Interreg
CENTRAL EUROPE
European Union
European Regional
Development Fund

STATUS QUO ANALYSIS OF INTERMODAL, ICT, ITS AND SMART GOVERNANCE MOBILITY RELATED SOLUTIONS IN SEVEN PARTNER REGIONS

(ENGLISH SUMMARY)

More information on the project is available on the internet (http://www.interreg-central.eu/Content.Node/Peripheral-Access.html).

CONTENT

1. Introduction

1.1. Short project summary

While traveller's expectation for door-to-door mobility is constantly increasing, only a well-organized (public) transport system can be a realistic alternative of motorised individual transport. This issue is even more crucial in peripheral areas (such as rural, remotely located or border regions as well as in the hinterland of urban areas) which consist 93% of the EU territories. Therefore the mission of the project is to improve public transport in peripheral areas through targeted interventions (analysis, action plans, pilot actions, pilot investments and evaluation) addressing the following three main thematic areas:

1. Multimodality & integrated transport

2. Enhanced use of Intelligent Communication Technology (ICT) &Intelligent Technology System (ITS)

3. Better cooperation through transport associations and cross-border marketing.

The consortium representing the following regions and includes the following project partners:

- German Association for Housing, Urban Development and Spatial Affairs (lead partner)

- Vogtland region (border region Germany / Czech Republic): Authority for local public transport Vogtland

- Region Friuli-Venezia Giulia (border region Italy-Slovenia): Venice International University & Trieste Trasporti S.P.A.

- Region South Moravia (border region Czech republic / Slovakia / Austria): KORDIS JMK

- Region around the city of Balassagyarmat (border region Slovakia / Hungary): KTI Institute for Transport Sciences Non Profit Ltd

- Region around the City of Graz: Regional Management Metropolitan Area of Styria Ltd (Austria)

- Region Lubin: Powiat Lubiński (Poland)

- Ljubljana Region: Regional Development Agency of the Ljubljana Urban Region (Slovenia)

1.2. Main objectives of this analysis

One of the final objectives of the project is to prepare regional action plans for the seven selected regions listed in chapter 1.1 in order to identify the best suiting interventions low-cost multimodal solutions for peripheral rural areas taking into specific consideration of the tight public budget. As a previous step a regional status quo analysis needed to be done for all the regions to provide a starting point, an overview of the still existing local public transport system. This document provides an edited and merged version of the seven regional status quo analyses with the following structure.

After a short introduction the area characterization provides relevant information on the location of selected area in a regional aspect defining its NUTS level and geographical characteristics, demographical and economical background of the selected area based on statistical data. Then an Introduction of road and public transport infrastructure of the selected area from a regional point of view follows based on a SWOT analysis related to the overall transport infrastructure listing strengths, weaknesses, opportunities and threats. The three main thematic areas are also addressed relating to the local public transport system. Finally those involved stakeholders are introduced who played an important role in collecting the necessary background data and information for the preparation of this analysis.

This summarizing document addresses the following deliverables:

- Deliverables D.T1.2.1, D.T1.2.2, D.T1.2.3, D.T1.2.4, D.T1.2.5, D.T1.2.6 and DT1.2.7: identification of intermodal mobility solutions, determination the role that different transport modes play in the public transport system of the seven partner regions

- Deliverables D.T2.2.1, D.T2.2.2, D.T2.2.3, D.T2.2.4, D.T2.2.5, D.T2.2.6 and DT2.2.7: identification of smart mobility services, missing smart mobility services (ICT, ITS) and good practices of intelligent information systems

- Deliverables D.T3.2.1, D.T3.2.2, D.T3.2.3, D.T3.2.4, D.T3.2.5, D.T3.2.6 and DT3.2.7: Report on the operational issues of local public transport are also introduced reflecting to missing elements for future planning

2. Regional status quo analysis of Balassagyarmat and its subregion

2.1. Introduction

Regional status quo analysis of Balassagyarmat and its subregion considers all the three thematic work packages. Intermodal mobility solutions, ITS and smart governance are all relevant for the analysis of the traffic infrastructure of the selected area. Strategic documents of Balassagyarmat, interviews with representatives of the local government, and field work data confirmed that all the above mentioned aspects have to be analysed in order to give a comprehensive overview of the traffic infrastructure and services of Balassagyarmat and its subregion.

While intermodal mobility solutions determine the role that different transport modes play in the public transport system of the selected area, smart mobility services identify missing smart mobility services (ICT, ITS) and good practices of intelligent information systems. Firstly we give an overview of the demographical and economical background of the selected area. Then, we focus services linked to multimodality after a brief introduction of the local public transport infrastructure. Next, those ICT and ITS elements of the public transport infrastructure are described which contribute to the smooth operation of public transport. The operational issues of local public transport are also introduced reflecting to missing elements for future planning.

Finally those involved stakeholders are introduced who played an important role in collecting the necessary background data and information for the preparation of this analysis.

