Interreg Danube Transnational Programme

CHESTNUT project

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Work Package 3: Mobility scenarios

WP Leader: Pannon Business Network Association

Output 3.1.: Transnational strategy based on mobility scenarios

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Document History

Version	Date	Note
0.1	November 2017	collecting the necessary input from all partners' Functional Urban Area
0.2	December 2017	status quo analysis, comparison of mobility scenarios
0.3	December 2017-January 2018	establishing shared mobility problems and challenges (overarching goals) between partners' FUAs
0.4.	January 2018	Revision of the document by (VUT) Finalised the Output 3.1 Transnational Strategy

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1 Introduction

This current Transnational Strategy on the one hand intends to establish a starting point with the help of mobility related status quo analysis of the participant countries' Functional Urban Areas (FUAs). The first part of the strategy shall provide comprehensive information about all the involving FUAs' mobility related status quo analysis and shall shed light on the common mobility problems and challenges which are present in the FUAs.

The status quo analysis, elaborated in the first section of the strategy, is essential to understand the current situation about FUA's mobility in a comprehensive manner. This forms a basis of the analysis of different scenarios, and will form an important basis of Sustainable Urban Mobility Plans (SUMPs) drafted in Work Package 4. (WP4) Vienna University of Technology (VUT) as the scientific supporter of Work Package 3 (WP3), and Pannon Business Network Association (PBN) as WP3 Leader prepared a guideline for the partnership which contained how to analyse their status quo, as well as it indicated the required methodology for mobility scenarios and overarching goals preparation too.

Following the demonstration of all project partners' Functional Urban Areas' current mobility situations, the next chapter of the strategy shall present the common problems and challenges, partners have to solve in connection with mobility in the near future.

The other aim of this strategy is to compare project partners 'mobility scenarios, prepared for Deliverable 3.2.3 (Mobility scenarios of 12 project partners' regions). All partners had to create at least three scenarios, but maximum five scenarios could be prepared. In this phase partners had to set their planning horizon on either 2025 or 2030 based on their FUA's planning time frame. The comparison of the prepared mobility scenarios shall be pointed out in the second half of the strategy.

Following the mobility scenarios comparison section, the strategy shall contrast the overarching goals of project partners. As the guideline suggests, these overarching goals guide the further steps of Sustainable Urban Mobility Plan drafting envisaged in WP4. Stakeholders in each FUA had to agree on a common vision, which is a long-term goal for mobility and transport development in partners' FUAs, which will guide the further planning and SUMP-drafting process. Partners were recommended to set up four to six overarching goals that shall be discussed in the last part of the strategy.

With the help of the comparison of FUAs' different mobility scenarios and overarching goals, project partners will have an overview about their mid- and long-term objectives as well as priorities that reflect a common vision of the Danube region. The current transnational strategy focuses on variegated urban areas involved in the project and will be the knowledge base for drafting the Sustainable Urban Mobility Plans at Functional Urban Area level with the help of status quo analysis as well as due to the comparison of mobility scenarios and overarching goals.

2 Analysis and understanding of Functional Urban Areas' mobility related status quo

Before stepping into analysis of different consequences of scenarios, understanding the current situation about FUA's mobility in an extensive manner is fundamental. The goal of this step is to obtain a comprehensive understanding of status quo of the mobility situation in the Functional Urban Areas.

In order to receive various aspects from the status quo analysis, different urban and mobility areas had to be reviewed, in a large extent with the help from data collected in CHESTNUT-Activity 3.1-Deliverable 3.1.1. data collection. Therefore, all project partners had to provide a status quo analysis based on their data collected in the mentioned deliverable. In Table 1 all partners, their represented FUAs and the contributors are listed who were responsible for data collection.

Official names of the partners	**Represented FUAs**	**Responsible contributors in data collection**
Municipality of Velenje	Velenje FUA	Halilović Nela, Arhena Marko Govek
Regional Development Centre Koper	Koper FUA	Slavko Mezek, Mitja Petek
Municipality of Weiz - Department for mobility and energy	Weiz FUA	Barbara Kulmer, Tanja Kortus, Nathalie Wagner
The Municipal District Prague 9	Whole city of Prague and Prague District 9	Pavel Pospisek, Helena Kvackova
Municipality of the City of Budapest, District 14, Zuglò	Whole city of Budapest and Budapest District 14	Orsolya Béres, Rita Petrovácz
Municipality of Dubrovnik - City of Dubrovnik development agency, DURA	Dubrovnik FUA	Marko Cosmai, Ana Marija Pilato, Andrea Novaković, Tomislav Matković
Zadar County Development Agency - Department for EU projects implementation	Zadar FUA	Josip Faričić, Ana Pejdo, Tome Marelić

Pannon Business Network Association	Sárvár FUA	Mihály Lados, Martin Dan
Municipality of Odorheiu Secuiesc	Odorheiu Secuiesc FUA	Emese Puskás, Gergely Csáki, Botond Fazakas, Zsuzsanna Hadnagy
Regional Development Agency Center	Alba Iulia FUA	Nicolaie Moldovan
Municipality of Dimitrovgrad	Dimitrovgrad FUA	Yasho Minkov
LIR Evolution	Banja Luka FUA	Vladimir Gladanac, Medina Garic

Table 1: Partners, their representing FUAs and their contributors involved in data collection

The guideline, prepared by VUT and PBN consisted the following 1+8 points which had to be covered by each partner in their analysis. Each topic was divided into further sub-topics and questions, which had to be answered by partners. With the help of these replies, the current mobility status of the FUAs could be revealed and meant to be a starting point for the later phases of the project. As a matter of course, similarly to the data collection, the extent of availability of the information and data differed from partner to partner. The following areas were listed and had to be elaborated to guide partners in their analysis:

- Topic 0: Data and information availability
- Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?
- Topic 2: Urban structure:
- Topic 3: Accessibility within urban area:
- Topic 4: Motor vehicle traffic:
- Topic 5: Road infrastructure and automobile-associated services
- Topic 6: Local public transport;
- Topic 7: Bicycle traffic;
- Topic 8: Pedestrian traffic:

Topic 0 was concentrated on the general data and information availability of the involving FUAs from the data collection. Partners had to summarise the missing data, and expressed how the necessary data can be obtained for the SUMPs. The main questions within Topic 1 were modal split and trip

purposes. These results have pointed out which the most popular mean of transport is within each FUA and the core city. The next, Topic 2 was mainly asking about the distribution of the population, business and other important destinations. Topic 3 intended to highlight the accessibility within the urban area and scrutinised the situation of public transport as well. Topic 4, within motor traffic, shall discuss the number of passenger cars, the type of road network as well as the pinch points of the congestion in the FUAs. The objective of Topic 5 was to shed light on the parking facilities and the availability of car-sharing system, whereas Topic 6 exclusively concentrated on public transport in each Functional Urban Area. Topic 7, as the name suggests, were asking about bicycle traffic in the FUAs, for instance the length, quality and the interconnection of bicycle lanes, the bicycle relevant regulations and the availability of the bike-sharing system belonged to the questions. Last but not least, the answers of the last topic revealed the situation of pedestrian zones and pedestrian safety in the respective Functional Urban Areas.

The respective data and the graphs/figures/tables in this section derive from the partners, who collected the information, so the sole responsibility for the content of this status quo analysis lies with the authors.

2.1 VELENJE FUA

2.1.1 Topic 0: Data and information availability

Regarding data and information availability, Velenje FUA claimed that mobility statistics data are the most deficient at Velenje FUA since most of them are missing. The main reason of the missing mobility data is that the lack of interests and priorities in spatial planning in the municipalities of the FUA, with exception of core city of Velenje.

The representatives of Velenje FUA are convinced that obtaining the necessary data for SUMPs in all of the municipalities in FUA, first the request at national level should be implied to all of the municipalities. One of the main reason of the missing data, mostly about mobility statistics part, is that simply this kind of data were not collected, since in past it was not a priority to do it so. From national level to regional and further to local level, the request should be implied and they could choose the methodology, which suits the most to their spatial characteristics. The reason that data was not collected in the past is also a result of insufficient data collection know how collecting data knowledge, where a solution may be an instruction manual for different types of methodological approach. Solving the problem of not collecting the data is not only important for understanding the present situation to make SUMP. Gathering data for longer time will be useful also for further research activities about trends and also for monitoring progress after adopting SUMP.

Velenje FUA states that missing data could be collected by regular surveys (seasonal or at least annual) for understanding travel habits of inhabitants in municipalities of FUA. Usual problem about surveys is that it is hard to get significant share of responses, so conducting written, face-to-face, telephone and online surveys is necessary. Data about energy consumption could be calculated based on traffic counts and integrating innovative technological solutions such as GPS-based data.

To fill the gap of missing data and for adopting the methodologies which would help gathering data, financial and human resources are needed. Human resources are important especially for interviewing inhabitants and could be also provided as part time jobs by Universities and Faculties that are offering studies connected to mobility (example: students of spatial sciences, traffic management, environmental studies, etc.). Collecting the data automatically would probably demand a bit higher cost for investments in equipment. At the moment, there is no information about availability of travel survey at regional or national level.

2.1.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

As it was already mentioned in the previous chapter, there is a gap of missing data about mobility of whole FUA with exception of core city. As the results point out, the concrete numbers about modal split in all of the municipalities are unknown. However, the data is known for the core city where in passenger transport the use of private vehicles prevails. As Table 2 reflects, in the modal split of Velenje core city, 61% is the extent of journeys with passenger cars, but it is followed by walking with 20%, bus and bicycle usage are almost the same (9-10 %) whereas rail transport is not or hardly used. These ratios can be also transferred to the whole FUA, since characteristics are similar.

Passenger car (+ taxi)	**61%**
Railway (train, tram, metro)	0%
Bus (bus, trolley bus)	10%
Bicycle	9%
Walking	20%

Table 2: Modal split of core city of Velenje in 2016 [%]

Data Source: Republic of Slovenia Statistical Office

The main differences within FUA region is that majority of municipalities are more likely rural (low settlement density, bad infrastructure, etc.). Therefore, the usage of cars is greater there, since public transport is not really developed and for greater distances the car is necessary. Distances and hilly terrains are the reasons for not using bicycles or walking widely, and the lack of safe infrastructure contributes to the small percentage of public transport and active ways of transport. Velenje is the only municipality in the FUA with satisfying infrastructure, with alternative, environmentally- friendly possibilities for moving around (free local bus, free city bikes etc.).

Mobility behaviour differences in social characteristics of inhabitants of FUA cannot be substantiated with concrete data, but since there is majority in car usage, those who cannot afford it or are not permitted to do it (young people, old people, socially disadvantaged, etc.), are those who use public transport and/or walk and cycle. Analysis of current situation showed that in whole FUA there is lack of infrastructure and public transport, which means that social groups who do not own a car are also the ones who are mobility-disadvantaged.

As far as the purpose of daily trips are concerned in the whole FUA, similarly to modal split these data are only available for core city. (seen in Table 3) The following trends of flows are result of interviews in core city of FUA, Velenje in 2016:

The purpose of 1st trip in a day:	The purpose of 2nd trip in a day:
44% work	35% shopping
27% shopping	29% leisure time, recreation
16% leisure time, recreation	14% returning home
8% other services (bank, hairdresser, …)	10% work
4% education	9% other services (bank, hairdresser, …)
1% returning home	3% education

Table 3: Purpose of trip in Velenje core city in 2016 [%]

Data Source: Republic of Slovenia Statistical Office

The respondents were asked also about their 3rd, 4th, 5th, 6th, and 7th trip in a day, and trend reveals, that share of own car was decreasing, while the share of sustainable way of transport (bicycle, city bus, walking) increased.

As Figure 1 depicts, the destination of traveling is mainly Velenje, which is the core city of FUA (78%). Respondents travelled to other municipalities of FUA in 5%, and other destinations were mainly in wider region or to the capital Ljubljana.

Graph 1: Shares of destination of traveling

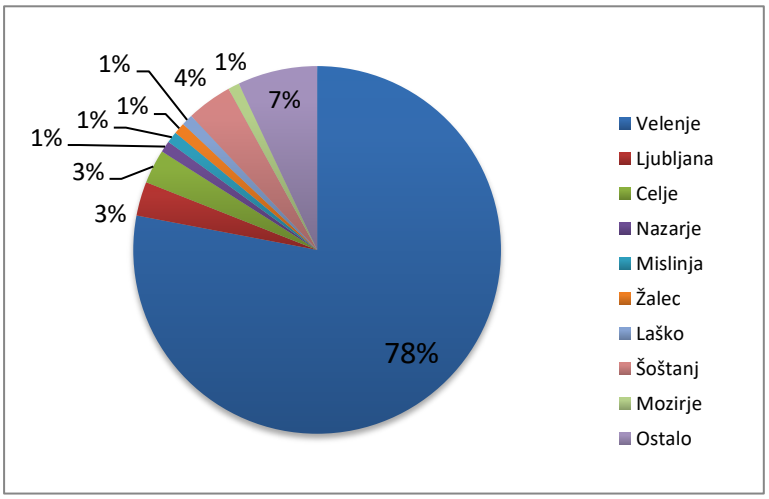


Figure 1: Destination of travelling of residents in Velenje FUA in 2016 [%]

Data Source: Republic of Slovenia Statistical Office

Data about inflows and outflows in other municipalities in FUA are not collected. 10% of inhabitants of other Municipalities of FUA are commuting to core city of FUA daily, according to SORS in 2016.

2.1.3 Topic 2: Urban structure

The results of the data collection clearly suggest that the core city in comparison of FUA in total is denser populated. Velenje is well-developed settlement, where all major functions with services, business and industry are located.

As Municipality of Velenje is an economic center, it is also daily commuting area from whole FUA. Because of the companies with many workplaces in core center, there are also other important urban facilities with large number of commuters/visitors. In core city there is High school center Velenje, two faculties and six primary schools. In whole FUA there is no other high school or faculty, so the share of young commuters to core city is also large. As a result of shopping centers in Velenje and some smaller ones in other FUA's municipalities, there are also leisure, recreational and touristic destinations and some events which are attracting significant numbers of visitors in whole FUA. These visitors are quite equal distributed within whole FUA in different seasons, with peak in core city. Reliable data about mean of transport of commuters in FUA is not available, but can be predicted that majority is using cars because of all the reasons listed in previous chapter.

2.1.4 Topic 3: Accessibility within urban area

Comprehensive travel time within FUA is not available, but can be predicted by some online tool (example: Google maps or any other journey planner).

From core city of Velenje to the furthest municipality of Solčava, travel time by car on working day in the middle of day based on Google maps is one hour and with public transport an hour and a half.

In case of core city of FUA, Velenje, travel times were researched within local SUMP, prepared in 2017. From the center the furthest point of urban area is accessible in 25 minutes by walking, which means approximately 10 minutes by bicycle. Outside of urban area in municipality of Velenje using of car is a must, since center is located in a valley and rural parts are at a bit higher altitude and public transport is not effective. Based on Google maps, drive from center of municipality of Velenje to one of the furthest settlement, Cirkovce (6 km), would take 10 minutes with a car and almost an hour with public transport. For walking or cycling the same destinations person should overcome approximately 300 m of difference in altitude heights.

In municipality of Velenje, according to local SUMP, adopted in 2017, there are two major goals for increasing the usage and accessibility of public transport:

- With different measurements increasing the usage of public transport there (till year 2022 20% increase of passengers in city and inter-city busses, till year 2022 10% increase of passengers of railways and till 2022 30% increasing of number of journeys with public transport).
- With different measurements improve of quality of public transport in general (til 2022 increasing of frequency of busses and optimization of routes, establishment of integrated ticket till 2019 and till 2022 adjusting whole public transport scheme to motion and sensory impediment persons).

2.1.5 Topic 4: Motor vehicle traffic

As the data have shown, the registered passenger cars per 1000 inhabitants in 2016 within whole FUA were 523. In core city, the number has 480 registered passenger cars per 1000 inhabitants. The roads within FUA and in core city are in combination of linear, radial and circular type. However, in the road network, there are few geographical barriers. First of all, it is a diverse surface with a lot valleys and hills, especially in Zgornja Savinjska valley, which is the most rural part of FUA). As a result, roads are not that dense and many places are not accessible with public transport. Besides that, few parts of FUA are protected under Natura 2000 ecological network. The main objective of the network is to conserve valuable biodiversity for future generations.

Traffic jams regularly occur during every workday in the core city caused by majority of working places in whole FUA. During summer, there is peak flow, since there is located Velenje beach, which is attracting every year more and more visitors, mainly FUA inhabitants and others from whole Slovenia, while the number of foreigners is increasing too. In municipality of Ljubno there is also annual event World Cup Women Ski Jumping that causes peak flow in winter.

Traffic calming area is in core city Velenje, since almost whole center is closed for traffic. This is the result of building city in concept of garden city in the 1960s, with lots of green surfaces and good accessible basic services. In core city there is also recreational center at Velenje lakes with leisure infrastructure (walking paths, benches, outdoor gym, etc.). In other municipalities there are any large traffic calming areas as defined, because other municipalities are not having big centers. However, there are other recreational and nature areas with leisure function, where cars are restricted.

Situation with traffic accidents in general could not be researched deeply since there is no available quantitative data neither at municipal, nor at FUA level.

2.1.6 Topic 5: Road infrastructure and automobile-associated services

Systematic assessment of street space quality was carried out in core city Velenje and whole municipality of Velenje within the analysis during preparation strategic document Sustainable urban strategy and SUMP for Municipality of Velenje in 2016. The aim of implementing Sustainable urban strategy was to analyse the current situation in Velenje in case of urban space (including street quality themes) and setting up development pillars for future. In SUMP, public space of Velenje was reviewed a bit more detailed in case of traffic, walkability and accessibility in general. To conclude from both documents city is walkable and accessible with bicycle.

While gathering data about parking places from parking policy in general, there were no problems recorded about parking on the street in whole FUA. Only exception is observable during bigger events that are already listed in previous chapter. In core city of FUA long term parking is cheaper than short term (for example for residents who buy whole year ticket daily parking ticket is 1 EUR, and for short term parking in center the ticket costs 0,40 EUR per hour). There are no payable private parking spots, so comparison to public ones is not possible.

In whole FUA, including core city, there is no car sharing service available. Data about further plans and if anyone would like to establish one are not available.

2.1.7 Topic 6: Local public transport

Within the Functional Urban Area of Velenje, only three municipalities possess railways. The railway is not efficient, as there are no sufficient number of stops and its infrastructure is quite old. Railway services are provided by national railway company, which is not investing a lot in infrastructure in general.

Trains from Velenje ride only to Celje (via two other municipalities in FUA) and from there, after changing trains, other bigger cities are accessible. During working days, there are 12 trains at different hours available, in general every one hour and during peak hours, three rails are available, every 40 minutes. During weekends, the situation is worse, since on Saturday there are only three trains available (between 5:30 and 14:15) and on Sundays there is no train available at all.

Core city of FUA is having free public transport, free bike-share system, train and two electric charging stations. Free public bus is managed by Municipality of Velenje in collaboration with private company Izletnik. Same company is managing public transport in most of other Municipalities of FUA, where only intercity buses are available. Main problem of public transport in FUA is that it is rather not satisfying and it is not being used as alternative to personal cars. Schedules are uncoordinated,

resulting that buses are not suitable for everyday commuters.
The road-based public transport is a combination of circular and radial characteristics. In core city there is central bus station, which is serving also as central transfer point within FUA, but it has to be mentioned, that there are no many buses and it mainly serves students, who are using school busses. By adopting local SUMP in municipality of Velenje there are also measures listed which are prioritizing the usage road-based of public transport, which are described in the chapter Accessibility within urban area. As the analysis reflects, the FUA does not possess any tramways. There are few barriers on implementation of updated road-based public transport. Firstly, geographical barriers - in whole FUA there are quite large distances between households, since there are many ridges and valleys, which are dividing area to rural parts and some of them are quite remote. For efficient updating of public transport, there should be quite big investment in public transport, which could hardly be profitable (low density of population – small amount of users). In addition, a barrier is a car-oriented mindset of population, which is the characteristic of whole nation. So not only investment to infrastructure and updating of public transport offer would be necessary, also big promotion of public transport as an alternative to car should happen.

Researching trends of using road based public transport is hard, since there is no data collected from providers of public transport in FUA. In the last few years the usage of public transport has been stagnating – nothing has happened for improving the situation, but there are still some regular users, who do not have other option.
However, the trends were researched within core city – based on sold tickets at railway station in Velenje in few years, it decreased by 6% annually. Nevertheless, the situation is a bit more optimistic in case of free city bus called Lokal'c, where study showed, that in period from 2013 to 2015 increased for 13%, which is also the result of development of smart application for informing about arrivals of busses.
In core city where free local bus is operating on five lines – four of them are connecting core city with surroundings in municipality of Velenje. One line is the most frequently one and it is riding circular only in city center, which means most of important everyday destinations in the city are accessible by this way. As the already mentioned city bus is free of charge, intercity buses, which are connecting other places in FUA, are provided by one private company of public transport that is having fare structure as it follows. The tickets can be bought as single, coupons (more single tickets at once with discounts) and seasonal tickets. There are fares for different social groups (pensioners, students, residents, etc.).

The newest improve of public transport by Ministry of infrastructure is definitely student subsidies for integrated tickets from 2016. Discounted tickets are for students who are travelling from their hometowns to university cities, and can be used for different kinds of means of transport. For example, students can use integrated ticket for their way to one of university cities (either intercity bus or train) and then can use the same ticket for city buses in the city they are studying. For now, there are no other integrated ticket for other social groups.

2.1.8 Topic 7: Bicycle traffic

Because of the physical and socio-geographic factors in the core city, it can be stated that there is a great potential of Velenje as a cycling town. The slopes in Velenje are appropriate for development of

cycling. The Šalek Valley where Velenje is located has a moderate continental climate, and its characteristic climatic conditions allow for cycling throughout the entire year. The socio-geographic factors – characteristics of the population, the structure of the town and employment structure – suggest that Velenje is a suitable place for cycling.

There are no unfavourable parts of core city for cycling since it is located in a valley, but after trying to reach other parts of municipality, which are located at higher altitudes, normal city bike is not appropriate anymore. This is the opportunity for developing some updating of city bikes to e-bikes or at least for promotion of them as they are gaining importance in cycling industry. On the other hand, this is also an opportunity for developing cycling and recreational tourism, since surrounding of core city is more rural in comparison to industrialized and urban Velenje.

Cycling network in Velenje consists out of 13 km cycling lanes, from which all of those are separated from car traffic. However, this information does not reflect the real situation of cycling infrastructure, where the major problem is missing connection and cyclists are forced to use either car streets or sidewalks for pedestrians. There are paths mainly purposed for recreation (cycling, walking, jogging and in winter cross-country skiing) in length of 11350 m. There are also other cycling and walking paths at rural parts of municipality, but the data is not available.

There is also a core city network map available (seen on Figure 2) – blue lines are representing city cycling network, green lines are for recreational paths all the dotted lines are for planned cycling and recreational paths. Red dots are representing employing centers, orange are shopping centers and blue are schools.

Picture 1: Core city network map

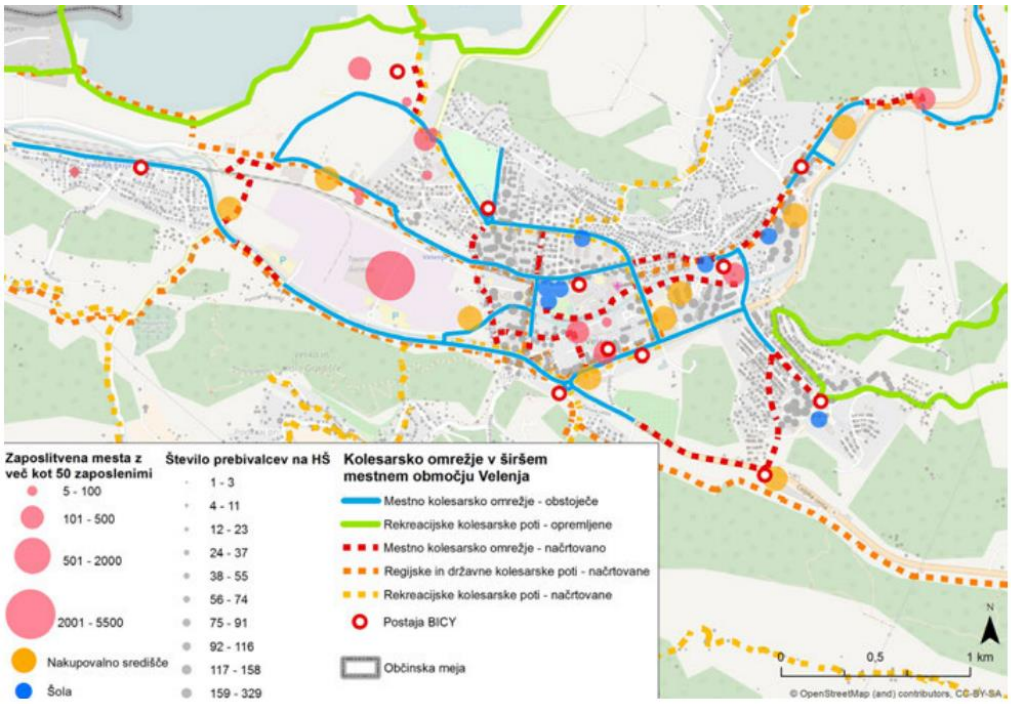


Figure 2: Velenje's core city network map about bicycle paths

Data source: Sustainable Urban Mobility Plan of Velenje, 2017

Figure 2 reflects that the whole city of Velenje is accessible by bike. The concept of the cycling network is good, but cycling paths are not interconnected and the network is incomplete, even it is dangerous in certain sections. Another weakness of the network is the lack of signs and direction boards and inadequate maps for potential cyclists. There is a lack of any 'special' infrastructure that is proving that Velenje is a cycling city (example – separated traffic lights, bike box, safe cycling stations, etc.). On a national level there is a legislative framework that allows designing of cycling paths against one-way direction on one way roads, but in core city there is no such measure. Parking conditions for cyclists are not well-structured either.

The research for preparing the local SUMP pointed out that there is no any bigger parking place for cyclists in the surrounding of railway or bus station in core city, which means that multimodality is hard to be encouraged. However, at main bus station there is a station for bike share, so it is easy to get a bike and continue a trip after arriving with bus.

In general, there is lack of parking spots for bikes in whole city. In front of public institutions they are usually present, but majority of those are inappropriate. In case of neighbourhoods (in Velenje there are parts with block neighborhoods with high population density) the parking's are present. There is no regulation about bicycle parking on the building code. Some of the buildings have special places for bikes as bicycle sheds. Those places are not safe since everyone has a key, so the bikes can be easily stolen. Besides the bicycle sheds, there are some bike parkings usual also in front of buildings, but

those are also inappropriate and not safe. Many people are storing their bikes in their cellars, but it is rather time-consuming to take them out every day.

In the core city of Velenje there is free bicycle sharing scheme with ten stations and it is connected to municipality of Šoštanj with five more stations. In the other municipalities of FUA, there is no other bike-sharing scheme.

The research made for preparing SUMP of Velenje showed, that in the last years the number of accidents of cyclists has been growing, which is caused by the growing the importance of bikes in everyday use.

Local interests groups in core city were quite successful in the past regarding ecological issues, since the municipality is primarily an industrial center. That could be a good prospect for new generations, since cycling shall be promoted in the future. There are some local initiatives for development of urban cycling, but these are not very active, which can be explained with lack of motivation, since the number of groups are not numerous.

2.1.9 Topic 8: Pedestrian traffic

The main pedestrian zones in core city are in center that is closed for traffic. Outside of strict center there are also safe pavements that are serving pedestrians for walking to reach all the neighbourhoods, companies, shopping centers, etc. There are still missing some tree avenues, which would make shade for warmer seasons, and some urban furniture that would make all the walkable distances even more enjoyable. In case of other municipalities in FUA, situation is a bit different, since their features are also opposite. Other municipalities have some sidewalks to reach major points of interests, but on the other hand, majority of those municipalities possess also many recreational walking paths that are used mostly for tourism.

The dividing effect between two areas because of heavy road traffic observations can be seen firstly, between core city Velenje and other areas in FUA. As it has been already stated, Velenje is an urban part of the FUA, with many traffic-generators in comparison with other FUA municipalities. In core city firstly, there is a problem that majority of traffic is motorized and on roads, and all the cargo traffic is concentrated in city. As there are so many employers, mostly industrial, there is also high share of cargo traffic. The most traffic loaded direction in city is in direction north-south (connecting Koroška region with central Slovenia). In addition, traffic-loaded direction is in east-west (connecting Velenje and Šoštanj and further to other FUA municipalities). Most visible dividing effect can be seen between Šaleška street, where most of traffic is generated in direction north-south and calmed, walking area in center.

No research has been carried out yet about conflict points between pedestrian and bicycles, so exact locations cannot be served. Nevertheless, it is known that in strict center of core city where the biggest pedestrian zone is located, there are possible conflicts since there are no specific cycling paths.

As Figure 3 shows, the majority of pedestrian accidents happened in municipality of Velenje whereas other accidents happened outside of centers, which might have been caused by the lack safe infrastructure.

Figure 3: Traffic accidents of pedestrians in Velenje FUA between 2010-2016

Data source: Sustainable Urban Mobility Plan of Velenje, 2017

2.1.10 FRAMEWORK CONDITIONS

This is a short and straightforward process to find external frameworks to draft FUA-level SUMPs. Velenje FUA has differentiated European, national and regional/local requirements which are in coincidence with the SUMP preparation for the Velenje FUA. It has been highlighted that the European Commision has published guidelines for “Sustainable Urban Mobility Plans”, setting a new standard for strategic transport planning. The SUMP guidelines were updated in August 2017. This new planning approach is implementation oriented, cooperative, integrated and dialogue oriented. Besides this document, other mobility-related documents have been published namely the Operational program for the implementation of European cohesion policy for the period 2014-2020, and the European Union Strategy for Sustainable Development (2009) which may be also served as source for Velenje FUA in the preparation of their own SUMP.

2.2 KOPER FUA

2.2.1 Topic 0: Data and information availability

Koper FUA assessed there were enough data available to understand status quo of the FUA mobility pattern. In spite of the fact that they had missing data in some cases, as well as some data could be collected in a regional and not FUA level, the Functional Urban Area of the Slovenian Koper can depend confidently on their representation. Data is collected from municipalities' SUMPs, Regional Development Plan of Coastal-Karst region, and some data was acquired from national survey on regional mobility carried out in 2016.

As their data collection reflects, the most of mobility data were not available on FUA level only at regional or even national level. Municipalities had the chance to acquire missing data, but they missed the opportunity in the process of creating SUMPs so the missing data are the challenge for further research. Traffic counts are available on national and some urban roads, while Slovenian Infrastructure Agency is responsible for the counters and data presentation. Collection of missing traffic data, especially in urban areas and municipal roads, could be implemented in two ways: selected sections are covered with human resources who count according to a certain methodology, or with automatic cameras placed on selected sections. This kind of cameras and IT programs for report making are already available on the market.

2.2.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

The modal split of FUA is derived from a national survey of mobility in 2016, where data was collected on a regional scale. FUA data are extracted from Coastal-Karst regional data, because interviewed municipalities were excluded from FUA (Divača, Sežana, and Komen) do not significantly change regional mobility status quo. Data for all FUA municipalities (including core city) are therefore the same as Figure 4 shows: 0.4 % commute by railway, 2.4 % by bus, 77.2 % by car (from those 10 % as co-drivers), 2.4 % by bicycle, and 17.6 % by foot as pedestrians. Figure 4 unequivocally points out the lack of railway connections in the region and FUA, which leads to greater pressures on roads. With more frequent and comfortable bus connections, the total public transport mode could rise from current 2.4 % of trips to 10 %. With improved bicycle infrastructure and more promotion, we assess that share of 2.4 % commuters by bicycle could rise above 5 % with people coming from places further away as well. Currently only a small share of commuters use bicycle within distances less than 2 kilometres away.

There is no data available to split data per genders, and no data to perceive regional differences within FUA.

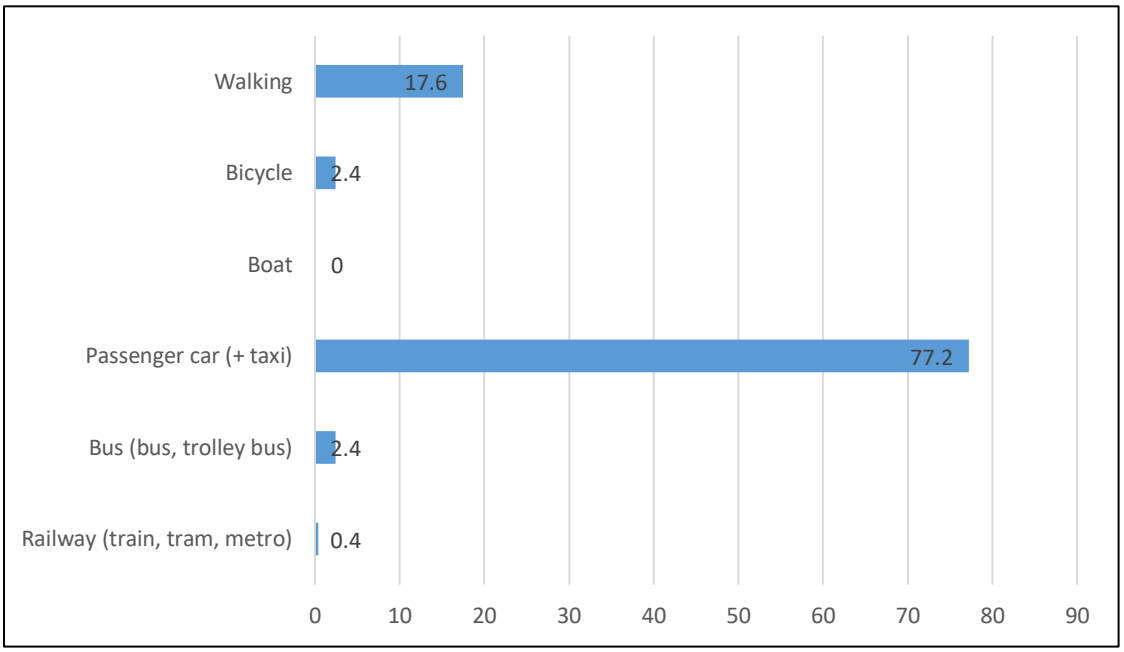


Figure 4: Modal split in Koper FUA in 2017; Data are on regional level

Data source: Republic of Slovenia Statistical Office 2017

The purpose of trip data results indicate (see Figure 5) that 41 % trips are related to work or shopping (work 19 % and shopping 22 %) in Koper FUA. The mobility data collection points out that 15 % of trips are private purposes (which are unspecified) and 11 % trips of going home (making a round trip). Other purposes are pick up/drop off someone (9 %), visiting someone (8 %), leisure and hobbies (7 %), while education, business trips, and other trips each adds per 3 % to the total sum. Distribution of travel distances is unknown because such survey has not been carried out yet.

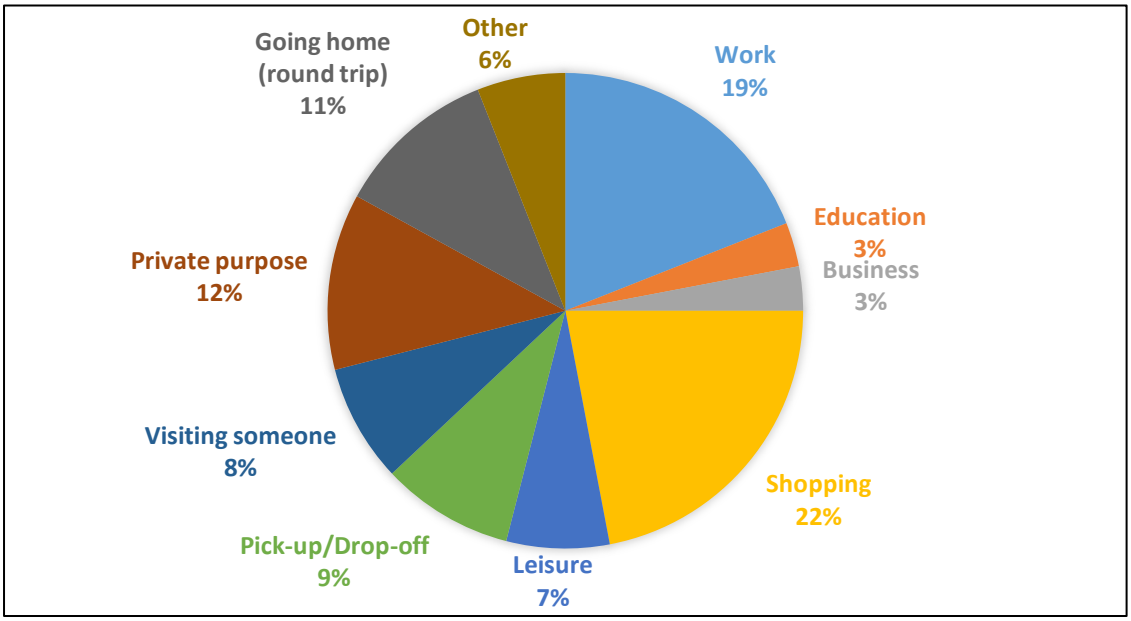


Figure 5: Purpose of trip in Koper FUA in 2016 (Regional data) [%]

Data Source: Republic of Slovenia Statistical Office

2.2.3 Topic 2: Urban structure:

As the representatives of Koper FUA explain, the urban network frame of the Coastal-Kras Statistical Region (and FUA) consists of the cities of Koper, Isola, Piran, Portorož and Sežana; however, the latter is located outside of the FUA Area. As defined by the Spatial Development Strategy of Slovenia, these centres possess national and regional importance too. A network of lower-tier centres is linked to these centres based on the separation of functions. The activities that prevail in individual centres are business, transport, trade and housing at Koper, tourism, central activities (hospital) and housing at Izola and tourism and service activities in the wider area of Piran.

Koper, Isola and Piran are cities with a long history that maintained their spatial structure for centuries. The cities experienced intense spatial development in the period after 1970 with suburbanisation.

Distribution of population tends to have higher density in close proximities of urban centers, and close to road network in all five municipalities. Hinterland villages are dispersedly populated.

If we scrutinise the dynamics of changes in population throughout the FUA Area in Table 4, we can see that the whole area exhibits a constant population growth during the whole period between 1960 and 2017 while the population grew faster during the 1960-1990 period and from 2000 to 2010. However, the growth was lower in the 1990-2000 period and even lower in the period after 2010.

Municipality	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Change (%)*
Ankaran/Ancarano	-	-	-	-	-	-	-	-	3237	3227	
Izola/Isola	15524	15739	16035	15867	15906	15951	15884	15813	15881	15920	2.55
Koper/Capodistria	50145	50708	51915	52548	52811	53155	53637	54287	51053	51140	1.98*
Piran/Pirano	17375	17231	17558	17814	17687	17675	17799	17783	17858	17823	2.58
Hrpelje-Kozina	4096	4127	4126	4197	4194	4253	4303	4260	4325	4366	6.59
FUA	87140	87805	89634	90426	90598	91034	91623	92143	92354	92476	1.06

*Table 4: Population trend of Slovenian municipalities and FUAs. *Without the Municipality of Ankaran;*

Data Source: Republic of Slovenia Statistical Office 2017

2.2.4 Topic 3: Accessibility within urban area:

In case of Koper FUA, no comprehensive tool is available neither in the region nor in FUA level that can measure travel time data. Information for travel modes by car, public transport, foot or bicycle can be found on different platforms for calculating travel times on personal computer or mobile devices. Legislation framework is set through various national strategies and municipal legislation of fostering sustainable development. There is no obligatory rule from national legislation to regulate urban development accessibility to public transport.

