to 5 (1 being the most important reason and 5 the least important one)

a. GLOSA (Green Light Optimal Speed Advice)
b. Routing for cars/cyclists
c. Specific GPS information for HDVs in urban areas (according to their characteristics)
d. Real-time information on access restrictions
e. Real-time information on traffic
f. Real-time information on infrastructure availability and accessibility (parking, loading areas, refuelling/charging infrastructure)
g. Advanced reservation and booking schemes
h. Speed alert systems
i. Pedestrian Alert Systems

j. Motorcycle approach indication
k. Road works warning
l. Road hazard warning
m. Emergency vehicles warning
n. Cooperative traffic lights
o. Real time public transport information
p. Intelligent Speed Assistance (ISA)
q. Autonomous Emergency Breaking (AEB)

21. Which traffic rules/signage/road marking needs should be addressed in priority in urban areas? Please rank them from 1 to 5 (1 being the most important reason and 5 the least important one):

a. Clearer signage and road marking
b. Better visibility of signs and traffic lights
c. Better synchronisation of traffic lights
d. Dedicated lanes
e. Be made aware of the traffic rules/access restrictions applicable in the city considered
f. Allocate more time and/or more time slots for loading and unloading
g. Ensure that traffic rules are respected by all vehicle users (law enforcement)
h. Speed limits
i. Dedicated way-finding for pedestrians/cyclists
j. Safe and more often road crossings

22. What are your suggestion(s) for solving the main problem(s)?

23. Please use the space below in case you have any comment(s) or suggestion(s)?

7.2 Agenda expert group

Agenda online workshop MORE Project - 07.06.2019

Task 1.1 Current user needs and Task 3.2 designing for future road user needs

11.00	11.05	**Introduction** *Anne Reynaud, IRU Projects*
11.05	11.25	**Presentation of task 1.1 and of the data from the survey** *Oleh Shchuryk, IRU Projects*
11.25	11.45	**Future Users' Needs – overview of the research done in task 3.2** *Lucia Cristea, European Integrated Projects*
11.45	11.50	**Q&A**
11.50	12.00	**Perspective from the Pedestrians** *Mario Alves, International Federation of Pedestrians*
12.00	12.15	**Perspective from Commercial Road Transport Operators (bus, coaches, and trucks)** *Remi Lebeda, IRU*
12.15	12.25	**Perspective from the Cyclists** *Aleksander Buczyńsky, European Cyclists' Federation*
12.25	12.35	**Perspective from the Cities** *Giacomo Lozzi, POLIS*
12.35	12.45	**Q & A**
12.45	13.00	**Closing remarks** *Oleh Shchuryk, IRU Projects*