2.2. Characteristics of the area

Balassagyarmat is a border town between Hungary and Slovakia with 17,000 inhabitants. According to the NUTS territorial system, it is located in Nógrád county (NUTS3 – HU313), within the region of Northern Hungary (NUTS2 – HU31), which is part of the Great Plain and North (NUTS 1 – HU3) macroregion. Balassagyarmat is an occupational, economic, administrative, and medical centre of its surrounding subregion that consists of 29 settlements and inhabited by 42,000 people. Balassagyarmat also has a good educational infrastructure and is a traditionally local centre of commerce and culture which makes its central role more dominant. In terms of administration, justice, law enforcement, education and healthcare, Balassagyarmat has regional significance. Part of the town's agglomeration is located in Slovakia. The Ipoly river, which flows right next to Balassagyarmat, is the natural border between Hungary and Slovakia thus the Ipoly bridge is an important border crossing point connecting the two countries. The town has great but yet unexploited potentials for tourism.
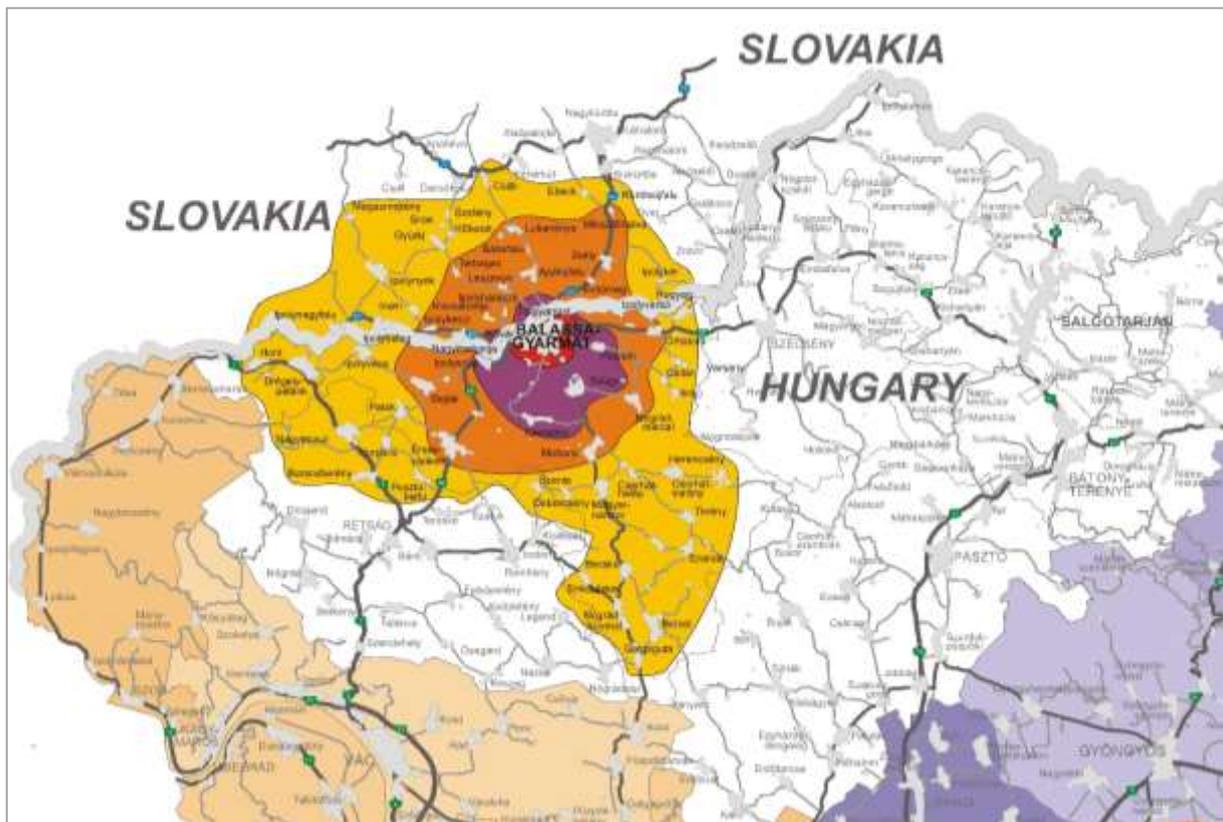
Figure 1: Primary (purple), secondary (orange) and tertiary (yellow) functional agglomeration of Balassagyarmat (source: KTI)

As it is common in Hungary and also in Balassagyarmat, the share of children between ages 0-14 is declining, while the share of elderly people is growing.

	Age 0-14 2011 [%]	Age 60+ 2011 [%]	Vitality index 2011	Population 2011 [fő]
Balassagyarmat	12.6	23.7	0.53	16 397
Balassagyarmat subregion	13.9	24.4	0.57	40 326
Nógrád county	14.5	25.2	0.58	202 427

Table 1: The population of Balassagyarmat and Nógrád county (source: ITS 2015)

In terms of educational attainment, Balassagyarmat shows better conditions than its subregion or Nógrád county. The share of those who completed tertiary education is quite high, but the number of those with less than 1 year of completed school years is not promising.

	Lesst than 1 year of total completed school years		Completed elementary school		Unfinished secondary school		Completed secondary school		Completed tertiary school		Population	
	[capita]	[%]	[capita]	[%]	[capita]	[%]	[capita]	[%]	[capita]	[%]	[capita]	[%]
Balassagyarmat	220	1.4	4783	31	2 830	18.3	5 271	34.1	2 344	15.2	15 448	100
Balassagyarmat subregion	581	1.5	15 231	40.3	8 143	21.5	10 066	26.7	3 800	10	37 821	100
Nógrád county	2 458	1.3	83 562	44.1	39 332	20.7	46 456	24.5	17 866	9.4	189 674	100

Table 2: The educational attainment of the population (source: ITS 2015)

Table 3 reveals that Balassagyarmat has less registered jobseekers than the subregion or the county or the town of Pásztó, which has very similar characteristics to Balassagyarmat. The share of women jobseekers is higher in the town because there might be more demand for their work in the agriculture of the rural area. There are a lot of qualified jobseekers in the town which suggests that the service sector is in crisis. The number of undereducated jobseekers is high which shows that the demand for higher educated people is more dominant in the local economy. The number of unemployed career starters is also high which motivates them to migrate.

	Registered job seekers from the working-age population [%]	Women's share of the unemployed [%]	Long-term unemployed's share of the unemployed [%]	Women's share of the long-time unemployed [%]	Long-term unemployed's share of working-age population [%]	Qualified job-seekers' share of the unemployed [%]	Share of those whose highest education is primary school or less inside the unemployed [%]	Career starters' share of the unemployed [%]	Number of the unemployed per 100 employed [capita]	Number of inactives per 100 employed [caipta]	Number of the dependent per 100 employed [capita]
Balassagyarmat	8.6	51.6	58.0	56.2	5.0	28.3	51.6	14.1	13.0	74.0	54.0
Balassagyarmat subregion	11.5	49.0	59.2	52.5	6.8	17.2	40.1	13.3	17.0	88.0	62.0
Nógrád county	15.3	46.4	61.4	51.0	9.3	13.1	47.1	11.8	23.0	97-0	68.0
Pásztó	12.0	43.7	57.6	49.1	6.9	13.0	43.7	11.7	20.0	85.0	62.0

Table 3: The status of the labour market in Balassagyarmat (source: ITS 2015)

Northern Hungary region has the weakest performing economy in Hungary, and Nógrád county has the weakest economy within the region. Most economic indicators of the county are well below the national averages. It seems that the gap has widened in the past few years. From 2011 to 2012, industrial production of companies (with more than 50 workers) has declined by 1.7% in Northern Hungary and by 12.3% in Nógrád county.

	GDP per capita 2011 [€]	GDP per capita compared to HU average 2011	GDP per capita compared to EU average 2011	National investments per capita 2012 [€]	Foreign investments per capita 2011 [€]
Northern Hungary region	5 265	59.4	38.6	767	1 338
Nógrád county	3 904	44.1	28.6	408	496

Table 4: GDP data and investments in Balassagyarmat (source: ITS 2015)

However, net income per capita of Balassagyarmat stood at 2 769 € per year which was higher than the national average. The same index of the subregion is 2 315 €, which is below the national average but above the corresponding figures for Northern Hungary and Nógrád county. The income gap in Balassagyarmat is similar to the average Hungarian level as the ratio of those inhabitants whose yearly gross income was above 16 000 € to those with gross income less than 3 200 € was 20.1. In the subregion (and also in Northern Hungary) this ratio is 12.2 which implies that there were less wealthy people according to 2014 data.