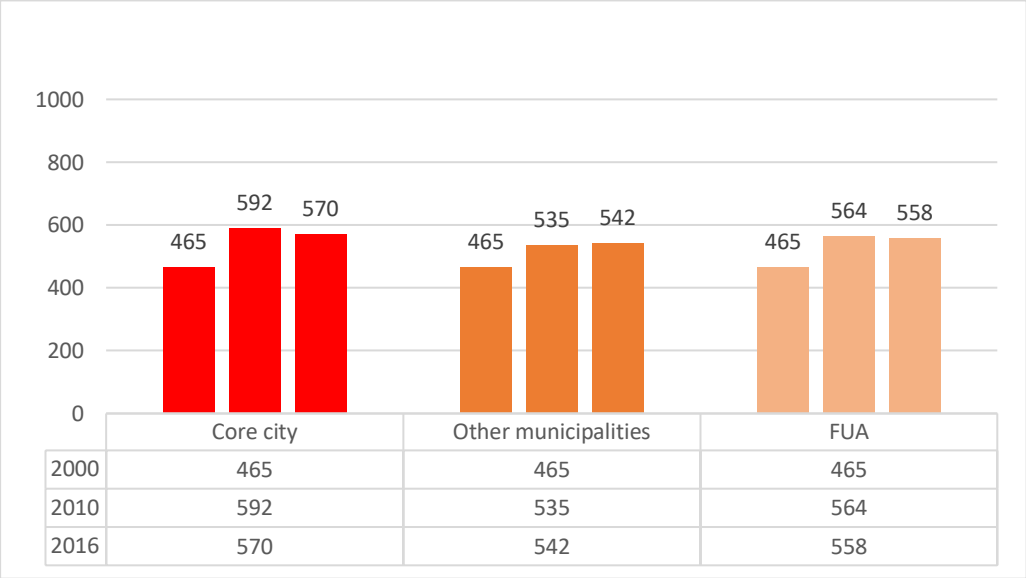
In Slovenia, due to the lack of practice and experience with strategic transport planning, motorized traffic has been continuously increasing whereas the quality of life is declining, while large budgetary expenditure does not lead to a significant improvement of the situation.

Although being existing national and local strategic documents (spatial planning, environment and development) in Koper FUA, which address sustainable transport, they mainly focus on road infrastructure. Until recently, there were no local strategies that would lead to action on the basis of an overall assessment, which would also address the individual elements of the transport system, such as walking, cycling, parking, and public transport.

Other documents related to spatial and mobility development, implement guidelines to stimulate use of public transport means and develop new platforms for commuting. Slovenian Strategy of Spatial Development is a document where public transport is mentioned as an easy and fast accessible mode of transport. Resolution on the National Programme for the Development of Transport and Transport Infrastructure in the Republic of Slovenia until 2030 proposes to increase competitiveness of public transport as a mode to work and school commuters. Municipalities of Koper, Izola and Piran created Sustainable Urban Mobility Plans to detect and attack local challenges of how to rise share of commuters by public transport, bicycle, and foot. Regional Development Plan 2014-2020 for Coastal-Karst region proposes to develop integrated regional system of rising public awareness and supporting practical solutions of sustainable mobility.

2.2.5 Topic 4: Motor vehicle traffic

Koper FUA had data for all the three given years (2000, 2010, and 2016) separated to core city, other municipalities and FUA total as well. (see Figure 6) However, they indicated that the data of 2000 is not as reliable as they are just estimations. Consequently, core city, other municipality and FUA total data are the same in 2000. If we examine the tendency, it is noticeable that in the core city the density of passenger cars was smallest in 2000 and the biggest in 2010, and the 2016 data show a slight fewer number comparing to 2010. Similar tendency can be seen when we examine FUA total as well. In contrast, in other municipalities of the Koper Functional Urban Area, the density of passenger cars continuously increased between 2010 and 2016.



	Core city	Other municipalities	FUA
2000	465	465	465
2010	592	535	564
2016	570	542	558

Figure 6: Number of passenger cars per 1000 inhabitants in FUA

Data source: Republic of Slovenia Statistical Office

It has been asserted that only the core city of the FUA has an obvious developed road network and it is a combination of radial and block pattern. Old city center cannot be accessed by private car by everyone, but those who can drive circularly around the old town and easily access south city parts where there is higher population density. In the southern parts of cities, the streets are dispersed in a block type of road pattern. Other municipalities in FUA have too small city centers and road networks to clearly distinguish a certain, or a general road network type.

As far as the terrain is concerned within FUA, it can be claimed that it is relatively hilly. North of Koper city, elevation reaches above 500 m in Hrpelje-Kozina municipality, but is lower than 200 m in the south parts of coastline urban areas. One of the bigger challenges for mobility planning are areas with higher altitudes in the south parts of urban towns, namely, Koper, Izola and Piran, and north of Ankaran city. They become unattractive for pedestrians and cyclists because of relatively high vertical drop. Historic and culturally protected areas are old urban centers in the cities of Koper, Izola and Piran. Access by private car is prohibited except for inhabitants and communal services who need to gain

municipal permission. Other areas of calmed traffic are around education centers (especially primary and secondary schools), healthcare centers, and most touristic points around hotels and other similar services. Coastline represents an important barrier for traffic, this is where maritime and road modes meet. There is no passenger terminal for private cars in any coastline port.

As far as Koper FUA is concerned, they had available data for traffic accidents in total, and number of accidents/fatality separately. As Figure 7 shows, the number of traffic accidents is the highest in the core city. When it comes to traffic accidents with injury, the numbers point out that FUA total has the highest proportion. As regards traffic accidents with fatality/100,000 inhabitants in Koper FUA, it is visible that in the whole Functional Urban Area of Koper eight traffic accidents ended up with fatality in 2015. Three of them happened in the core city, whereas five accidents were in the other municipalities of the FUA. (see Figure 8)

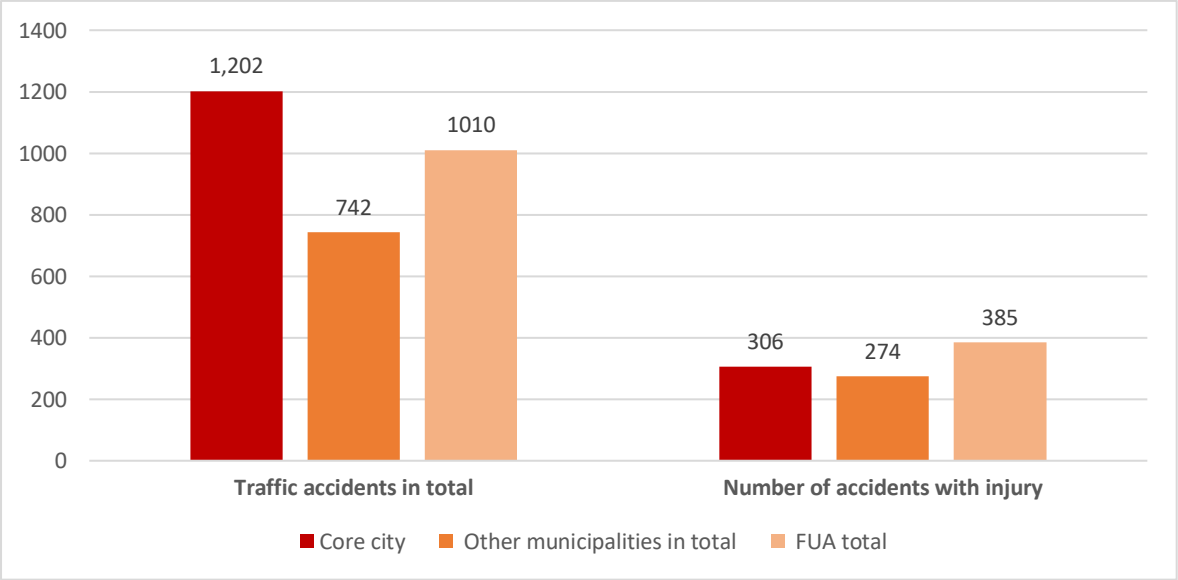


Figure 7: Number of traffic accidents in total and with injuty/100,000 inhabitants in Koper FUA in 2015

Data Source: Chamber of Commerce and Industry of Slovenia data

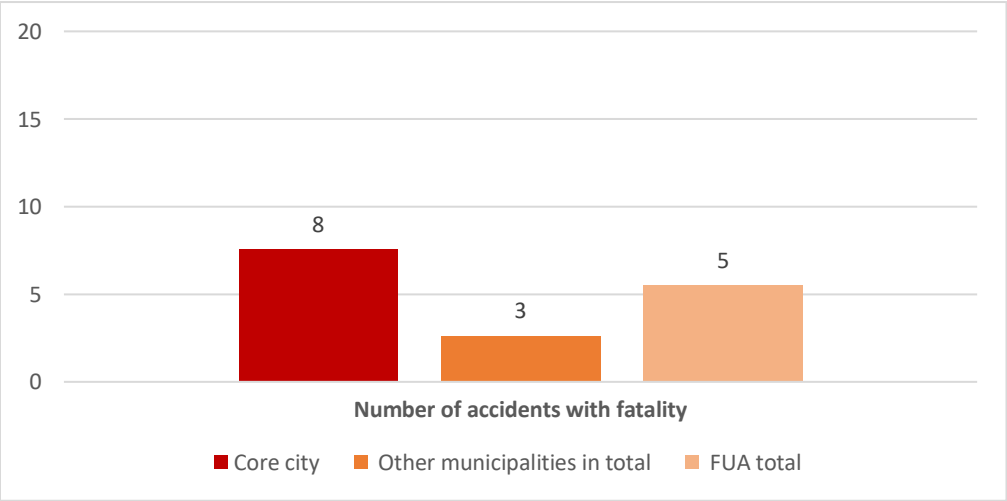


Figure 8: Number of accidents with fatality/100,000 inhabitants in Koper FUA in 2015

Data Source: Chamber of Commerce and Industry of Slovenia data

2.2.6 Topic 5: Road infrastructure and automobile-associated services

There are urban areas in Koper, Izola and Piran where population density is high and consequently the car ownership too. The parking zones are located relatively close, because they were enabled by former traffic politics. All public parking spaces have to be paid while private companies (shopping centers) offer parking spaces for free. Koper FUA possesses three P+R locations, all of them in the city of Koper. However, these P+R spaces are located in unfavourable locations and hardly seen from the main roads, even though payment policy is favourable for users (daily parking and urban bus ticket costs only 1 €). Parking is affordable for urban inhabitants too with a reduced price. The general cost of parking in FUA is 1 € per hour on average (varies between 0,5 € and 2 €) in Ankaran, Koper, Izola, Piran, while specific parking garages in Piran municipality cost more (3 € per hour) because of the touristic sector. Parking charge for residents is 30 € and more, depends on the municipality regulations.

There are more than 10,000 public parking lots at Koper, of which about a half are payable. The number of free parking lots is decreasing, but they are fully occupied. There are 427 P+R parking lots at Koper, namely 186 at Semedela between the connection to the expressway and the premises of the former Citroen factory and 241 along the Kolodvorska Street close to the main bus/train station.

Hinterland villages away from urban centers do not experience the same situation as urban towns. Only during bigger events or thematic holidays, there is increased demand for parking spaces. There is no national or local regulation how many parking spaces have to be ensured by the authorities.

Car sharing is not available in the region, but Avantcar company is trying to implement alike system with only electric cars (called Avant2GO platform).

2.2.7 Topic 6: Local public transport;

As far as the local public transport is concerned in Koper FUA, public passenger transport has a dual role in the region. Its function in sparsely populated and less developed areas is to facilitate travel to work, schools and supply and service activities in order to preserve the population density and provide greater development opportunities. In developed and dynamic areas (coastal zone), the role of public passenger transport is to relieve road traffic as an alternative to individual motorized transport.

Regarding the railway system and connections in Koper FUA, they are inadequate to meet population needs. There is one connection between Kozina (Hrpelje-Kozina municipality) and Koper city as the last

station with a railway. There are four daily connections between the two towns and journey lasts approximately 40 minutes. It is operated by national company, Slovenian railways, which is 100 % owned by the state.

A particularly big problem in the area of railway transport infrastructure is the obsolescence of railway network. Technical elements do not meet present needs for transport with faster and higher-capacity trains. Passenger transport in the Slovenian coastal rail network is almost non-existent or much subordinated to freight transport that hinders the passenger transport by higher utilisation of the network capacity. Among the coastal towns, only Koper is directly accessible by train. From there, other towns can be reached by road.

Bus services are the main mode use of public transportation. The concentration of bus lines is highest in the coastal zone, including intercity, suburban and city buses. The municipalities of Koper and Piran have an organized public transport system, while the Municipality of Izola runs it in conjunction with the neighbouring municipalities. Public transport represents only a small part of transportation, although this segment of passenger traffic has strengthened in recent years. Intercity connection is operated by private company Arriva, while three other private companies operate partially because they cross FUA. There is no common company operating public transport on a regional or FUA level.

In terms of infrastructure, a new central bus station has been planned at Koper. If united with the tram railway station in the immediate vicinity of the city harbour, it would represent an ideal passenger intermodal centre for the transfer of passengers to various public transport systems. Similarly, central bus stations should be built at municipalities Ankaran, Izola, Hrpelje-Kozina, Piran with at least the basic facilities for passengers where they could also get the basic information on schedules, lines and other information.

2.2.8 Topic 7: Bicycle traffic;

As elsewhere in Slovenia, most bicycle traffic in the Coastal-Kras Region takes place on roads intended for motor vehicles, while the urban centres of Koper, Izola and Piran – which is normal for cities – have some lanes designed specifically for cyclists.

Particularly suited for recreational or tourist cycling are the less busy roads in the hilly hinterland. Unfortunately, these roads are mostly poorly marked and therefore mainly used only by locals and rare explorers of the coastal surroundings. They are frequently poorly maintained and, in particular, their structure is in poor condition. These roads are mostly managed by municipalities. To deal with this problem, a joint project of all coastal municipalities would be welcome, because only an integrated approach could provide appropriate solutions in the FUA.

As Figure 9 depicts, in the area of the Slovenian Istria a regulated cycle path is running (mainly recreational), following the route of an abandoned narrow-gauge railway called Porečanka (Parenzana), which is becoming increasingly popular. The cycling track along the entire route of the abandoned narrow-gauge railway Trieste-Poreč (Parenzana) is currently being arranged.

Figure 11: Bicycle paths (yellow) and other cycling trails in Koper FUA

Data source: Geopedia.si.

Each coastal centre copes with the development of cycling facilities in its own way. Cycling facilities and pedestrian corridors are put up within other infrastructural arrangements (roads, squares, residential and business complexes). In addition to the development of facilities for pedestrians and cyclists, different systems are being introduced for public hire of bicycles and bike-sharing system. Parking spaces are ensured in limited locations, because transport mode is not well recognized.

In general, the cycling network is not adequately developed to produce a more significant role in short-distance mobility. One-way roads do not accept cyclists in both ways, while legislation about this rule can be regulated by the municipality.

Accidents are mainly result of poor infrastructure signalization and crossroad conflicts between different commuting groups: personal cars, cyclists and pedestrians.

2.2.9 Topic 8: Pedestrian traffic:

The main pedestrian zones in the FUA are located in the old towns of Koper, Izola and Piran. Ankaran and Hrpelje-Kozina urban centers do not have specific areas of pedestrian zones, but they have infrastructure that offers safety for pedestrians. Certain sections outside of city centers still lack basic pedestrian infrastructure (pavement, lightning, access for handicapped, road crossing section). In recent few years, public lightning and surface signs to prevent conflicts were renovated in all municipalities. Some parts of cities lack maps and information how to access different locations, but with modern technologies and map planners, this information can be accessed through internet connection. Koper has built under-overpasses for pedestrians and cyclists to connect city parts of old town and south neighbourhoods. South parts of coastal cities, namely, Koper, Izola, and Piran, and north part of Ankaran are less favourable to walk because of vertical difference. Other cities do not have over-underpasses and are not planned to be built.

Walking intercity distances is only present in a recreational function. Therefore, infrastructure in these sections is not appropriate for pedestrians or cyclists. Closed coastal road between Koper and Izola in March 2017 opened new opportunities to create space without personal cars. Closure was accepted by local population with great gratitude. Accidents are mainly result of poor infrastructure signalization and crossroad conflicts between different commuting groups: personal cars, cyclists and pedestrians.

There is no guidance for visibility-impaired people and limited access for handicapped people.

2.3 WEIZ FUA

2.3.1 Topic 0: Data and information availability

During the data collection, the main data sources of Weiz FUA were Das Serviceportal des Landes Steiermark, which provides data for Styria region, the national Austrian Central Statistical Office, the Styrian transport network. Besides these official statistical database, Weiz FUA could collect information from mobility experts of the core city of Weiz and from other municipalities of the FUA, as well as employee surveys, conducted in 2017, helped them to collect relevant data for the research.

Similarly to other partners, there were missing data in their case too, but as they stated there is never enough data available to allow a clear analysis of the traffic or the effectiveness of the measures.

2.3.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

As Table 5 points out, the majority of the employees working in Weiz is from the surrounding areas especially from municipalities located outside of the FUA. Besides it can be read from the table that 28,4% of employees working in Weiz are residents of the city itself too.

From the city of Weiz	3215 employees	28,4%
From 6 surrounding municipalities	2592 employees	71,6%
From elsewhere	5506 employees	

Table 5:Employed people in Weiz core city in the year 2015.

Data source: Statistik Austria

The FUA statistics and Figure 12 have shown that 77.8% of the employees from the city of Weiz, other municipalities of the FUA and municipalities outside of the FUA use a "MIV" - motorized individual mode of transport (car, car passenger, moped / motorcycle), 19,7% walk/cycle, whereas 2,5% go to work by bus or train.

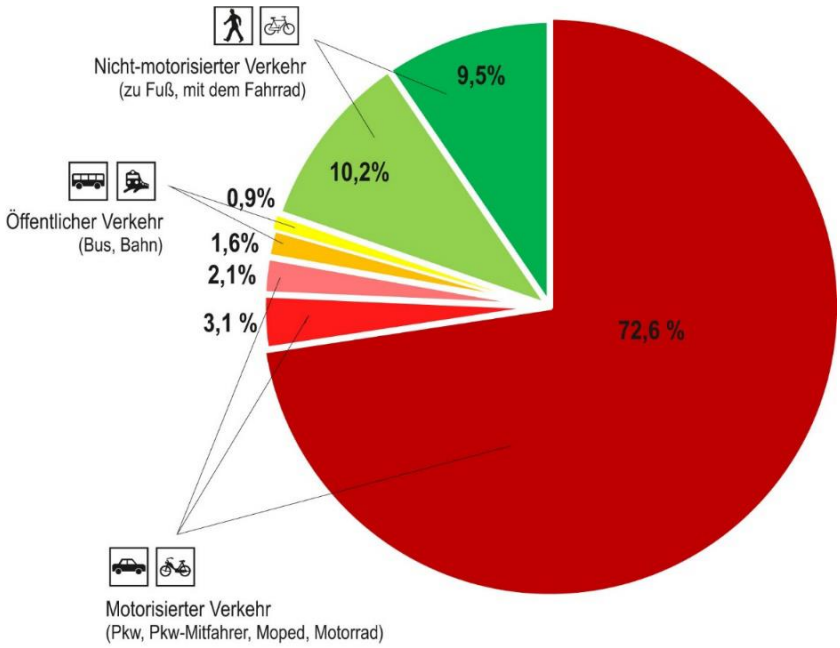


Figure 12: Modal split of employees from City of Weiz, surrounding community and otside 11.313 people

Data Source: Statistik Austria

When the employees only from other municipalities (excluding Weiz) of the FUA and the surroundings municipalities are scrutinized, (Figure 13) the proportion of MIV users is much higher, 90,5%. The ratio of public transport users among employees outside is 3,4%, whereas 6,1% use bike or walk.

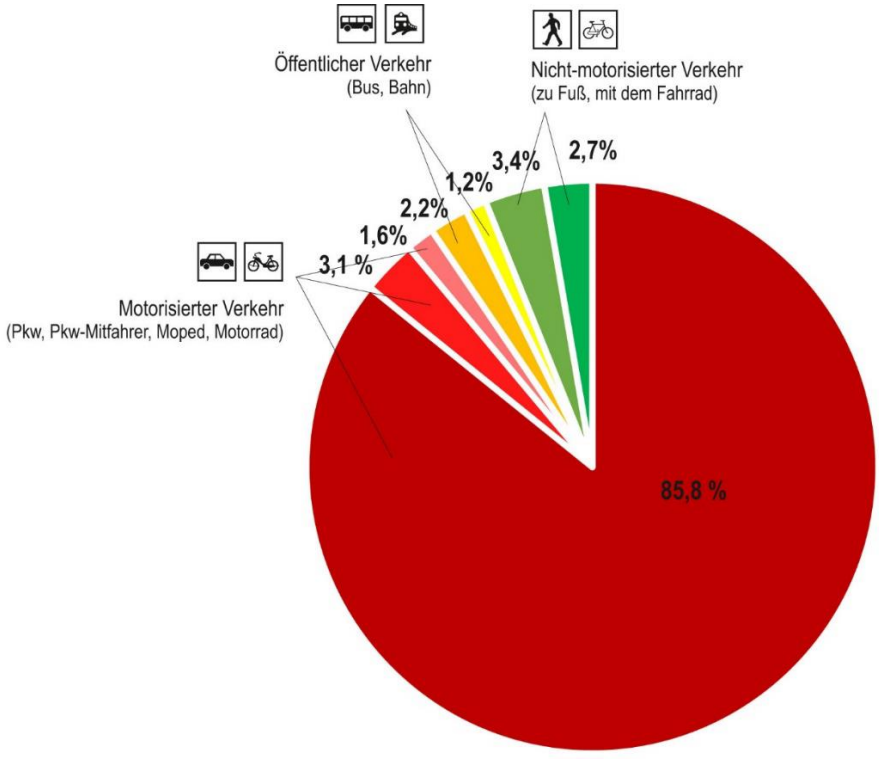


Figure 13: Modal split of employees only from surrounding municipalities and elsewhere 8,098 people

Data source: Das Serviceportal des Landes Steiermark

The situation is a lot better if we examine employees who work and live in the city of Weiz. Every second employee walk or cycle to work, which is an extremely high proportion and reflects the environmentally friendly way of thinking of Weiz employees. (Figure 14) Almost the other half of the employees use MIV, whereas the usage of public transport in this category is very low, merely 0,5% as Figure 14 points out.

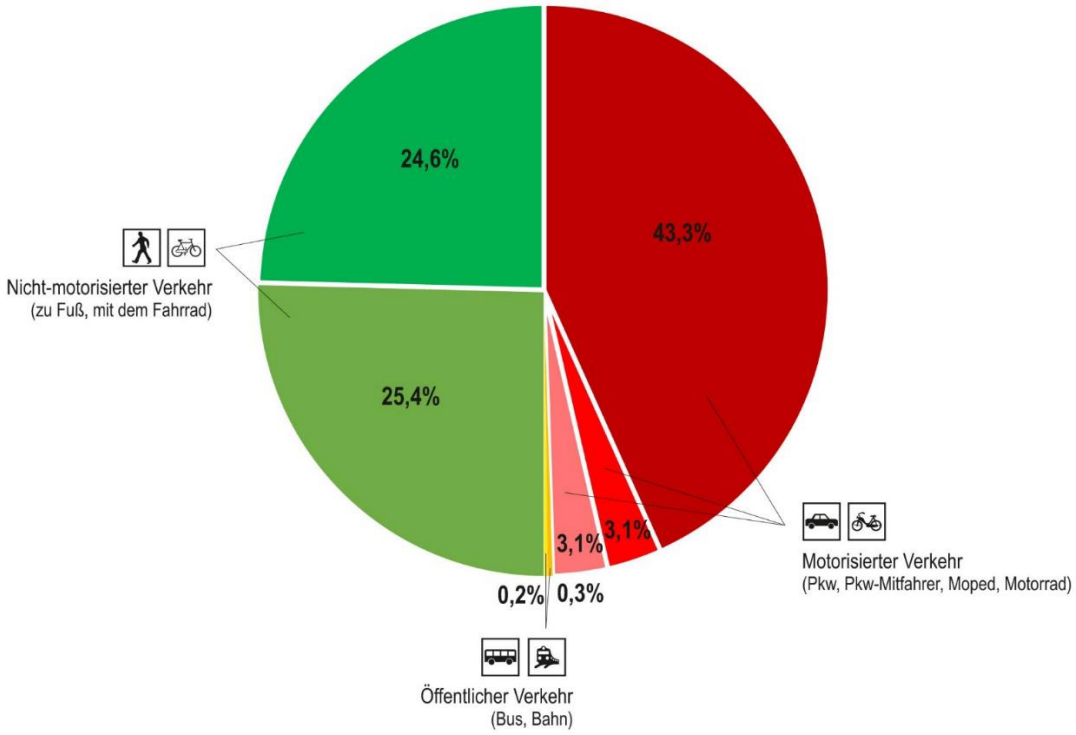


Figure 14: Modal split of employees from the core city of Weiz

Source: Das Serviceportal des Landes Steiermark

2.3.3 Topic 2: Urban Structure

Weiz is particularly important in the electrical industry, in metalworking and woodworking, and in the recent past in the automotive industry too. The "Statistics Austria" has a total of 11,313 employees in the city of Weiz for the year 2015.

As far as the education is concerned in Weiz FUA, there are 19 school locations, with a total of 4.358 pupils in this area.

As it has been already mentioned, there are 2,592 commuters to Weiz from six surrounding municipalities, whereas 311 employees commute from Weiz in 6 surrounding communities.

2.3.4 Topic 3: Accessibility within urban area

As the numbers suggest, Weiz is the smallest city in the partnership with its 5,1 km2 area. Not only the core city is the smallest, but also the whole FUA too among the CHESTNUT partnership. Figure 15 points out that the area proportion of the other municipalities is a lot bigger than the core city's. In Weiz FUA there are not big distances between the municipalities, so the accessibility is rather easy with different kind of transport modes.

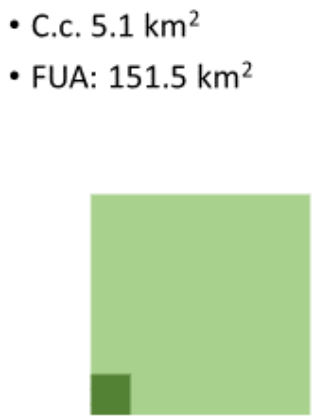


Figure 15:The area division of Weiz's core city and FUA

Data source: Statistik Austria 2017

2.3.5 Topic 4: Motor vehicle traffic

When we examine Weiz's FUA density of passenger cars on Figure 15, we can observe that the data in the determined years (2000, 2010, and 2016) are equal. The reason for this is that Weiz could provide data only on regional level. Nevertheless, the increasing tendency can be observed. As Figure 15 below points out, there is an increasing tendency in the density of passenger cars from 2000 until 2016 in the region of Weiz. As it was indicated in Weiz FUA's status quo analysis, traffic jam zones occur in the city centre.

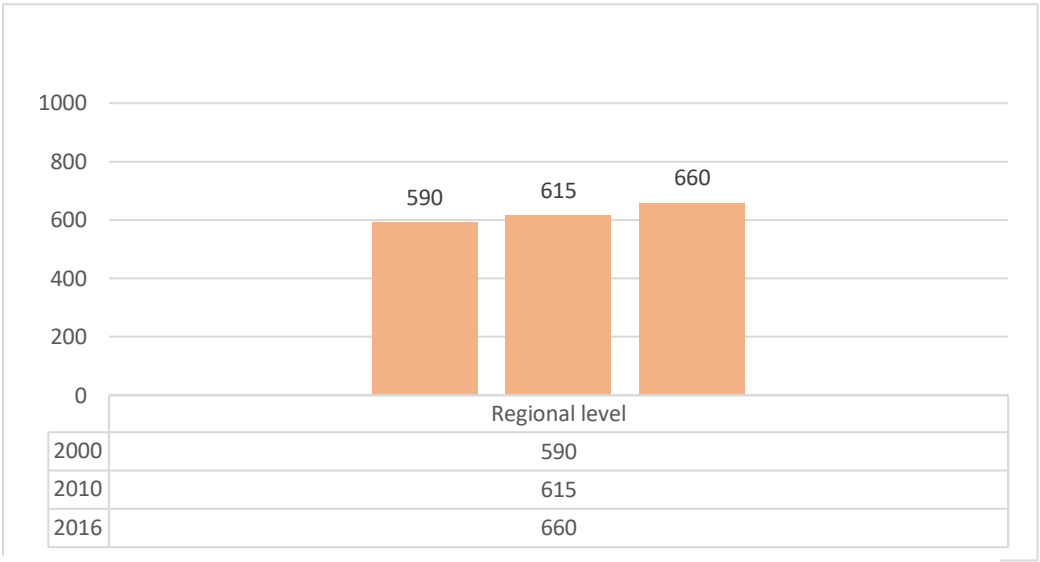


Figure 15:Timeline of density of passenger cars in Weiz's region (Steiermark) between 2000 and 2016

Data Source: Das Serviceportal des Landes Steiermark

When it comes to Weiz's FUA traffic accidents data, they did not have data for traffic accidents in total, and they could not make a distinction between injuries and fatalities either. As Figure 16 points out, if we calculate the injury and fatality data together, the other municipalities possess the highest number, whereas the core city data is 40% less.

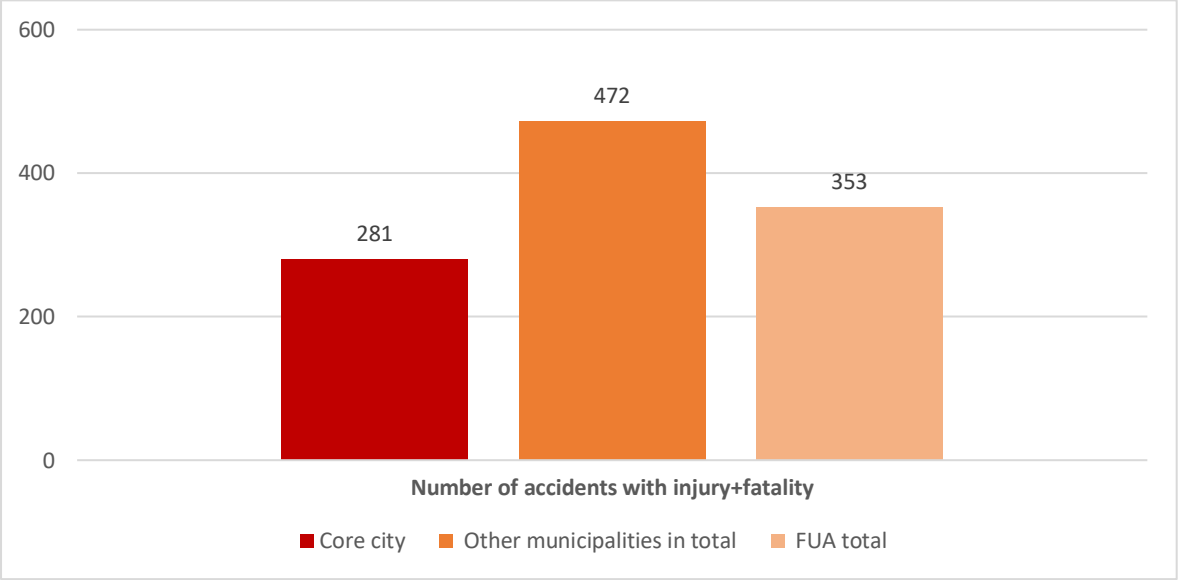


Figure 16: Number of traffic accidents with injury and fatality /100,000 inhabitants in Weiz FUA in 2015

Data source: Statistik Austria

2.3.6 Topic 5: Road infrastructure and automobile-associated services

As far as the parking situation is concerned in the core city of Weiz, there are two parking garages with 250+120 parking spaces, whereas in the city center there are 800, and the surrounding areas there are 1000 parking spaces, so in total the City of Weiz possesses 2,170 parking spaces. In the city, three kinds of parking zones are differentiated. Zone 1 is the paid parking in the city center, where car-users have to pay on working days, and the maximum parking time limit is three hours with the first 30 minutes for free. This parking zone is free of a charge on holidays and weekends, as well as electric vehicles are allowed to park here for free anytime. Zone 2 is a free parking space up to three hours, as well as Zone 3 is available for permanent usage.

2.3.7 Topic 6: Local Public transport

When we examine the local transport system in Weiz, the train line S 31 has to be highlighted which runs between Weiz-Gleisdorf (within the FUA) up to Graz (outside of the FUA). As Figure 17 points out this train line has nine stops within the Functional Urban Area of Weiz. The train stations are very well

located because nearly 80 % of the inhabitants, businesses, public facilities are within 500 meters of the train stations.

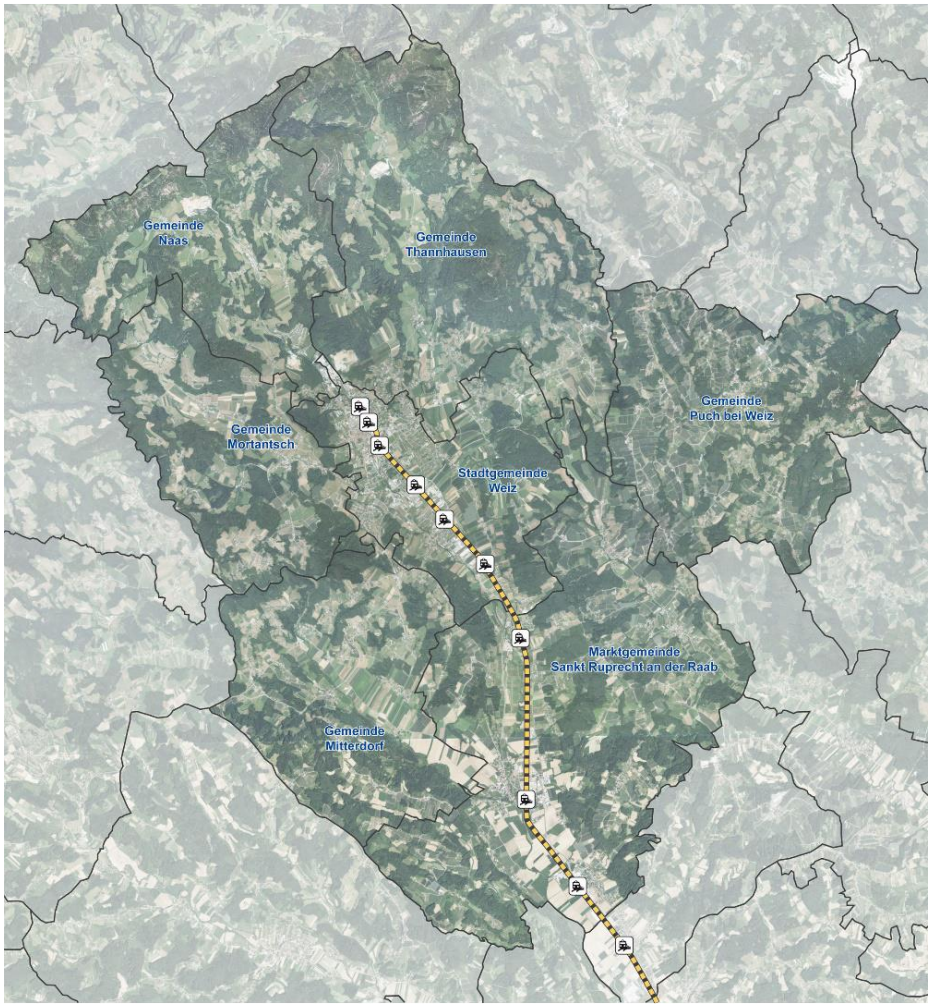


Figure 17:The train network in Weiz FUA in 2017

Data source: Das Serviceportal des Landes Steiermark

The timetable of the trains is given below.

- 5:30 to 7:00 in 30-minutes-timing
- 7:00 to 13:00 in 1 hour timing
- 13:00 to 17:00 in 30-minutes-timing
- 17:00 to 22:00 in 1 hour timing

The operator of the trains is the *Steiermärkische Landesbahnen (STLB)* that is the transport company of the Styrian region. Passengers have possibility to change their public transport mode to busses at Weiz train station and at Weiz-center.

Regarding the bus transport in Weiz FUA, it is tightly cross-linked system with overall 14 bus lines and 134 stops. As it was indicated, the main disadvantage of the bus service in the FUA is the rare and inappropriate density of buses between 9:00 to 12:00 and 14:00-17:00, so employees who finish work in the early afternoon have few possibilities to use the bus.

2.3.8 Topic 7: Bicycle traffic

When it comes to bicycle traffic in Weiz FUA, the statistics have shown that there are seven main bike routes with a total of 68,3km and there is a connection to national cycle paths and further secondary routes.

As Figure 18 points out, there are 11 rental stations with 80 bicycles in total (including 20 e-bikes)

Figure 18:The available bike-sharing stations in Weiz core city in 2017

Data source: Das Serviceportal des Landes Steiermark

2.3.9 Topic 8: Pedestrian traffic

In the old town center, there is a traffic-calmed zone, which is partly a pedestrian zone. Besides, there are shared spaces in the Functional Urban Area of Weiz too.

2.3.10 Framework conditions:

In the future, mobility actions shall be taken which are supposed to be in line according to superordinate goals and plans on national and EU level in the field of traffic and sustainable mobility.

Below some current regulations/strategies can be seen which have sustainable-mobility related sections:

- „Fahrradstrategie Land Steiermark“, bicycle strategy Styria
- Electric mobility –National level,
- „MasterplanRadfahren“, master plan cycling –national level
- Smart transport logistic –national level

2.4 PRAGUE District 9

2.4.1 Topic 0: Data and information availability

As the data collection results in case of Prague District 9 points out, approximately 50% of data were available. Some data are accessible via public databases, some are presented in the Prague strategic plan. Other data is possible to reach in the centre of transport information in Brno and Prague Transport Company. Measuring of the pedestrian flow is missing together with data about bicycle transport. There were missing travel surveys and traffic counts for district Prague 9.

As it was indicated in Prague 9 analysis, the main reason of the missing data is the insufficient financial support for looking up and obtaining all available data. It will be necessary to get additional finance for an external expert for some parts of SUMP.

2.4.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

The share of using the cars or public transport in Prague 9 is well balanced. The type of means of transport depends on the location of the residents' working places. Residents use cars as a mean of transport, in case the working place is located on the periphery or behind the city border. If the residents are travelling into the city center they mainly use public transport, which is a cheaper and reliable way of transport. The underground subway is very fast and well connected. The bus lines are reliably operating at the main transport junctions. The entire border Prague districts have the same issues. Prague districts in the city center are dealing with the issue of parking space.