In the field of investments there are large differences between the regions: the per capita investment in Northern Hungary is only 61.5% of the national average, whereas the same figure in Western Transdanubia climbs to 174.5%. Nógrád attracts the lowest level of investments in Northern Hungary which creates a strongly disadvantageous economic environment for Balassagyarmat. According to 2012 figures, Nógrád had the lowest number of foreign investments and the lowest foreign direct investment stock per capita within Northern Hungary.

Balassagyarmat has a rich cultural heritage, attractive landscape, and good transport connections but the town is not a frequently visited tourist destination. There are 11.7 commercial accommodations per one thousand inhabitants, which is less than one third of the national average and also less than the corresponding figure for the subregion (12.8). Currently, there is not a single hotel in the town. In 2014, 215 guest nights per one thousand inhabitants were spent by tourists, which is significantly below the Hungarian average. In the subregion this figure shows a somewhat better performance with 415 guest nights per one thousand inhabitants. The average duration of stay was also below the county average and that of the subregion as well. The share of foreign tourists (7.52%) from the total number of guests was marginally higher than in the subregion (7.34%). Although the capacity of tourist accommodations is low, the prices are relatively high.

2.3. Overview of transport infrastructure (incl. SWOT analysis)

Balassagyarmat is located 80 km from Budapest and 50 km from Salgótarján. The nearest highway is 58 km from the town. Inhabitants may travel to Budapest by car within an hour via the M2 expressway. The transit through the subregion (on road no. 22) is significant mainly because of the Slovakian border. In 2004, a two kilometre long bypass road was built north of Balassagyarmat thus part of the transit traffic now does not go through the town centre. The other part of the traffic that reaches the town comes from the south-east from the settlements of Cserhát. In the long run, it would be essential to build the eastern section of the northern bypass road and to build a southern bypass road for servicing the industrial areas. These infrastructural elements would also be used by the interurban and long-distance buses so the town centre would be more liveable. The west-east transport corridor in Nógrád county is not significant because people use other opportunities to reach their destinations.

The lower level roads of the subregion are outdated, have little capacity and their condition is not satisfactory. The public transport is usually rare therefore it is not comfortable because of the frequent overcrowding of the vehicles. The related micro regions have significant transport handicaps as well.

Road no. 22 connects Rétság and Salgótarján through a bypass at Balassagyarmat). If the driver comes from the west the bypass ends in a roundabout from where Slovakia can be reached through the Ipoly-bridge and drivers may continue their trip towards Salgótarján through the town. Road no. 2108 connects Balassagyarmat and Aszód, road no. 2119 connects Balassagyarmat and Őrhalom. In the table below (Table 5) the traffic volume and the share of freight transport is displayed according to a traffic count performed in 2013. Road no. 2108 had higher traffic volume than road no. 22, but there is more freight traffic (both in absolute and relative terms) on road no. 22.

	Traffic [vehicle per day]	Rate of freight transport [%]
Road 22	5799	19,1
Road 2108	7450	7,7
Road 2119	2296	5,1
Road 2204	No data available	
Road 21126	3537	9,6

Table 5: The traffic of the main roads in Balassagyarmat (source: ITS 2015)

On *Rákóczi fejedelem útja* (which is the main road crossing the town centre) there is a weight limit of 3.5 tonnes and a speed limit of 30 km/h, which have contributed to the successful reduction in traffic. In addition, throughout the town several roads have a weight limit of 7.5 tonnes.

In Balassagyarmat, the number of cars per thousand inhabitants is almost the same as the Hungarian average: the degree of motorization was 326 in the town and 301 in the subregion in 2015. These figures show heavy car usage. The number of newly registered vehicles per thousand inhabitants is also around the national average as it reached 17 in Balassagyarmat and 15 in the subregion.

The local public transport is mainly served by buses. A new bus station was built close to the Ipoly bridge in 2007 as the old one had limited space in the historic town centre. The new bus station has 14 departure points, 3 arrival points and 26 parking places for buses. On average, 70 local and 340 interurban routes are served on weekdays. The coverage of local service is dense as bus stops are available in almost every 500 metres. The local demand is served by 8 main bus lines and several sublines.

The vehicle infrastructure of Balassagyarmat is quite close to the Hungarian average. There is one bus for just local purposes, there are 24 buses for interurban purposes and 38 buses for both functions (in sum it means 63 buses). The oldest one was produced in 1987, the newest ones are from 2017. The averge age of the fleet is 13.5 years. 8 % of the buses are low-floor buses and 38 % of the buses are low-entry buses which means that obstacle clearing (for elder and disabled people) is not solved in the 54 % of the vehicles. 46 % of the buses do not have air conditioning system which means a low level of comfort during the summers.

Figure 2: The new bus station completed in 2007 (source: KTI)

Railway is also an opportunity for interurban travel. There are two railway lines in Balassagyarmat: line no. 78 offers connection towards Aszód while line no. 75 links the town to Vác (through Drégelypalánk). However, rail transport has low significance. On weekdays, only 14 pairs of passenger trains are operated and only 2-10 freight trains reach the town on a monthly basis. The vehicle fleet of trains is very old as it consists of Bzmot trains (mainly from the 80s). The trains are not low-floor type vehicles and they do not have air conditioning systems.

Figure 3: The local train station (source: KTI)

The infrastructure for non-motorized transport remains well below the European standard. There is only a 150 meter long bicycle path near the Ipoly bridge but it is not used because further bicycle infrastructure network is not connected to it. This is the reason why the ongoing EU-financed project of TOP 3.1.1-16 aims to create the basis of an extensive local bicycle network.

In the town centre the demand for parking is quite high. During the working hours of the week there are virtually no free parking places. To cope with this situation, a parking lot was built in Óváros square, which offers a secondary parking opportunity for cars. Furthermore, the introduction of a parking management system with parking fee in the town centre is currently being considered.