Figure 19 reflects the modal split of Prague as a whole:

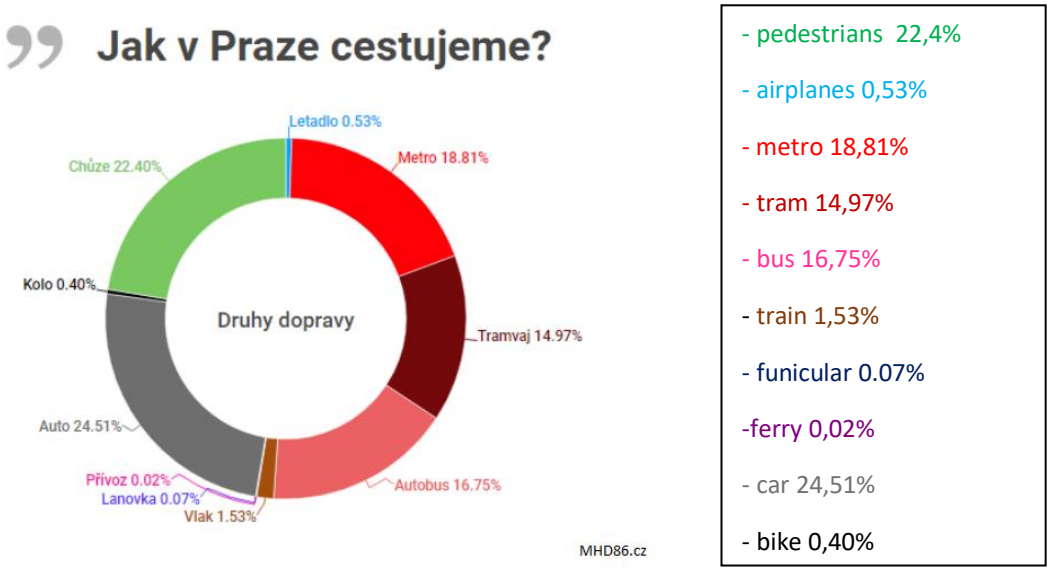


Figure 19:Modal split of Prague as a whole in 2017

Data source: http://mhd86.cz/2017/06/27/cim-cestujeme-po-praze-52-cest-pripada-na-mhd-cyklodopravu-tvori-04/

Figure 20 is differentiating the different types of public transport modes, and it points out that the metro is the most popular public transport modes (36.17%), but it is immediately followed by bus usage (32.41%) in Prague.

PID ridership and share of total PID passengers within City of Prague in 2015	
Mode of transport (operator)	**Persons/year**
Metro (DPP)	456 820 000
Trams (DPP)	358 284 000
Urban buses (DPP and private)	372 435 000
Suburban buses (private and DPP)	36 855 000
Railway (PID or ČD ticket)	36 669 000
Funicular (DPP)	1 480 000
Ferries (private carriers)	402 700
Total	**1 262 945 700**

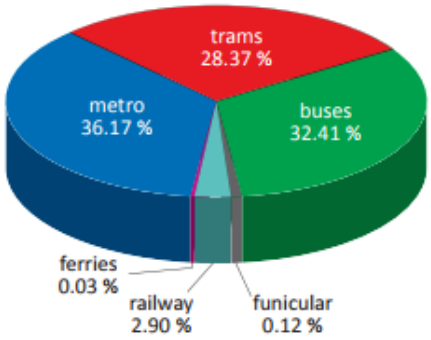


Figure 20: Public transport modal split in Prague as a whole in 2015

Data source: http://www.tsk-praha.cz/static/udi-rocenka-2015-en.pdf Prague Transportation Yearbook 2015

When we scrutinize the different age groups and their mobility behaviours, the statistics have reflected that younger citizens prefer the public transport because of the lower price and flexibility. Regarding middle-age citizens, they use cars more frequently.

According to Prague 9 estimation, approximately 50% of residents has to travel 2 x 15 km every day by car or using public transport. Besides, further data were provided in the common transnational template, which reflect that in the District 9 of Prague, 25 passenger kms/ day occurs by car, whereas this data is 10-10kms for busses and bicycles, and 30 kms for railway modes including train, tram and metro too.

As the matter of parking, the situation in Prague 9 is not satisfactory. Part of the parking space is taken by citizens from the Central Bohemian region. There is also a problem with high number of cargo transport due to the fact that there is a part of the Prague outer ring (Vnější městský okruh) still missing. We are also dealing with the issue of the exit from the Blanka tunnel, which should have been solved by another subsequent tunnel. This subsequent tunnel might not be built because of the lack of finance.

2.4.3 Topic 2: Urban structure

The distribution of the population in Prague 9 is balanced. In the core-city the business zones are concentrated in particular districts. In the city-center headquarters of companies and city authorities are situated. At the peripheries, mainly storehouses and warehouses of big consumer goods companies can be seen. The concentration of commuters is visible at the metro stations especially at those stations where the buses from distant Prague surroundings arrive. Passengers, within Prague 9, have the opportunity to travel/commute by bus, tram, metro, and trolley bus. The ratio of them is indicated and explained in the previous section.

2.4.4 Topic 3: Accessibility within urban area:

From Prague 9, the travel to the city center of Prague takes approximately 30 minutes on weekdays and 40 minutes on weekends. Traveling from one end of the district to another takes about 10-15 minutes. There are online public transport applications, also some applications for cars/navigation that may tell travel time by car and public transport. Prague 9 emphasised that it is necessary to keep the current regulations of transport master plan and the intentions of other mobility related documents already prepared for Prague 9 and for the whole city.

2.4.5 Topic 4: Motor vehicle traffic:

Figure 21 reflects the registered vehicles from 1961 to 2015 in the whole city of Prague. It can be easily seen from the statistics that the number of motor vehicles and passenger cars have been continuously increasing in the Czech capital.

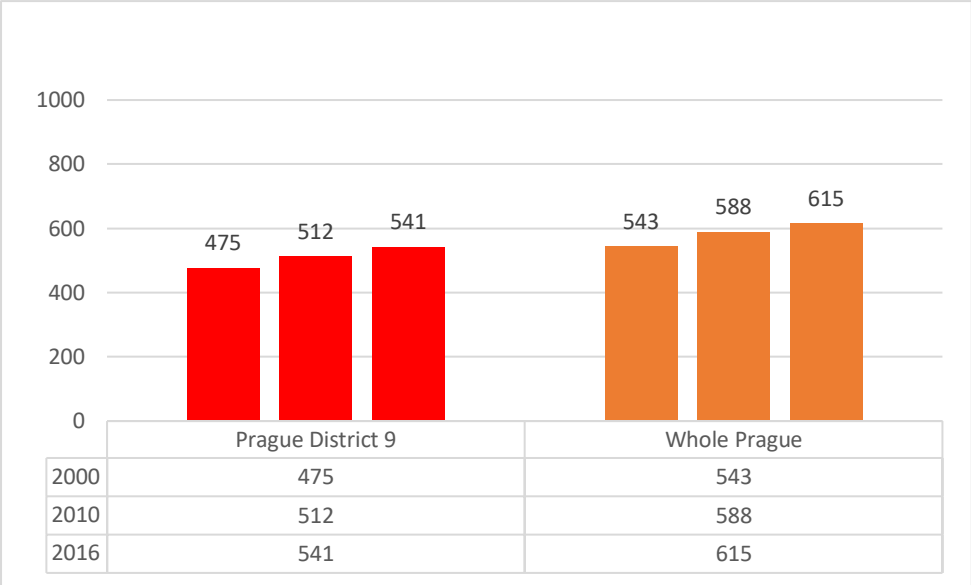
Comparison of registered vehicles in 1961–2015

Year	Prague				
	Pop.	Motor vehicles		Passenger cars	
	(000s)	total	%	total	%
1961	1 007	93 106	22 %	44 891	13 %
1971	1 082	203 519	48 %	133 129	40 %
1981	1 183	367 007	86 %	284 756	85 %
1990	1 215	428 769	100 %	336 037	100 %
2000	1 181	746 832	174 %	620 663	185 %
2010	1 257	928 769	217 %	699 630	208 %
2012	1 247	835 427	195 %	647 839	193 %
2014	1 259	881 235	206 %	690 037	206 %
2015	**1 267**	**941 145**	**219 %**	**740 745**	**220 %**

Figure 21: Number of registered vehicles in Prague;

Data source:http://www.tsk-praha.cz/static/udi-rocenka-2015-en.pdf Prague Transportation Yearbook in 2015

If we go into details, there is a 13% increase in passenger cars between 2000 and 2016 at both in District 9 and in the whole city. On the other hand, if we examine the exact numbers, the density of cars of the 9th District in 2016 do not even reach the density in 2000 in the whole capital city. In consequence, it can be claimed that Prague as a whole is more car-oriented than the district. (see Figure 22)



	Prague District 9	Whole Prague
2000	475	543
2010	512	588
2016	541	615

Figure 22: Timeline of density of passenger cars in Prague between 2000 and 2016

Data source: Czech Statistical Office in 2017

Nevertheless, it has to be mentioned that there are cars registered elsewhere, outside of the District 9, however, there are no exact numbers of it.

When the type of the road network is scrutinised, it can be claimed that there are linear, radial, and circular parts both in District 9 and in whole Prague too.

There are some geographical barriers (hilly landscapes, river, and historical city center) which make the travelling more difficult.

As Prague as a whole, there are available statistics about the most congested parts in the capital with the vehicles per day in certain areas (see Figure 23)

Prague road network segments with heaviest traffic in 2015		
	Section	**Vehicles per day (0-24 h) total**
1.	Barrandovský most	136 000
2.	Jižní spojka section 5. května – Vídeňská	127 000
3.	Jižní spojka section Chodovská – V korytech	123 000
4.	Strakonická section Dobříšská – Barrandovský most	118 000
5.	Jižní spojka section V korytech – Průběžná	113 000

Figure 23: Prague roads with heaviest traffic;

Data source: http://www.tsk-praha.cz/static/udi-rocenka-2015-en.pdf Prague Transportation Yearbook in 2015

The mobility analysis of Prague has pointed out that villa districts and park areas are the traffic-calming areas.

If we scrutinize traffic accidents in total in Prague as a whole as in Prague 9 separately, we can notice that this data is almost 1.5 higher in whole Prague than in the District 9. The traffic accidents with injury+fatality's data are roughly the same on both in the district and in the whole capital. (see Figure 24)

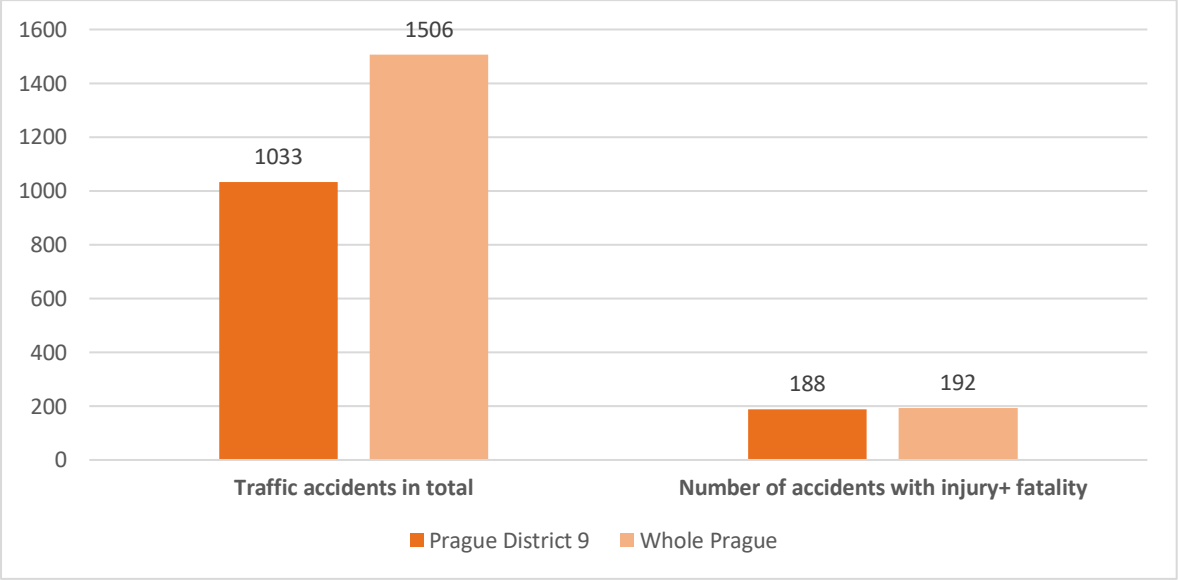


Figure 24: Number of traffic accidents in total+ number of accidents with injury and fatality in Prague in 2016

Data source: Czech Statistical Office

2.4.6 Topic 5: Road infrastructure and automobile-associated services

In Prague, roads are divided into four categories. Roads in the first and second category are responsibility of the Prague town hall. Roads of third and fourth category are a responsibility of a municipality. The representatives of the districts are giving some ideas and suggestions about repairs and adjustments. After that, as an outcome of negotiations there are agreed results that are realized by city companies. The evaluation of quality or the walkability is not established.

For the good accessibility around the bus stations, the district of Prague 9 and the Prague Public Transit Co. Inc. are the responsible bodies.

As Prague analysis has stated, that there are many civic associations in Prague 9, who observe the city space and give suggestions about changes and improvements.

Parking in the city-center (core city) is very expensive. In the city-center are so-called “blue zones”. In the district there are both, payed and free parking lots. Generally, there is lack of parking space due to the original plan from 50´s. Prague 9 also wanted to address constructing of parking houses.

It was stated that the area of stations of the underground/metro, health centers and schools belong to “hot spots” and these are the over-parked areas and receive high pressure of on-street parking.

Some places have no “blue zones”, so short-term and long-term parking is possible on the streets for free. There are also possibilities of monitored payed parking lots. Generally, the long-term parking is cheaper. The cheapest solution is to park on the street. It is forbidden to park out of the streets. If citizens do so, there are strict regulations and fines. Regulation claims that for each new apartment, there has to be also one parking place. Some problems may occur around the old buildings. In the capital city Prague, there are numerous P+R, they are usually situated at the edges of the city and they are operated by the capital city Prague (City hall). Unfortunately, there are no P+R opportunity in Prague 9.

As far as car-sharing service is concerned, there is a small private activity, but it is not very well developed, so one of the main aims of Prague to improve this facility too.

2.4.7 Topic 6: Local public transport;

Regarding the railway services in Prague, at peak time, the interval is 10- 15 min whereas in the off peak time time period this interval spread s from 30- 60 min.

The major stations are Vysočany, Libeň that serve the centers in Prague 9.

There are no data available for the percentage of business and other important facilities are covered within 500m radius from railway stations.
The long-distance express railway lines are operated by the State transport company and two private companies.

In the analysis of Prague status quo, it was mentioned that the unused railroads were refurbished into bicycle paths
Regarding the road-based public transport (bus, tram, trolley bus), the characteristics of the network is radial and tangential.
There is a central transfer for long-distance buses. For local buses, the central transfers are around the underground/metro stations where the suburban buses end.
The connecting points with the railway services are at the train and bus stations.

Regarding the infrastructure of the public transport, it has basic technical standards + low-floor buses/trams, air-conditioned carriages, Wi-Fi connection; electric timetable signs (on the bus/tram stops) are being introduced. Currently, data are being collected to prioritize the road-based public transport.

In most cases, the buses have their own lane. In particular, crossroads there are some problems with bus lanes. The number of passengers with public transport is permanently increasing. There are no exact numbers of it, because the related data are being collected at the moment.

In Prague an integrated railway-road tariff system available with separate prices for different age groups depicted in Figure 25.

Individual fares for 1 person in Prague

TICKET TYPE			Adult	Child ***	Senior ***	0 – 6/70+ years of age
Tickets	Basic	90 min.	32 CZK	16 CZK	16 CZK	0 CZK
	Short-term	30 min.	24 CZK	12 CZK	12 CZK	0 CZK
	1 day	24 hrs.	110 CZK	55 CZK	55 CZK	0 CZK
	3 days	72 hrs.	310 CZK	•	•	0 CZK

Figure 25: Individual fares for the integrated railway-road tariff system in Prague in 2016

Data source: http://www.dpp.cz/en/fares-in-prague/

There is a cooperation between the Czech railways and the Prague City hall who together are in charge of fare integration

Regarding the fare structure, there is one price around the whole area inside the boarders of the capital city of Prague. Outside of Prague, there are different zones according to their distance from Prague boarders. Different zones have different rate/tariff functioning by the rule – the further the more expensive. There is a long-term and area-covering ticket offer for residents.

Passenger has to have a “transfer ticket”. Which is a bit more expensive than the basic one, so they do not need to buy separate bus tickets.

Yes, there is just one operator in the city of Prague who accepts the bus fare. In the Central Bohemian region there are many operators.

2.4.8 Topic 7: Bicycle traffic;

As far as Prague's topography is concerned in connection with cycling, it can be stated that the city is not very favourable for cycling because it is rather hilly terrain. The surrounding of the city-center is the most unfavourable for biking.

In District 9, the length of the bicycle paths is 24 km whereas in the whole city this length is 225 km (source: http://www.tsk-praha.cz/static/udi-rocenka-2016-cz.pdf)
10 km of the roads have separated bicycle in the district. 15km of the bicycle path and lanes is mainly for recreational purpose. A network map is available in the city too

As the statistics show, some selected crossroads (20%) have separate traffic lights for bicycle.

In most cases, the lanes are on roads, so it is asphalt ground. The bicycle paths ground is sometimes asphalt and sometimes soil.
The legislation, to make it possible to cycle against one-way direction on one-way road, is in progress.

There are no public bicycle parking places in Prague 9. Although there are individual stands/holders.

In Prague 9 the only chance for parking the bicycles are the previously mentioned stands/holders. One is for example in front of the Municipal town hall Prague 9. Regarding the whole city of Prague, there are some good practice examples from "Centrum Chodov". In 2016, this shopping Centre has constructed two new parking lots for bicycles including lockable bicycle boxes. (source: http://www.tsk-praha.cz/static/udi-rocenka-2016-cz.pdf) Another good practice example comes from Klánovice. In September 2016, the first B+R parking lot was opened at Klánovice train station. This bicycle parking lot includes lockable bicycle boxes and sheltered bicycle stands.

There is no regulation about bicycle parking on the building code. When it comes to bike sharing there are roughly two smaller companies, who develop this service.

If we examine the safety of bike usage, bicycle paths are separated and safe in Prague. The bicycle lines are less safe and sometimes they end without warning. Bicycle accidents are primarily in collision with cars.

The local interest groups are emphasising that there are not enough bicycle paths in the district. The City hall of Prague intends to forbid the motion of bicycles in the center. Building new bicycle paths also appears in transport planning plans.

2.4.9 Topic 8: Pedestrian traffic

In Prague the main pedestrian zones are parks, namely Park přátelství and Park podviní

The quality of the current pedestrian routes is fine (there is appropriate lighting, street furniture, park surface, etc.)

Pedestrian passes under bridges or viaducts are being built. At these places, in most cases the pedestrian routes are safe and citizens can pass without fear.

As it is stated in the analysis of Prague, there have not been any conflicts between pedestrian and bicycles so far.

At the pedestrian crossing, the pedestrians have the priority over the cars, however they do not have priority over trams. Primarily, the pedestrian accidents are in collision with cars.

The bus/tram stops, squares and other areas are equipped with guidance for visibility-impaired people too.

2.4.10 Framework conditions of Prague 9

Currently, Prague possesses some plans, which advocate sustainable urban mobility, and has formulated exact measures. The following strategies are advantageous for the preparation of the Sustainable Urban Mobility Plan for Prague District 9 too:

- Prague urban plan – Územní plán sídelního útvaru hl.m prahy
  http://www.iprpraha.cz/platnyplan
- Strategic plan of the Prague city – Strategický plan
  http://www.iprpraha.cz/clanek/83/co-je-strategicky-plan
- The metropolitan plan - The Metropolitan Plan is the new Prague Land Use Plan.
  http://www.iprpraha.cz/uploads/assets/dokumenty/obecne/brozura_ipr_eng.pdf

2.5 BUDAPEST District 14

2.5.1 Topic 0: Data and information availability

If we examine the data availability of Budapest District 14 and the whole Budapest, we can observe that despite the extensive data collection, mainly the mobility statistics part of their data collection is

rather deficient. Some data could be collected for both the district and the whole FUA, some just for the whole city, but there were some data that were not available at all. Therefore, further research and analysis have to be carried out in the future to collect the missing data and provide comprehensive input for this field.

2.5.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

Modal split in Budapest:

Modal split data are not available on district level, only on whole city level. Figure 26 reflects the modal split of Budapest in 2014 and the estimation for 2030. The goal that should be achieved by 2030 is set up in Budapest's planned SUMP.

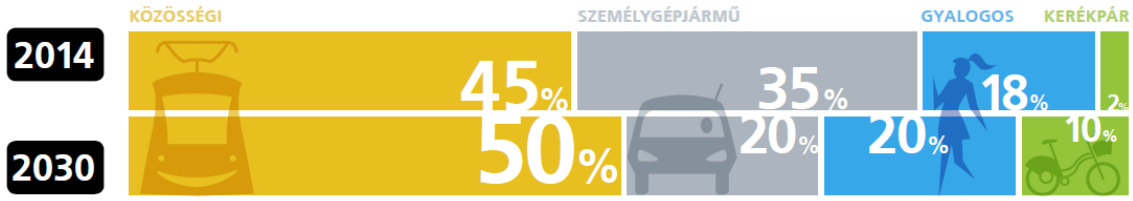


Figure 26: Modal split in Budapest in 2014 and prognosis for 2030

Data source: Center for Budapest Transport - Budapest Traffic Model, Balázs Mór Plan I. 2014

The distribution of purposes of trips made in the district is unknown, data is available only on whole city level in Figure 27:

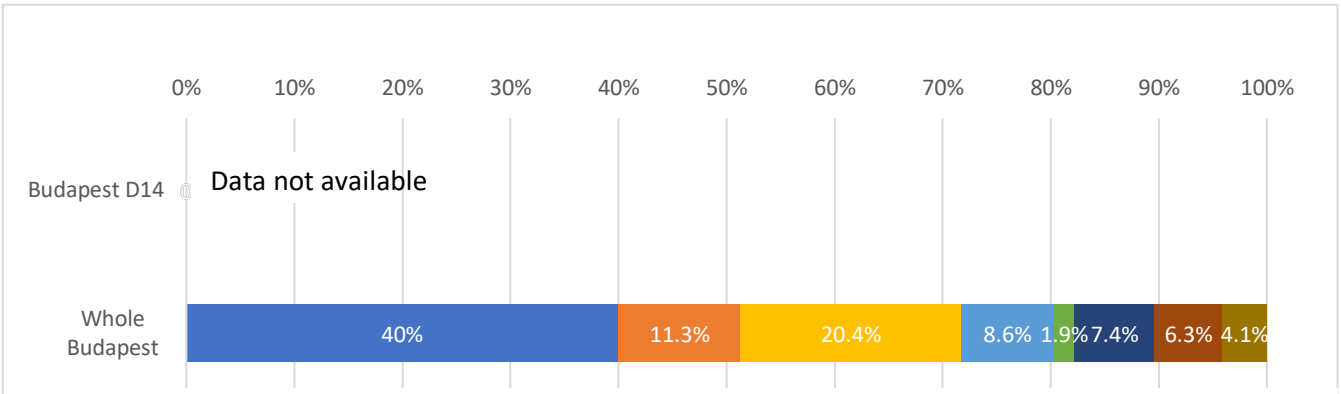


Figure 27:Purpose of trip in Budapest in 2012 [%]

Data source: Hungarian Central Statistical Office

Daily travel data per person is not available, but the average travel distance per trip per transport means is presented in Figure 28. No such data is available for the Budapest agglomeration.

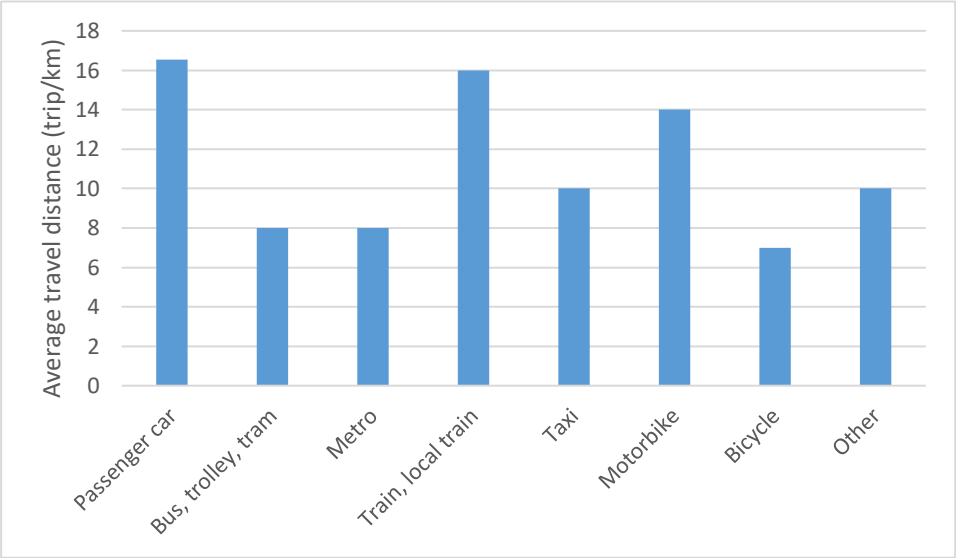


Figure 28: Average travel distances in Budapest (2012)

Data source: Hungarian Central Statistical Office

2.5.3 Topic 2: Urban structure:

Since the 1960's, Budapest had a continuous population growth, which peaked in 1980. This dynamic growth was mostly due to migration from other areas of the country. Since the 1990's, the number of new arrivals has toned down, but more and more residents of Budapest have moved to the agglomeration area surrounding the capital city due to the development of external areas and the availability of non-built-up areas. This process resulted in 2011 in the lowest number of inhabitants in the city compared to previous years. The population decrease of the city stopped in 2011. This was caused by the fact that mortality rates improved, thus the natural decline of the population decreased, and the suburbanization wave calmed down, moreover, more people moved back to the capital. The population of Budapest FUA grew continuously in the last decades as the table below shows.

In districts forming the city core, population decline in the last decades exceeded the average of the capital city, but the number of inhabitants around the core area (e.g. Zugló) changed in the same fashion as the average of the capital city. The ageing of the population of Budapest continued in the last decades. The number of children born is decreasing rapidly and at the same time, the number of elderly people is increasing in the capital. By 2030, the aging process is expected to continue, an

increasing number of older people and fewer children born are expected. As Table 5 depicts, the population of Zuglo has decreased continuously since 1990. In 1990 the population of the district was 143 501 inhabitants, in 2001 the number was 123 510 and around 2010 the population stabilized around 127 000 inhabitants. Between 2001 and 2013 the population increased by 4,27 %.

	Budapest	Budapest Functional Urban Area	FUA total	Budapest XIV. Zuglo
1990	1 777 920	675 390	2 453 320	143 501
2001	1 729 040	805 850	2 534 890	123 510
2011	1 745 000	1 555 000	3 000 000	127 000

Table 6: Population trend on district, Budapest and FUA level from 1990 to 2011

Data Source: Hungarian Central Statistical Office

As Zuglo is situated between outer and inner parts of Budapest, the district's main roads are busy by transit traffic. Therefore, many transport-related problems go beyond the scope of district level. It's important to mention that the problems have great effect on the quality of life of local inhabitants. For that reason, one of the main problems that should be considered in the SUMP of Zuglo is transit traffic.

Zuglo is bounded by railways, busy main roads and by a highway, so crossing the borders of Zuglo is not easy everywhere. As it can be seen in Figure 29, the boundaries of the district, each crossing point is marked considering its bike-friendliness. The legend of the figure is the following:

- black – need for new crossing
- red – existing crossing but not bike-friendly at all
- yellow – existing crossing but should be developed
- green – existing crossing with good connections

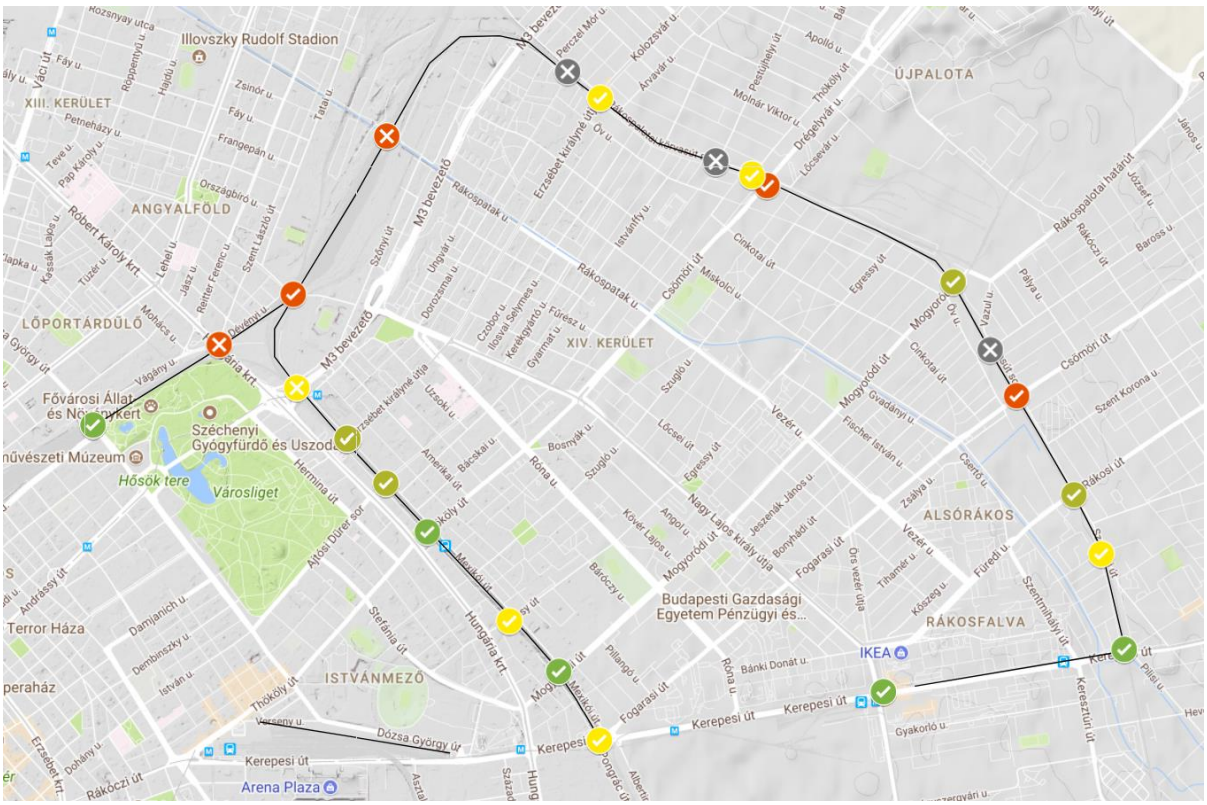


Figure 29: Bike-friendliness map of Zugló in 2017

Data source: Integrated Urban Development Strategy of Zugló

2.5.4 Topic 3: Accessibility within urban area:

Daily travel data per person are not available, but the average travel distance per trip per transport means is presented in Figure 30.

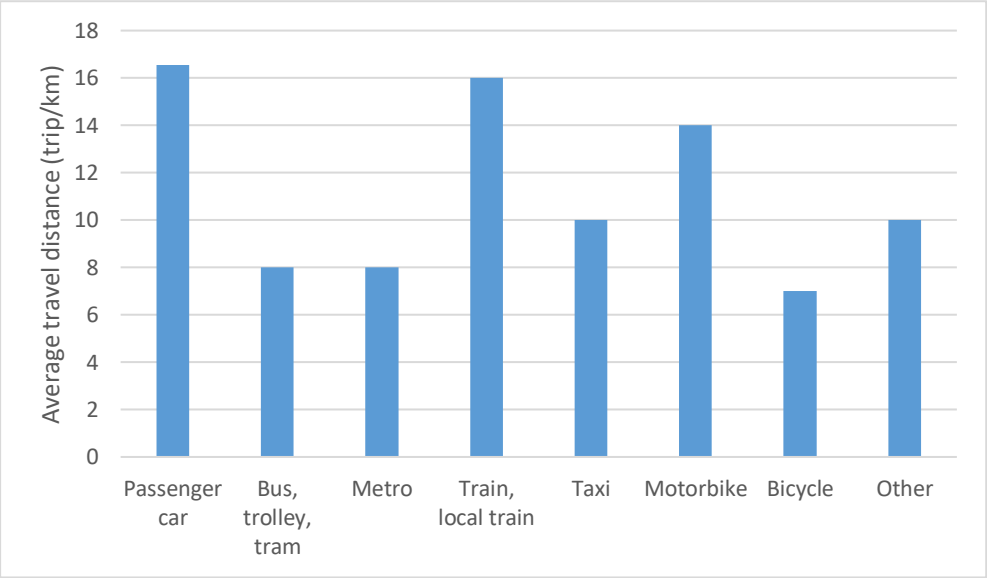


Figure 30: Average travel distances in Budapest in 2012

Data source: Hungarian Central Statistical Office

As Figure 30 reflects, the biggest number of distances was travelled by car in Budapest in 2012, however it is followed by train and local train, and the difference between the distances of the two means of transport is very low.

There are two typical peak periods within the daily traffic flow in Budapest. The morning peak can be observed between 6:30 and 9:00 a.m., and it is culminating between 7-8 a.m., while the less pronounced peak period in the afternoon spreads between two and 6 p.m., with a culmination between four and 5 p.m. The congestions occur at different places in the city and in different time intervals. First, the entrance roads are affected by the congestion, especially at connection nodes to the main elements of the main road network, and later on, the inner city quarters are affected. Certain transit routes (e.g. Hungária Avenue) are overcrowded all the time, although the influence of rush hours in the morning and in the afternoon is also felt here.

Travel time data available on Google Maps. To compare travel times of different modes we used Google Maps route planner for private vehicles and FUTAR[1] for public transport and bicycle. Table 7

[1] Official route planner application of Budapest: http://futar.bkk.hu

shows the comparison between the travel times of different destinations with different means of transport.

Number	Origin - Destination	Time of departure	Travel Time			
			Walking + Public Transport	Bike + Public Transport	Bicycle	Private Vehicle
1.	Bosnyák tér (XIV.) – Deák Ferenc tér (V.) [to inner city]	Monday 7:30 am	25 mins	22 mins	23 mins	16 - 40 mins
2.		Wednesday 10:00 am	24 mins	22 mins	23 mins	16 - 35 mins
3.	Bosnyák tér (XIV.) – Árpád-híd (XIII.) [to northern BP]	Monday 7:30 am	21 mins	17 mins	16 mins	10 - 22 mins
4.		Wednesday 10:00 am	23 mins	17 mins	16 mins	10 - 35 mins
5.	Bosnyák tér (XIV.) – Szent Imre tér (XXI) [to southern BP]	Monday 7:30 am	41 mins	43 mins	47 mins	28 – 70 mins
6.		Wednesday 10:00 am	38 mins	43 mins	47 mins	20 – 45 mins

Table 7: Comparison between travel time of different destinations and means of transport

Data source: TomTom's database https://www.tomtom.com/en_gb/trafficindex/city/budapest

2.5.5 Topic 4: Motor vehicle traffic:

The district's transport strategy defines the main problems related to motor vehicle traffic:

- Lack of ring roads between Zuglo and district XIII. (Szegedi út, Körvasúti körút)
- Nagy Lajos Kiraly utja: one of the most important roads of Zuglo, unfavourable design for all kind of road users.
- Bad effects of transit traffic.
- Temporary results: need for strategic planning and decision-making.
- Dangerous crossings and intersections for all kind of road users.
- Parking problems in the peak hours around schools and other educational institutions

When we scrutinize Budapest and its passenger car density data, Table 8 suggests that we can talk about an increasing tendency here as well. In whole Budapest, there is a slight decrease between

2000 and 2011, but their recent data from 2012 show increase. Interestingly enough, that in Budapest approximately every third person has a car both in district and capital level.

Year	2009	2010	2011	2012	2013	2014	2015	2016
Registered passenger cars in Budapest	581 991	573 315	566 790	565 563	573 264	583 694	597 337	611 941
Registered passenger cars in Zuglo[2]	data request is in progress.							

Table 8: Timeline of density of passenger cars in Budapest from 2009 to 2016

Data source: Hungarian Central Statistical Office

Zuglo lacks ring roads that cause poor connections with neighbour districts. The necessity of new ring road connections has been under discussion for a long time. Figure 31 depicts the traffic calming areas (green – existing, blue – planned, short term implementation, red – planned, long term implementation)

[2] Data request in progress

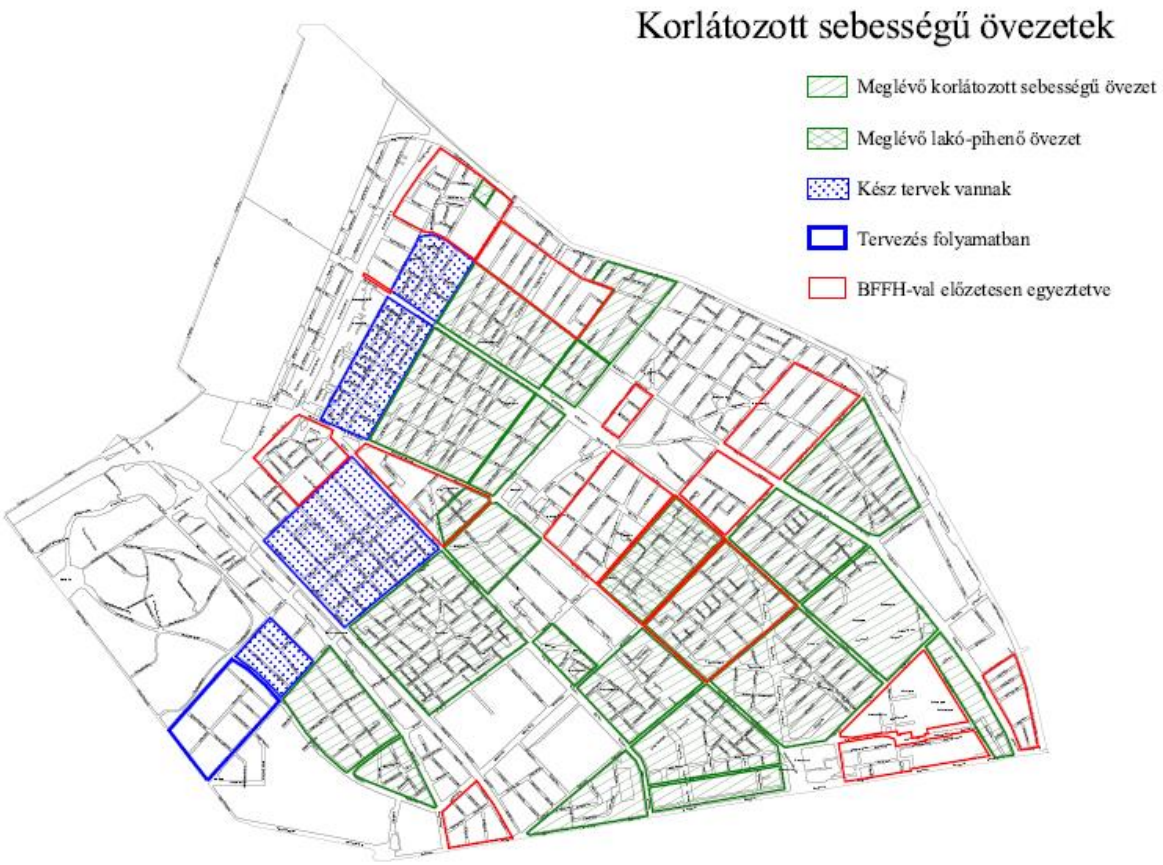


Figure 31: Traffic calming areas in Zugló in 2017

Data source: Integrated Urban Development Strategy of Zugló

2.5.6 Topic 5: Road infrastructure and automobile-associated services

Car sharing:

GreenGo is the biggest car-sharing provider in Budapest. Unfortunately, the cars are available only in the inner parts of Budapest. Just a small area of Zuglo is covered by GreenGo.