Strengths	Weaknesses
- In Balassagyarmat, the public spaces of the town centre have been renewed and some parts of the main street have been turned into a low traffic zone - East-west sector of the bypass is already completed - Passenger information system with considerable potentials has been introduced in Balassagyarmat - In Balassagyarmat, there is a large number of public parks and green space	- Low quality and limited transport options to Balassagyarmat - Very few bicycle routes in Balassagyarmat - Lack of direct road connection linking the southern economic areas as the southern bypass road is missing. - An entire section of road no. 22 bypass has not been built yet. This also means that freight transport cannot avoid Balassagyarmat, which has a detrimental environmental impact. - The demand for parking places is higher than what is available in the town centre of Balassagyarmat. - Several green areas are not sufficiently maintained in Balassagyarmat. - Several green public spaces are missing between the economic and the residential areas in Balassagyarmat.
Opportunities	Threats
- If political relations between the Hungarian and Slovak central governments improve, the Slovakian part of Balassagyarmat's agglomeration might develop faster. - If national funds are devoted to the extension of the bicycle road network and new parking places will be created, then the quality of life may improve in Balassagyarmat. - If national funds are available for expanding green public spaces for pedestrians, the town may become more attractive. - If national funds are spent on building recreational areas on the banks of the Ipoly river, then the area may turn into a tourist attraction which would also be beneficial for the inhabitants of Balassagyarmat - The passenger information system can be further developed	- If political relations between the two central governments do not improve, then Balassagyarmat may remain less attractive for its Slovakian agglomeration. - Lack of investment into the extension of the bicycle road network will not decrease the environmental impact of the current local traffic - If the missing section of road no. 22 bypass is not built (because of the lack of funds allocated from the central government budget), congestions will frequently occur in the town centre of Balassagyarmat, which involves negative consequences both for the freight transport and the inhabitants

Table 6: SWOT analysis

2.4. Multimodal services

The main opportunities for multimodal services in Balassagyarmat are at the bus station and the railway station. The figures below show how many people use buses and trains in an average workday and where they come from. The input data of the maps is based on the country level origin-destination matrices prepared by KTI in 2017. Approximately the same number of passengers travels to and from Balassagyarmat, which is the reason why only a single relation of the journeys is shown.
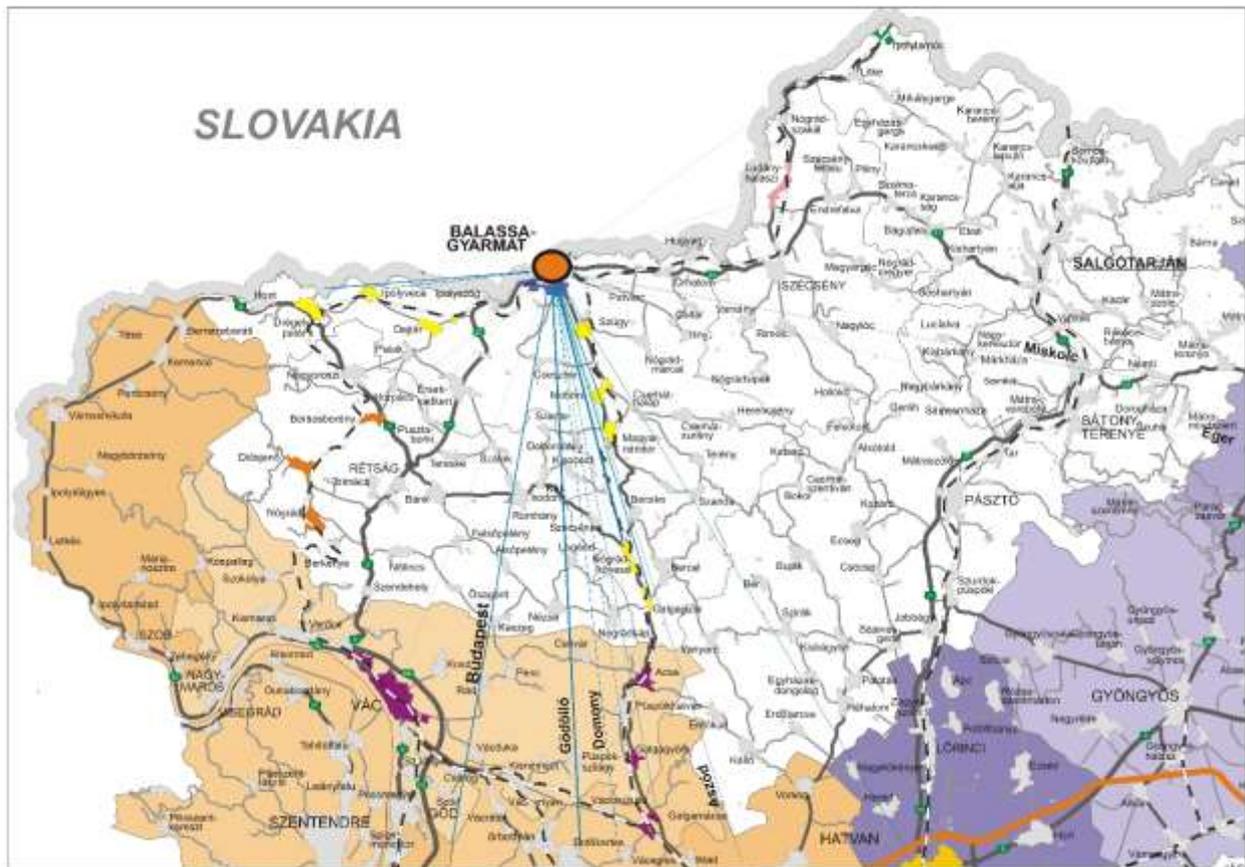
Figure 4: Number of passengers who travel to Balassagyarmat by train (MÁV) on an average workday (source: KTI)

According to Figure 4, the significance of railway passenger transport in the interurban transport is low. According to a recent research conducted in 2017, most passengers (18) travel to Nógrádkövesd on an average workday. This research counted 100 passengers who use trains on an average workday, which is very few. The local operator (MÁV) estimated the daily number of passengers between 200 and 300 which shows a slight increase over the previous period but it still remains marginal relative to the number of passengers using bus services. The reason of low railway usage can be:

- Long travel times (the average speed of the railway is 36 km/h towards Vác and 43 km/h towards Aszód);

- High risk for service disorders (because of the single track routes) that involves a lot of delays;

- The low level of comfort represented by the old Bzmot trains (constructed in the 1980s) that are operating here.

There is a local bus stop next to the railway station where the following buses stop: 1, 1C, 2C, 3, 3B, 3C, 9, 9A. Although parking places are available, those people who own a car tend not to transfer to train but rather go to their destination by car on the entire route. There are no bicycle networks that connect to the railway station and there are no bicycle parking places either although there might be demand for this as several people lock their bicycles to trees, pillars or fences. In the near future it is not likely that the railway system would be developed which also means that multimodal services at the railway station might not be effective.

Figure 5: Number of passengers who travel to Balassagyarmat by bus (Volán) on an average workday (source: KTI)

The bus station demonstrates more impressive traffic. In the interurban transport the Balassagyarmat-Szécsény relation has the highest number of passengers (more than 550). There are 200 people that commute to Budapest on an average workday which is significant. Approximately, 4400 people use the interurban bus service every workday.

Normally, passengers walk to the station instead of using any other means of transportation. There are two bicycle parking places at the bus station which are full most of the time (especially when the weather is nice). The security of the locked bicycles is enhanced by camera supervision. The above mentioned TOP 3.1.1-16 project aims to extend the bicycle network and the bus station will be connected with the new main bicycle routes. This might contribute to an increase in the number of bicycle users. For the cars there are some parking places available but most of the drivers use the big parking lot of the nearby Tesco which is about 70 meters from the station. Parking fees are not likely to be introduced in this area.

2.5. Smart mobility

In Balassagyarmat (and in its subregion) the use of ICT systems is lower than the European average. In 2012, the passenger information system of the regional buses was modernized through an EU-funded project, but currently the system does not provide high quality service (dynamic, real-time information) even though it has the potential for that.

Twelve solar panel displays (at the arrival and departure places) were installed in the bus station. In the waiting hall, information boards provide travel details to passengers. The displays show the current time, and the schedule of arrivals and departures of the buses, but these pieces of information are taken from a static timetable, thus the information boards do not display real-time data. Besides the visual information of the displays there are loudspeakers which aid the visually impaired.

On-board-units (OBUs) with a GPS-based fleet tracking system were installed in 187 regional buses which places the KMKK (the regional service provider) among the rather modernized service providers in Hungary. The OBU provides online connection between the driver and the dispatcher via a touch screen and a headset. There are "smart buttons" that send programmed error messages immediately which makes it much easier for the drivers to request help. The dispatcher can track the buses in real-time and can give direct orders through the screens or the headsets. The passengers also have the opportunity to track the buses via the web (http://menetrend.nogradvolan.hu/) where they can find information about the actual position of the bus and potential delays.

There are 30 buses where large LED displays have been installed at the front, at the side and at the back that enhance visibility even in difficult visual conditions. Inside the buses one-row "running" LED displays were placed that provide information about the next stop and transfer options. A dynamic acoustic information system was also installed that informs passengers about the next stop independently from the driver.

The fleet tracking system has some unexploited potential: the bus stops could be further developed by installing digital displays with real-time information obtained from the tracking system. Furthermore, a mobile application could be developed to show these tracking data in a more user-friendly way.

The railway station has a dynamic, acoustic passenger information system, which is active, but dynamic visual displays of arrivals and departures of the trains are missing.

Figure 6: *solar panel display at the bus station (source: KTI)*

Car drivers usually use GPS-based navigation systems (mainly via smart phones). The use of those applications bears great potentials for local traffic management as they provide real-time information about the road and traffic conditions and thus influence the routes of cars in such a way that can potentially reduce congestion.

Introducing parking fee in the town centre remains in the mid-term or long-term plans of the local government. ICT solutions are planned to offer online payment opportunities for the parking fee (via SMS, web or smart phone application). The introduction of a parking management system would also be

beneficial for drivers because it would provide them with real-time information about the number of available parking places in each street and thus navigate them to the nearest free parking place.

2.6. Smart governance and marketing

KTI organizes an annual personal meeting about the public transport timetables of Balassagyarmat and its subregion (as in other counties of Hungary). Besides KTI, local public transport service providers, mayors of municipalities and educational institutes of the subregion are represented in this meeting. Remarks and proposals considering the timetable, urban and interurban bus services can be submitted orally or in writing. These remarks and proposals are then examined by the competent service provider and if necessary a traffic counting is ordered to evaluate how reasonable the request is.

Train services are ordered from the headquarters of the Hungarian State Railways (MÁV) located in Budapest which let the local branch know about the requested new services. Cross-border co-operation between Hungarian and Slovakian train service providers can be initialized only by the MÁV headquarter. Currently, there is only freight transport between the two countries on the line which crosses the border at Ipolytarnóc, located 40 km from Balassagyarmat.

The local bus service operator, which has been selected through a tender, provides its service based on a ten-year contract. Currently, there are no local bus services between Hungary and Slovakia, and the coordination of the schedules would be possible only through negotiations with the bus operators. A good practice to be implemented in the future would be to use interurban buses in the administrative area of the town with an urban season ticket.

Figure 7: The bridge on Ipoly, the border river between Hungary and Slovakia
(source: KTI)

While 8 local bus lines are in operation in Balassagyarmat, several interurban bus lines run across through the town. These two types of service belong to the same service provider company, Eastern Central Hungarian Transport Centre (KMKK) which facilitated the use of interurban buses in local traffic. Therefore it is possible to travel by interurban buses within the administrative boundaries of Balassagyarmat by using a local single ticket or season ticket.

The municipality did not promote public transport and non-motorized transport modes in the past few years. Some sports events (like "Run gyarmat" or triathlon races) definitely made sporting activities more

popular but did not highlight the beneficial effects of walking and cycling thus these active means of transport did not become more popular.

2.7. Involved stakeholders

Municipality of Balassagyarmat

Local government body of the town of Balassagyarmat.

Eastern Central Hungarian Transport Centre (Hungarian acronym: KMKK)

KMKK is a bus service provider company of Nógrád, Heves and Jászn-Nagykun-Szolnok counties and local bus service provider for the following twons: Balassagyarmat, Bátonyterenye, Egerbe, Gyöngyös, Hatvan, Jászberény, Karcag, Mezőtúr, Salgótarján, Szolnok, Tiszafüred and Újszász. It was founded in 2012 by merging five former regional bus service provider companies, Agria, Hatvani, Jászkun, Mátra and Nógrád Volán. Volán companies remained subsidiaries until 31 December 2014 and merged into KMKK from 1 January 2015.

Hungarian State Railways (Hungarian acronym: MÁV)

Hungarian State Railways is the Hungarian national railway company, with divisions "MÁV START Zrt." (passenger transport), "MÁV-Gépészet Zrt." (maintenance) and "MÁV-Trakció Zrt.". The "MÁV Cargo Zrt" (freight transport) was sold to Austrian Federal Railways (ÖBB) in 2007. The head office is located in Budapest. MÁV START Zrt. is the local train service provider for the Balassagyarmat region.

3. Regioinal status quo analysis of the South Moravian Region

3.1. Introduction

KORDIS JMK is the public transport authority responsible for the Integrated Public Transport in the South Moravian Region (IDS JMK) including regional capital - the City of Brno. KORDIS ensures comprehensive activities in all types of public transport, e.g. conceptual planning, operational inspection, controlling and promotional terms. KORDIS is responsible for managing, developing and maintenance of city and regional public transport including the local and regional trains. The IDS JMK service area covers whole South Moravian Region (NUTS 3) plus overlaps partly border territories in the surrounding regions of the Czech Republic and few municipalities in Austria and Slovakia. The IDS JMK public transport services are thus provided in densely populated areas as well as in rural areas outside regional and local centres.