P+R facilities in Zuglo:

Name	Capacity
Mexikói út	257 (free of charge)
Papp László Sportaréna	300 (guarded, charged)
Pillangó utca	121 (guarded, charged)
Örs vezér tere	265 (guarded, charged)

Table 9: P+R facilities in Zugló in 2017

Data Source: Integrated Urban development Strategy of Zugló 2015

2.5.7 Topic 6: Local public transport;

There are three main railway lines on the boarders of Zuglo but none of them serve the district well because of poor connections between local public transport and railways and lack of well-positioned railway stations. The stations are in bad conditions, B+R facilities are needed. There are two railway stations in the district: Rákosrendező and Budapest-Zuglo stations. Rákosrendező is one of the biggest brownfield area within Budapest. Zuglo's aim is to revitalize the area but the owner of it – the Hungarian national railway company – makes the procedure almost impracticable.

Local public transport serves Zuglo well. Trams, buses, trolleybuses, suburban railways and metro lines are available. In spite of the impressive number of PT lines in the district, there are some areas that are not covered by them. The figure below shows the PT stops and stations with the 300 m (500 m in case of main transit hubs and railway stations) covered area. Figure 32 depicts the main public transport lines in Zugló with 300 m (500 m) accessibility and passengers per day.

The legend of Figure 32 is the following:

(black – railway, red – trolleybus, purple – suburban railway and metro, yellow – tram, blue - bus)

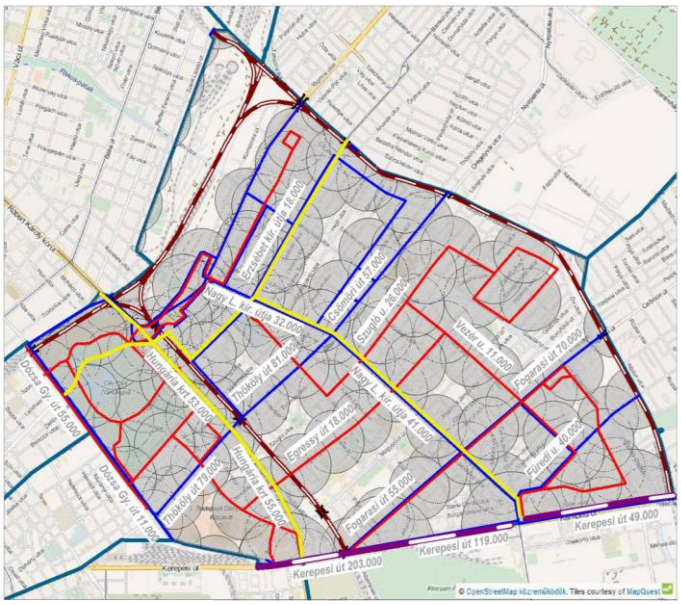


Figure 32: Main public transport lines in Zugló in 2017

Data source: Integrated Urban development Strategy of Zugló 2015

The institutional background of local public transport in Budapest is summarized in Table 10.

Budapest	
Ordering body of PT	Municipality of Budapest orders the local PT service for the city regarding every means of local public transport (buses, trams, subway, trolleybuses, boat). Some of its competences have been delegated to its transport authority, BKK (Centre for Budapest Transport Ltd.). Suburban services – railways, buses, from 2017 also local railway belong to the National Development Ministry as a service ordering body, and to the MÁV Hungarian Railways as railway operator.
Coordinating body of PT	BKK is contracted to the Municipality of Budapest in order to coordinate the ensuring of PT in Budapest on behalf of the Municipality.
Service providers of PT	PT in Budapest is provided mainly by the city owned BKV Budapest Transport Company as an internal operator, while apart of the bus service is provided by private operators selected by tenders. BKV Ltd. operates the PT service based on an 8 years-long public service contract, signed with BKK, who is empowered by the municipality of Budapest. The private operators are chosen by public procurement procedures.

Table 10: The institutional background of local public transport in Budapest

Data source: Budapest Transport development Strategy

The representatives of Budapest consider the followings as main problems related to public transport:

- Some parts of the district are poorly served by public transport.
- Accessibility for disabled: lack of low-floor vehicles and accessible infrastructure.
- Lack of good and fast connections with suburbs.
- Poor connections between local public transport and railways.
- Unattractive, chaotic conditions at main transfer hubs.
- Overcrowded public transport lines

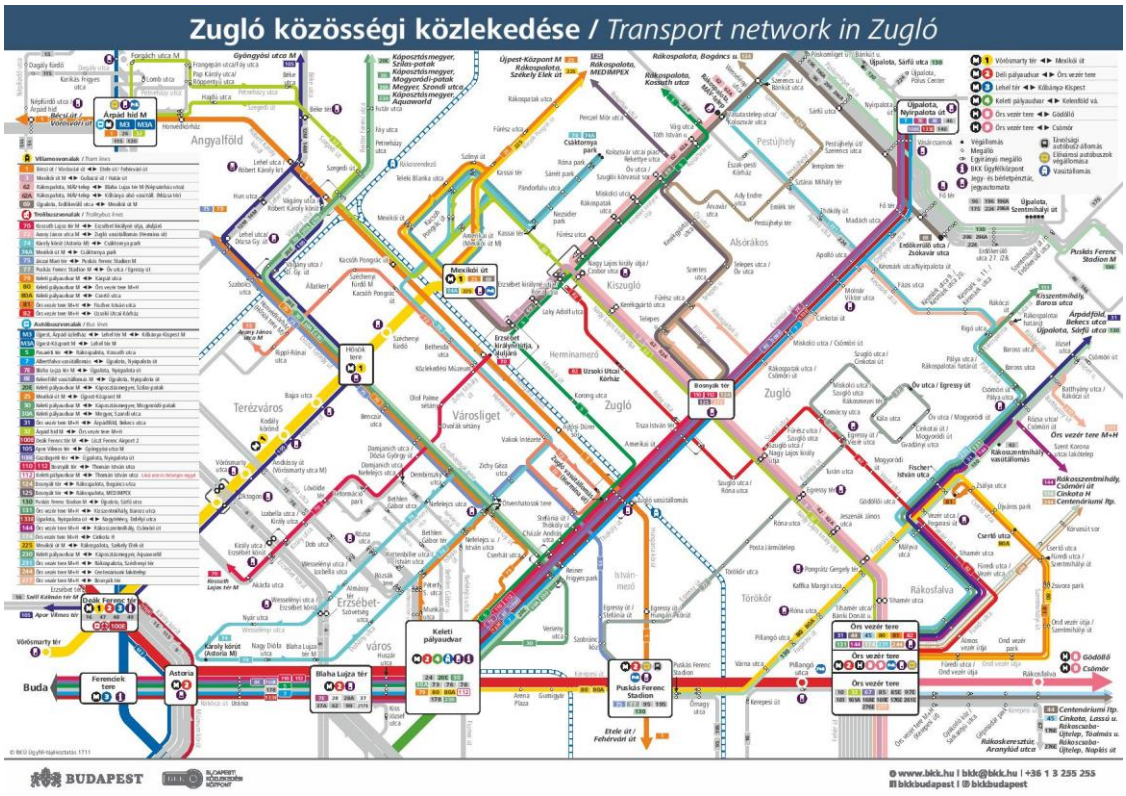


Figure 33: Public transport network in Zugló in 2017

Data source: Centre for Budapest Transport

Real time route planning services are available for PT users. New traffic management and passenger information system was introduced in 2014. In the framework of this project a real-time data based travel planning system was developed, which serves the passengers through a mobile application. It has a map module, an optional travel preference module, a door-to-door or unobstructed route planning function in it. Google Maps includes real-time PT information as well. Within the borders of Budapest single tickets, 24 h – 72 h and a great variety of passes are available. Commuters from the suburbs have to buy an extension ticket or metropolitan area pass as supplementation.

2.5.8 Topic 7: Bicycle traffic

Zuglo has great potential to spread urban cycling. The share of cycling in Budapest has increased 10-fold since the mid-1990s. The main attractions and important destinations are within cycling distance. Even the inner districts can be easily reached from the centre of Zuglo by bicycle. The SUMP of Budapest, Zuglo's transport master plan and Zuglo's bicycle-friendly development strategy have common goals: increasing the share of cycling by bicycle-friendly developments and promotional, awareness raising campaigns.

Within the collaboration of Zuglo and the Hungarian Cyclists' Club, the district's bicycle development strategy was established in 2017. The strategy includes the analysis of the current situation, the current conditions, the main barriers, the potential of cycling, evaluation of recent developments etc. The strategy sets up overarching goals and includes a development program too.

The overarching goal is the following: In the future, Zuglo should become a place where anybody (regardless of age or level of experience) can choose the bicycle as an option to get from A to B on the shortest path as a result of the existing safe and bicycle-friendly conditions. The overall goal is to increase the acceptance and prestige of cycling, increase the share of daily cycling rates, increase traffic safety and reduce conflicts between road users.

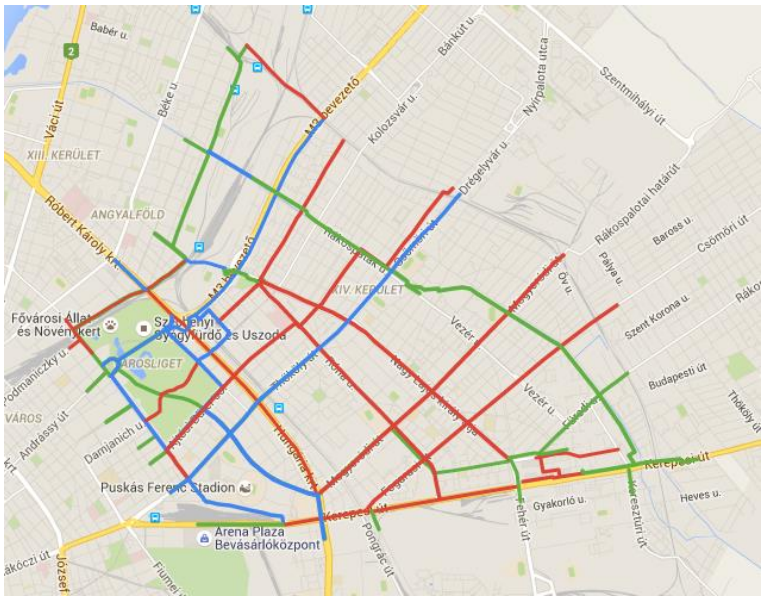


Figure 34: Existing and planned main cycling network of Zuglo (green – existing, blue – under planning, red – no planning activity yet)

Data Source: Integrated Urban Development Strategy of Zugló in 2015

Figure 35: Bike parking in Zugló (P – existing, red – proposed)

Data Source: Integrated Urban Development Strategy of Zugló in 2015

2.5.9 Topic 8: Pedestrian traffic:

As it was described in the chapter of urban structure, Zuglo's borders are highways, main roads and railways. As a result of this, Zuglo is in lack of good quality and accessible bike and pedestrian crossing on its borders as Figure 36-39 depict. Roads and railways divide Zuglo from other parts of Budapest and from its neighbour districts.

Figure 36: Left – Narrow sidewalk for cyclists and pedestrians at a narrow, busy railway underpass Right – A local NGO painted out the underpasses to make them more welcoming

Source of the photos: Integrated Urban Development Strategy of Zugló in 2015

Figure 37*: Left – Lack of crossings results in people crossing the railtracks at dangerous places Right – Even the crossings should be developed to make them suitable for bikes*

Source of the photos: Integrated Urban Development Strategy of Zugló in 2015

The district's most popular greenway is located along Rakos Creek. The route is under planning and it will be developed in the following years.

Figure 38: Conflicts between pedestrians and cyclists as a result of poor infrastructure

Source of the photos: Integrated Urban Development Strategy of Zugló in 2015

Figure 39: Good and welcoming pedestrian and cycling zones in Zuglo

Source of the photos: Integrated Urban Development Strategy of Zugló in 2015

Route4U, a smart route planner application is available for people with limited mobility to help them get from A to B. There are some institutions for people with special needs like blind and disabled people.

2.6 DUBROVNIK FUA

2.6.1 TOPIC 0- DATA AND INFORMATION AVAILABILITY

One of the most important factors while creating a traffic model is traffic volume. It is necessary to collect data on traffic volume on the characteristic road sections and intersections at the most loaded areas of Dubrovnik. To create high-quality and relevant traffic model, in addition to data on the load of the transport network (traffic volume) which is available, it is necessary to analyse the statistical data on the demographic structure of the population and other social and economic characteristics which are missing for now. Dubrovnik FUA has analysed zoning documents on the development of the transport network of the City of Dubrovnik and analysed existing traffic studies and documents. The traffic model of the state of the art of traffic system in Dubrovnik is based on the relevant road network of the City of Dubrovnik.

What they need is the updated information, because last traffic counting in the city of Dubrovnik was carried out in the period from 2008 to 2012. Counting was carried out as part of the first phase of development of the traffic study of Dubrovnik in 2012 which was created by the company Promel project Ltd. from Zagreb and University of Civil Engineering in 27 locations.

In addition to the stakeholders, the citizens of Dubrovnik will have a very important role in the implementation of mobility plans. For this reason, it is important to involve citizens in all phases of preparation, elaboration and implementation of the plan. Citizens need to be included through presentations, workshops, public events, surveys and such similar events. These activities need to cultivate the knowledge about the benefits and necessity of using sustainable forms of traffic. In this way, it is possible to encourage a change in the habits of using traditional means of transport.

Regional/Dubrovnik Neretva county Master Plan has been approved recently, which will also serve as a good database for the future documents.

2.6.2 TOPIC 1- What are characteristics of the people's mobility of my FUA and core city?

Urban settlement Dubrovnik is located on the southernmost part of the Croatia and it is the administrative and economic centre of County »Dubrovačko - Neretvanska«. Dubrovnik is the most important and largest urban centre in the county as well as the seat of local government. Its territory is specific with the narrow coastal belt separated from the mountain range and inhomogeneous territory interrupted by the state border with Bosnia-Herzegovina. The area is characterized by two main county physiognomic and functional units: narrow coastal area with a number of offshore and coastal islands and the delta of river Neretva. According to the inventory in the year 2001 in the county 122,870 inhabitants live. General urban plan (GUP) covers an urban areas of the City of Dubrovnik in size 3496 ha or 24% of the territory. The GUP involves 16 settlements (with part of Zaton, Osojnik and Podbrežje) with 40,334 inhabitants.

From the analysed data from the counting of traffic flows, it can be concluded that the traffic in the city of Dubrovnik is highly loaded throughout the day. Besides, the traffic is uniformed throughout the month. The analysis of annual linearity from traffic counting has brought the conclusion that the load is even present throughout the year, but a deeper analysis of the other parameters of traffic flow have indicated that the traffic load is higher during the summer months. The main difference is in the vehicle categorization during the summer and winter months; the share of motorcycles is significantly higher in summer, while in winter the largest share is made by passenger cars. The transport network of Dubrovnik is highly loaded, especially at major city.

No differences were measured according to gender or age groups, while significant difference was spotted in distribution of travel distances, which showed that over 50% of population in FUA gravitates to Dubrovnik due to business or private purposes. The conclusion is that the FUA areas are far less developed in every sector of life, and have more job positions to offer, which causes migration of people from smaller districts to Dubrovnik.

2.6.3 TOPIC 2- URBAN STRUCTURE

Urban area of Dubrovnik is the administrative and economic district of the whole Dubrovnik Neretva county. By that definition, it is the biggest and most important urban centre in the county, as well as the centre of local government. It includes 32 districts, and by the census, it is inhabited by over 42 thousand citizens. The number of inhabitants makes 25 % of the overall population of Dubrovnik Neretva county.

2.6.4 TOPIC 3- Accessibility within urban area

Unfortunately, there is no available data on the comprehensive travel time by public transport to or from city center to other parts of the FUA, except survey done for previous research and available online tools like Via Michelin or Google Maps to count that information.

There is no any national, regional or municipal rule to regulate urban development either with regard to accessibility to public transport.

2.6.5 TOPIC 4-Motor vehicle traffic

According to data from the Police of Dubrovnik-Neretva County motorization rate in the City of Dubrovnik, in 2010 there were 2 people per car or 496 cars per 1,000 inhabitants, which is significantly higher than the Croatian average.

In the city of Dubrovnik in 2016, the number of traffic accidents was higher in summer, in the period when the traffic load is the highest. There is probably some gaps between registered number of cars and real number of cars in the core city and FUA, because there are lot of rent-a-car companies that register their cars in other cities in Croatia that have lower taxes or similar discounts.

There is a barrier in the road network within the FUA, which is the cross-border area of Neum-Bosnia and Herzegovina, which also makes the pinch point especially during the summer months. Within the core city, the pinch points are always or very likely to occur, and those are the roads which go from

the main port to the Old town, and the road around the Old town. The most probable cause to that is the fact that there is the lack of parking spaces around the Old town which makes the 'must see' sight when visiting Dubrovnik. Also, most of the crowds and traffic jams occur in the period from May-October, due to tripled number of people staying in Dubrovnik (tourist overnights), as well as cruise guests and one day guests. All those facts make all areas in Dubrovnik and FUA almost 'bursting' . The pinch points are also the places where most traffic accidents occur.

2.6.6 TOPIC 5- Road infrastructure and automobile associated services

Road transport network in the city of Dubrovnik consists of state roads, county roads, local roads and unclassified roads and city roads. Intense tourist traffic and an above-average number of vehicles per capita are in collision with a deficient road infrastructure. In addition, the city of Dubrovnik, especially its narrower urban area, due to the specific location (steep surroundings and urbanized area) is a restricted area for the construction of new transport infrastructure. D8 Adriatic highway (Adriatic Tourist Highway) is the most important road that connects the city of Dubrovnik with the rest of the Croatia. Connections of the Adriatic highway with bridge of the Dr. Franjo Tudjman has to be reconstructed in order to gain better organization and flow of motorized traffic.

Stationary traffic is handled by public or private parking / garage space. The current deficit of parking spaces shall be replaced with the gradual construction of public parking lots / garages, mostly in the inner urban area resort of Dubrovnik.

Parking in Dubrovnik is one of the main issues that city authorities ought to handle. The decision confirmed by the City council defines the public parking areas that are subject to payment, parking organization and payment method, parking zones and areas of parking zones. The critical hotspot is Old town area, and parking around it, especially in the summer months. Parking is divided in 4 parking zones (zone 0 being the closest to the old town entrance).

Residents of the City have the special monthly tariff (circa 10 EUR for three zones, there is no possibility of paying special tariff for Zone 0) while guests pay the full price depending on the zone. On-street parking actually makes 80 % of parking in Dubrovnik, and complicates life during the season, mostly because of the inadequately parked cars that then need to be towed. Off-street parking is mostly done on private parcels, while the City regulation is to have a minimum one parking lot per private apartment/house.

Park-and-ride is not available in Dubrovnik, nor car sharing.

2.6.7 Topic 6: Local public transport

There is no railway services nor tram available within the FUA. Public transport in the City of Dubrovnik is organized using urban and suburban bus lines, and the total length of lines is 341 km. In the further development of public transport, it is necessary to propose new solutions in terms of transport organization that will improve passenger transport from ships and cruise ships entering the Port of Gruž to the city center (most likely using seaways). Public transport has a great significance in the design of urban transport in the situation of insufficient profile of the roads. Public bus transport connects all parts of the settlement of Dubrovnik and it is managed by company LIBERTAS, 100% owned by the City. The public transportation is now limited only to buses, which have their special road lines only on couple of main city roads, which makes them extremely depended on the current traffic condition. It is emphasised during high season when buses schedule gets disturbed due to high percentage of traffic jams. Trend of public transportation usage in Dubrovnik and FUA is increasing, mostly because of the inadequate number of parking lots and /or public garages, and this way of transportation makes it more convenient for the commuters but also guests.

2.6.8 Topic 7: Bicycle traffic

The configuration of the terrain in Dubrovnik, with big differences in elevation, is not suitable to develop classic bicycle traffic. Cycling infrastructure includes only three bicycle routes near Dubrovnik. In order to extend the offer of bicycle trails within the Dubrovnik-Neretva County and promote sustainable form of transport, it is necessary to construct cycling paths in and around the city of Dubrovnik, where the configuration of the field in terms of altitude allows them. New infrastructure for bicycle traffic will be extremely important for the safety of the cyclists (locals and tourists) as well as for the development of tourism in general.

2.6.9 Topic 8: Pedestrian traffic

Regarding the infrastructure for pedestrian traffic, except for the Old city and the King Zvonimir promenade there are no adequate pedestrian corridors and zones, which further complicates pedestrian traffic especially for people with lower levels of mobility. Lack of infrastructure for pedestrian traffic is reflected by the lack of sidewalks in certain streets or where the existing sidewalks are not wide enough. A large number of streets have no pedestrian crossings and pedestrians are forced to go around or they can cross anywhere, thus further endangering their safety and the safety of other road users.

Topographical configuration significantly complicates walking within the city, due to the large altitude differences and a number of steps. This is one of the reasons why pedestrian safety is not satisfactory, and locals often replace walking with usage of motorcycles or cars. However, pedestrian infrastructure can be considered as incomplete, and it is necessary to define a new pedestrian corridor that will meet the requirements for pedestrian safety and will be accessible to people with disabilities and reduced mobility.

2.7 ZADAR FUA

2.7.1 Topic 0: Data and information availability

During the last decade, several comprehensive studies were written dealing with the City of Zadar and Zadar FUA transport system. Some of them only focused on the transport system (Study of transport and parking in the Centre of Zadar, 2013; Ferry Terminal Zadar – transport-technical solutions, 2006; Study of passengers transport in road transport, 2008) while others analysed the transport system considering its spatial influence (Spatial plan of development of City of Zadar, 2016). The most comprehensive study on transport in Zadar settlement so far is Study of transport system of City of Zadar: ITS (intelligent transport system) and reconstruction of roads in City of Zadar.

During the process of SUMP drafting, different data on mobility has been collected. Process itself demands co-operation with a wide range of partners. According to the available data on some topics, such as demography and urban structure there are sufficient data needed for writing introductory parts of SUMP. These data are mainly provided by Croatian Bureau of Statistics. Majority of newest data on population can be found on-line while older data has been collected manually by demography experts. Data on urban structure has been collected partially. There are no data on the number of employees in shopping centres or in industrial park. Only total number of employees in FUA is available according to economic activates but not according to exact place of work for each employee. Data on average surface of shopping centres were obtained using ArcGis software and Spatial Development Plans for FUA Zadar.

As Zadar FUA's data collection reflects, the majority of data on mobility is missing. Only available data is on the length and density of roads, bus lines, cycling paths, etc. This has been calculated using ArcGis software. Nevertheless, there are no data available for FUA Zadar according modal split of transport, average distances, average door-to-door trip time by purpose, etc. For collecting such data further comprehensive traffic survey should be done. There are some data on traffic counts for FUA Zadar but only for some locations.

Regional travel survey is still not available but it is planned for the end of 2017 and the beginning of 2018. Moreover, additional human and financial resources are needed for writing an extensive Sustainable Urban Mobility Plan.

2.7.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

Due to insufficient data, this question cannot be answered properly. There are no official data on traffic modal split in Zadar FUA, therefore detailed travel survey should be conducted to determine traffic modal split.

One research was done for the purpose of writing PhD thesis "Development of Zadar County transport system in the context of lateralization process in Croatia". Survey was conducted in the Sukošan and Veli Iž settlements, as examples of settlements within Zadar FUA, one on the mainland and the other on the islands that is administratively part of the City of Zadar. In the settlements located on the mainland majority of population used cars while this is not so frequent on islands.

The aim of the survey was to determine the extent of the population of these settlements takes part in the transport system of Zadar FUA and to which degree are they satisfied. Data from the survey determined that daily commuters mainly travel up to 30 minutes from the place where they live to the place where they work or go to school.
Although the analyses of statistical indicators determined relatively high concentration of roads in all towns/municipalities in the FUA, a large portion of the surveyed population is not satisfied with their quality. The survey also pointed out high degree of dissatisfaction of Sukošan population with the rail and road network while the population of Veli Iž is relatively satisfied with the number, frequency and the speed of the ship lines.

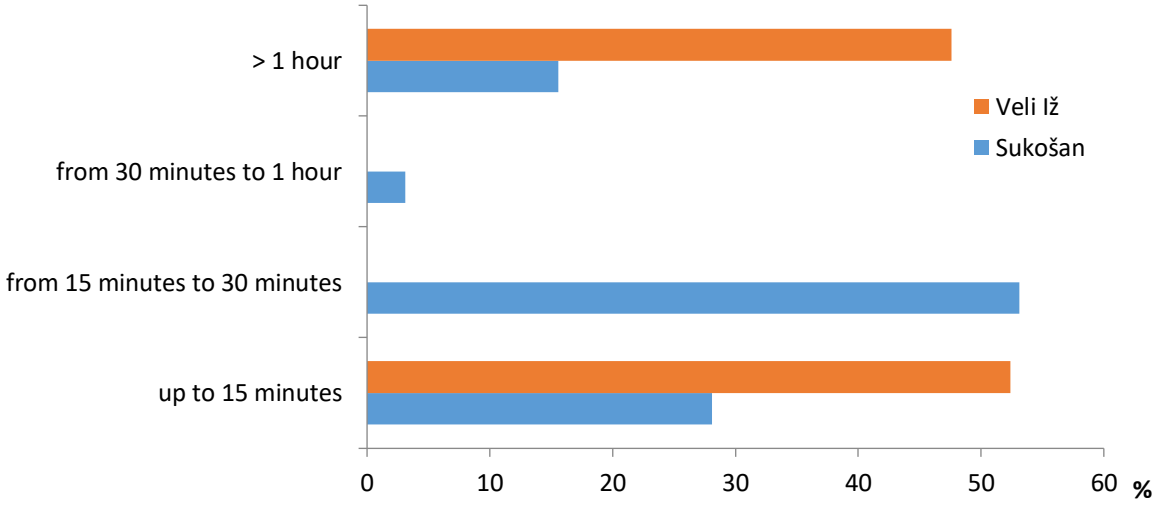


Figure 40: Modal split share in Sukošan and Veli Iž settlements in 2017 according to the travel length to school/work

Data source: PhD thesis "Development of Zadar County transport system in the context of lateralization process in Croatia"

It was turned out in the analysis that the most dominant transport mode in the Zadar FUA is road transport. The majority of all kind of trips are taken by private cars for the purpose of going to work or going shopping. Due to well-organised network of public schools in majority of settlements, children often walk to school or go by buses since bus lines are adjusted to their school schedule.

In recent years, the number of cyclists increased but mainly for recreational reasons. Future development of transport should be directed towards development of public transport and cycling; study on modal split should be done for the whole FUA.

2.7.3 Topic 2: Urban structure

The main criteria for defining Zadar urban area is the share of daily commuters from other local administrative units toward city as the centre of urban area. Out of total employees, 30% need to be daily commuters. Zadar urban area encompasses larger part of Zadar County, that is wider Zadar region up to Novigrad and Karin Sea on the Northeast and islands within City of Zadar and local administrative units on Ugljan Island situated in the vicinity of Zadar and well connected by mainland with ferry and boat lines. In such manner functional connections of Zadar and local administrative units are defined: City of Zadar, City of Nin, Municipalities Vrsi, Bibinje, Sukošan, Poličnik, Zemunik Donji, Galovac and Škarbnja; Ražanac, Posedarje and Novigrad on the mainland and Municipalities Preko, Kali and Kukljica on Ugljan Island.

In general, the highest level of built-up area is in Zadar settlement that has the highest number of population, the highest population density, the highest road density and it is economically the most developed part of the administrative unit.

In 2011, 95.2% of total population of City of Zadar lived in the central settlement of Zadar. Population density was 387.5 inhabitants per km^2 whereas the average for the Republic of Croatia was 75.8 inhabitants per km^2.
The highest population density is in narrow littoral zone with over 1000 inhabitants/km^2. Figure 41 depicts Zadar's FUA population density statistics, and it can be read from the figure that the coastal areas are the most densely populated.

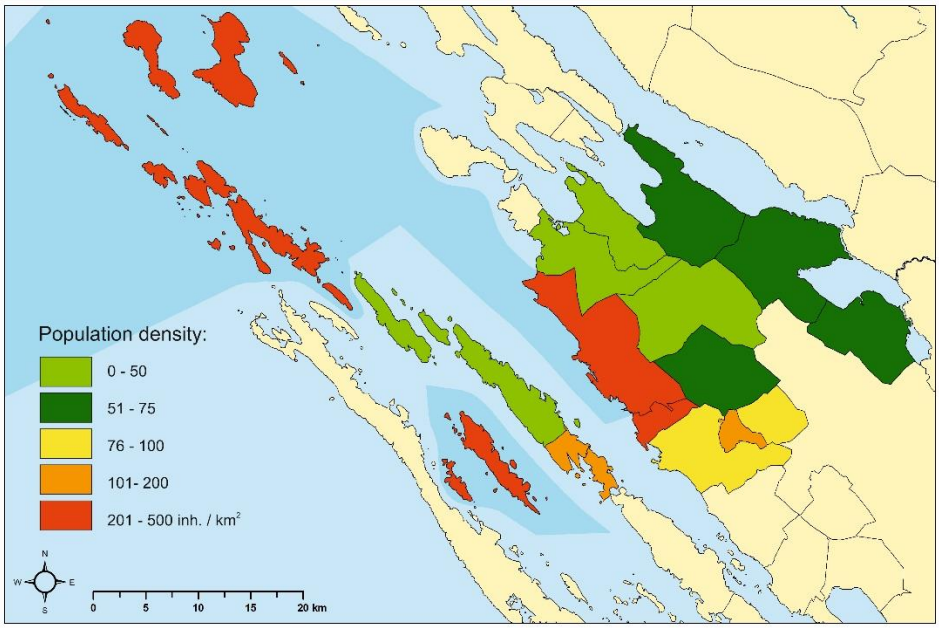


Figure 41: Zadar FUA Population Density

Data source: Croatian Geodetic Survey, Croatian Bureau of Statistics, 2017

Portion of built-up area is slightly higher in coastal and island settlements, especially in parts situated along the coast. These are also the most economically developed areas with the highest share of transport connections in relation to other parts of the City of Zadar.
During the last years, numerous former military barracks were being transformed to scientific, cultural and sport facilities, and several older economic zones into residential areas. Public transport has only partially adjusted to new circumstances and new redistribution of population and businesses.

As the statistics have shown, the majority of daily commuters use cars for going to work, shopping or while performing other activities. Primary and secondary school children use buses or walk to school. Often parents drive their children to school causing traffic jams during rainy days.

Majority of commuters work in city centre or on the city outskirts. Aside that there are business zones and industrial parks situated in the vicinity of Zadar (Poličnik, Murvica). Due to inadequate bus lines workers more often use cars than buses.

Unfortunately, there are no exact data on transport mode spilt in FUA Zadar. Such research should be done in order to determine where additional bus lines are needed and to provide exact numbers of modal share.

2.7.4 Topic 3: Accessibility within urban area

During the data collection phase, Zadar FUA could not collect comprehensive travel time data within the FUA because it was not available.
The city bus system is based on regular operation of transit buses along a route calling at agreed bus stops according to a published public transport timetable. In Table 11, the main bus lines, the time, and the average distances on all bus lines in Zadar are shown. There is only one official operator for all lines. School busses operate on specific routes and are not always in accordance with demand.

Main lines	Origin	Destination	Time (h)	Distance (km)[3]
Borik Puntamika	Main Bus Station	Borik Puntamika	20 min	11.85
Diklo	Main Bus Station	Diklo	25 min	15.30
Petrići	Main Bus Station	Petrići	15 min	7.92
Bokanjac Novo naselje	Main Bus Station	Bokanjac Novo naselje	25 min	16.98
Stanovi Bili Brig	Main Bus Station	Stanovi Bili Brig	15 min	9.92
Poluotok	Main Bus Station	Poluotok	10 min	4.16
Gradsko groblje	Main Bus Station	Gradsko groblje	10 min	4.90
Crno	Main Bus Station	Crno	15 min	12.12
Gaženica	Main Bus Station	Gaženica	10 min	7.38
Dračevac Ploča	Main Bus Station	Dračevac Ploča	15 min	9.05
Bibinje	Main Bus Station	Bibinje	15 min	7.04

Table 11: The main bus lines in Zadar FUA

Data source: Municipality of Zadar

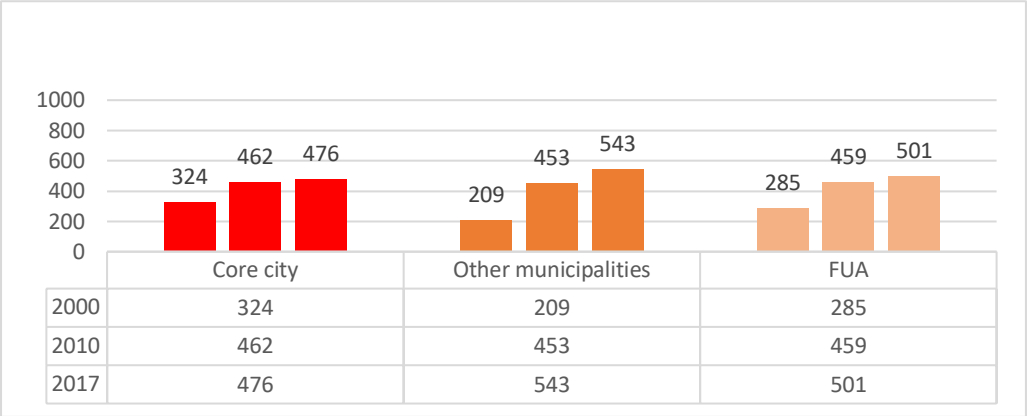
Railway is not available within the Functional Urban Area of Zadar.

2.7.5 Topic 4: Motor vehicle traffic

As Figure 42 reflects, there has been a constant increase of registered cars numbers per 1000 inhabitants from 2000. The increase of registered cars was a lot bigger between 2000 and 2010 than between 2000 and 2017 in the core city, in other municipalities, so in FUA total too.

[3] Distance is calculated for each bus line (from Main Bus Station to destination and back to Main Bus Station).

Zadar FUA has stated that there is no gap between registered number of cars and real number of cars in the core city and FUA.



	Core city	Other municipalities	FUA
2000	324	209	285
2010	462	453	459
2017	476	543	501

Figure 42: Timeline of density of passenger cars in Zadar FUA between 2000 and 2017 [number of cars/1000 inhabitants]

Data source: Zadar County Police Administration offical statistics data

In 1990, a green wave (a series of traffic lights, usually three or more, coordinated to allow continuous traffic flow over several intersections in one main direction) was introduced on road section on Franje Tuđmana and Ante Starčevića Street. Corrections were made in 2015 after new data on traffic flows were collected.
The most congested roads/zones in Zadar are:

- Franje Tuđmana Street
- Ante Starčevića Street
- Old city center (Zadar settlement)
- Put Nina
- Put Bokanjca

Zadar FUA has indicated the main reasons of the congestions, which are the followings: inadequate road infrastructure on some road sections, tourist flows in summer months and increased number of vehicles due to tourist arrivals. There are no geographic barriers embedded in the road network.

In case Zadar's FUA, only FUA data was available regarding traffic accidents, no separate data could be provided for Zadar core city. Moreover, no distinction was made between injuries and fatalities. (see Figure 43) The traffic accidents in total in Zadar FUA the ratio is between 1000 and 2000, which is an average ratio. Their traffic accidents with injury+fatality data can be considered ordinary too.

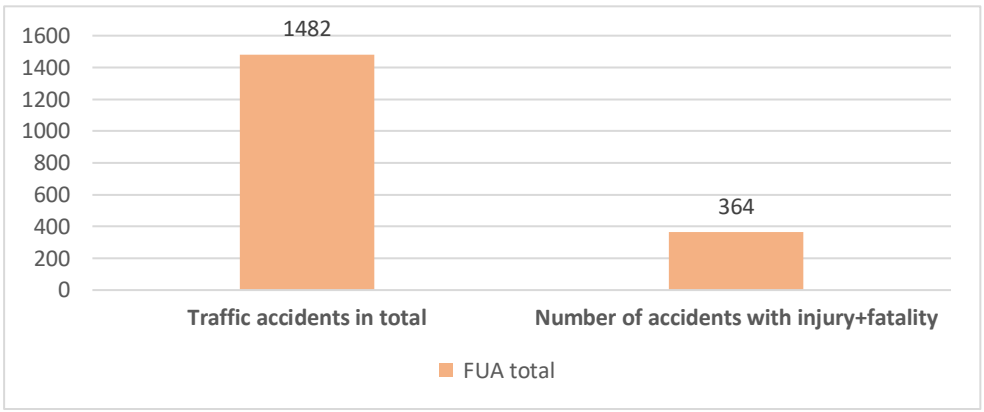


Figure 43: Number of traffic accidents in total + Number of accidents with injury and fatality/100,000 inhabitants in Zadar FUA in 2015

Data Source: Zadar Police Station

2.7.6 Topic 5: Road infrastructure and automobile-associated services

As it has been indicated, until now there has not been any systematic assessment of street space quality. For the purpose of writing PhD thesis, Silvija Šiljeg conducted a survey on satisfaction with technical equipment of the City of Zadar. Technical equipment indicator was created on the basis of ten chosen variables:
Satisfaction with:

- Sidewalk quality,
- Soad quality
- The width of the access path
- Street lights quality
- Parking places
- Roads flow
- Frequency of bus lines
- Frequency of garbage collection
- Frequency of street cleaning
- Sewage system quality

Research analyses of satisfaction with technical equipment indicated that the highest average satisfaction is in the centre of core city i.e. in the statistical circles, meaning that the location extremely affects the satisfaction with variables of the technical equipment indicator.

Parking system

City of Zadar has organized parking system. Obala i lučice Ltd. operates public parking places. Overall number of parking places under concession is 1,749. The total number of free parking places is not known.
Regarding the prices, they change during the year. In the period between May 1st until September 1st parking is charged on weekdays and Saturdays from 8 am until 10 pm. There is free parking on Sundays and holidays, except from July 1st until August 31st. In the period between October 1st until April 30th parking is charged on weekdays from 8 am until 4 pm hours, Saturdays from 8 am until 2 pm. Free parking on Sundays and holidays are available in this time period.There are lower prices of parking tickets for residents.
Aside in the centre of the core city, in Nin and Preko settlements where there are marked parking places, in the other parts of FUA Zadar parking is free of charge.
The company "Obala i lučice Ltd" has concession for all public areas which are designated as parking lots of charge. Parking lots of charge on public land in the area of Poluotok (peninsula) and the street Branimirova obala are divided into two zones - blue and white, i.e. the first and second parking zones, which differ in mode and price.

Sidewalk and automobile-associated service

Road analyses indicate that 74% of roads in the City have no sidewalk, 7% have a sidewalk on one side and only 19% have sidewalks on both sides of the road. In statistical circles closer to city centre the portion of roads with a sidewalk is higher while the situation deteriorates in peripheral statistical circles. In the majority of statistical circles of the core city the function of sidewalk is being neglected. There is no longer an area designated for pedestrians, but they have become parking places for automobiles.
Car-sharing scheme and park-and-ride system are not available in Zadar FUA and there are still no operators interested in providing such service.
Even though spatial planning documents indicated general requirements regarding minimum parking lots required by square kilometres in practice this is not applied.

2.7.7 Topic 6: Local public transport

Bus

Public transport system in Zadar and majority of other towns in County is designed as a radial one focused on peak hour commuter travel. The city public transport system includes different lines run by 22 buses. City bus lines cover all parts of the City of Zadar. In addition to providing city transport services, the main activities of "Liburnija" Ltd. Zadar also include operation of local public transport lines running throughout the County of Zadar as Figure 44 illustrates. The price of the individual ticket is 10 kunas and the price of the ticket for two rides is 16 kunas, however, ticket for two rides cannot be bought in the bus. Individual tickets can be used for a specific period, from the moment they are validated until the expiry of the period specified on the ticket. In case of transferring from one line to another, the ticket is valid only for buses traveling in the same direction and within the period of 50

minutes. A ticket for two rides purchased at a marked price is valid for a period of 15 days from the price change, while unused tickets can be substituted within the period of 30 days at an additional surcharge.

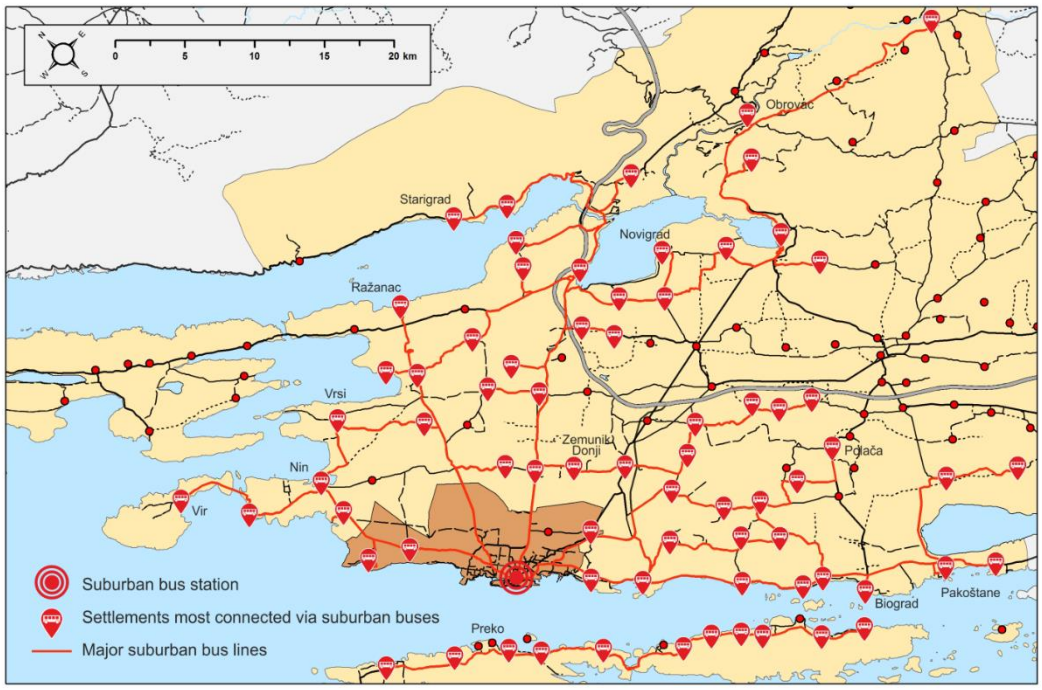


Figure 44: Suburban bus lines in Zadar FUA in 2017

Data source: Bus Croatia

Boat

Zadar, after Split is the second largest passenger port in the Croatian part of the Adriatic Sea. It is the departure point of one international and several regional and local ferryboat lines, and it also serves as a cruise ship terminal. Majority of traffic (via ferry boats) takes place in the new Gaženica port, while the old town port is still used for passenger transport via ships and hydro-buses that connect Zadar with surrounding islands, not only with those incorporated within its territorial boundaries, but with all of the islands in its archipelago.

Table 12 illustrates the main boat lines, its destinations, the travel time and the distance.

Main lines	Origin	Destination	Time (h)	Distance (km)
Zadar (Gaženica)-Ancona	Zadar (Gaženica)	Ancona	6 h	175

Main lines	Origin	Destination	Time (h)	Distance (km)
Zadar (Gaženica)-Brbinj	Zadar (Gaženica)	Brbinj	2 h	29
Zadar (Gaženica)-Iž (Bršanj)-Vela Rava-Mala Rava	Zadar (Gaženica)	Mala Rava	2,5 h	37
Zadar (Gaženica)-Ist (Kosirača)-Olib-Silba-Premuda-Mali Lošinj	Zadar (Gaženica)	Mali Lošinj	6 h	112
Zadar (Gaženica)-Ošljak-Preko	Zadar (Gaženica)	Preko	30 min	6
Zadar (Gaženica)-Rivanj-Sestrunj-Zverinac-Molat-Zapuntel	Zadar (Gaženica)	Zapuntel	4 h	71
Zadar-Mali Iž-Veli Iž-Mala Rava-Vela Rava	Zadar	Vela Rava	1 h	43
Zadar-Molat-Brgulje-Zapuntel-Ist	Zadar	Ist	1,5 h	56
Zadar-Ošljak-Preko	Zadar	Preko	20 min	7
Zadar-Premuda-Silba-Olib	Zadar	Olib	1,5 h	79
Zadar-Rivanj-Sestrunj-Zverinac-Božava-Brbinj	Zadar	Brbinj	1,5 h	57
Zadar-Sali-Zaglav	Zadar	Zaglav	1 h	28

Table 12: The main boat lines in Zadar FUA

Data source: Croatian Geodetic Survey in 2017

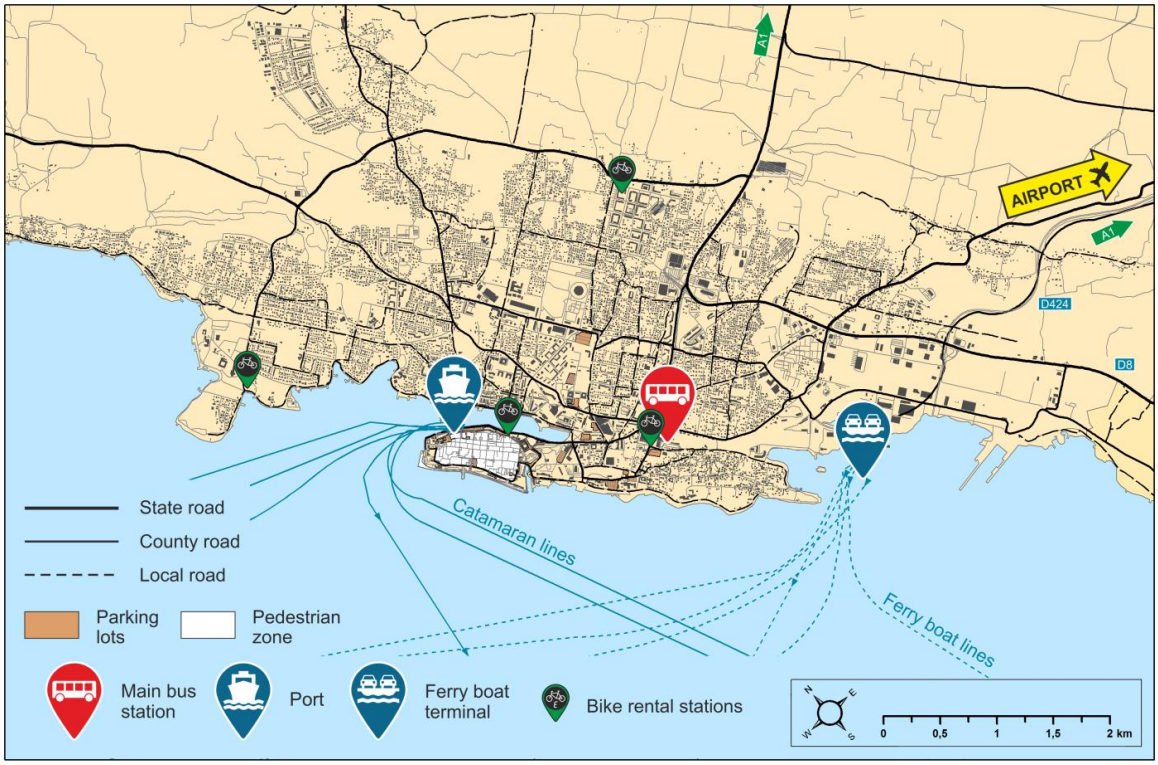


Figure 45: Transport network in Zadar FUA

Data source: City of Zadar Department of Spatial Development

2.7.8 Topic 7: Bicycle traffic

One of the ways to improve mobility and solve some of public transport system problems is to encourage cycling as a new mobility solution. Nextbike Zadar system, started in 2016, modelled after similar services in other Croatian and European cities, provides simple rental of bikes that can be used by both tourists and locals. It consists four stations (Poluotok, Main bus station, Borik and Bili brig) and 25 bicycles. In the period from 24th May until 20th November 2016, 1170 users were registered, 39% of them were tourists. The highest number of rentals was recorded in July (942). Average distance recorded per user was 2.1 km. Until November 20th, bikes were rented per 4392 times and the total length of trips therefore is 9223 km. It has been discussed that additional stations are needed to be implemented in the future.

The increasing number of tourists coming to Littoral Croatia on bikes or those who hire bikes after arrival was not followed by adequate infrastructure provided for cycling. Zadar, as the primary urban centre in Zadar County, has only about 15 kilometres of cycling lanes.

Figure 46: Nextbike cycling station in Zadar

Source of the photo: Municipality of Zadar

Total number of traffic accidents in the jurisdiction of the Traffic Police Station Zadar for the year 2014 is 1438. Out of that, 31 traffic accidents included a cyclist; 24 traffic accidents included injured people, of which five people suffered severe and 19 minor bodily injuries.

2.7.9 Topic 8: Pedestrian traffic

Road analyses indicate that 74% of roads in the City have no sidewalk, 7% have a sidewalk on one side and only 19% have sidewalks on both sides of the road.
In statistical circles closer to city centre the portion of roads with a sidewalk is higher while the situation deteriorates in peripheral statistical circles.
In addition, it should be highlighted that in the majority of statistical circles the function of sidewalk is being neglected. They are no longer an area designated for pedestrians, but they have become parking places for automobiles. It was indicated by Zadar FUA that the majority of population does not cycle because of heavy car traffic during summer. Conflicts between pedestrians and bicycles occur on almost all roads in core city since there are only approximately 15 kilometres of marked cycling paths. According to statistics, traffic safety for pedestrians is very high. Bus/tram stops, squares and other public areas are not equipped with guidance for visibility- impaired people. There are only sign signals built-in some street lights enabling visibility-impaired people to hear whether they can cross the road.

Figure 47: Pedestrian paths and areas in Zadar settlement

Data source: Croatian Geodetic Survey, OpenStreetMap, GoogleMaps and field survey

2.8 SÁRVÁR FUA

2.8.1 Topic 0: Data and information availability

When Sárvár FUA data collection is scrutinized, it can be observable that the most missing data appear in the mobility statistics dataset, in the other four datasets, the data were available more or less. The main problem of the missing data in the mobility statistics set is that the lack of relevant mobility plans. In order to fill the missing gap, a comprehensive survey, and interviews are needed to make as many data available as possible. In conclusion, further mobility data are needed for comprehensive SUMP drafting.

Among others, the Vas County Road Maintenance Company could carry out an extensive regional travel survey, as well as interviews could be conducted with the main stakeholders and decision makers of Sárvár FUA: (Mayor, Vice Mayor, traffic expert, County Directory of Hungarian Public Road Non-profit PLC, Public Transport Companies (Hungarian State Railways, GySEV, for train transport and North-West Transport Center for bus transport, Sárvár Industrial Park Management, Touristic Destination Management, Sárvár Spa and Wellness Center)

Sárvár and its FUA belong to the smaller territories in the partnership. The analysis has shown that Sárvár's area is nearly 10% of the whole FUA. This data reflects that in the Sárvár FUA the area of the other municipalities composes a lot bigger proportion than the core city Sárvár itself**.** (see Figure 48)

If we study the West-Hungarian city, Sárvár's population distribution, Figure 49 points out that the proportion of population is almost the same as it was at the other small FUA, Weiz. Like Weiz, in Sárvár FUA nearly 40% of the population live in the core city as well. As a result, the majority of the population live in the other municipalities of the Functional Urban Area in both cases.

Figure 49: The population division of Sárvár's core city and FUA in 2010 [1,000 inhabitants]

Data Source: Hungarian Central Statistical Office

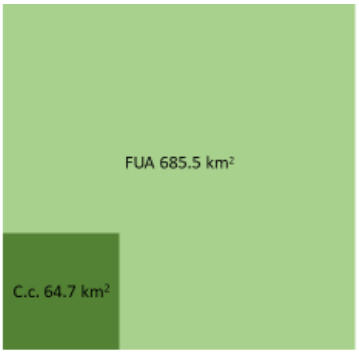
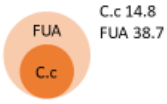


Figure 48: The area division of Sárvár's core city and FUA

Data Source: Hungarian Central Statistical Office



2.8.2 Topic 1: Mobility: What are characteristics of the people's mobility of Sárvár FUA and core city?

Since no exact modal split data are available for the Functional Urban Area of Sárvár, information regarding people's mobility cannot be stated unequivocally, merely estimations may mean the base of modal split and further mobility data. According to estimations, there is no significant difference by gender, but there is by age groups. Three main age groups can be considered as main ones that are students, employees and elderly people. Furthermore, a difference is observable in the regions of the FUA. Lot of people commute daily to Sárvár for work from other municipalities of the FUA. Nevertheless, employees from smaller municipalities and from Sárvár pass the FUA border and work in the center of the county or even in Austria. So, it can be observable that the inflow to Sárvár from

other municipalities is almost the same as the outflow from Sárvár to the center of the county or to Austria.

The majority of the employees go to work by private car, but more and more people take advantage of the opportunity of car-pooling due to the national web-based system, where drivers provide free places for passengers who can choose based on their destinations.

Furthermore, the main companies provide specific busses for its employees, so they can use this way of transport too.

2.8.3 Topic 2: Urban structure

As far as the trip purposes are concerned, the majority of the passengers go to Sárvár, centre of the FUA to work, or to study but since tourism plays and important role in Sárvár FUA because of the spa located in Sárvár, the target groups of tourists have to be taken into consideration too.

In Sárvár, in the centre of the FUA 6000 people are employed, and approximately half of them work in the industrial park, located in the edge of the city. As it has been already mentioned in the previous sub-chapter, the ratio of inflow/outflow to Sárvár is nearly the same (3000 employees) According to statistics from the year 2014, about 165 thousand tourists visit Sárvár, who spend 450 thousand guest nights in the town.

The concentration is on passengers who go to the industrial park to the spa and hotels to schools, to hospital, to government office, go shopping or visit cultural events in Sárvár and in the other municipalities of the FUA.

As Figure 49 points out, 38% of the FUA population live in the core city, so the majority of the residents live outside of Sárvár. However, regarding business and other important destinations, circa 90% of them are located in Sárvár, the number of these places in other municipalities is minimal.

2.8.4 Topic 3: Accessibility within urban area:

The municipalities in the FUA are accessible within a half an hour by car. If public transport is used the timeframe is a little bit longer and it has to be mentioned that not every municipality possesses a train station and none of them have an internal bus transport either, but it is possible to reach the destinations via long-distance coaches that have stops in the municipalities.

The local and inter-urban bus transport are provided by ÉNYKK. However, Sárvár does not possess a local bus line, but there are some bus stations in the city, where the inter-urban buses stop, so it is possible to travel from one part of the city to the other. ÉNYKK provides bus lines to the FUA of Sárvár, so these villages are accessible by bus. Whereas, the train railway system is operated by Hungarian State Railways. (MÁV-Zrt.)

As regards smart applications, there is an opportunity to look for the bus/train timetable on the Internet. In addition, due to the GPS system these lines can be followed by non-passengers too while they are on the way as well. There is a possibility to buy e-tickets on the Internet to the rail, which is supported by MÁV-ZRT, because those who buy their tickets this way come in for a 10% discount from the price of the ticket.

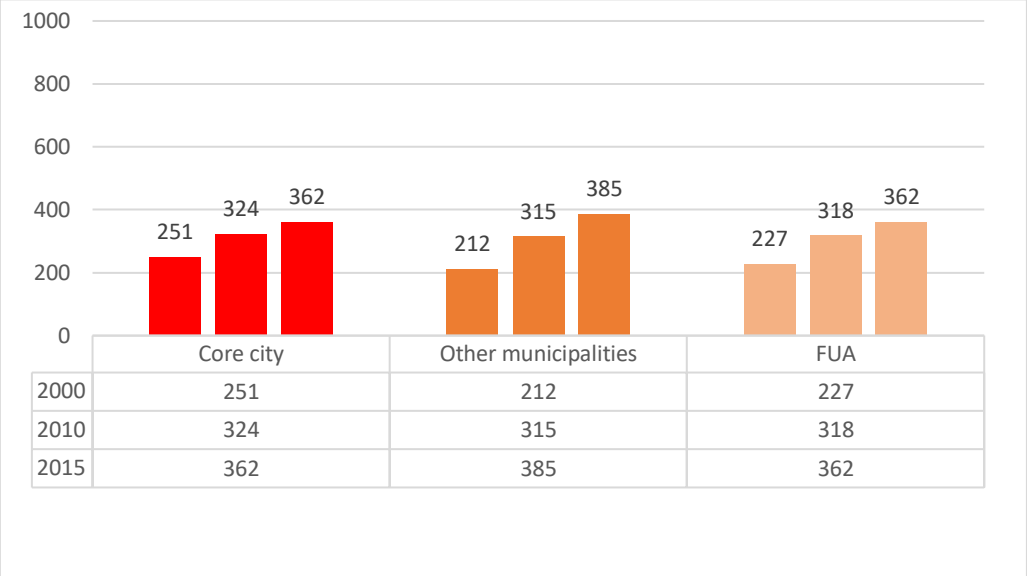
There is no LEZ/ZTL operated in Sárvár and Sárvár FUAs. However, mobility of heavy vehicles is restricted in the city center, they have to use a by-pass to their destination. Additionally speed limit (30 km/h) was introduced in the Health Resort Area. The industrial park is located in the edge of the city, so there is no need for trucks to go to the center.

Besides, the city possesses a kind of Hop-on Hop-off “local small railway system” which can be used from spring to autumn by 56 people. Due to this train, the most important tourist attractions are easily accessible. There are 14 stops in this line within the city. On the train a GPS based city guide tour is available in four languages. The residents of Sárvár can use the train with a discount.
Furthermore, in Sárvár it is possible to rent bicycles, (bike-sharing with traditional and e-bikes as well).

The construction of bicycle and pedestrian routes plays important roles in Sárvár’s conception. In the neighbourhood of the spa, a bike route has already been built. In the Health Resort Area, the speed limit is 30 km/h and 12 t heavy vehicles are not allowed to go in. 12 t heavy vehicles – except direct freight – are restricted from the main road going via the city center. In the Integrated Urban Development Strategy (IUDS, April 2015) further bicycle and pedestrian routes are planned to be built in the city in the future.

2.8.5 Topic 4: Motor vehicle traffic:

As regards Sárvár, the average increasing tendency in the number of cars is present in this Functional Urban Area too. When we examine the measure of the increase in the density of passenger cars in the core city an almost 50% increase is realised. Figure 50 points out that the density of passenger cars increased in the other municipalities of the FUA too, so the increasing tendency is present in the FUA total. The highest increase can be found in other municipalities' data.



	Core city	Other municipalities	FUA
2000	251	212	227
2010	324	315	318
2015	362	385	362

Figure 50: Timeline of density of passenger cars in Sárvár FUA between 2000 and 2015 [number of cars/1000 inhabitants]

Data Source: Hungarian Central Statistical Office

It is indicated that there is no difference between registered number of cars and real number of cars, however there are huge number of daily commuters by personal car to the spa and hotels from outside of Sárvár FUA.

Regarding the network of roads in the core city and FUA, there are two radial roads meet in the city center. Besides, there is a circular road around the Spa Resort Area Furthermore, there is a half ring around Sárvár as well.

The castle and the Arboretum are located in the city center of Sárvár. However, high weight lorries are not allowed to go through the main axes of the city and low emission zones were introduced with 30 km/h speed limit in different areas of the city.

The pinch points of the road network are located around the spa because especially in hot summer days, because of the capacity of parking spaces.

The traffic-calming area is located across the main axes of the city and around the Spa Resort Area.

As far as traffic accidents are concerned, there is no exact relevant data are available, but it can be claimed that there is a low accident rate in and around Sárvár. There are more accidents on the ring of Sárvár because of the high speed of cars and trucks.

2.8.6 Topic 5: Road infrastructure and automobile-associated services

In general, there are national roads and local roads in the Hungarian road system. Vas County Road Maintenance Company is responsible for the inspection of road quality in the area of Sárvár FUA. Municipalities themselves have relatively low budget for road maintenance.

When it comes to the situation of parked cars on the street, in the core city of Sárvár parking areas are appointed in the following areas: City center along the road, the Castle, at the Spa Resort Area, at the railway station.

In hot summer days, streets around the Spa Resort Area are always crowded, because the parking capacity of the spa is not sufficient for the high number of visitors arrived by car.

Park-and-ride facility is available, but only in the core city of Sárvár, at the railway station, and additionally at the Spa. Car sharing is not functioning in the FUA, and there is no market interest for establishing and operating such system in the area.

2.8.7 Topic 6: Local public transport

When railway services is scrutinised, transport of people and freight are also available, but both have a decreasing trend. The focus is on people who enter into the city of Sárvár (commuters/tourists) or leave the city (employees in Szombathely or in other part of the county outside of the FUA)

As it has been already indicated in the previous subchapters, none of the municipalities in the FUA possesses an internal public transport. However, a kind of hop-on hop-off system, which is situated in the main season in Sárvár, can be embedded into local public transport.

Within the FUA, long distance bus line are running by ÉNYKK (there are stops at the major public places: Spa, hospital, city hall, railway station, so these frequented places are accessible by bus.

Within the framework of another project, SOLEZ, funded by Interreg Central Europe Programme, Sárvár FUA's intention is to develop an ICT-based smart phone application that would promote sustainable mobility involving all available transport modes in Sárvár FUA.

The software would include a map about Sárvár FUA, which would show the different restaurants, accommodations, touristic destinations. This application (software) would contain the different means of transport, and their timetable within and outside of the city (FUA). As regards the exterior means, the available train and bus lines would belong to the app, whereas within the inner modes the available e-bikes and traditional bikes, that can be rented in Sárvár, Sárvár's inner train (seasonal Hop-on, hop-off) system, and the electric charging stations available may be part of the app. Besides, the available pedestrian and cycling routes, their length, in the whole FUA, the place of available parking places as well as health care places would be also part of the application. Furthermore, the prices of the public

transport, taxi opportunities and car-pooling facilities will be included in the application. The application would enable a navigation system with comparison of the means of transport available in the FUA.

There is no fare integration between railway-road system in Sárvár FUA. Its implementation depends on central government actions.

2.8.8 Topic 7: Bicycle traffic

Sárvár FUA is a flat area, so it is advantageous for cycling. When it comes to cycling paths, it can be observable that they are very fragmented in the FUA, so there are few possibilities to reach Sárvár and the other municipalities from outside of the city borders. Exact data for cycling paths is available only for Sárvár, similar data could not be collected in the other municipalities. According to statistics, the length of cycling path is 3.36km in Sárvár.

However, the construction of bicycle and pedestrian routes plays important roles in Sárvár FUA conception. In the neighbourhood of the spa, a bike route has already been built. In the Integrated Urban Development Strategy (IUDS, April 2015) further bicycle and pedestrian routes are planned to be built in the city in the future.

Bike sharing is available in Sárvár, managed by the main touristic destination management of the FUA. From 2017 August, the bike fleet was supplemented by six e-bikes, so now 6+6 traditional and e-bikes can be rented by local people, commuters and tourists.

2.8.9 Topic 8: Pedestrian traffic

The main pedestrian zones are the area around the Castle and the Arboretum and the Spa Resort Area. Related to Health Resort Development Strategy „Walking Sárvár" program is under preparation. As the data collection reflects, the total length of pedestrian zone in Sárvár is 80km.

2.8.10 Framework conditions:

Currently, there are numerous policies/regulations/laws already adopted in Sárvár FUA, which have sustainable mobility-related sections. These official documents are listed below.

Regional supporting documents

- Development Strategy and Program of Vas county
- Master Plan of Vas county
- Climate Adaptation Strategy of Vas county (2017)

Local supporting documents

- Master Plan of Sárvár
- Sárvár Integrated Urban Development Plan (2015)
- Health Resort Development Strategy 2014-2020 (2016)
- Sustainable Energy and Climate Action Plan (2017)

In spite of the fact that numerous documents were accepted in the previous years, which promote sustainable mobility in the area of Sárvár FUA, no mobility plans are still available. Therefore, one of the main objective is to accomplish this task in order higher number of mobility-related data be available.

2.9 ODORHEIU SECUIESC FUA:

2.9.1 Topic 0: Data and information availability

Odorheiu Secuiesc has a SUMP, referring to the core city that was completed in 2016. The data collected for the core city is complete, but the FUA data is incomplete because similarly to other partners, not every data was available in Odorheiu Secuiesc FUA's municipalities.

The missing FUA statistical data refers to traffic data, modalities and mobility issues and commute.

It was indicated that in order to get this traffic data, a travel survey and traffic counts are needed. For these actions, they need human and financial resources. It was stated that they do not possess any regional or national travel surveys.

2.9.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

Since Odorheiu Secuiesc FUA only has data collected for the core city, the modal split for FUA is in the process of definition. The modal split for core city is available: 13.9% for public transport, 35.5% for passenger cars, 10.7% for bicycles and 39.9% for walking.

The municipality of Odorheiu Secuiesc is classified to the section of urban settlements and comprised 34257 inhabitants in 2011. The population decreased by more than 14% between 1992-2011. This negative dynamics improved slightly between the census-measured intervals: 1992-2002 down 7.53% and 7.28 % between 2002-2011.

Regarding the other municipalities of the FUA, this negative tendency is not common, in some cases the population is decreasing but in a slower pace there are some municipalities where increase is noticeable.

Population breakdown by age group highlights a high number of people who have the legal driving age of a motor vehicle (over 65%). However, 16% of the population, represented by children, requires a

safe travel between home and school / kindergarten. In a difficult situation there are also residents over age 65 (14% of the total) which are moving difficult and are dependent on public transport.

Regarding the main demographic indicators, Odorheiu Secuiesc Municipality has better results than the national average for aging, the proportion of people aged 0-15 years of the total population, the proportion of people aged over 65 and above, the ratio of demographic dependence, the dependency ratio of young people, the dependency ratio of the elderlies. Only at the level of the labor force replacement rate Odorheiu Secuiesc is below the national average.

At the peak hour, approximately 6.254 trips are made by car using the street network of the city (information available from year 2016), of which 96% is the traffic generated by Odorheiu Secuiesc and 4% is the passage traffic.

The share of traffic that takes place within the administrative boundary of the city, which uses only the street network, is 63%. The remaining 37% proportion of trips are either caused by cross the city or to enter or leave the city, generated or attracted to the internal area.

From the transport demand analysis, corresponding to the p.m. peak time, the traffic of incoming / outgoing traffic is about 55% -45%. In other words, in the afternoon hour, the urban area of Odorheiu Secuiesc attracts more traffic than it generates.

In conclusion, Odorheiu Secuiesc is an important polarizer of the functional urban area, which has a progressive impact on the region. In order to be able to identify the real situation of problems and strengths at FUA level, it is necessary to collect and analyse all data. The low quality of life and the lack of economic activity in the localities around the city force the inhabitants to travel considerable distances to find a job and public utilities. The main points of interest of the functional urban area converse to Odorheiu Secuiesc, generating major traffic problems, encouraging non-motorized journeys.

2.9.3 Topic 2: Urban structure:

Most of the population of the core city is concentrated along the streets of Victoria, Croitorilor, Bethlen Gábor and Independence Boulevard. These streets serve the collective housing districts of Beclean and Taberei, ensuring their connection with the central area. A large number of population is also served by the Insulei street located in the southern neighborhood of the river Târnava. The other areas include a lower population because of the dominant habitat typology (individual dwelling).
These areas with a high population density generates a high pressure on the under-dimensioned transport infrastructure. At the level of the other FUA localities, the population is distributed along main streets in individual dwellings.
Businesses, schools and other important desinations are concentrated in the core city, polarizing the surrounding municipalities.

The largest share of jobs is concentrated in southern and northeast industrial areas, which generates high rate of commuters' concentration.

It has been indicated that Odorheiu Secuiesc FUA do not have any complete data on commuters' travel within FUA.

2.9.4 Topic 3: Accessibility within urban area:

There is no comprehensive time travel data in the FUA area. However, the Google Maps service can provide travel time information for cars and pedestrians.

2.9.5 Topic 4: Motor vehicle traffic:

In order to determine the degree of motor traffic registered in the city core / FUA, a thorough traffic study has to be carried out, this analysis is under progress. As the statistics point out, at the core city level, in 2014, there were 360 cars / 1,000 inhabitants.

It cannot be stated precisely, but it has to be mentioned there is a very small number of vehicles registered in Hungary that circulate inside the city.

The street network is quasi-irregular, the combination of radial roads that converge towards a historic center, consisting of narrow and irregular roads. The network of peripheral neighbourhoods, developed in recent years, is approximately orthogonal (grid). Old areas, developed on the hills, have an irregular network. At FUA level the street network is predominantly linear.

The city is located in a depression area, surrounded by high relief. The core city is crossed by Tarna Mare River, which is an obstacle to the urban travel. In addition, the core city is crossed by a railway line that runs parallel to the Tarnava Mare River, contributing to a physical barrier.

The “pinch points” of the road network where congestion regularly occurs is located in the following areas:

- Perimetral area of the Historic Center
- Bethlen Gábor Street (between Kaufland commercial center and Historic center)
- Kossuth Lajos street (between Kuvar Street and Historic center)
- Intersections: Beclean Street – Nicolae Balcescu Street; Vulturului street – Nicolae Balcescu street; Kossuth Lajos street – City Hall Square; Tomcsa Sándor street – Tamási Áron street.

The traffic calming areas are located in the core city and they are represented by the roundabouts: Taberei Street – Bethlen Gábor Street; Bethlen Gábor steet – Kaufland access;

In order to assess the safety of urban traffic in Odorheiu Secuiesc, the data of the Accident Database is managed by the Road Police were analysed.

The Road Accident Database shows a constant dynamics of the number of accidents recorded on the street network of the core city, the number of victims was 55 in 2015, but most of them were slightly injured.

Table 13 depicts the number of road accidents and the type of injuries in street network in Odorheiu Secuiesc between 2010 and 2015.

Year	Accidents	Death	Bad Injuries	Slightly Injuries
2010	46	0	16	34
2011	42	1	13	34
2012	32	1	14	33
2013	41	0	23	43
2014	36	3	15	26
2015	41	1	14	40

Table 13: Number of road accidents in Odorheiu Secuiesc between 2000 and 2015

Data source: Sustainable Urban Mobility Plan of Odorheiu Secuiesc

An analysis of the causes of accidents shows that most accidents result from side collisions (30%), followed by pedestrian bumps (25%) and hitting obstacles off the road (10%).

According to statistical records within the core city, the areas with the highest risk of incidents of road accidents are the Bethlen Gabor and Beclean Streets, according to the studies done for the SUMP document. (see Figure 51)

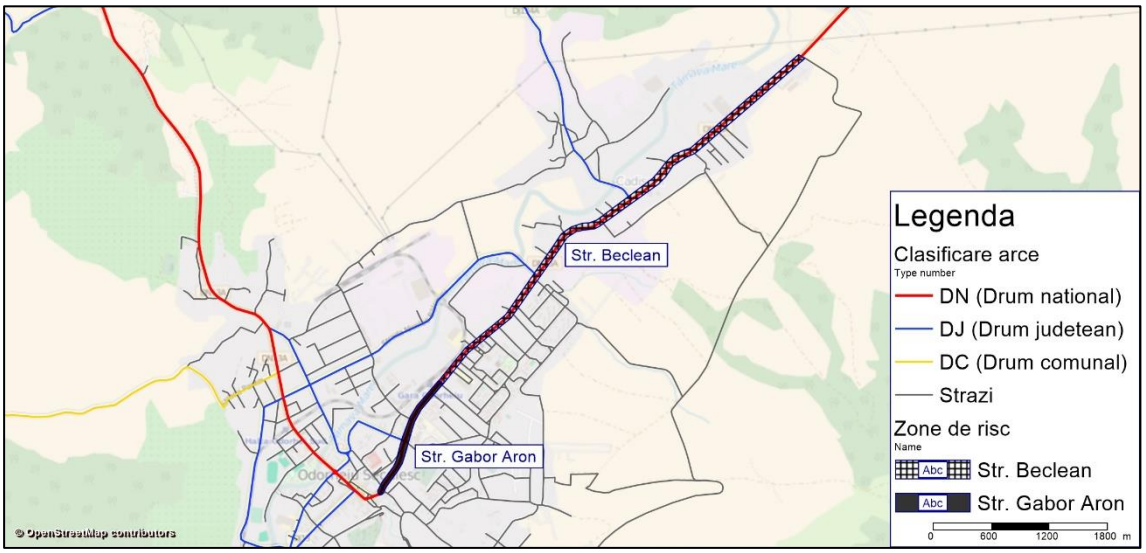


Figure 51: Location of high risk areas for road accidents in Odorheiu Secuiesc

Data source: Sustainable Urban Mobility Plan of Odorheiu Secuiesc

2.9.6 Topic 5: Road infrastructure and automobile-associated services

Odorheiu Secuiesc Municipality's communications and transport routes currently satisfy a large part of the current needs, but the following aspects and dysfunctions are noteworthy:

- an inappropriate technical condition
- a lack of sidewalks and appropriate markings;
- a lack of arranged parking spaces;
- a lack or inadequate maintenance of road signs.
- high traffic values

The technical condition of the road network of Odorheiu Secuiesc is largely in an inappropriate condition, which negatively affects the mobility of the population.

About 35% of the arteries located in the core city's network are in a medium, bad or very bad state of affairs, highlighting the crossing routes used by freight transport vehicles as well as peripheral areas.

The market share and the attractiveness of public urban transport are affected by the poor viability of the streets used by buses and minibuses.

Improving the technical viability of the streets is a major objective for improving the urban mobility of passengers, goods, and non-motorized traffic of pedestrians and cyclists.

Analyzing the existing situation of the core city, from the point of view of the pedestrian areas, there are numerous strong points and weaknesses in terms of their arrangement and functionality. This identifies a relatively small number of streets where pedestrian space does not exist. These are found

in the peripheral areas of the city, where the urban expansion phenomenon is encountered. The creation of pedestrian links with newly developed areas is an important element for encouraging non-motorized transport while supporting accessibility to these area.
Besides these peripheral areas, there is a lack of pedestrian accessibility on Nicolae Bălcescu Street, an important artery connecting the industrial area and the residential area. Ensuring pedestrian access to this artery would strengthen the link between the two areas and promote non-motorized traffic.

The Odorheiu Secuiesc municipality has a special declivity, which generates narrow but spectacular streets. Due to these characteristics and the inappropriate dimensioning of the street profile, a large number of undersized pedestrian areas can be observed, especially in the residential areas of the Beclean and Taberei districts. Also, there is a subdimension of pedestrian space on a section of Beclean Street (intersections with Lemnarilor Street and Nicolae Balcescu Street). This phenomenon is a weak point, as this artery is important at the level of the whole city, providing access to services and industry, functions that contribute to economic development, and obstructed pedestrian routes limit accessibility to these functions.

At the level of the central area, more precisely in the historical center of the core city, undersized pedestrian spaces and the presence of motorized vehicles, contribute to the increase of pedestrian safety and prevent the promotion of the tourist image of the area. It also identifies a number of pedestrian-friendly arteries. Successful positive examples of pedestrian safety are identified on the Kossuth Lajos Street, Tamási Áron Street and a 13A County Road section (from the central ring of the city, crossing Kornis Ferenc Street). These types of pedestrian movements represent a real potential for promoting non-motorized travel, fulfilling all the principles of an adequate pedestrian space. In the case of the Kossuth Lajos Street, although it complies with the principles of proper pedestrian traffic, the "built-in" area of the pedestrian area is not efficiently dimensioned to promote the commercial character of the area.Figure 52 describes the pedestrian areas of the core city.

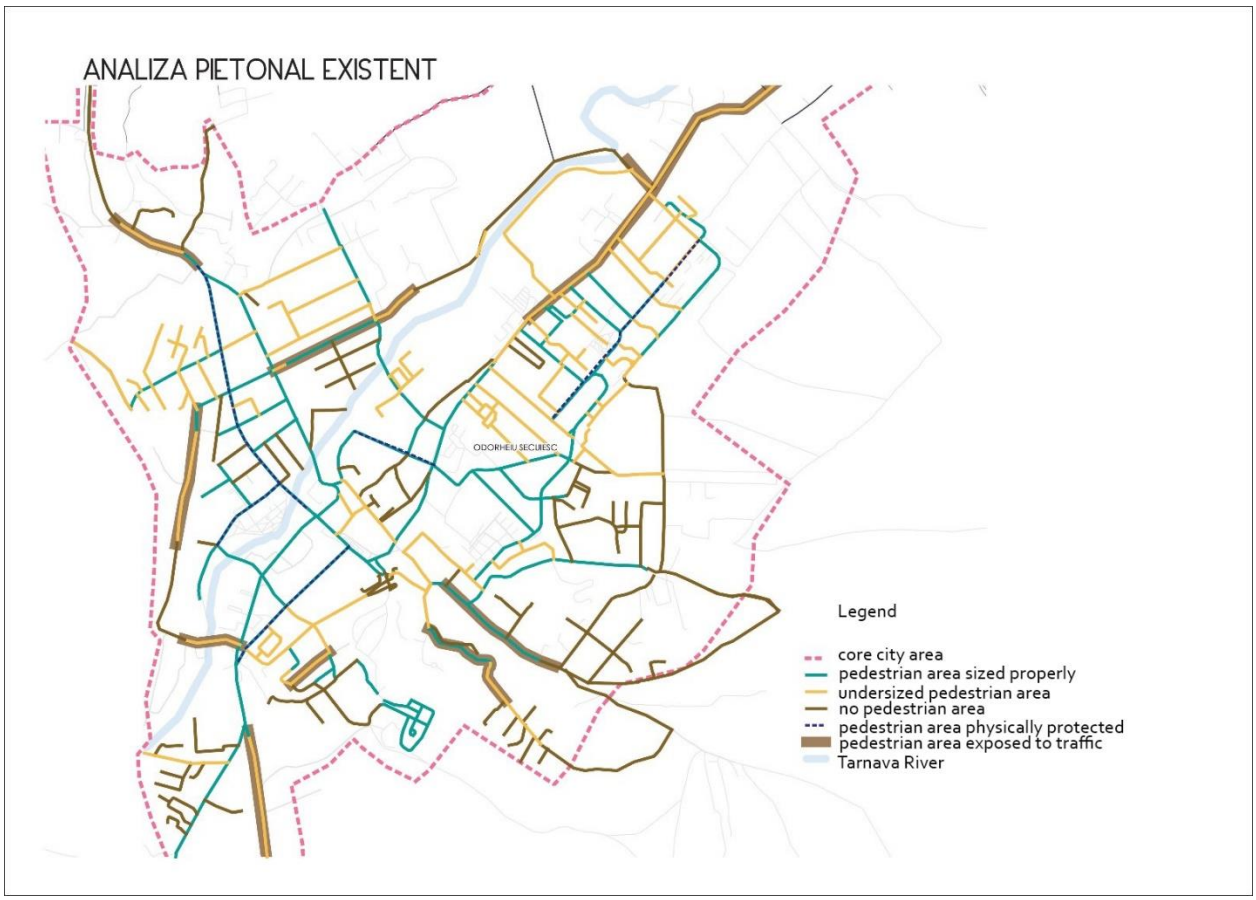


Figure 52: Pedestrian areas of Odorheiu Secuiesc

Data source: Sustainable Urban Mobility Plan of Odorheiu Secuiesc

At the FUA level, the municipalities have poor pedestrian infrastructure, predominantly pedestrianized and exposed to traffic. These features of the pedestrian space encourage motorized journeys.