KORDIS has a long term experiences with intermodal transport and coordination of intermodal public transport nodes. Transport planning and studies including the interconnectivity of transport nodes were carried out in last decade when the Integrated Public Transport system was implemented stepwise in the whole South Moravian Region. KORDIS is responsible for coordination and management of the whole system without being itself a transport operator who owns public transport vehicles.

The work plan of the Peripheral Access project is structured in 3 work packages (WP) that are focused on different aspects of mobility in rural and peripheral areas. In particular, the topics to be tackled in the project are clustered in WPT1 - Intermodality, WPT2 - Use of ICT/ITS and WP3 - Smart governance. Intermodality and use of ICT/ITS have been basic features of IDS JMK since its establishment in 2004. Interconnections between single transport modes in nodes are guaranteed with harmonisation of timetables and central management centre which provides real-time information on the public transport services. The information is distributed to electronic information panels at stops, mobile application and search engine on website. In view of these facts, KORDIS will deal mainly with the 3rd WP. The principles of multimodality and existing ICT/ITS services in IDS JMK are however mentioned in this summary.

Since 2004 KORDIS endeavours to interconnect the South Moravian public transport with transport systems at national and international level. Not only long-distance links between the region and the Trans-European Transport Network may however boost mobility at transnational level. Rural areas in the South Moravian Region bordering with Austria and Slovakia represent territory which suffers from low accessibility and cross-border mobility can positively influence regional development.

This analysis is based on a review of available studies. The goal of the analysis is to gain relevant information and foster knowledge about smart governance which will be utilized in the pilot action implemented within the Peripheral Access project.

3.2. Area characterization

The South Moravian Region (NUTS 3) is situated in the south-east of the Czech Republic. it is a border region located to the borders with Austria and Slovakia – federal state of Lower Austria on the Austrian side and regions of Trnava and Trenčín on the Slovak side. Its area of 7188 km² covers about 9 % of the Czech Republic's territory. Approximately 1 200 000 inhabitants live in the region, placing the region at the 4th position in population within the Czech Republic. Its border position within the Czech Republic brings further possibilities for the development of the cooperation between border towns and the regions. The favourable natural conditions contribute to the development of tourism – suitable terrain, slightly warm climatic conditions, preservation and diversity of natural potential with the possibility of year-round use.

Figure 8: The South Moravian Region in Central Europe

The

Figure 99 shows in detail the bordering regions with the South Moravian Region: 1 – the South Moravian Region, 2 – Lower Austria, and two Slovak regions - 3 – Trnava region, 4 – Trenčín region.
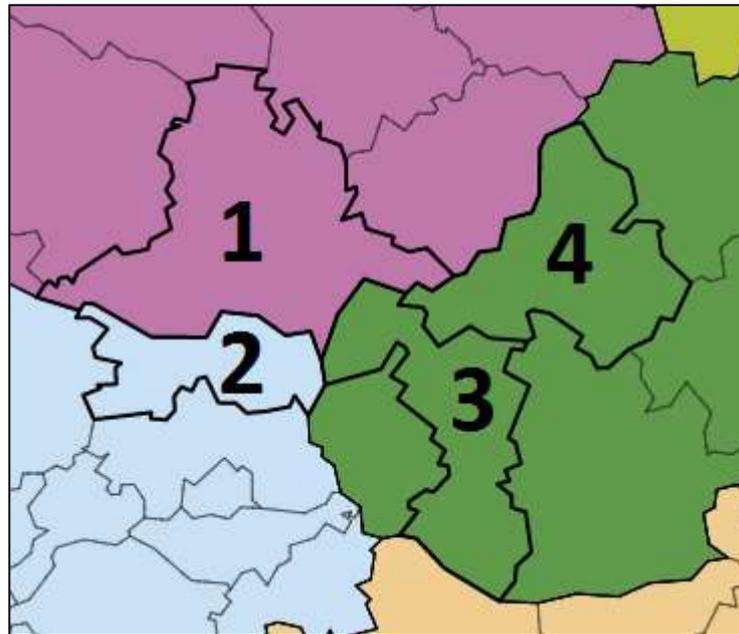
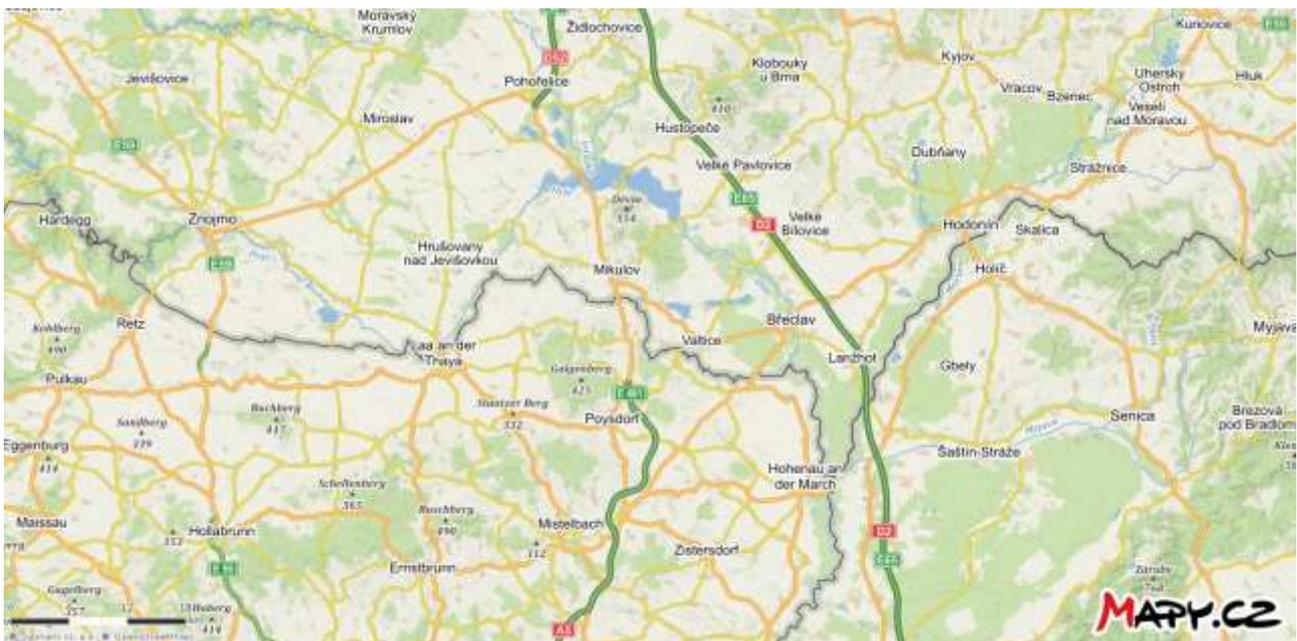Figure 9: Map of the South Moravian Region and its neighbouring foreign regions at NUTS 3 level (source: http://ec.europa.eu/eurostat/web/nuts/statistics-illustrated)

Figure 10: Area around the state border between South Moravian Region and its neighbouring foreign regions (source: www.mapy.cz)

There are around 700 municipalities in the South Moravian Region, with the city of Brno being the largest The least densely inhabited area is Znojmo district, specifically its south part (bordering the National Park Thayatal/Podyjí) and its part bordering other regions, the density of population being less than 50 people per km^2. The most densely inhabited areas are region's centres (Brno, Znojmo, Blansko, Hodonín, Břeclav, Vyškov) and adjacent suburbs.