Odorheiu Secuiesc has 406 paid parking spaces managed by the City Hall. These places are concentrated in the central area, with the charge of 1 leu / hour at the parking machine or by 0.30 € using SMS payment. There is also the possibility to purchase subscriptions per day, month or year but this purchase does not guarantee a reserved parking space.
The pay-parking program runs between 8:00 and 17:00, allowing residents to park for free during the night.At present, public parking in Odorheiu Secuiesc can be used by any person who owns a vehicle, regardless of the place of origin, but with the payment of a parking fee and compliance with the regulations. Parked parking spaces are classified according to their area (area A and B).

The toll differences between parking area A and B are very low, which encourages parking in the central area of the core city. For the other municipalities included in the FUA, there are no regulations for parking, because in most cases the inhabitants park their car on their properties.

Currently there is no document that specifies the off-street parking position in Odorheiu Secuiesc FUA.

As the analysis reflects, at the moment, there is no car-sharing operator interested in establishing a service neither in the core city nor in the FUA.

2.9.7 Topic 6: Local public transport

The railway services within the FUA are limited, currently serving only the core city, Feliceni and Mugeni municipalities. No information is available on the timing of the trains passing through these areas. In the core stations, the main rail station is located near the city center and for the other municipalities the railway station is located at the border of the municipalities.

Regarding the railway traffic, the locality is in an unfavourable situation. Although the local railway line Odorheiu Secuiesc-Vanatori was put into operation in the nineteenth century, there have been no relevant developments to date. Although this railway line was extended 5 km to Sighisoara, Odorheiu Secuiesc is now an insufficiently exploited branch. The consequence of this state is not only the absence of a railway link to Miercurea Ciuc, but also the over-hindrance of rail access to other large cities of the country.

The train station covers a service area of 500 m of approximately 2550 inhabitants in the core city. The operator and infrastructure manager of railways is CFR (Romanian Railways), and it is a strategic sector of national interest, contributing to the free movement of people inside and outside the country.

The Public Transport Service in Odorheiu Secuiesc was delegated by the Local Council Company Balint Trans S.R.L.

Within public transport, bus is available in all municipalities of the FUA. The characteristic of the network is radial, focusing on the main streets of the FUA. There is no central/sub-central transfer points for the bus. In the core city the bus line is connecting to the railway station, but there are no infrastructure dedicated to this purpose. There is no measure to prioritize the road based public transport within FUA.

Approximately 4 % of population, business and other important facilities covered within 300m radius from railway stations.

The public transport usage is decreasing in the FUA and this phenomenon takes place because of the poor facilities of public transport, inadequate rolling stock, and the low frequency of the traffic. Areas that are not covered by public transport, the inappropriate means of transport for various reasons, the long distances between stations, the unattractive public transport offer, as well as the lack of facilities for people with reduced mobility also contribute to the poor usage of public transport in the FUA.

2.9.8 Topic 7: Bicycle traffic;

The way of town planning compliance of Odorheiu Secuiesc municipality makes it hold one optimum size for pedestrians and cyclists. In general, cities whose size (length / width) is around 5km, are considered favourable for walkable city. This is due to the fact that the reduced size allows the city to cross in less than an hour on foot or 15 minutes by bicycle. Odorheiu Secuiesc has a length 6km east-

west and 4km north-south. However, the most important facilities and areas the most densely populated inhabited in a perimeter of 3 x 3.5 km.

The topography of the core city is variable, and there are portions with a high slope of 18% (Gabor Aron Street) where there may be a difficulty in navigating the routes. In conclusion, the conformation of the city is favourable for cycling, except for some areas identified.

Currently, the cycling infrastructure links the historic center to the northern part of the city. This connection is provided by the Tamási Áron and Orbán Balázs streets, which include single-cycling path with a maximum width of 1m. Although road traffic is carried out in double-sided mode, in the absence of space, cyclists circulate uniquely on the two streets. After leaving the built area, the bicycle path turn into a bicycle track, bounded by road traffic and located along the forest. Another bike path is located on the Kossuth Lajos Street that links bicycle tracks to the city center with the southern industrial area. This axis is represented by bicycle lanes of a maximum width of 1 m, located on the pedestrian space. Although the bike lane is protected by road traffic, placing it on the pedestrian space makes it difficult for pedestrians to travel and limits the street's street character. The highest demand for cycling is between the west side of the core city and the historic center. This is largely due to the fact that most of the city's population lives in the Beclean and Taberei collective housing districts and the interest objectives are grouped in the central area and along the Bethlen Gábor Street. Thus, Bethlen Gábor Street becomes the main route for the cycling movement although it does not have the necessary facilities.

The existing cycling infrastructure has a length of approximately 5 km, but there is no separated bicycle path, and there are no separate traffic lights bicycle available. The existing bicycle path and lanes are in very bad condition: the paint of the markings is almost erased, and the cars are parked irregularly over them.

As it was stated by the representatives of Odorheiu Secuiesc FUA, there is no legislative framework for bicycles. The bicycle parking is poor in the core city and inexistent in the other municipalities.

There is no bike-sharing scheme available in the city/ FUA.

The majority of accidents involving cyclists are due to the inattention of drivers and the priority bicycle rider.

The local groups are integrated in the decision and the discussions about the future cyclist mobility development. In the core city there is a bicycle association that is helping people to implement the right measures for population needs. For this topic of cycling infrastructure, this association observed the main problems of the day-by-day cyclist, and resolve the main concerns.

2.9.9 Topic 8: Pedestrian traffic

As it has been claimed in the analysis, there are no pedestrian zones in the core city nor in the other municipalities of the FUA.

At the core city, the dividing effects are identified in the main streets of Bethlen Gabor and Tamási Aron. At FUA level a major problem identified in most of the municipalities included in the area of

interest is the fact that the main roads on which heavy traffic passes through the localities, creating a barrier effect.

At the core city level the main conflicts between pedestrian and bicycles regularly happen where the bike lane is positioned on the sidewalk, among others, this is the case on Kossuth Lajos street.

The majority of accidents involving pedestrians are due to the inattention of drivers and the lack of priority for the pedestrian in intersections and low visibility on crosswalks.

2.10 ALBA IULIA FUA

2.10.1 Topic 0: Data and Information Availability

At Alba Iulia Municipality level there was a traffic study elaborated (which could be improved using traffic counts (bike counters, pedestrian's counters and car counters). However, there is the need to have a comprehensive traffic study including traffic counts for different means of transportation as well as for pedestrians for the eight rural administrative unit parts of the FUA in order to obtain all the necessary information and the accuracy of the information provided for each of the commune.

Another instrument for the communes would be to join to the Covenant of Mayors, and realize the SEAP for the Climate and Energy Covenant of Mayors 2030. Alba Iulia Municipality has already taken these steps.

As it was pointed out, mainly financial resources are needed to conduct an extensive analysis for Alba Iulia Municipality as core city and the communes of the FUA.

Unfortunately, national and regional travel surveys as well as the already available statistics are not very specific in terms of traffic counts for rural administrative units; therefore, there is no available data for these elements.

Different funding available only for rural areas are not eligible to conurbation level, so could not be accessed in a coherent manner for the entire area

In addition, public procurement is difficult to be conducted at conurbation level. However, in terms of public transportation this challenge is solved by the existence of the Intercommunity Association for Development Alba Iulia Local Transportation available at conurbation area.

2.10.2 Topic 1: Mobility

Regardless of the distance and the purpose of the trip, the preferred transportation method, both in the core city and at FUA level is the personal car, secondly bus transport, followed by walking. Cycling is used mostly for recreational purposes while the train transport (the national railway network) is not considered a very comfortable and viable method of transport at FUA level. Due to recent developments in the national legislation regarding cars taxation, it is expected that the number of personal cars will increase constantly in the next years bringing additional pressure on the capacity of the core city to absorb traffic inflows and to provide parking spaces.

Figure 53 illustrates the modal split distribution in Alba Iulia FUA, which shows that the ratio of walkers is relatively high, the percentage exceeds 15% in all cases. The fewer number of car users in parallel

with the biggest number of bus users are presented in other municipalities. As Figure 53 suggests railway does not play an important role in Alba Iulia's mobility.

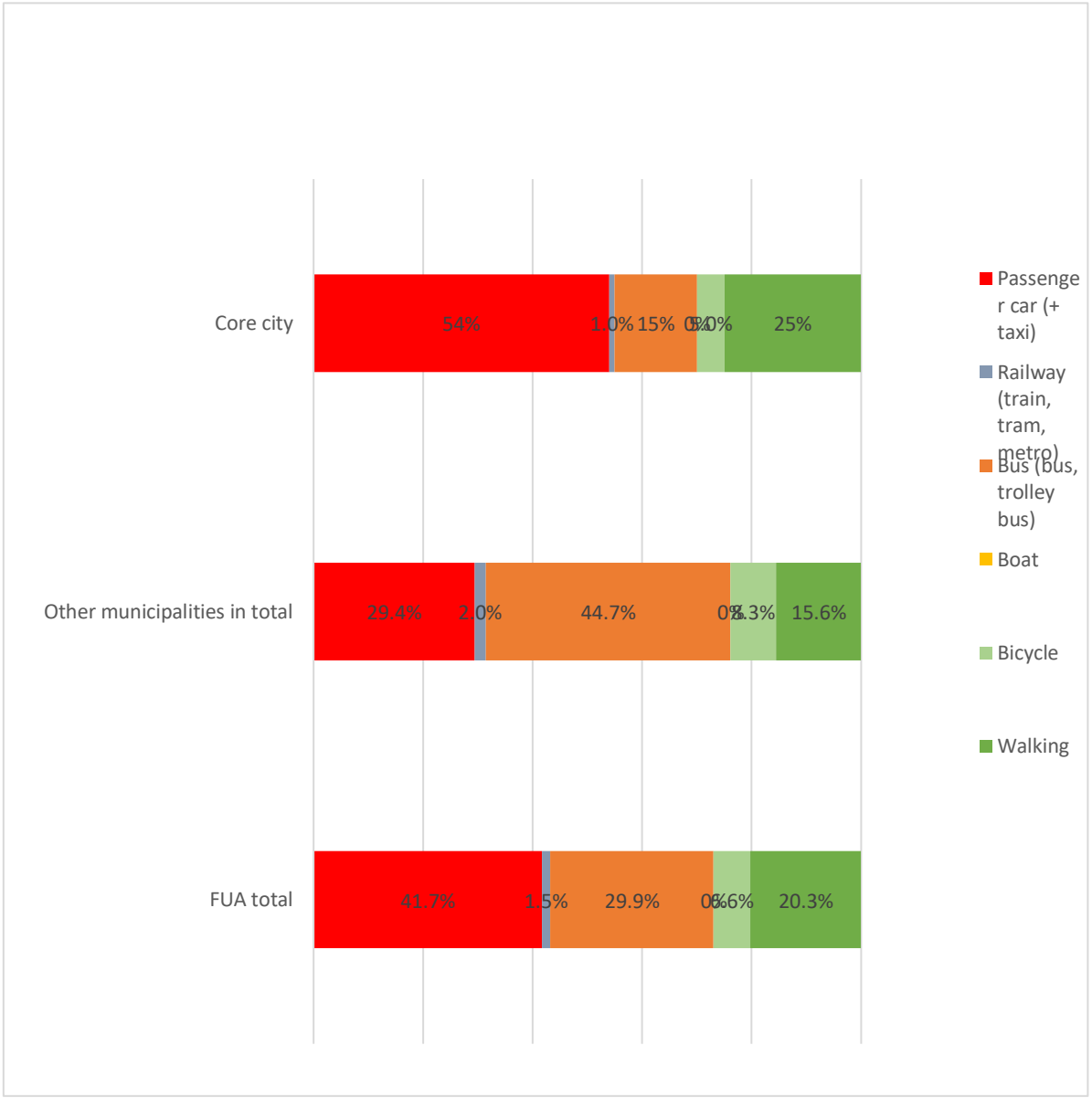


Figure 53: Modal split in Alba Iulia FUA in 2017 [%]

Data Source: Asociatia Intercomunitara de Dezvoltare Alba Iulia – AIDA+ Societatea de Transport Public of Alba Iulia

Even though there are no statistics regarding the trends concerning the gender and age groups in terms of using different means of transportation, it can be observable that there is a high use of public transportation by the seniors (since the public transportation is free for this category based on their retirement certificate. Besides, a high number of children use public transport between ages 8-18 because they have a discount of 50% based on their monthly subscription. In addition, students are using public transportation too, since the discount is applicable also for them and the transportation, company included a special route for students from their Student Campus to the University. There are

also some disadvantaged groups encouraged to use for free the public transportation (e.g. one parent child etc.).

Concerning cycling, the youth are the main users of bikes at FUA level. However, adults also use bike to go to work, although their proportion is not outstanding. As it was observed, bike is used more frequently for leisure.

There is no significant difference in terms of trip purpose either between the core city or between the FUA. In both cases the main trip purpose is work related, followed by education, shopping, leisure and business.

Regarding the distribution of travel distance by each mode, in the core city, the majority of people prefer to use personal cars for distances of up to 13 km, the public transport system for distances of up to 25 km, and bicycles or walking for smaller distances (6-7 km). At FUA level, the differences are not so obvious, here the bus is also used with priority.

2.10.3 Topic 2: Urban Structure

As far as the distribution of population of the FUA is concerned, the core city concentrates 75% of the FUA's population, (seen in Figure 54) and the density is bigger than in the rest of the seven administrative units. Over 80% of the jobs at FUA level are located in the core city.

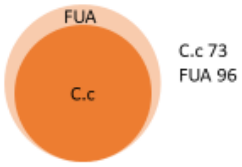


Figure 54: The population division of Alba Iulia's core city and FUA in 2010 [1000 inhabitants]

Data Source: Romanian National Institute of Statistics

The number of students in primary and secondary education is almost 5 times higher in the core city compared with the other municipalities of the FUA.

The biggest concentration of commuters can be found in the seven rural settlements composing the FUA. The commuters usually travel for work or educational related purposes to the core city.

“The cities with the largest share of urban immigrants are Timișoara, Cluj-Napoca, Baia Mare, Alba Iulia and Târgu Mureș, all from the intra-Carpathian region which has an urbanization rate above average. Timișoara and Cluj-Napoca, the most developed cities in Romania after Bucharest are attracting lot of young people for studies and jobs, especially from other cities in the northern, center and western part of the country. Baia Mare, Alba Iulia and Târgu Mureș, are also university centers, and attract young people from different towns around them.” Currently, the largest cities in Romania attract most of the commuting workforce from rural areas. Nevertheless, some of those that are at the heart of a larger urban system, such as Bucharest, Ploiești, Pitești, Brașov, Constanța, Baia Mare, Deva, Alba Iulia, Râmnicu Vâlcea, attract a significant number of commuters from their satellite urban settlements.

However, from a relative perspective, the cities of Pitești, Ploiești, Târgoviște, Deva, Târgu Mureș, Alba Iulia, Miercurea Ciuc and Brașov report the largest share of jobs occupied by commuters (over 25%).’

County magnets are FUAs that have attracted more than 10,000 migrants between 2001 and 2011, primarily from their own county. County magnets include 13 FUAs: Bacău, Râmnicu Vâlcea, Buzău, Galați, Târgoviște, Suceava, Satu Mare, Focșani, Baia Mare, Târgu Jiu, Alba Iulia, Piatra Neamț, and Bistrița.

Several of the county magnets have good tourism potential, and they should exploit this advantage. Alba Iulia is the home of the largest Vauban Fortress in Romania, and one of the most important and appreciated tourist attractions in the country.

County magnets are also, surprisingly, important commuter hubs. In the FUAs of Târgoviște, Alba Iulia, Piatra Neamț, Râmnicu Vâlcea, Buzău, Focșani, Suceava, Baia Mare, Târgu Jiu, more than 20% of the work force commutes across administrative borders for work. This phenomenon itself will require some measures in metropolitan planning.

In the World Bank report, Alba Iulia is shown as a good practice example for organizing the public transportation: “For example, the City Alba Iulia and several of its surrounding localities have set up a metropolitan transport system, operated by a private public transport company, which now serves as an example to other cities”.

Regarding the public transport system, bus is used by a large number of commuters, but personal cars are still used by the majority of people. Bicycles are rarely used due to inexistence of cycling paths between the core city and the localities composing the FUA.

A coherent modal transportation system is a challenge at all levels of the FUA since beside the public transportation there is no other integrated mean of transportation available at FUA level.

2.10.4 Topic 3: Accessibility within the Functional Urban Area

Most of the population, businesses and other important destinations: institutions, education and health care facilities are in the core city.

There are some statistics available related to the average travel time, however there are no statistics on the time spent by a traveller from a different part of the city to other parts of the FUA. This data can be available if there is a demand from the company to make a survey and to send a report on the average time spent by public transportation from one part to another.

There are differences regarding the time spent in the traffic by cars according to the pick hours when traffic is more intense.

Google maps is a common instrument used to plan a journey, however the public transportation company has adopted an application to help travellers better plan their journey. It is a beta version of the application called “Transport Urban” but it has to be developed in the future.

The Integrated Urban Development Strategy and also the SUMP of the core city could be considered urban development guidelines at municipal level. Alba Iulia Municipality adopted its Sustainable Urban Mobility Plan in November 2016 focusing its future mobility on smart multi-modal transportation at the level of the core city and the FUA, changing the current shift from conventional and motorized transportation to alternative and non-pollutive transport means. Moreover, the sustainable mobility is a priority for Alba Iulia Municipality and it is reflected in different strategic instruments of Alba Iulia Municipality.

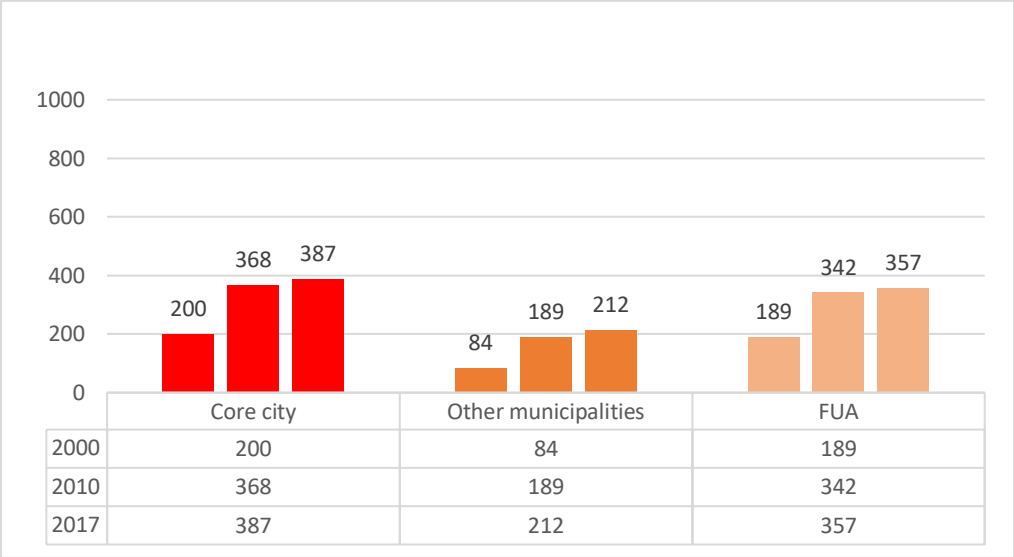
The following national strategies have been adopted too which contribute to the sustainable mobility in national level.

- The Intermodal Transport Strategy in Romania 2020
- Sectoral strategy on the medium term on decentralization in the Ministry of Transport (august 2008)
- Sustainable Transport Strategy for the period 2007-2013 and 2020, 2030

However, it has to be mentioned that **t**here is no separate transportation strategy at regional level, the transportation is part of the regional development strategy of the Center Region. However, there is no specific regional document adopted at regional level to ensure a coherent development of the transportation at regional level (with a bottom up approach starting from FUAs to regional level).

2.10.5 Topic 4: Motor Vehicle Traffic

As Figure 55 depicts, according to 2017 data in the core city there are 387.57 cars/1000 inhabitants and at FUA level this number is 212.24 cars/1000 inhabitants. Comparing to the previous years (2000 and 2010) a continuous increase is perceptible in the number of cars.



	Core city	Other municipalities	FUA
2000	200	84	189
2010	368	189	342
2017	387	212	357

Figure 55: Timeline of density of passenger cars in Alba Iulia FUA between 2000 and 2017 [number of cars/1000 inhabitants]

Data Source: Alba Iulia Municipality and administration of communes from FUA

The gap between registered number of cars and real number of cars in the core city and FUA is not significant. There was a national trend in registering cars in Bulgaria at national level due to the tax issues but not at Alba Iulia and FUA level.

Regarding the network of the roads in Alba Iula, from the point of view of roads access, it is possible to enter Alba Iulia on radially circular roads, from Sebeş, Cluj-Napoca and Zlatna. The street network of Alba Iulia has a rather circular structure as it can be seen in Figure 56. For the FUA the main natural barrier is the Mures River. For the core city, the main urban barrier is Carolina citadel that occupies a vast territory in the heart of the city. However, the fortress (which is the largest in Romania) after its rehabilitation has a bike lane accessible all around the fortress within the entrenchments, and the plan is to connect these lanes to all the main parts of the city, as well as with the other members of the FUA". Moreover, the fortress is crossed by an electric bus that can be accessed by either tourists or local inhabitants.

All major access points in the core city can be considered as pinch points because of the commuters, in the morning and in the afternoon.

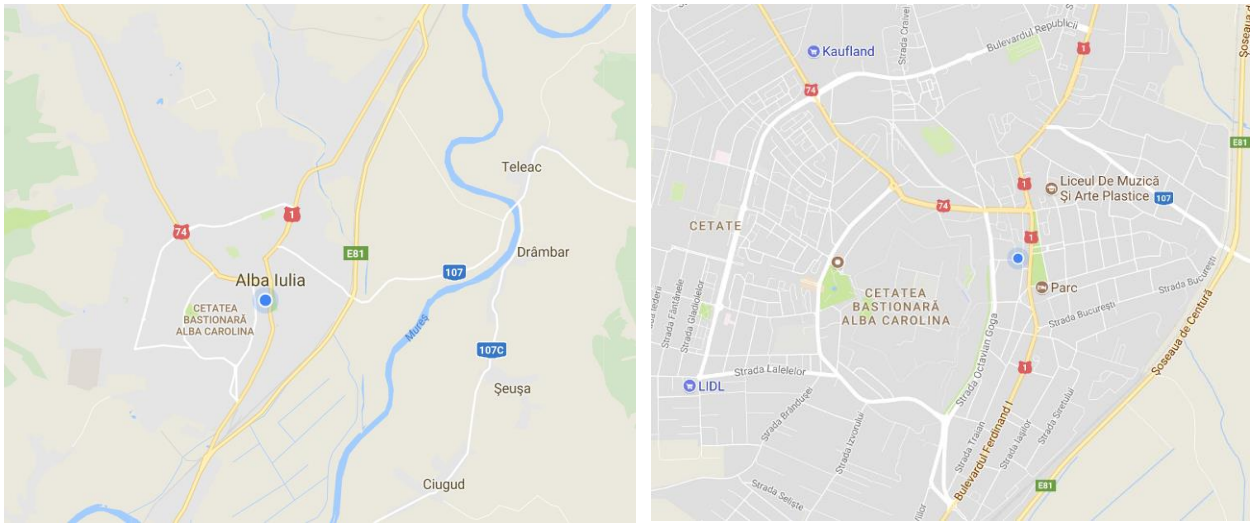


Figure 56: Street network in Alba Iulia in 2017

Data source: Google maps

Besides, in the evening, the transportation inside the core city suffers because of the people who go to shopping centers by personal car.

As far as traffic-calming areas are concerned, there are no available statistics, which exactly point out them, however there are some parts in the city where the traffic is not that high even in rush hours. For example, there is no traffic (or small traffic) inside the fortress outside the touristic season (since it is not a residential area), besides, there is less traffic on the roads accessing the Dendrologic park the entire year. Less traffic is observable on the roads with dead ends and other residential areas with no connected routes and no economic activity.

When it comes to traffic accidents, most of them happened in the core city (509 per year, 6 times more than in the rest of FUA.) according to a research carried out in 2017. According to the SUMP, and the address issued by the Alba County Police Inspectorate, Road Service, „during the period 2013-2015, Alba Iulia registered 86 serious accidents, the death of 8 people and 199 light casualties resulted in light injuries of 259 people. In the mentioned accidents generally occurred because of the failure to prioritize of vehicles, according to the traffic rules. Thus, it is expected that by intervening in the existing problems with measures for mobility, which refer to both physical intervention and behavioral changes, the safety and security on the road in the region will grow. At the same time, during the period 2016-2017 they were recorded at the level of Alba Iulia.

The most sensitive areas prone to traffic accidents are the followings: the Cloşca area, the Civic Center, the Hotel Cetate area, the Kaufland hypermarket area, the Revolution Bd., The Partoş area, etc. Concerning the incidents where public transportation was involved, the number of events (accidents) in 2016 involving the means of public transport mounted to 32, out of which 14 were caused by STP

drivers. The areas with the highest frequency of accidents where buses of the public transport company were involved: Bd Revolution, roundabout Cetate Square on the way from Closca to the Stadium, roundabout in BCR's neighbourhood, on the direction of the train station, Macului Street (Gh. Pop de Basesti)."

2.10.6 Topic 5: Road Infrastructure and Automobile-Associated Services

Alba Iulia benefits from an analysis elaborated by experts from GEHL Architects, for monitoring pedestrian and bicycle traffic in some of the busiest places in the city - "ALBA IULIA towards a city for people and culture health check mini-report". The assessment reveals about the city's potential in terms of developing measures to transform it into a city for people instead of a city for cars. According to the assessment "The performance of a city at eye level and a 'people-oriented' focus at the planning process, represent the starting point of this project. The strategies and recommendations will have a 'people-first' perspective focusing on the human experience at eye-level". The report focuses on identifying the needs and on proposing recommendations for the city in terms of being more sustainable development and people-oriented.

The methodology used by Gehl Architects experts to develop this strategic document was based on observing human behaviour. The Gehl Architects team positioned itself at the most important crossroads in the city to observe the number and behaviour of cyclists and pedestrians. In addition, the team used 12 quality criteria as tools for the assessment of urban areas in Alba Iulia. "Alba Iulia Towards a City for People and Culture" by Jan Gehl, who is a world leader in urban design for people, states that the main urban challenge for Alba Iulia is creating an integrated transport system while encouraging mobility with low impact on the environment and reducing dependence on private cars. The picture below provides information on the location of the surveys, the size of the sample, the period and the time intervals in which the collection of bicycle frequency data took place. The same model of measurement was applied to collect data on pedestrian frequency.

The study was not made on the walkability around public transport stops, however it touches the needs in terms of walkability and cycling at city level.

The space quality in Alba Iulia but as well at FUA level needs to be improved, that is why Alba Iulia tries to work with relevant experts in the field.

There is a need to interconnect the entire road infrastructure to be adapted for intermodal transportation means (bike, bus, pedestrian) and to be connected with the railway stations. There is a need to increase the surface of green spaces around the routes etc.

In Alba Iulia and as well as at FUA level, there is no paid parking. (Except one parking in Alba Iulia, modern and rehabilitated with barrier where people need to pay in order to leave their cars and as

well the residential parking which are paid under monthly subscription by the residents). There will be a regulation at Alba Iulia level in order to pick up the cars illegally parked.

In rural areas, the need for parking is not as high as in Alba Iulia since people are used to park their car in their courtyards. When going to the rural areas there is always enough parking place. However, the situation in Alba Iulia is different since there are areas overwhelmed by car parking during the day and depending on the activities in some parts of the day.

Residents pay 126 lei / year for their parking subscriptions (approx. 28 euros) and for the only parking with barrier you pay 1 leu / hour (approx. 0,18 euros). It is similar to other costs in the country. For residents this price is acceptable and they agree it is a fair pay.

There are regulations in terms of a minimum space for parking agreed by national standards.

Regarding park-and-ride system, there is no such instrument available at Alba Iulia or FUA level. However, in the Alba Iulia SUMP there are measures that include this as well for short and medium term.

No car-sharing operator is functioning in the FUA, but Alba Iulia municipality was discussing with Uber representatives who are more active in larger cities. Alba Iulia takes into account to have an Uber system available at city level in the future, with an electric fleet.

2.10.7 Topic 6: Local Public Transport

The railway (train transport) services in the Functional Urban Area are available for only three administrative units of the FUA connecting them to the core city. The train is used by the commuters but not as the main mean of transportation. The operator is the national company for railways and as well a private company to some extent for some of the freight distribution. There is no data/analysis using Geographic Information System.

The Public Transportation is privately owned at FUA level by the Public Transportation Company STP ALBA. The bus public transport in Alba Iulia Municipality is one of the most modern and well-organized one in Romania.

The Alba Iulia Association for Intercommunity Development – Local Transport (AIDA TL) has developed and modernized this transport utility for interconnecting Alba Iulia and the seven partner communes of the FUA. The core city and FUA are permanently served by 68 buses. Each mean of bus is equipped with last generation of intelligent systems like GPS, e-ticketing, surveillance, hourly taxation that will allow buying the ticket from a vending machine or using a text message via mobile phone.
The bus transport network is a combination of radial and circular roads. In the core city, the main bus station is very close to the railway station so transfer is easy. The SUMP of Alba Iulia proposes projects that will be implemented in the next period so the public transport will be prioritized.

The use of public (bus) transport has constantly increased in the past years and will continue to increase in the next years after implementing the measures of the existing SUMP of the core city.

It has to be highlighted that the public transport covers all of the everyday destinations (such as large employers, schools, shopping facilities etc.) inside the core city.

Railway is a national owned company, but there are also some private railway providers. Fares are more or less 30 euros / ticket for a 300-400 km distance.

Regarding bus tickets, they are available one hour even if passengers change the lines. The fare is common among different bus operators to other buses at national level as well. Besides the one hour validation and the monthly subscription there is no long-term & area-covering ticket offer for residents. It has been indicated that there is no integrated tariff system with the railway.

2.10.8 Topic 7: Bicycle Traffic

The topography of Alba Iulia allows the development of a cycling paths network. There is a difference of altitude between downtown and the upper part of the city but this does not represent a major impediment for the development of the cycling paths network.

19 kms of bike lanes are available in Alba Iulia and another two kms at one commune level part of the FUA.

In most of the cases, there are not separated cycling paths. Most of the cycling paths and lanes are used for touristic or recreational purposes. There is no network map available at this point which shows the roads for bikes. There are no traffic lights for bicycle available, as they are not yet necessary. Bicycle paths and lanes are usually made of pavement or asphalt.

The bicycle lanes are mostly part of the road/sidewalk, but inside the citadel, 13 km are available as separate lanes not on the sidewalk or street.

In the heart of the fortress where the main bike lane is situated, there are lots of sidewalks and green spaces, and mostly cars are not allowed to go in.

As it has been indicated, at the moment no legislative regulation is known regarding one-way direction for bikers on one-way road.

There is no data available concerning the bicycle parking places available at major transportation stations (e.g. Railway station), since Alba Iulia FUA does not possess the statistics on the private ownership of bike parking slots at commercial centers (eg. Penny Market situated just in front of the railway station). However, there are data regarding the available bike parkings at city level.

In Alba Iulia, 1380 bike parking slots are available, owned by the municipality.

In addition, 200 bike-parking slots will be available in the near future in other public spaces like schools.

This number of parking for bikes does not include the private parking spaces- such as for commercial centers- either.

It was highlighted that most of the interest areas in the city are equipped with parkings for bikes.

The local regulation only stipulates the minimum number of parking for cars, but there is no regulation for bike parking for the building code.

As far as bike-sharing system is concerned, there is such a system at the disposal of those who want to visit the Fortress; bicycles are available for rent in front of the House of Culture near the Fortress Gate VI. The multi-sharing bike system used in Alba Iulia is I'Velo. This is the most well-known multi-sharing bike system in Romania.

Regarding accidents occurred by bicycle, the primary causes of cycle accidents is that the bikers are circulating on the streets due to the fact that no bike lanes are available for some routes and in this case the cars don’t respect the priority of bikers even if they are considered to be participants in the traffic with the same rights and obligations. Another cause is that bikers are not equipped with safety equipment such as safety helmet.

The local interest groups agree that there is a high request for a cycling paths network in the city. Through the projects, which will be implemented in the next period, the cycling paths network will increase significantly.

2.10.9 Topic 8: Pedestrian Traffic

The main pedestrian zones are located inside the Fortress and in its vicinity where there is a major boulevard dedicated to pedestrians. Another pedestrian area is the Dendrologic park in the suburbia. There are also some pedestrian zones in small parks in the civic center and in some neighbourhoods.
Only one pedestrian underpass is located in Alba Iulia Municipality, near the city hall and is lighted during the night. Due to the fact that it is situated just between two restaurants, which are open until late in the night, there is no considered to be a dangerous area for walking.
Conflicts between pedestrian and bicycles are regularly happening where there is not a clear delimitation between them. Main cause of pedestrian accidents is crossing through an unauthorized place, instead of using the pedestrian crossings.
The guidance for visibility-impaired people is not available at city level in bus stops, squares. However, to some crossroads equipped with traffic lights there are devices installed announcing the green light for impaired people through sounds.

2.11DIMITROVGRAD FUA

2.11.1 Topic 0: Data and information availability

As the data collection phase of Dimitrovgrad FUA reflects, mobility statistics data is available only for the whole FUA, the further parts of the data were available more or less at core city level too.
Therefore, the main deficiency is the lack of data for the core city mainly in mobility.
In order to obtain the data for the SUMP there should be more information related to the number and volume of passengers, the trip time and travel distance by purpose of traveling.

2.11.2 Topic 1: Mobility

In Dimitrovgrad, only FUA data was provided in connection with modal split, and their numbers are rather surprising. (see Figure 57) The proportion of walkers almost reach 50% and their ratio exceeds the car users too. The proportion of public transport and cyclists are roughly the same, but none of them reaches 7%.

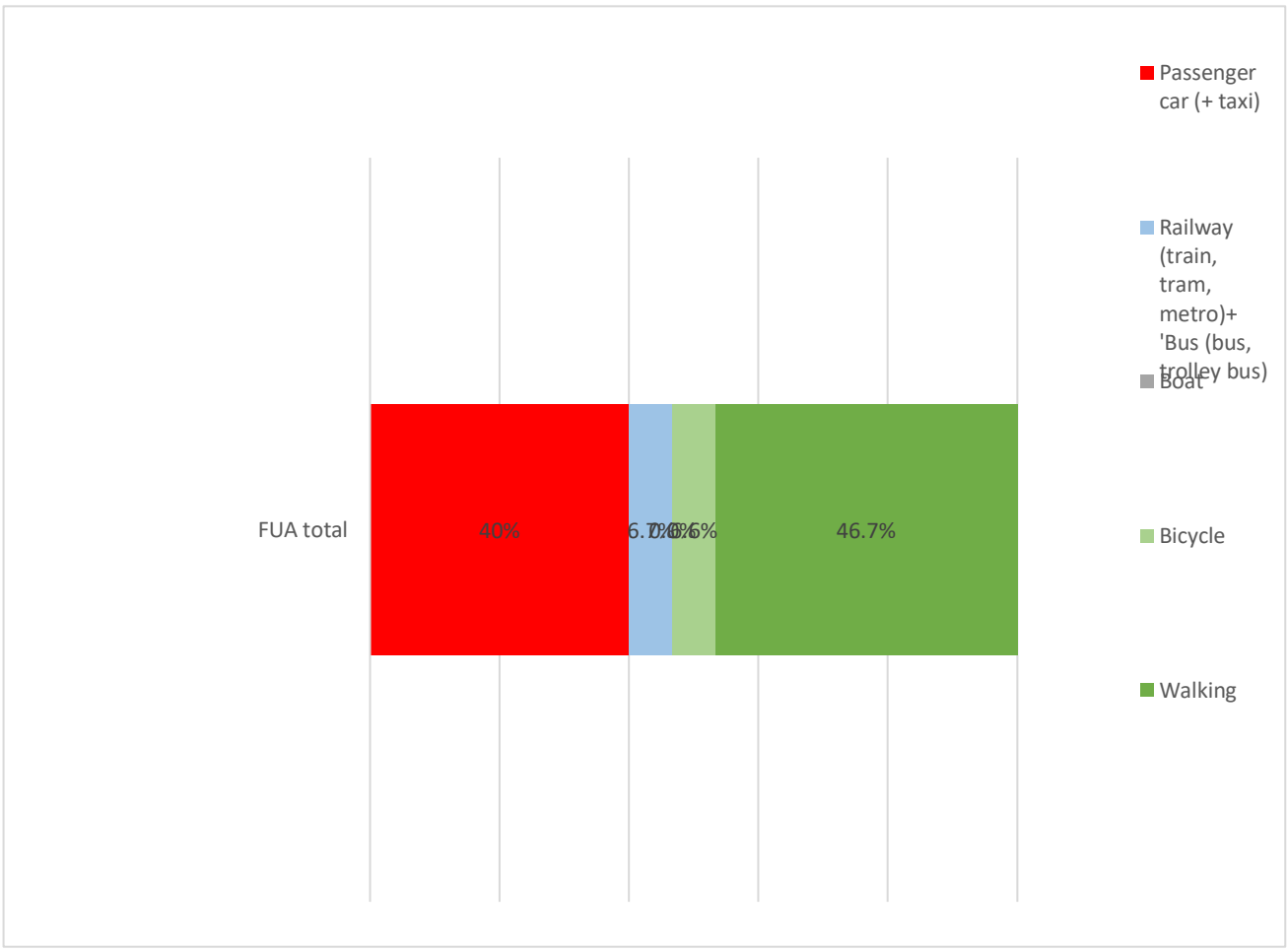


Figure 57: Modal Split in Dimitrovgrad FUA in 2011 [%]

Data source: Dimitrovgrad Municipality

Regarding gender and age division, there is no available data for difference by gender or age, and unfortunately, there is no available data for the purpose of trips either.

2.11.3 Topic 2: Urban Structure

As far as the Bulgarian partner, Dimitrovgrad and its FUA is concerned, the area of the core city gives about 10% of the whole FUA, so it can be stated at this FUA too, that the other municipalities in the FUA all in all represent a lot bigger proportion in area than the core city itself. (see Figure 58)

As regards Dimitrovgrad's population ratio, it is approximately the same as it could be seen at Alba Iulia's data, namely the population of the core city is about 75% of the whole FUA population. (see Figure 59) Dimitrovgrad municipality consists of 25 villages and two towns –Dimitrovgrad and Merichleri, but no statistics for any of them separately is available. It has been stated that the core city is with the highest population density and respectively generates the highest pressure on the transport infrastructure.

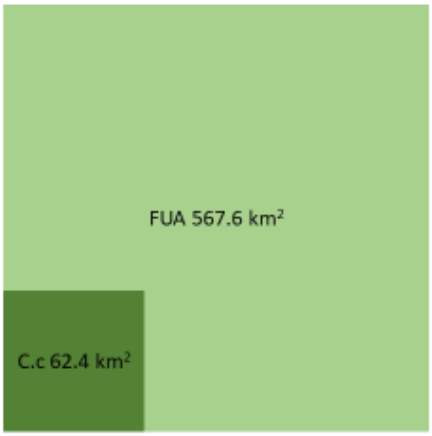


Figure 58: The area division of Dimitrovgrad's core city and FUA

Data source: https://www.dimitrovgrad.bg/en

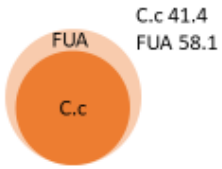


Figure 59: The population division of Dimitrovgrad's core city and FUA in 2010 [1000 inhabitants]

Data Source: www.grao.bg.