Brno, capital of the region, is the second largest city in the Czech Republic. Nearly 400 000 inhabitants live in Brno and another 65 000 people commute to Brno every day. The City of Brno faces the challenge to maintain its relatively high share of public transport and to foster the use of sustainable transport systems. Low carbon mobility planning is an important issue to be addressed in a new spatial urban mobility plan.

Apart from Brno, the important economic centre of the whole Czech Republic, we can also find areas in the South Moravian Region which suffer from structural economic problems due to their isolation and distance from the main economic hubs of the region. These areas are defined as peripheral areas. According to the Development Programme of the South Moravian Region, areas meeting this definition in the South Moravia are mainly the district of Znojmo, lying on the border with Austria, and the district of Hodonín, located on the border with Slovakia. Their main characteristics is increased rate of unemployment vis-à-vis other parts of the region, lower average income of its inhabitants and negative net migration rate. Reasons of their position among the region are mostly historical: their character had always been rural and agricultural with almost no industry being present. As these areas are also located at the state border, they had always been far away from other parts of the region, also due to insufficient transport infrastructure.

The reason why KORDIS wants to aim at the region's peripheral area is that this rural area is sparsely populated, its population is aging and the mobility of people is more complicated. This result in depolluting of remotely placed parts of the South Moravian Region and positive migration rate in the Brno surrounding.

Peripheral areas are present not only in the South Moravian Region, but in its neighbouring regions in Austria and Slovakia as well. Figure 1111 shows demographic data about districts located on the borders of South Moravian Region, Austria and Slovakia – districts Znojmo, Břeclav and Hodonín on the Czech side, districts Horn, Hollabrunn and Mistelbach on the Austrian side and districts Senica, Skalica, and Myjava on the Slovak side. According to the Czech territorial organisation, districts are divided into territories of municipalities with extended authorities (abbreviated ORP in Czech), which respond more in terms of population to districts in Slovakia and Austria. The following figures will show data only for ORP which are directly on the border with Austria or Slovakia – Znojmo (part of district Znojmo), Mikulov, Breclav (district Breclav), Hodonin, Veseli nad Moravou (district Hodonin).

District (AT, SK), ORP (CZ)	Population	Unemployment rate in %	Average age
CZ – Znojmo	91 323 (2016)	8,8 (2016)	41,9* (2016)
CZ – Mikulov	19 827 (2016)	6,4 (2016)	42,3* (2016)
CZ – Breclav	59 854 (2016)	5,2 (2016)	42,3* (2016)
CZ – Hodonín	61 042 (2016)	8,7 (2016)	42,9* (2016)
CZ – Veselí nad Moravou	38 310 (2016)	7,6 (2016)	42,9* (2016)
AT – Horn	50 541 (2015)	5,2 (2015)	44,47 (2016)
AT – Hollabrunn	31 397 (2015)	5,7 (2015)	44,27 (2016)
AT – Mistelbach	74 793 (2015)	5,6 (2015)	43,75 (2016)
SK – Senica	60 686 (2013)	4,69 (2017)	40,33 (2015)
SK – Skalica	46 887 (2013)	2,89 (2017)	41,12 (2015)
SK – Myjava	27 229 (2013)	2,73 (2017)	43,65 (2015)

*data are available only for the whole district

Figure 11: Demographic information

(sources: www.czso.cz, www.statistik.sk, www.statistics.sk, www.urbistat.com)

All of these regions – South Moravian Region in the Czech Republic, Lower Austria in Austria and Trnava and Trenčín Region in Slovakia are among the wealthiest regions within their respective state. However, the centres of economic activities are situated far from the boundary areas – Brno in the Czech Rpublic, Vienna in Austria and towns in the valley of river Váh in Slovakia. Higher unemployment rate of Czech and Austrian boundary districts in comparison with the rest of the country points out that these regions

struggle more with missing work opportunities than other inner-state districts. The situation is relatively better in Slovakia, some industrial parks have been built in the region, although the portfolio of work possibilities is not that wide as the economy is concentrated on industry.

According to the data of the Czech Statistical Office (ČSÚ), in the border regions which are less populated the number of people who are older than 65 years was about 20 % in 2016. It was more than number of young people (0-14 years) which was about 15 %. The same situation is in the Slovak border regions. According to the data of Statistical office of the Slovak Republic the ratio of older people was about 17-18 % in the same year and it was higher than the ratio of young people which was about 13-14 %. The situation in the Austria is comparable. The data from Statistics Austria confirms that the number of young people has fallen in Lower Austria, while the number of older people has strongly increased.

Based on the above mentioned facts, it can be concluded that problems of less populated areas, people moving to cities and elderly population are common for challenges to be tackled in all three countries - in the Czech Republic, Austria and Slovakia. New public transport services and cooperation with local stakeholders may improve accessibility of these rural areas and make the border area more attractive for visitors from the neighbouring countries.

3.3. Overview of transport infrastructure (incl. SWOT analysis)

Transport infrastructure in rural border area of the South Moravian Region comprises railways, roads and cycle tracks. Considering that public transport is primarily used by commuters, the largest passenger flows are evident between suburbs and towns where job opportunities are available. On the contrary, public transport services in rural areas are mostly ensured with buses. Single bus lines are interconnected with each other or with trains so that public transport services cover the whole region in a cost effective way.

The railway infrastructure (black-and-white chain-dotted lines) along with motorways and main roads (Orange lines) in the South Moravian Region is depicted in the Figure 12. The picture shows that:

- Brno is central node of the road and railway network (TEN-T node – Orient/East – Med, Baltic Adriatic corridor).

- Absolute majority of the regional centres (towns beyond 5.000 inhabitants) are interconnected with railway.

- Znojmo district and the rural area in its surrounding are accessible from Brno only on road. The railway link via Břeclav is in terms of travel time not competitive with road transport.

- 2 railway transport links with Austria exist (Znojmo – Retz, Břeclav – Hohenau)

- 2 railway transport links with Slovakia exist (Břeclav – Lanžhot, Veselí nad Moravou – Vrbovce)

- Desirable motorway Brno – Vienna has been constructed only on the Austrian part, yet.