2.11.4 Topic 3: Accessibility within urban area

When it comes to the accessibility solution within the Functional Urban Area of Dimitrovgrad, the statistics point out that most of the trips in the core city and whole FUA are made by car. The high proportion of car users may be caused by inappropriate situation of public transport that ought to be more effective as it is now.

The statistics have pointed out that not so many people choose walking and biking for long distances, but those who select these mobility methods are exposed to the traffic.

The online tool that can be used to track travel time by car in the FUA is Google Map. There is no tool that can tell travel time by public transport.

2.11.5 Topic 4: Motor vehicle traffic

The road system in the FUA is linear and it is around 108 km. Only 15% of it is in relatively good condition, 20% - in average and the rest is in really poor condition. Therefore, around 80% of the whole road system needs reconstruction. There are no serious relief barriers in the road network except the Maritsa River and the elevations between Haskovo and Dimitrovgrad.

As Figure 60 suggests, in Dimitrovgrad FUA only two years data were available regarding the density of passenger cars indicator. These two data are the 2010 and 2017 data regarding FUA total. Although very few data are available here, it can be stated that in FUA total the density of passenger cars increased between 2010 and 2017 in the whole FUA.

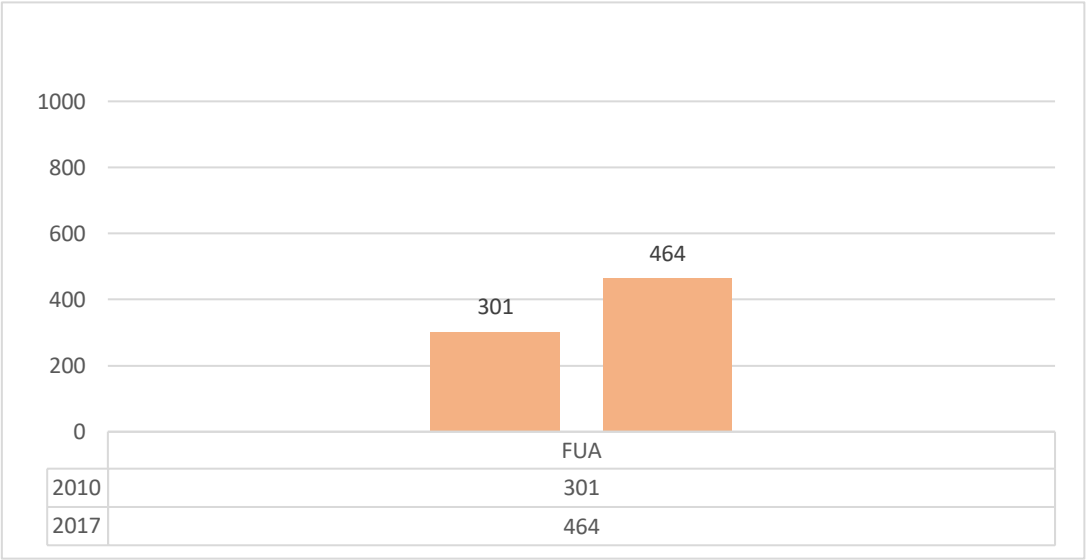


Figure 60: Timeline of density of passenger cars in Dimitrovgrad FUA between 2010 and 2017 [number of cars/1000 inhabitants

Data Source: Action Plan for Sustainable Energy and Climate of Dimitrovgrad in 2016

When it comes to Bulgaria and Dimitrovgrad, Figure 61 depicts that only FUA data were available for traffic accidents. As it can be read from Figure 61, traffic accidents ended in injury and fatality were calculated together. This overall data points out a relatively small number comparing to the other partners.

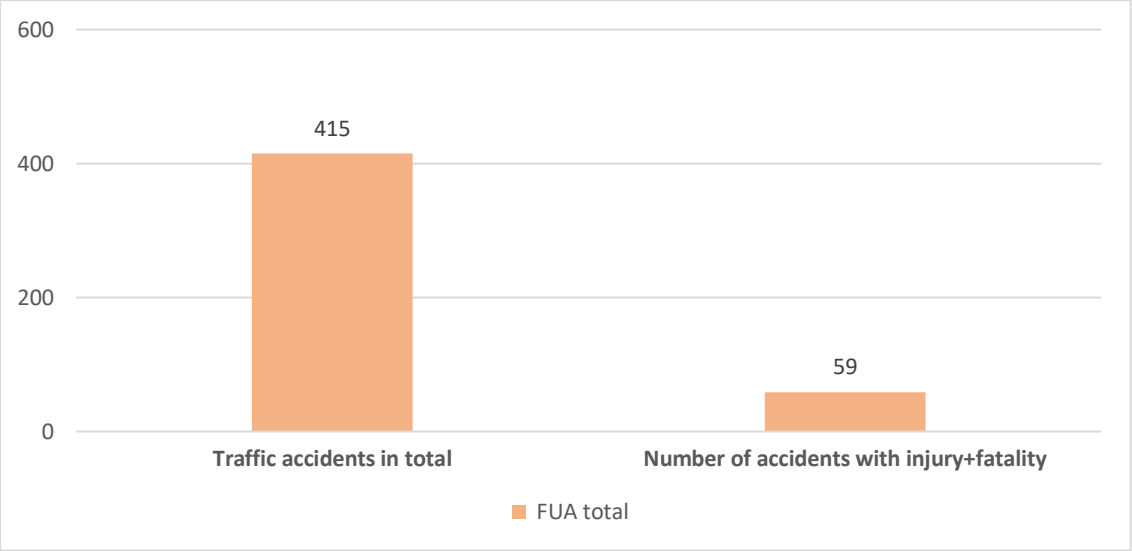


Figure 61: Number of traffic accidents in total+ number of accidents with injury +fatality in Dimitrovgrad FUA in 2016

Data Source: Dimitrovgrad's Police Station

2.11.6 Topic 5: Road infrastructure and automobile-associated services

The transport infrastructure in Dimitrovgrad is in bad condition, because of the roads in the core city. It was claimed that the street space quality is convenient in the core city.

There are parking regulations working on the whole FUA territory, as well as there are 18 parking areas in total FUA with 800 parking places. Parking spaces are classified according to their area and are called “Blue zone”; the price is 1 lev per hour and 0.50 lev for half an hour;

As it was pointed out in the analysis, car-sharing system is not available in the FUA yet.

2.11.7 Topic 6: Local public transport

Regarding local public transport (train) in the FUA, two railway stations are serving the FUA territory:

One of them is Dimitrovgrad Railway Station, which is one of the largest and most important distribution stations in southern Bulgaria. Besides, there is another train station in the core city called Dimitrovgrad Railway Station North. Among others, the railway line Sofia - Svilengrad and Ruse - Podkova is passing through Dimirovgrad as well.

As far as bus transport is concerned, there are four bus lines with 29 public buses serving the whole FUA. In the core city the bus line is connected to the railway station; as the statistics reveal, in general the bus public transport usage is continuously decreasing.

2.11.8 Topic 7: Bicycle traffic

When it comes to bicycle traffic in the FUA, its situation is not in an appropriate way, because there is no existing bicycle path system in the municipality. Therefore, building up a concept and implementing a bicycle traffic scheme is necessary. The bicycle mobility will be designed as a complete system in the communicational and transport planning system. It will be based on analyses and forecasts that take into account the structure of the urbanized territory, its topographical features, and the habits and traditions of the population.

2.11.9 Topic 8: Pedestrian traffic

The main pedestrian zones are located in the center of the core city, the green areas in the core city and in the centers of the other urbanized structures in the FUA total.

At FUA level a big problem that occurs in most of the municipalities in Bulgaria is the fact that the main roads on which heavy traffic passes through the localities, creating an unsafe zone for pedestrians and generates many traffic accidents.

2.12 BANJA LUKA FUA

2.12.1 Topic 0: Data and information availability

As it was indicated, Banja Luka is one city, not divided in municipalities/ districts. There are city zones/areas but there are no separated data for them. All data collected are related to the city of Banja Luka and it is in total for urban and sub-urban areas. (see the map of Banja Luka in Figure 62 and the satellite image in Figure 63)

Regarding the whole data collection, Banja Luka at some cases could not provide exact data, instead they provided mobility expert's estimations. The critical problem is the civil war that was in the period 1992-1995 and the post-war period, so from these times data were not available. At that time, the focus of the activity was the establishment of basic life functions and activities, as well as the restoration of demolished areas.

Figure 62: City of Banja Luka- map of the city

Data source: Google maps

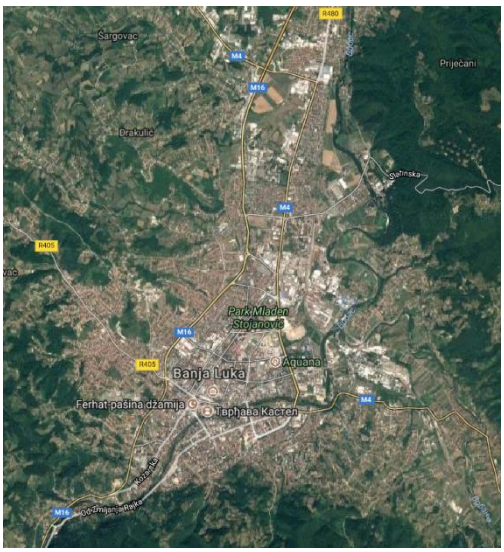


Figure 63: City of Banja Luka-satellite image

Data source: Google maps

2.12.2 Topic 1: Mobility: What are characteristics of the people's mobility of my FUA and core city?

Since, there are no complete studies in mobility field, modal split has not been determined exactly either. Banja Luka's data at this indicator in their data collection table represent an expert evaluation. Furthermore, research and analysis of the determination of gender and age groups, differences in individual parts of the city, travel, comparison with cities of similar characteristics and size have not been carried out either.

Regarding the gender structure of the population, it is relatively balanced, the proportion of males is 48%, and the female is 52%.

Expert evaluations are based on some previous research: counting traffic at individual intersections for traffic lights correction, counting passengers on individual public transport lines due to correction of departure times, counting traffic across bridges in order to determine the load on the bridge, various surveys in the field of traffic safety (the number of drivers using the seat belt, determining the average speed movements on individual shares, etc.)

Due to the war, the implementation of strategic planning documents, such as the Urban Plan, stopped. That is why the city came to a big problem, because the increase in the number of motor vehicles was not followed by the construction and development of the infrastructure.

With this in mind, in the year of 2017, a Council for the development of the urban plan was formed. The task of the Council is to define the guidelines and implement as well as control the process of drafting the urban plan as an urban planning document in the city.

Before the development of this plan, the existing condition must be analysed and determined which means a complete, detailed and serious research in traffic but also in many other fields.

2.12.3 Topic 2: Urban structure

Banja Luka is the capital of the Republic of Srpska. Republika Srpska is one of the two theorities in Bosnia and Herzegovina (see in Figure 64).

In the central city area, all Ministries, Tax Administration, basic public companies, Geodetic Administration, etc. are located. In addition, in the central city area is the City Administration as well as most secondary schools. We conclude that administrative and business facilities are located in the central city area.

Figure 64:The position of Banja Luka in Bosnia and Herzegovina

Data source: Google maps

As far as the educational life is concerned, Banja Luka is a university city with a large number of faculties (public and private), but these educational institutions are not located in the central city zone.

It is important to note that the "Clinical Center of Republika Srpska" is located in Banja Luka, but it is located outside the central city area (see in Figure 65)

Figure 65:Location of the "Clinical Center of Republika Srpska

Data source: Google Maps

The city of Banja Luka is a true example of migration of the population: migration within the city and within the state.

There is a large traffic load in the central city area by the population of Banja Luka, who come from residential areas daily to the central city area, to work, to school, to doctor, for shopping, etc. In Banja Luka, as a capital city, a large number of inhabitants of neighbouring smaller municipalities come every day. Due to the complete administration, a large number of inhabitants of neighbouring municipalities commute to the town every day because of their needs.

Trips to the city area are done in three ways: passenger cars, buses and pedestrians. The largest number of trips are made by passenger cars and buses. Passenger cars are used about 50% of the trip, and 25% is composed by bus travelling.

Banja Luka does not belong to the group of large cities, therefore for this reason the share of pedestrian trips is around 20%.

The network of public transport lines is very developed, and the population from almost all parts of the city has a direct connection (without interchanges) with the central city zone (Figure 66 and Figure 67).

Figure 66: City Line Network

Data source: Municipality of Banja Luka

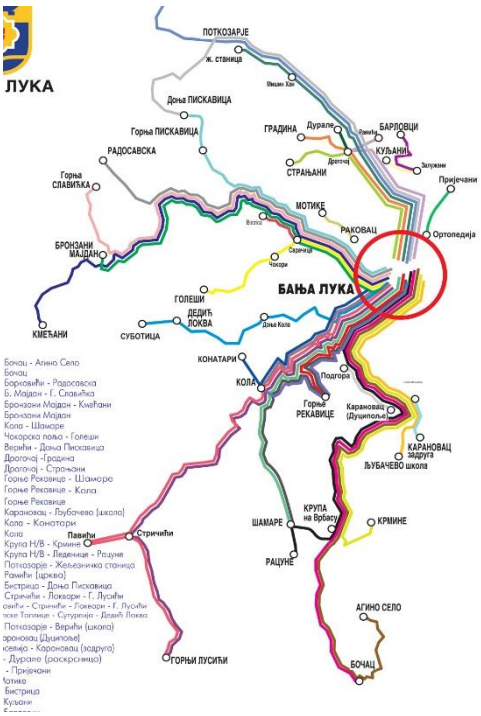


Figure 67: Network of suburban lines

Data source: Municipality of Banja Luka

2.12.4 Topic 3: Accessibility within urban area

As it has been already mentioned in the previous subchapter, there is no research that would accurately determine travel time by passenger cars or buses.

Travel times represent expert evaluation based on individual analyses made in Banja Luka and the experiences of cities of Banja Luka's size. In addition, travel time by purpose (job, education, pleasure, shopping, going home, private purpose, etc.) also represent expert evaluation.

There are on line travel tools for passenger cars and autobuses. For travel by passenger cars, navigation tools and maps on mobile phones are also available. There are any on-line tools that are made exclusively for travel by passenger cars for the City of Banja Luka.

A special online tool has been created for traveling to buses in the Banja Luka area. The tool is an application for mobile phones and tablets, which is made for the IOS and Android platform. It is called "BL BUS" (Figure 68). This tool contains an on-line view of the driving rows of all public transport lines, a graphic representation of lines and views, and a number of other data relevant to the use of public transport in the city. The application was also made in English.

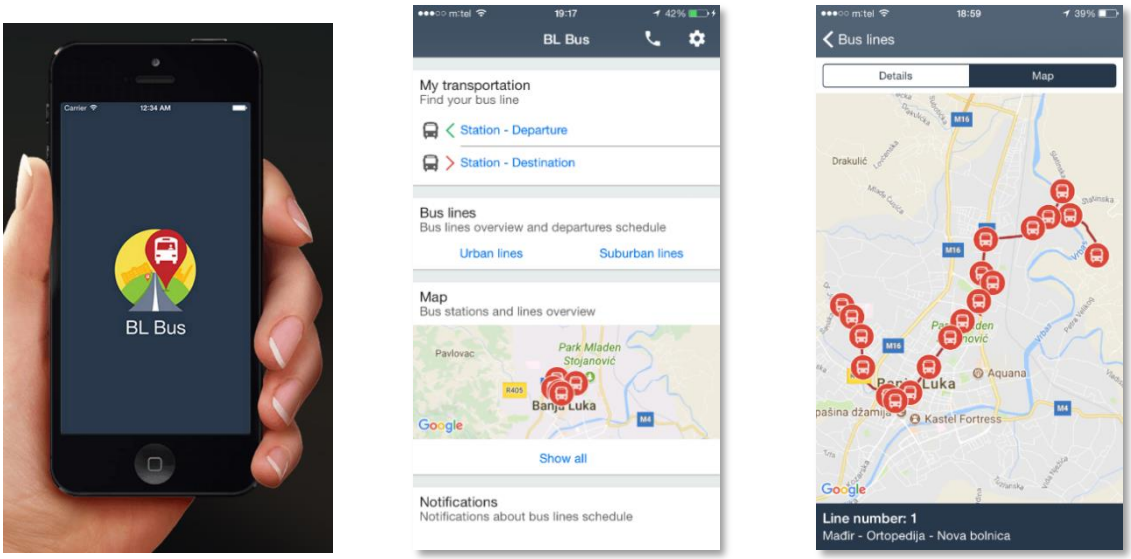


Figure 68: BL BUS smartphone application

Data source: bl-bus.com

At the state level there is a "Law on Transport in Road Traffic". This law provided a good basis for regulating public transport in cities and local municipalities. Based on this law, cities and local municipalities have passed their "Decisions (local law)" to regulate public transport in more detail.

In the period from 1991 to 2003, the City of Banja Luka had no control over public transport in the city. Public transport was run by a large number of private carriers without city control. There were about 15 private companies that operated exclusively on routes that had passengers and profits. In 2003, the city made a decision on route and driving routes, issued a public call, selected five companies and concluded contracts. Since 2003, the city has control over public transport.

During the development of the regulatory plans, the route of buses and bus stops are planned.

2.12.5 Topic 4: Motor vehicle traffic

There is a constant increase in the number of passenger cars in the city every year. Compared to 1990, the number of passenger cars has almost doubled. As Figure 69 points out, the degree of motorization in 1990 was 137.17 passenger cars / 1000 inhabitants, in 2000 it was 155.01, in 2010 it was 212.16 and in recent data from 2016 the ratio was 228.82 passenger cars / 1000 inhabitants.

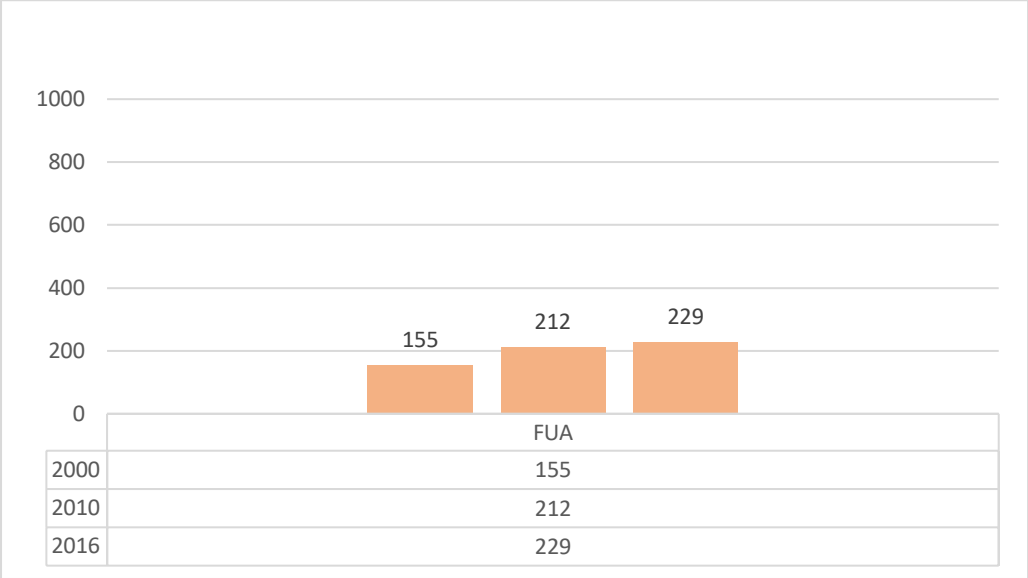


Figure 67: Timeline of density of passenger cars in Banja Luka FUA between 2000 and 2016 [number of cars/1000 inhabitants]

Data Source: Insitute of statistic Republic of Srpska

The major problem of traffic safety and environmental pollution is the average age of passenger cars that is over 15 years old.

In addition to this number of passenger vehicles, the daily traffic of the surrounding region to Banja Luka as the capital city is affected daily by the traffic load.

In addition to these daily migrations, through Banja Luka pass the main roads that connect the region on the highway, especially from the south and west, to the Gradiska border crossing and the European road network.

Regarding the structure of the traffic network, it can be considered linear.

There are two main roads in the city, in the western and eastern part of the city, which extend north-south (Figure 68). These two roads are called "Western transit" and "Eastern transit".

The big problem is just one real cross-link that connects these two roads. In addition to the problem of traffic connections of the eastern and western parts of the city, a natural obstacle in the shape of the river Vrbas should be added, dividing the city into two parts, with a characteristic lack of bridges.

At the time of writing this analysis, (2017 winter) there was a problem that one bridge was closed for the traffic of motor vehicles. The analysis has confirmed the bridge is much damaged and cannot be repaired and that a new bridge must be built which resulted two things. The first thing is to redirect traffic to neighbouring roads to the neighbouring bridges, which are now more and more burdensome and causes heavy traffic jams and congestions in the city. The other thing is that it is necessary to find

great financial resources for building a new bridge at the location of the old bridge. The city for the construction of a new bridge through regular financial revenues cannot provide financial means for building a bridge and will have to build a bridge from credit funds.

- "Western transit" and "Eastern transit"

- the only real cross-link in the city

- old bridge that is closed for motor traffic this year

Figure 68: The main roads in Banja Luka

Data source:Google maps:

Banja Luka has a problem with the division of competencies. Through the city, the passage of five state roads (roads marked with yellow and red in Figure 68), whose maintenance and management are under the jurisdiction of the state and the city, and regulated by law.

There are no obstacles in the city such as tunnels, nature reserve, historic city wall, etc.

Traffic jams in the city are in the period from 7:30 to 8:00 and 15:30 to 16:30, both on bridges and on the road that connects the „western transit and east transit".

The traffic-calming area is in the zones of all primary schools. In order to ensure the safety of traffic in the zones of all primary schools in the city, so-called »speed bumps« were placed, marked pedestrians crossed and vertical traffic signalization was installed.

In Table 14 data on traffic accidents for 2015 and 2016 are shown. The table reflects that there is no significant difference between the data of the two years, only minor changes are noticeable.

	The type of traffic accidents	2015	2016
1.	Total number of traffic accidents	2718	2684
1.1.	- with material damage	2288	2280
1.2.	- with dead people	20	13

1.3.	- with severely injured persons	96	76
1.4.	- with minor injuries	314	315
2	- number of dead people	23	13

Table 14: Traffic accidents in Banja Luka FUA in 2015 and 2016

Data source: Institute of statistic Republic of Srpska

There are no points in the city that would represent the concentration of traffic accidents. When traffic accidents ended in fatality is being scrutinised, their concentration is on state roads that pass through the city.

2.13 Topic 5: Road infrastructure and automobile-associated services

So far, no assessment has been made of the state of the roads in the entire city territory.
In the central city area, the roads are wide, with built pavements and trees. The problem is the traffic routes in parts of the city, which are not in the central city area, that is, at the end of the urban area of the city. These streets are not wide, with a width of less than 5m, without built sidewalks and stops for buses on the street.

Distribution of the street space for different traffic modes can be done only in the central city area.
The total length of local roads is 927,20km and further 969,81km are unclassified. Local roads are classified according to the criteria (whether public transport lines pass, connect the city with state roads, which is their function in the network, etc.) in three groups: 1st order, 2nd order, 1st order line. The length of the local roads of the 1st line is 167.80 km, the second order is 200.90 km and the third line is 558.50 km.

Experts believe that Banja Luka should be a modern European city that will develop and function according to the principles of sustainable development. Nevertheless, the opinions of stakeholders regarding street space are very different.

In the summer of 2017, as a kind of initiative test, the main city traffic road was closed for motor traffic in the period June-August, every weekend between Saturday, 18h - Monday 05h.In this period the traffic was a zone for pedestrians and cyclists (Figure 69).

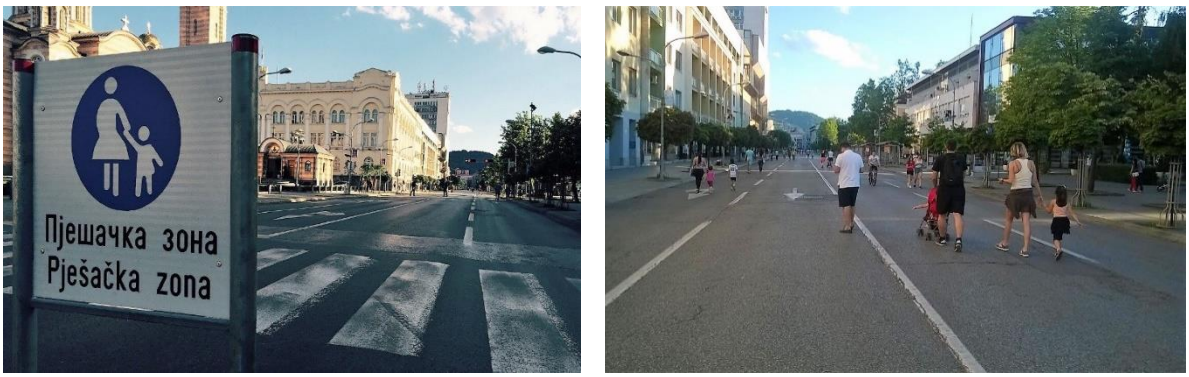


Figure 69: Banja Luka's city centre closed for motor traffic in 2017 summer

Source of the photos: Municipality of Banja Luka

As far as the parking lots are concerned, the total number of parking lots under payment is 4826. Out of these, parking on the street is about 35%. Parkings in the narrowest central area are mostly overburdened. The tariff system consists of three zones of parking: zero zone, the first zone and the second zone. In the zero zone, the parking price per 1h is 0.5 €, the driver can park the vehicle for a maximum of 2 hours. In the First Zone the parking price is also 0.5 € for 1h, and for 2.5 € per day. In the second zone the charge for 1 hour is 0.25 € and for the whole day 01.05 €. For a resident population, a special parking cost of 25 € per year is provided. There are no private parking lots in the city. 65% of parking spaces under the charge are off street parking. Of this number, only a small number (190) are garage-parking places.

As the mobility status quo analysis of Banja Luka reflects, park and ride facility does not exist in the city. Besides, there is no car sharing in the city either because so far no one has tried to realize the car-sharing system. This system has not even been mentioned as an opportunity in information media so far.

2.13.1 Topic 6: Local Public Transport

The railway passenger transportation service in the city is very low. The train station is located at the entrance to the city (Figure 70.) It is used for transportation of cargo, with very small number of passengers being transported. The main characteristic is old wagons and poor infrastructure.

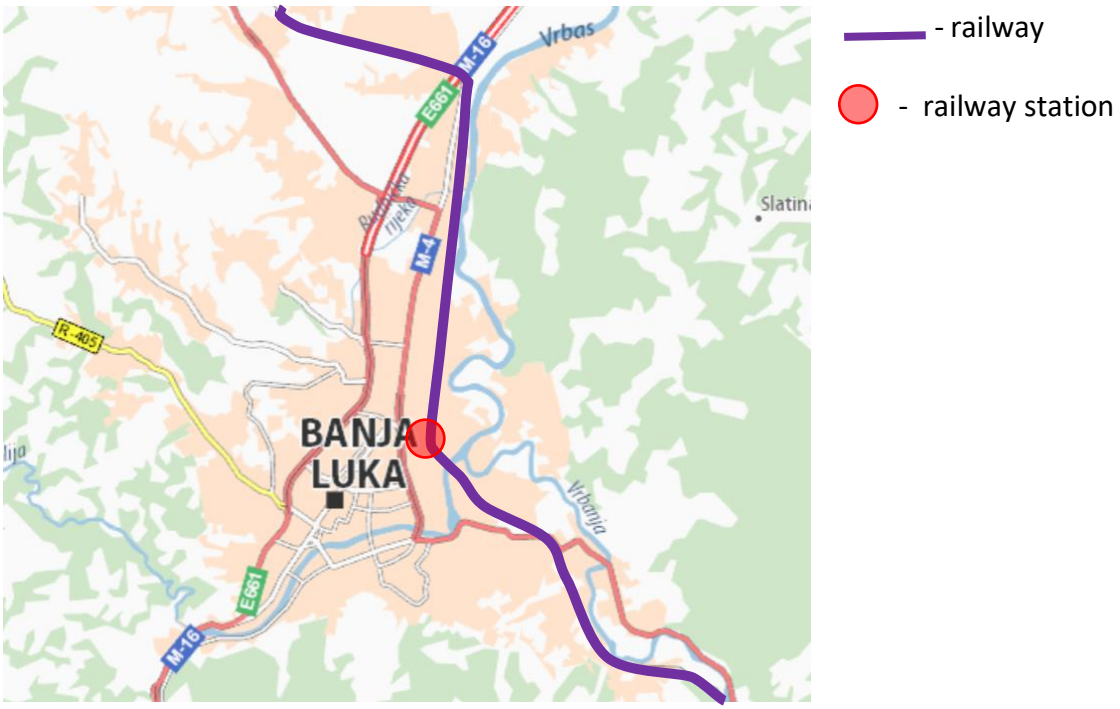


Figure 70: The location of train station in Banja Luka

Data source: Google maps

Public transport in the city area is done by buses and cabs. There are no trams and trolleybuses in the city. Public transport buses consists of 23 bus lines 34 and suburban transport lines. The total length of city lines is 212.34 km, while suburban lines are 788.7 km. During the month, about 680 km are being realized.

At the location of the railway station there is a bus station for intercity passenger transport. A number of city and suburban lines have a station nearby this location. The network line represents a combination of radial and linear lines.
Currently, there are no measures to give priority to public passenger transport. Buses are equated with other vehicles and it happens that buses get stuck in traffic jams.

As Banja Luka analysis points out, very few inhabitants (insignificant number), business and other important facilities covered within a radius of 300m from the train station. Besides, there is no data / analysis using GIS geographic information system in Banja Luka.

As the statistics reflect, there is a downward trend in the number of passengers in public transport.

About 2,300 departures are realized in public transport during the day. The needs are fully met with the passengers' main destinations like main workplaces, school, hospital, shopping centres recreation facilities etc. The tariff system consists of the following tickets: one-way ticket, daily ticket, monthly ticket for workers, monthly ticket for students, and monthly ticket for elderlies. There is no integrated system of maps between different modes of transport. Transportation is done by seven private

companies that have signed a contract with the city. A passenger can choose to buy a ticket valid for only one private company or with all private companies.

Ticket prices on city transport lines:

- for one ride: 0.8 €
- daily card: 2.5 €
- monthly ticket valid for only one private company: worker 20 €, student 14 €, old people 6.5 €.
- Monthly ticket valid for all private companies: worker 22.5 €, student 14 €, old people 10 €.

In suburban transport there are the same types of tickets whose price is defined on the distance.

2.13.2 Topic 7: Bicycle traffic

Topographically Banja Luka is very appropriate for bicycle traffic. However, bicycle traffic is very poorly developed. The total length of the bicycle trails in the city is very short and is only 14 km (see Figure 71). The specified length is not in continuity. Because of the small length that is scattered across settlements, it is not possible to talk about biking trails that serve exclusively for recreational purposes.

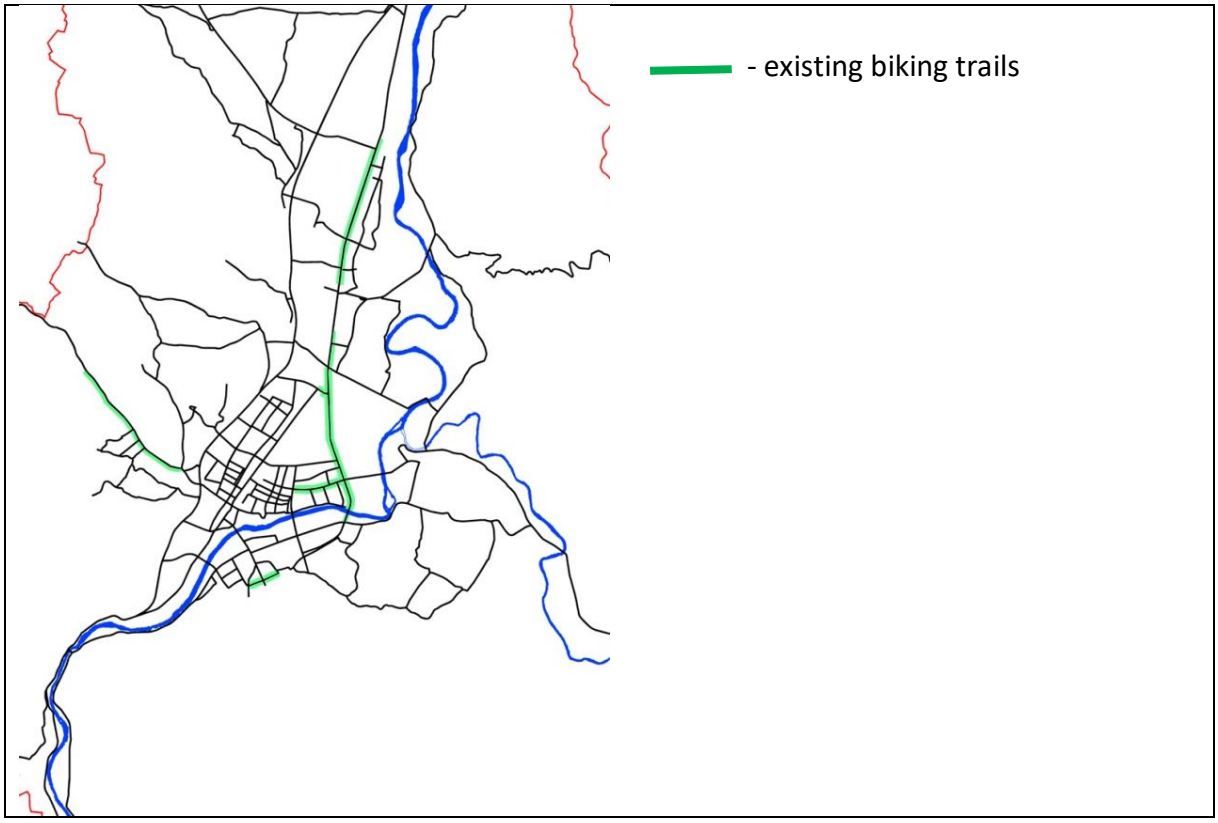


Figure 71: Existing biking trails in Banja Luka

Data source: Municipality of Banja Luka

In the city, there is no special traffic signalization for bicycle traffic.

Currently, there is no legislative framework to make it impossible to cycle against one-way direction on a one-way road.

Bicycle parks are set up very unplanned, without a clear vision and strategy. Each institution puts its own bicycle parking in front of its facility. (e.g. in front of the post office, tax administration, in the park, etc.). There are no parking bikes on the city's border.

There is no regulation about bicycle parking on the building code.

Bike sharing system does not exist either, nevertheless it is planned to implement the bike sharing system in the spring of 2018. Implementation of the system will depend on financial resources. At the same time with the bike sharing system, a network of bicycle paths and strip should be developed. Bicycle paths would be done separately along the street and through park surfaces, and the paths would be marked on the street, depending on the width of the street. Due to financial problems, financial assets will try to find out through loans, EU funds or another similar model.

Everyone in the city believes that bicycle traffic should be developed, but very little has been done so far. Non-governmental organizations make activities to promote bicycle traffic.

2.13.3 Topic 8: Pedestrian traffic

The main pedestrian zone is located in the immediate vicinity of the building of the City Administration of Banja Luka (Figure 72.). It is illuminated, it consists of three parts. In the first part, there is a large number of commercial objects (Figure 73.). In the second part there are benches with a park surface (Figure 74.), whereas in the third part there are catering facilities (Figure 75.).

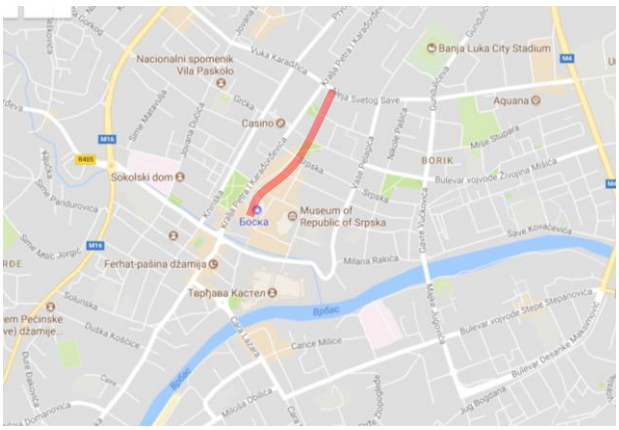


Figure 72: Main pedestrian zone in Banja Luka (marked with red colour)

Data source: Municipality of Banja Luka

Figure 73: The first part of the pedestrian zone in Banja Luka with commercial objects

Source of the photo: Municipality of Banja Luka

Figure 74: The second part of the pedestrian zone in Banja Luka with a park

Source of the photo: Municipality of Banja Luka

Figure 75: The third part of the pedestrian zone in Banja Luka with catering facilities

Source of the photo: Municipality of Banja Luka

There are four pedestrian viaducts in the city- as Figure 76 illustrates- and two pedestrian underpasses, on the main roads. The analysis has pointed out that unfortunately citizens do not have a developed awareness of the importance of using these facilities. The analysis showed that between 20-30% of pedestrians do not use these facilities.

Figure 76: The four pedestrian viaducts in Banja Luka

Data source: Municipality of Banja Luka

Conflicts between pedestrians and cyclists cannot be mentioned because there is no developed bicycle traffic.

Furthermore, another deficiency in Banja Luka that there is no equipped with guidance for visibility-impaired people on the street.

3 Shared mobility problems/challenges among project partners' Functional Urban Areas

As the different Functional Urban Areas' status quo analyses in the previous chapter reflect, all project partners' FUA possess some kind of mobility problems, deficiencies that ought to be solved in the near future. As a matter of course, the class and the extent of these problems differ from FUA to FUA.

This subchapter shall discuss and compare the shared mobility problems and challenges among Functional Urban Areas. With the help of this comparison, all partners will have the opportunity to overview their own mobility challenges and compare them with other partners' main mobility inadequacies.

Before starting to set the shared mobility problems, it has to be stated Questionnaire that the biggest difficulty of the partners was to find the appropriate and reliable data source for the required indicators in the common transnational template created under the framework of Deliverable 3.1.1.

3.1 High share of car users/inappropriate situation of public transport in FUAs

One of the most relevant data, which plays an important role in the analysis of mobility, is the modal split. Nevertheless, it has to be highlighted that not every FUA could collect exact data for this indicator, in some cases, only mobility expert's estimations are available or even no data were available at all. As the modal split section in the status quo analysis pointed out, passenger car is the most frequent mean of mobility in almost all of the FUAs. The high proportion of passenger cars in the majority of the FUAs may be caused by several reasons.

Among others, the availability and quality of the public transport infrastructure may shape the modal split to the detriment of car users. Needless to say, that if the public transport system is appropriate in a FUA, it may be attractive for passengers and they may use this kind of transport instead of cars.

However, the situation of public transport is not convenient in every Functional Urban Area. When we compare the two Slovenian partners, Velenje and Koper, both of them stated that the public transport is not really developed in their FUAs. They highlighted the railway system, which is not efficient for passenger mobility purpose, as there are no sufficient number of stops, and the infrastructure and technical elements do not need the present expectations. Therefore, bus is the main public transport mode in these areas, but as Velenje stated they are not suitable for everyday commuting. As a result, private vehicles prevail in both areas, and their ratio is the highest.

Weiz FUA has also emphasised that in their case there is a high rate of motorized individual modes of transport. In the Functional Urban Area of the Styrian city the train system is rather fine, because it has numerous stops, which connect the most important destinations, as well as its infrastructure is adequate too. In spite of the fact that bus transport is available in Weiz FUA, their density is not appropriate between 9:00 to 12:00 and 14:00-17:00, so the usage of this transport is rather hard for employees.

When the two capital cities (Prague, Budapest) data are scrutinised, they point out that the proportion of public transport exceeds the ratio of cars in both cases which is an advantageous result. In Prague the ratio of public transport usage is permanently increasing, and this tendency is envisaged in Budapest too. However, there are some problems, which Budapest 14 has to tackle regarding public transport. Among others, some parts of the district are poorly served by public transport and the lack of good and fast connections with suburbs is also a critical point. Besides the overcrowded public trains were also classified as main problems in Budapest 14

As far as Dubrovnik FUA and its public transport is concerned, they indicated in their analysis that there are no railway services nor tram available within the FUA. Therefore, public transportation is limited to bus which usage has been continuously increasing.

The general situation that private car is the most frequently used mean of transport is true for Zadar FUA too. As the data have shown, the majority of all kind of trips are taken by private cars in this area and daily commuters use cars for going to work, for shopping and for other trips as well. Their analysis reflect that the public transport in the Functional Urban Area of Zadar is rather inadequate. Railway is not available at all, and the bus lines are not always in accordance with the passengers' demand.

In Sárvár FUA the car usage is high, which main cause is the inappropriate situation of public transport. The data collection pointed out that not every municipality in the FUA possesses a train station, and there is no internal bus transport in none of the municipalities, only the coaches, which circulate between the whole FUA and county, stop in the municipalities, however their density should be higher.

Odorheiu Secuiesc FUA is exceptional, because in their case, the share of walking exceeds the car users. Nevertheless, this proportion is only true for the core city, because modal split data was not available in the other municipalities of the FUA. On the other hand, the core city, as the statistics point out, attracts more traffic than it generates. Besides, the road network of Odorheiu Secuiesc is largely in an inappropriate condition.

Regarding Alba Iulia, the preferred transportation method, both in the core city and at FUA level is the personal car. Their analysis has shown that only three administrative units of the FUA are connected to the railway to the core city. However, bus is rather popular among FUA inhabitants, especially in the other municipalities where its proportion exceeds car users.

When it comes to Dimitrovgrad FUA, the statistics point out that the proportion of walkers almost reach 50% (47%) and therefore exceeds the car users too (40%). They acknowledged that the public transport in their region is in inappropriate situation and they highlighted the bus public transport usage, which is continuously decreasing.

Banja Luka could not collect exact modal split data, but their own mobility expert estimated 50% for car users that composes the highest ratio among mobility modes. However, they stated that network of public transport bus lines are very developed, and the population from almost all parts of the city has a direct connection (without interchanges) with the central city zone. In contrast, the railway passenger transportation service in the city is very low. As the statistics reflect, there is a downward trend in the number of passengers in public transport.

All project partners are aware of the fact that they should increase the proportion of sustainable mobility modes usage, and in parallel decrease the usage of cars in their Functional Urban Areas.

However, reaching this drastic change is a difficult and time-consuming process because of several reasons. Among others, FUAs need financial resources in order to develop public transport modes, as well as awareness raising is necessary is needed among inhabitants to encourage them that using private cars is non-sustainable, and other mobility modes ought to be used. On the other side, FUAs need to integrate their public transport systems as far as possible. The introduction or the development of an integrated tariff system may contribute to the easier usage of public transport.

3.2 The general situation and common challenges of active transport modes in the FUAs

When we compare the analyses of the different Functional Urban Areas in connection with active transport modes, it can be stated that in some cases bicycle/pedestrian traffic are rather outstanding whereas in other areas they are in poor condition and should be developed.

When Velenje FUA active transport situation is scrutinized, the modal split ratio shows that bike and pedestrian proportion is not outstanding, mainly because of the hilly terrains located in the area of the FUA. It is stated that there is a great potential of Velenje as a cycling town, however the current situation is not adequate because of numerous reasons. At the moment cyclists are forced to use either car streets or sidewalks for pedestrians, because the cycling paths are not interconnected and the network is incomplete. There is a legislative framework that allows designing of cycling paths against one-way direction on one-way roads, but in core city there is no such measure. Besides, there is no big parking place for cyclists. In the core city of Velenje there is free bicycle sharing scheme with ten stations and it is connected to municipality of Šoštanj with five more stations, so this system is ver advantageous. Regarding pedestrians, the main pedestrian zones in the core city are located in center, which is closed for traffic. Outside of strict center there are also safe pavements and other municipalities have some sidewalks, but they are mostly used by tourists.

Similarly to Velenje, the cycling network is not adequately developed in the other Slovenian FUA Koper either. There are some bicycle lanes in the FUA, but they are particularly suited for recreational or touristic purposes. These lanes are poorly maintained and in particular, their structure is in poor condition. Koper FUA does not possess specific areas of pedestrian zones, so it can be summarized that the active transport infrastructure requires high extent of development in the FUA of Koper. This development is under progress for pedestrians and cyclists, because different systems are being introduced for public hire of bicycles and bike-sharing system. Besides, closed coastal road between Koper and Izola opened in March 2017 to create space without personal cars.

As far as Weiz Functional Urban Area is concerned, the infrastructure of active transport is in a very good situation. A very comprehensive bike-sharing system is available with traditional and e-bikes, as well as in the old town center, there is a traffic calmed zone, which is partly a pedestrian zone. As a result of these facilities, Weiz and its FUA can be considered a positive example for providing active transport modes.

When it comes to the active transport mode analysis in whole Prague and District 9, it was mentioned that the district is not very favourable for cycling because of the rather hilly terrain.

However, it was highlighted that the unused railroads were refurbished into bicycle paths, so the area for bikers has been expanded in this area.
However, there are not enough bicycle paths in the district, and public bicycle parking places in Prague 9.Regarding the pedestrian traffic, the quality of the current pedestrian routes is fine and these routes are safe and citizens can pass without fear.

When we examine Budapest District 14, Zugló's active transport facilities, it can be claimed that the district's accessibility with bicycle or on foot are not the best. There are narrow sidewalks in the district that are shared by cyclists and pedestrians. Therefore, the conflicts between pedestrians and cyclists are quite common because the available lanes are not big enough for cyclists and pedestrians at the same time.

As far as Dubrovnik FUA is concerned, in this area cycling infrastructure includes only three bicycle routes near Dubrovnik, so it is highly necessary to construct new bicycle lanes in the FUA. Besides, another negative point in connection with active transport infrastructure is that there is no adequate pedestrian corridors and zones, which further complicates pedestrian traffic especially for people with lower levels of mobility. In addition, pedestrian safety is not satisfactory, and locals often replace walking with usage of motorcycles or cars.

In the other coastal Croatian FUA, Zadar, the number of cyclists has been increasing for the last years but mainly for recreational reasons., Daily commuters still prefer cars for going to work, shopping and for other purposes. Summer period is more critical than the rest of the year, because the majority of population does not cycle because of heavy car traffic. It has been indicated that 74% of roads in the core city have no sidewalk, so this number should decrease in order more and more roads possess sidewalk. Because of the insufficient infrastructure, conflicts between pedestrians and bicycles often occur which needs to be eliminated. However, Zadar has a bike-sharing system, which is an excellent opportunity for inhabitants and commuters to use bikes.

Regarding Sárvár FUA, the infrastructure of bicycle paths is not in the best condition. The distribution of them is rather fragmented, so it is difficult to travel between municipalities. As a result, further cycling lanes have to be built in the future to connect the cities in the FUA. However, in the core city there is an opportunity to rent traditional and e-bikes, but this facility has only one station, so it should be expanded in the future as well. The main pedestrian zones are located around the main touristic destinations, however their length should be increased too.

When we talk about the active transport infrasture in Odorheiu Secuiesc FUA, it can be claimed that neither the bicycle, nor the pedestrian traffic are appropriate in this area. There are no separated bicycle paths in the FUA, so bikers have to share the roads with cars or the lanes with pedestrians, which lead to accidents and conflicts. There are no separate traffic lights for bicycle available that may be another reason of accidents and conflicts. The pedestrian traffic requires improvement too, because there are no pedestrian zones in the core city nor in the other municipalities of the FUA.

Talking about Alba Iulia FUA, bicycles are rarely used due to inexistence of cycling paths between the core city and the localities composing the FUA. Bikers are circulating on the streets because no bike lanes are available for some routes and in this case, cars do not respect the priority of bikers.

Therefore, there is a high request for cycling paths network in the core city and in the other municipalities of the FUA. Besides, another deficiency in connection with bicycle traffic is that there are no traffic lights for bicycle available, and there is no data available concerning the bicycle parking places at major transportation stations, as well as there is no regulation for bike parking either. Regarding pedestrian traffic, only one pedestrian underpass is located in Alba Iulia Municipality. Conflicts between pedestrian and bicycles regularly happen since there is not a clear delimitation between them.

As far as the Bulgarian partner, Dimitrovgrad FUA and its active transport modes are concerned, it can be stated that a high extent of development is required in this field. When it comes to bicycle traffic in the FUA, its situation is not in an appropriate way, because there is no existing bicycle path system in the municipality. Therefore, building up a concept and implementing a bicycle traffic scheme is essential. The main pedestrian zones are located in the centre of the core city, but main roads create an unsafe zone for pedestrians and generates many traffic accidents.

When it comes to Banja Luka, bicycle traffic is very poorly developed. There is no legislative framework to make it impossible to cycle against one-way direction on a one-way road. Besides, there is no regulation about bicycle parking on the building code. Bike sharing system does not exist but it was planned to introduce it in 2018.

In Banja Luka, pedestrian traffic is not appropriate either, and the main problem is the lack of awareness from the inhabitants, as their analysis reflects. In spite of the fact that there are two underpasses in Banja Luka, the analysis showed that between 20-30% of pedestrians do not use these, so the awareness raising is one of the main issues Banja Luka has to deal with.

3.3 Further shared problems (car-sharing, road network, heavy congestion, density of passenger cars) among FUAs

Besides the high proportion of car users, and the inadequate situation of public transport as well as the poor infrastructure of active transport modes in the majority of the FUA, further common challenges have to be highlighted.

When we scrutinise the availability of car-sharing facilities in the Functional Urban Areas, it has turned out that this is a common deficiency in every region. As the analyses of project partners point out, the majority of the FUAs do not possess car-sharing facility at all. The two areas where car sharing is available are the districts of the capital cities, Prague 9 and Budapest 4. Nevertheless, the coverage of car sharing is not appropriate in none of the districts, because in Prague 9 the system is not very well developed, whereas in Budapest 14 small areas are covered by car-sharing facilities, the majority of the locations are located in the inner city of the Hungarian capital. Therefore, it can be unequivocally stated that car sharing requires improvement in all the FUAs including the expansion of the system in the two districts of the capital cities as well.

As far as the road network is concerned, numerous partners claimed that the geographical barriers such as rivers and hilly terrain in their FUAs may make the traffic more difficult. On the other side, another major common problem in the FUAs is that the municipalities are not connected in a proper way. Therefore, the development of the road network, including the connection of cycling paths, is an essential challenge in FUAs where they are currently in bad conditions. Dimitrovgrad FUA's road network data is outstanding, because they claimed in their analysis that 80% of the whole road system needs reconstruction. Odorheiu Secuiesc FUA also highlighted that the road network is largely in an inappropriate condition, so it needs refurbishment.

The majority of the FUAs were complaining about the heavy congestion in the core city during peak hours, especially in the morning and in the afternoon. Main touristic destinations like Dubrovnik, Zadar and Sárvár emphasised that in summer period the traffic increases mainly in the core cities but it can observable in other municipalities of these FUAs too, because of the high number of tourists who come to these regions this time.

When we compare the density of passenger cars in project partners' Functional Urban Areas, the statistics and the graphs have pointed out that a growing number of passenger cars is observable in the last years. The common transnational template exactly asked for the density of the passenger cars per 1000 inhabitants in core city, other municipalities and FUA total in three years: 2000, 2010 and besides these the most recent data was asked too. The data reflect that there is an increasing tendency from year to year in the FUAs, but of course, the extent differs. Hence, one of the main common challenge is to stop this trend and encourage inhabitants to use public or active transport modes instead of personal cars.

4 Mobility scenarios comparison

Following the status quo analysis and the checking of framework conditions in the FUAs, partners' next task was to build and analyse different mobility scenarios based on the preliminary guideline, prepared by Vienna University of Technology (scientific supporter of WP3) and Pannon Business Network (WP3 Leader). All partners had to choose at least one mobility scenario from each group, but maximum five scenarios could be chosen. The zero scenario group was a must scenario, called business-as-usual, which was mandatory to choose by all partners. The first group involved three different test scenarios, whereas in the second group four possible test scenarios were listed.

It was emphasized that the test scenarios do not mean the partners' future policy goals, sometimes called target scenario. Therefore, there is no "right" or "wrong" scenario. The test scenarios can be considered a "what-if" thought experiment to discuss and to share the understanding among stakeholders.

In this Section partners' test scenarios shall be compared and the comparison will show the similarities and the differences of the partners' scenarios. Table 15 shows which scenarios were chosen by partners.

Group	Test Scenario	
Must	*Business-as-usual* • Continue your current transport/mobility policy in next 20 years; • EU, National and Regional Policies do not change in next 20 years.	every partner
Group 1	*Optimization of road network for automobiles* • Road network is expanded; • Free parking space is provided throughout FUA; • Charging stations for EVs (Electric vehicles) are made available everywhere in FUA by 2025.	1. Budapest District14/whole city 2. Dimitrovgrad FUA
	Making public transport more attractive; • Public transport covers 80% of the FUA's population and workplaces/schools by 2025 within 300m of stations/stops. • High frequency of the service and longer service hours is provided. • Introduction of integrated ticket system for all types of public transport (bus, tram, railway);	1. Velenje FUA 2. Koper FUA 3. Weiz FUA 4. Prague District9/whole city 5. Alba Iulia FUA 6. Banja Luka FUA

Group	Test Scenario	
	• Public transport fare is made affordable to everyone;	
	Fostering "active" transport modes (walking and cycling) • Implementing 200km bicycle lanes in five years; • Introduction of shared space or pedestrian zone in all of local centers within FUA; • Introduction of "Superblock" neighbourhood model upon Barcelona model;	1. Koper FUA 2. Weiz FUA 3. Prague District9/whole city 4. Budapest District14/whole city 5. Zadar FUA 6. Odorheiu Secuiesc FUA 7. Banja Luka FUA 8. Sárvár FUA
Group 2	*Very high cost of energy (fuel and electricity)* • Fuel price is double in 2025 compared to now; • Introduction of renewable energy pushes up the energy cost;	1. Velenje FUA 2. Weiz FUA 3. Budapest District14/whole city 4. Sárvár FUA
	E*U Policy to prohibit private car ownership by 2045* • EU decides to prohibit private car ownership in 2025, with 20-year transition period; • Any type of cars are allowed to be owned by companies, but not allowed by private person;	1. Zadar FUA 2. Odorheiu Secuiesc FUA
	National road pricing on all roads • The national government decides to introduce nation-wide road pricing for automobiles and trucks including all types of urban roads in 2025. • The pricing is 2% of average annual household income per automobile.	1. Velenje FUA 2. Koper FUA 3. Weiz FUA
	Population of the FUA increases by 50% between 2020 and 2050 • FUA's population is increasing rapidly, and becomes 50% more in 2050 compared to today; • FUA's population is ageing at the same time, and the average age of the citizens is 10 year older in 2050.	1. Prague District9/ whole city 2. Alba Iulia FUA

Group	Test Scenario	
Other	*Alternative mode stimulation and emission reduction/Increase of non-sustainable and conventional transport*	1. Dubrovnik FUA
Other	**Optimisation of walking, cycling and public transport**	2. Dimitrovgrad FUA

Table 15: The chosen mobility scenarios by Functional Urban Areas

All partners had to analyse the consequences of each scenario they selected. For the sake of the SUMP-drafting for partners Functional Urban Areas, it was important to keep in mind that the purpose of the scenario analysis is to encourage discussions among stakeholders and citizens. In light of this, partners had to answer the following questions through the analysis of test scenarios:

For each of scenario, partners had to answer all of the questions listed below, and give logical foundation for their answer. Wherever possible, they were asked to provide a quantitative answer to the questions. It was recommended to set the planning horizon on either 2025 or 2030 based on the FUA planning time frame.

- How will the demographic structure of your FUA and the core city in it be in your planning horizon around 2025 to 2030? (No of population, age structure, etc.)
- Which types of transport technology will have been diffused or will disappear in your FUA in your planning horizon around 2025 to 2030?
- How will the share of transport mode change in your core city and FUA? Will there be higher share of journey with cars or less? Will it increase or decrease the share of public transport? Will there be more cyclists and walkers, or less?
- Which part of your future prediction is not in line with upper-level transport policy (of region, country and EU)?
- Is the overall situation improving the living quality of your FUA?
- What are the effects on particular demographic groups, such as children, elderly, low-income group, foreigners and migrants, students, mobility-impaired people, etc.?
- How will the transport-related cost paid by each end user change? How will the transport-related cost paid by your municipalities or regional government change?
- Will the overall change lead to increase or decrease of transport-related energy consumption in your FUA?
- Will the overall change will lead to increase or decrease of transport-related CO2 emission in your FUA?

5. The comparison of partners' test mobility scenarios

As Table 1 above points out, from the first group the *„Fostering "active" transport modes (walking and cycling)"* test mobility scenario was chosen by the most (8) partners. Besides this, "*Making public transport more attractive"* mobility scenario has proved to be significant, because six partners have selected this one. From the second group "*Very high cost of energy (fuel and electricity)"* mobility scenario was the most popular and was selected by four partners. Besides, *"National road pricing on all roads"* scenario was popular too, this scenario was selected by three FUAs as their what-if models.

5.1. The comparison of partners'„Fostering "active" transport modes (walking and cycling)" mobility scenario.

When we scrutinize partners (Koper FUA, Weiz FUA, Prague District 9/whole city, Budapest District 14/whole city, Sárvár FUA. Zadar FUA, Odorheiu Secuiesc FUA, Banja Luka FUA) who have chosen *„Fostering "active" transport modes (walking and cycling)"* test mobility scenario, some similarities are visible among the partners. Within this scenario, every mentioned partner emphasises the promotion of green vehicles against fossil fuels, with different methods. The most commonly method is the build of new pedestrian and cycling paths, which contribute the popularization of active transport modes. Besides, the introduction/development of bike sharing in the FUAs also plays a significant role, to popularise cycling. As far as modal split change is concerned, the frequent vision is that the share of private cars shall reduce, and in parallel the public transport and especially the ratio of active transport modes (walking and cycling) will increase. As a result of this change in modal split, the quality of life will improve in the FUAs, the municipalities will be safer, quitter, and healthier due to the high rate of active transport modes. Another consequence of the high rate of cycling and walking will be the reduction of transport-related energy consumption and CO_2 in the Functional Urban Areas. Irrespective of their vision year, the FUAs, who have selected this scenario, agreed on that none of transport technology will disappear in the next decade, however, green vehicles, and active transport modes will receive more emphasis.

5.2. The comparison of partners'"Very high cost of energy (fuel and electricity)" mobility scenario

From the second group of the listed mobility scenarios, this scenario was chosen by the most partners. Four FUAs have selected this scenario, namely Velenje FUA, Weiz FUA, Budapest District 14 and Sárvár FUA. When we scrutinize these four partners mobility scenarios in this topic, numerous correspondences may be found. On the one hand, it is claimed in all of the scenarios that as a result of the foreseen increased cost of fossil fuels the private car usage will be drastically decreasing, and it will become the privilege of high-income people. In parallel, the usage of public transport and active transport modes will give more emphasis in the mentioned FUAs. Furthermore, it was commonly stated in the scenarios that the transport-related energy consumption as well as transport-related CO_2

emission are not envisaged to raise, even they are said to be decreased. As a consequence of the reduction of private cars in the FUAs, the living quality is expected to be better in the next decades.

5.3. Comparison between mobility scenarios of coastal FUAs (KOPER FUA, DUBROVNIK FUA, and ZADAR FUA)

The following subchapter shall make a comparison between the elaborated mobility scenarios by the three coastal FUAs (Koper, Dubrovnik and Zadar).

Koper FUA has chosen four mobility scenarios, including the mandatory business-as-usual one too. These scenarios are namely "Making public transport more attractive" "Fostering active transport modes" and "National road pricing on all roads"

Dubrovnik FUA has not selected from the preliminary given list exactly, they created their scenarios on their own. Besides the obligatory first scenario, they elaborated two further ones, which are the followings: "Alternative mode stimulation and emission reduction" and „Increase of non-sustainable and conventional transport which can be considered a bad case, and pessimistic vision.

The other Croatian coastal FUA, Zadar, has elaborated three mobility scenarios including the compulsory business-as-usual too. The further two scenarios are the "Fostering active transport modes" and the "EU Policy to prohibit private car ownership by 2045". The section will shed light on the similarities and difficulties of the aforementioned mobility scenarios of the three coastal areas.

5.3.1. The comparison of the Business-as-usual scenarios of the coastal FUAs

The Slovenian Koper FUA in their business-as-usual scenario emphasised the continuation of the current transport policy in the next 20 years. This means that in the FUA of Koper travel habits are centred around car use. It is also mentioned that no new measures for supporting sustainable mobility are foreseen. The modal split will not change significantly, but the share of car use will increase by 3 percentage points to 80 %, mainly on the account of bike use and walking, and in parallel, the use of bus will remain on the same level. The scenario depicts that the individual expenditure for transport will increase due to increase of individual motorised mobility. In spite of increase of car use, this scenario predicts lower transport-related energy consumption and CO_2 emission due to uptake of alternatively fuelled vehicles.

On the contrary to Koper FUA, Dubrovnik FUA highlights in their business-as-usual scenario that until 2030, the usage of personal car as transport mode will decrease by small margin. Besides, it was mentioned in the scenario that alternative modes of transport would be continually promoted by local decision makers. Regarding walking, the percentage of pedestrians will slightly increase because new

infrastructure for pedestrians. Similarly to Koper FUA, the number of cyclists will not increase in Dubrovnik FUA either, because of unsuitability of terrain for introduction of new cycling lanes. The continued process of intensified traffic caused primarily by personal cars are not in line with the upper-level policies neither in Koper FUA nor in Dubrovnik FUA. Similarly to Koper FUA, the gradually increasing number of alternatively fuelled vehicles contribute to the stagnation or even the reduction of transport related energy consumption and CO_2 emission.

In case of the other Croatian partner, Zadar FUA, the implementation of smart and innovative transport solutions plays important role in the next decade. Zadar highlights -that likewise to the other two coastal areas- all transport modes will remain the same as nowadays, but the alternative transport modes will receive bigger emphasis. The two Croatian FUAs agree upon the precondition that in both areas there will be fewer journeys with car in the next decade. Zadar FUA highlighted that new shipping lines will be introduced between the neighbouring islands. It was also mentioned that the number of pedestrians and cyclists will increase too. This all will lead to air quality improvements, noise reduction and positive health effect that contribute to better quality of life. The improvement of the living quality was mentioned in all coastal FUAs, because of the promotion of alternative fuelled vehicles and active transport modes. At the moment, the government policy in Zadar FUA encourages the reduction of CO2 emission by extra taxing cars with higher CO2 emission. This results the decreasing transport related CO2 emission in Zadar FUA, which tendency is planned to happen in Koper FUA and Dubrovnik FUA too.

5.3.2. The comparison of the Fostering “active” transport modes (walking and cycling)”/Emission reduction of the coastal FUAs

As it has been already mentioned above, Koper FUA and Zadar FUA have chosen the “Fostering active transport modes whereas Dubrovnik FUA has selected “Alternative mode stimulation and emission reduction” whose content is very similar to the promotion of active transport modes. In these scenarios, all three FUAs are engaged in the change of modal split in favour of active transport modes and the number of journeys with cars is envisaged to reduce. Besides, the infrastructure of active transport is advocated with building new pedestrian and cycling lanes in every coastal FUA. On the other hand, it is described in their scenarios that they are determined using more and more green vehicles. As far as public transport is concerned, the two Croatian FUAs explained in their scenarios that the usage of this mode is foreseen to increase, on the contrary, Koper FUA points out a decrease in public transport usage in this scenario. As a result of the planned elements, -including the promotion of cycling and walking and their infrastructure, the reduction of car usage- the living quality is envisaged to improve in all coastal FUAs. At the same time, not only the transport-related energy consumption is intended to reduce but also the transport related CO_2 emission in the coastal FUAs.

5.4. Comparison between mobility scenarios of the districts of capital cities (Prague District 9 and Budapest District 14)

When we compare the base scenarios of the two districts, it can be easily noticeable that both areas prefer pedestrian and cycling transport in their business-as-usual mobility scenarios, and they intend to create a more walkable and bicycle-friendly districts and cities. In addition, private car use is expected to drop gradually in Prague 9 and Budapest 14 too. Besides, it is also mentioned that further alternative transport modes will be supported, like bike sharing and car sharing, and at the same time public transport, related services and vehicles are foreseen to develop. One of the main objectives in Prague 9 and in Budapest 14 too is to create a preferable connection between different modes of transport, which will result better intermodality. As a consequence of the listed elements, which promote active transport modes, and alternative way of transport, the energy consumption related to transport as well as CO_2 emission are expected to decrease in both districts.

Besides the business-as-usual scenario, there is another common scenario, which was chosen by Prague 9 and Budapest 14 too, namely the “Fostering active transport modes”. In this scenario, the betterment of cycling and pedestrian transport play important roles in both districts. Prague is engaged in to develop their bike and car-sharing system, whereas Budapest 14 promotes the continuous cycling network and green ways. Prague 9 and Budapest 14 also emphasise their intention to make public transport more attractive in the capitals with providing affordable prices to all age groups. Due to the envisaged plans, explained in this scenario the energy consumption and carbon-dioxide emission are foreseen to decrease in the next decade.

6. Partners' overarching goals

In this chapter partners' FUAs overarching goals shall be presented, which were elaborated after the discussion with relevant stakeholders. These overarching goals can be considered as common visions, which are long-term goals for mobility and transport development in the regarding FUA, and they will guide the further planning and SUMP-drafting process in the following steps of the project. (Work Package 4). Partners were recommended to formulate four to six overarching goals. The name of the goals shall be shown in Table 16 and then a comparison shall be depicted between partners' goals. Partners were asked to explain their goals concisely using the common given template prepared by VUT and PBN. The key points of these goals are that partners shed light on what kind of city/FUA partners want to live in in the future. These named overarching goals form parts of the Sustainable Urban Mobility Plans that will be drafted by each FUA in the following phase (WP4) of the CHESTNUT project.

However, it has to be emphasised that goals, indicated in Table 16, are not the final versions, it will be modified by partners in the following phases of the project, based on the recommendations by the WP4 Leader Vienna University of Technology. In the later phase of the project, each FUA has to prepare their overarching goals, priorities, targets and measures. Overarching goals indicate what kind of city they want to live in the future. In other words, these can be considered as future visions. This is thus very abstract and qualitative like "Healthy and safe city". Regarding priority, it is a qualitative statement of what kind of changes are required (what needs to be reduced, increased or maintained) in the Functional Urban Areas. For example, "Reduce the number of traffic accident" can be a priority. In contrast, targets are more specified elements, because they indicate the quantitative statement of required changes already formed at priority level within a given timeframe For example, "Traffic accident will be reduced to 100 accidents by 2025." Measure is the most specific level because it contains real actions that FUAs will take to achieve the target, and thus priority and thus the overarching goal. For example, "Extend 30km/h zone".

	GOAL 1	GOAL 2	GOAL 3	GOAL 4	GOAL 5	GOAL 6
VELENJE FUA	*Improving accessibility to the region and within the region, for all social groups*	*Infrastructural transformation in the region for future mobility*	*Reducing car dependence and improving the conditions for transport sharing, public transport and*	*Increase of walking and cycling for shorter routes.*	*Improving the state of the environment, the quality of life and human health.*	-

			multimodality.			
KOPER FUA	*Establishing integrated transport planning*	*Rational use of motorized vehicles*	*Improved supply of public passenger transport.*	*Providing the conditions for comfortable and attractive cycling*	*Promote walking as an important travel way*	-
WEIZ FUA	*Intermodality*	*Territorial development*	*Promotion of sustainable mobility*	*City for people*	*Awareness raising*	-
PRAGUE9/WHOLE CITY	*Support of alternative types of transport*	*Make public transport more attractive and accessible*	*Reduce unhealthy effects of transport vehicles*	*More security and safety, especially around schools and nurseries*	-	-
BUDAPEST14/WHOLE CITY	*Liveable urban environment*	*Mobility will be safe to all kinds of users*	*Transport related pollution and energy consumption will be minimized*	*Integration between different modes of transport*	-	-
DUBROVNIK FUA	*The introduction of public sustainable vehicle system*	*Enhancement of the competitiveness of public bus transport*	*Improvement of infrastructure for pedestrian and bicycle traffic*	*Enhancement of traffic regulation at key intersections by introduction of the intelligent traffic lights*	-	-
ZADAR FUA	*Shared space – pedestrian zone in the*	*Reorganise and improve current public*	*More cycling lanes for more cyclist*	*Accessibility and higher transport*	*Intelligent transport system*	-

	Zadar city centre	*transport system*		*safety for all*		
SÁRVÁR FUA	*Safe and low emission mobility*	*Promotion of public transport*	*Development of mobility by use of alternative energy*	*Development of non-motorized mobility*	-	-
ODORHEIU SECUIESC FUA	*Integrate all transport systems to streamline daily journeys*	*Connected & Accessible: Creating an attractive and affordable transport system supporting the concept of "Walk & Connect*	*SUSTAIN: Sustainable environment by reducing pollutant emissions, reducing greenhouse gases*	*Prosperous development through economic growth at ZUF level*	*SMART:- Implementing the components of the smart mobility concept at the ZUF level*	-
ALBA IULIA FUA	*Development of a functional intermodal transport system at the FUA level by the year 2030*	*Introduction of an integrated unitary payment system for all means of public transport at the FUA level by 2030*	*Increasing the use of non-polluting transport modes such as bicycles, electric vehicles, walking, etc. at the FUA level by 2030*	*Decreasing CO2 and greenhouse gas emissions caused by existing road traffic at FUA by 2030*	*Increasing the safety of traffic participants at the FUA level by 2030*	*Increasing by 60% the use of public transport at the level of FUA by 2030.*
DIMITROVGRAD FUA	*Functional integrated transportation plan*	*Building a bicycle paths network*	*More accessible and more efficient public transport*	*Greener and recreational spaces*	*Upgrading the safety of the movement between pedestrians and cyclists*	*Implementing an electronic cards and tickets system*
BANJA LUKA FUA	*Public Transport - First Choice For*	*City Of Banja Luka - Eco City*	*The promotion of cycle, Not*	*Efficient City Centre Without*	-	-

	Movement In The City		*Automobile*	*Motor Vehicles*		

Table 16: Project partner FUAs and the short names of the first version of their mobility related overarching goals

6.1. Comparison of partners' overarching goals

As Table 2 points out, there are numerous overlapping between FUAs' overarching goals. Among others, better accessibility between the municipalities of the Functional Urban Areas and territorial development of the region occur as goals at several partners. Furthermore, the promotion of better intermodality with the help of support of non-motorised as well as active and public transport are also common elements in FUAs' future visions. These goals can be considered as transnational visions of all FUAs, and they undoubtedly imply that sustainable mobility and alternative ways of transport play important roles as goals to be implemented in the involving Functional Urban Areas.

6.1.1. Comparison of the two smallest FUAs' (Weiz and Sárvár) overarching goals

When it comes to the comparison of the two smallest Functional Urban Areas in the partnership (Weiz, and Sárvár) some similarities can be found between their overarching goals. The Austrian Weiz FUA in one of their goals advocate sustainable mobility modes so as the West-Hungarian Sárvár FUA. Weiz highlights the improvement of the infrastructure for electric mobility, plan to create smart solutions for roads, traffic lights and car parking facilities. In addition, Weiz promote the efficient usage of resources with creating mobility that causes as little pollution as possible, and advertise electric mobility through the authorities. As far as Sárvár FUA is concerned in connection with promotion of sustainable mobility, they would like to change of the car stock of municipality entirely to e-cars. Besides, Sárvár FUA's aim is to increase the number of e-bikes in Sárvár share biking system.

On the other hand, both FUAs would like to shape the FUA for people, not for cars. Excellent examples for this vision in Weiz FUA's overarching goal are the increase of active forms of mobility and transport, reduction of noise emission as well as creation safe environment for the people. In Sárvár FUA's case further development of Low Emission Zones (LEZ) and low traffic zones (LTZ) are foreseen. Moreover, the increase of the capacity of cycling paths as well as the „Walking Sárvár" Program which intends to link between actual fragmented pedestrian areas also contribute to a more liveable FUA.

7 Conclusion

The purpose of this strategy, on the one hand, was to provide a comprehensive mobility status of the involving Functional Urban Areas. The prepared mobility related status quo analyses, seen in the first section of the current strategy, are excellent bases and starting points for the Sustainable Urban Mobility Plans to be elaborated by each FUA. In the following steps of the project, this knowledge is essential and partners may benefit from the collected data.

By scrutinising the status quo analysis of the partners, we can observe that there are numerous main common mobility problems, which will have to be solved in the future.
Among others, the inadequate facility of public transport, the inappropriate situation of active transport modes (bicycle and pedestrian traffic) as well as the high rate of passenger car users, and the deficient of car-sharing availability belonged to the critical points, which were indicated by the majority of the partners as their deficiencies. Therefore, these problems can be considered transnational among the partnership, and it is a joint objective to improve the mentioned shortcomings in the respective Functional Urban Areas in favour of sustainable mobility.

In the second section of the strategy, the prepared mobility scenarios were compared and analysed. These mobility scenarios can be considered common, because partners had to choose from the preliminary given scenario options, included in the guideline written by VUT and PBN. The scenarios, prepared by each FUA, set clear mid- and long-term objectives, which contribute to the mobility and transport development in the FUAs, and guide the further planning as well as the drafting process of Sustainable Urban Mobility Plans.

As the mobility scenario comparison section has pointed out, partners are aware of the fact that the public transport as well as active transport modes should be promoted in their FUAs, because the majority of the partners have elaborated Fostering *"active" transport modes (walking and cycling)"* test mobility scenario, besides the so-called "*Making public transport more attractive"* mobility scenario has proved to be significant too. As a result, these scenarios can be considered as the most prevalent transnational visions in the partnership.

In the last part of the strategy, the mobility related overarching goals were discussed, which were explicated by each FUA based on a separate template provided by VUT and PBN. This section consists a list of the goals, which reveal what kind of city/FUA partners want to live in the future. The comparison of the different overarching goals sheds light on that there are numerous overlapping between FUAs' goals, so a kind of transnational vision can be formulated from the common objectives. Among others, better accessibility between the municipalities in the Functional Urban Areas and territorial development of the region occur as main goals at several partners. Furthermore, the promotion of better intermodality in favour of non-motorised as well as active and public transport, are also common elements in FUAs' future visions. These goals can be considered as transnational visions of all FUAs.

As it has been mentioned in the relevant part, these goals, already formulated by partners, are just first versions, and they will be revised and amended by the partners with the valuable coordination of the WP4 Leader Vienna University of Technology. Following the revision of the overarching goals, the prepared goals, in case of every FUA, will be subdivided into priorities, targets and measures, which all contribute to the completion of the Sustainable Urban Mobility Plans.

Taking everything into account, the strategy summarized the current mobility status of the Functional Urban Areas, involving the already present beneficial sustainable elements, as well as reflected the occurring deficiencies in connection with mobility field. The elaborated mobility scenarios and the overarching goals unequivocally determine the future visions of each FUA, and contribute to solve the current problems.

8 ANNEXES:

8.1 Template for scenario description and analysis

A.1 Template for scenario description and analysis

Project Number	DTP1-1-037-3.1
Project Name	CompreHensive Elaboration of STrategic plaNs for sustainable Urban Transport
Project Acronym	CHESTNUT
Work package	WP3 – Mobility scenarios
Activity	Activity 3.2 – Elaboration of Transnational Strategy (based on mobility scenarios)
Title of Working Document	Analyais Methodology for Concequendes
WP responsible partner	Pannon Business Network - PP8
Dissemination Level	Public
Date of Preparation	INSERT DATE
This document must be referred to as	
Author	PUT_YOUR_NAME
Contributors	LIST_ALL_CONTRIBUTORS

Document History

Version	Date	Note
Template	02.10.2017	Template by Takeru Shibayama (VUT)

Information about this test scenario

FUA Name	INSERT_YOUR_FUA_NAME
Scenario Name	CREATE_YOUR_SCENARIO_NAME
Date	DATE_OF_THIS_DOCUMENT
Policy target year	2025 or 2030 (choose one)
Contributor	LIST_ALL_CONTRIBUTORS

Assessment of consequences

How will the demographic structure of your FUA and the core city in it be in your planning horizon around 2025 to 2030? (No of population, age structure, etc.)

Which types of transport technology will have been diffused or will disappear in your FUA in your planning horizon around 2025 to 2030?

How will the share of transport mode change in your core city and FUA? Will there be higher share of journey with cars or less? Will it increase or decrease the share of public transport? Will there be more cyclists and walkers, or less?

Which part of your future prediction is not in line with upper-level transport policy (of region, country and EU)?

Is the overall situation improving the living quality of your FUA?

What are the effects on particular demographic groups, such as children, elderly, low-income group, foreigners and migrants, students, mobility-impaired people, etc.?

How will the transport-related cost paid by each end user change? How will the transport-related cost paid by your municipalities or regional government change?

Will the overall change will lead to increase or decrease of transport-related energy consumption in your FUA?

Will the overall change will lead to increase or decrease of transport-related CO2 emission in your FUA?

8.2 Template for setting overarching goals

A.2 Template for setting overarching goals

Project Number	DTP1-1-037-3.1
Project Name	CompreHensive Elaboration of STrategic plaNs for sustainable Urban Transport
Project Acronym	CHESTNUT
Work package	WP3 – Mobility scenarios
Activity	Activity 3.2 – Elaboration of Transnational Strategy (based on mobility scenarios)
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Author	PUT_YOUR_NAME
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Document History

Version	Date	Note
Template	02.10.2017	Template by Takeru Shibayama (VUT)

Overarching Goals

Name of FUA: INSERT YOUR NAME OF FUA

Note: Set 4 to 6 overarching goals. Set short names for each goals so that everyone can remember easily. Add description so that it makes clear what each of your goal mean.

To set the goals, make use of the opportunities to present the scenarios to the stakeholders. Recommendation is to prepare draft goals to present to the stakeholders, and discuss/refine them.

Goal 1

Short Name	INSERT SHORT NAME OF THE GOAL HERE (Max 100 Characters)
Description	INSERT YOUR DESCRIPTION HERE ABOUT THIS GOAL (Max 10 lines)

Goal 2

Short Name	INSERT SHORT NAME OF THE GOAL HERE (Max 100 Characters)
Description	INSERT YOUR DESCRIPTION HERE ABOUT THIS GOAL (Max 10 lines)

Goal 3

Short Name	INSERT SHORT NAME OF THE GOAL HERE (Max 100 Characters)
Description	INSERT YOUR DESCRIPTION HERE ABOUT THIS GOAL (Max 10 lines)

Goal 4

Short Name	INSERT SHORT NAME OF THE GOAL HERE (Max 100 Characters)
Description	INSERT YOUR DESCRIPTION HERE ABOUT THIS GOAL (Max 10 lines)

Goal 5

Short Name	INSERT SHORT NAME OF THE GOAL HERE (Max 100 Characters)
Description	INSERT YOUR DESCRIPTION HERE ABOUT THIS GOAL (Max 10 lines)

Goal 6

Short Name	INSERT SHORT NAME OF THE GOAL HERE (Max 100 Characters)
Description	INSERT YOUR DESCRIPTION HERE ABOUT THIS GOAL (Max 10 lines)