- The south-west fringe of the region (ca. 90 km far from Brno) is sparsely populated rural area without any other regional centre except Znojmo.

Global development plans regarding the transport infrastructure are stated in the *Development plan of the South Moravian Region 2018 - 2021*. According to this plan the following strategic objectives are foreseen to be reached:

- Finishing of the backbone network of motorways (D43 and D52).

- Fundamental upgrading of regional railway tracks (electrification, eventually double-tracking of selected tracks)

- Reconstruction and upgrading of roads in possessive of the South Moravian Region

- Modernisation of rolling stock and other public transport vehicles

- Conceptual planning of Park and Ride carparks, use of ICT for information on occupancy of the car parks
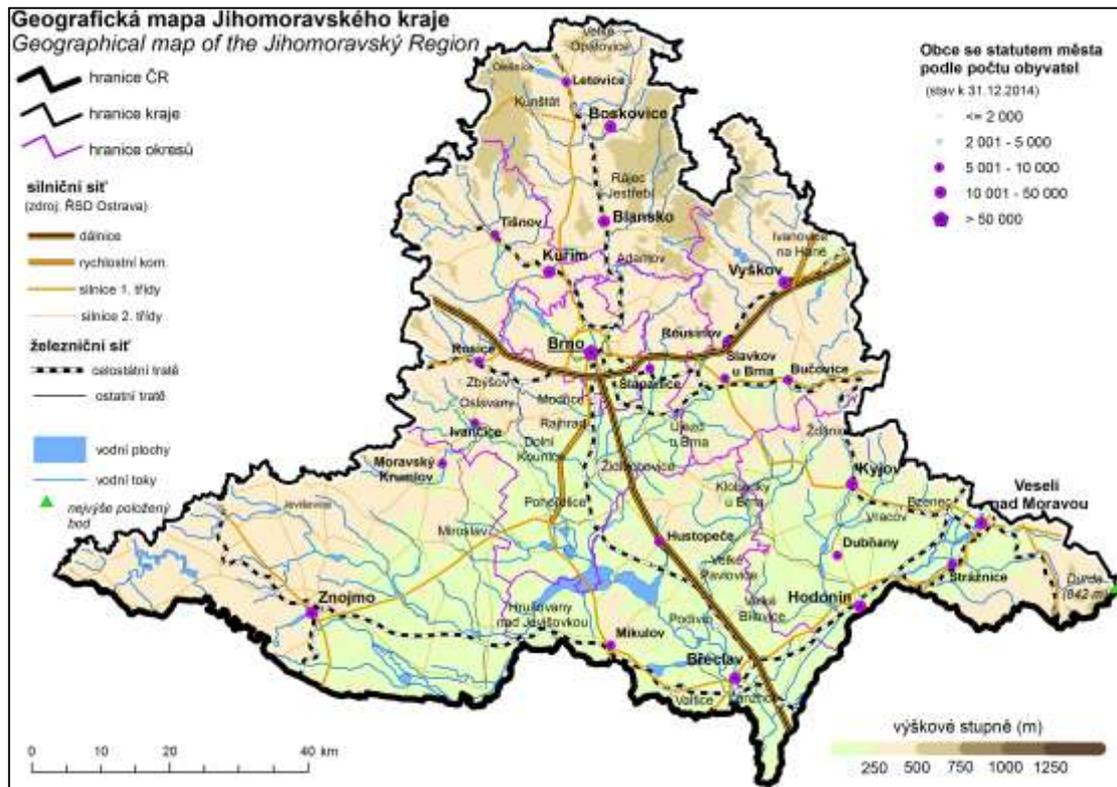
Figure 12: Geographical map of the South Moravian Region

(source: https://www.czso.cz/csu/czso/mapy-a-kartogramy-wpx831xfog)

The transport network in the South Moravian Region is developed and maintained by several institutions. The Railway Infrastructure Administration (SŽDC) is in charge of providing operation, operability, modernization and development of the railway infrastructure. It also allocates path capacity. It is a state-owned body conducted by the Ministry of Transport.

The General Motorway and Road Directorate (ŘSD) is responsible for the operation and development of the motorways and 1st class roads. The 2nd and 3rd class roads are owned by the South Moravian Region and maintained by the Road Administration and Maintenance of the South Moravian Region (SÚS JMK). Very important is cooperation between these organizations in order to coordinate maintenance and reconstruction works without any negative impact on performance of public transport system. Besides that, close cooperation with the Regional Authority of the South Moravian Region and KORDIS allows quick exchange of information on actual infrastructure restrictions, needs of modernisation, etc. Working meetings of all the above mentioned institutions took place as needed so that the planning at strategic as well as tactic level can be harmonised with all relevant parties.

Moreover, the IDS JMK public transport services are operated on a small scale outside the territory of the South Moravian Region. IDS JMK lines run in 9 municipalities of the neighbouring countries. There is a bus line which passes towns Holič and Skalica, and a train line which goes through Vrbovce up to Myjava. Both lines are corss-border going to Slovakia. Cross-border connections with Austria are ensured by two bus lines. The first one is going all year round to Laa an der Thaya, the second one is only seasonal during summer and connects the western part of the Znojmo district with the Austrian town Drosendorf.

The South Moravian Region is also suitable for cycling especially its south area is very popular among cyclists. Cycling can also be an alternative to individual car transport and it can complement public transport services for the first/last mile of the transportation chain.

In June 2015, a concept of cycling in the South Moravian Region was elaborated as a strategic document for the period 2016-2023. The Concept contains a detailed analysis and particular recommendations for a conditions improvement for cycling. The South Moravian Region supports cycling through public transport. Bicycles are allowed to be carried in all regional trains and by cyclobuses – buses with special racks on stern of the bus or with a trailer for carrying bicycles. The capacity of the rack is 5 bicycles whereas the

trailer can transport up to 20 bicycles. Nowadays, there is 13 regional bus lines in the IDS JMK which enable transport of bicycles.

Infrastructure for cyclists is continuously developed under coordination of the South Moravian Regional Authority. One of the most attractive products for tourists are the Moravian wine trails (Moravské vinařské stezky) which are shown in the Figure 13. Moravian Wine Trails consist of 1200 km of cycling trails, which are connected into 10 thematic wine routes named after original wine-growing areas. The trails lead between vineyards and orchads, offer interesting view on South Moravian Region and enable visit of wine cellars for cyclists along each trail. This largest network of thematic cycling trails in the Czech Republic has started in years 1999 - 2003 as a pioneering project with the idea to connect all important wine villages and vineyards, including major touristic attractions in the South Moravian Region. Iniciator and main coordinator is Nadace Partnerství (Czech Environmental Partnership Foundation). Project includes over 250 wine villages, later on (based on tourist demand) were established thematic website with local events.
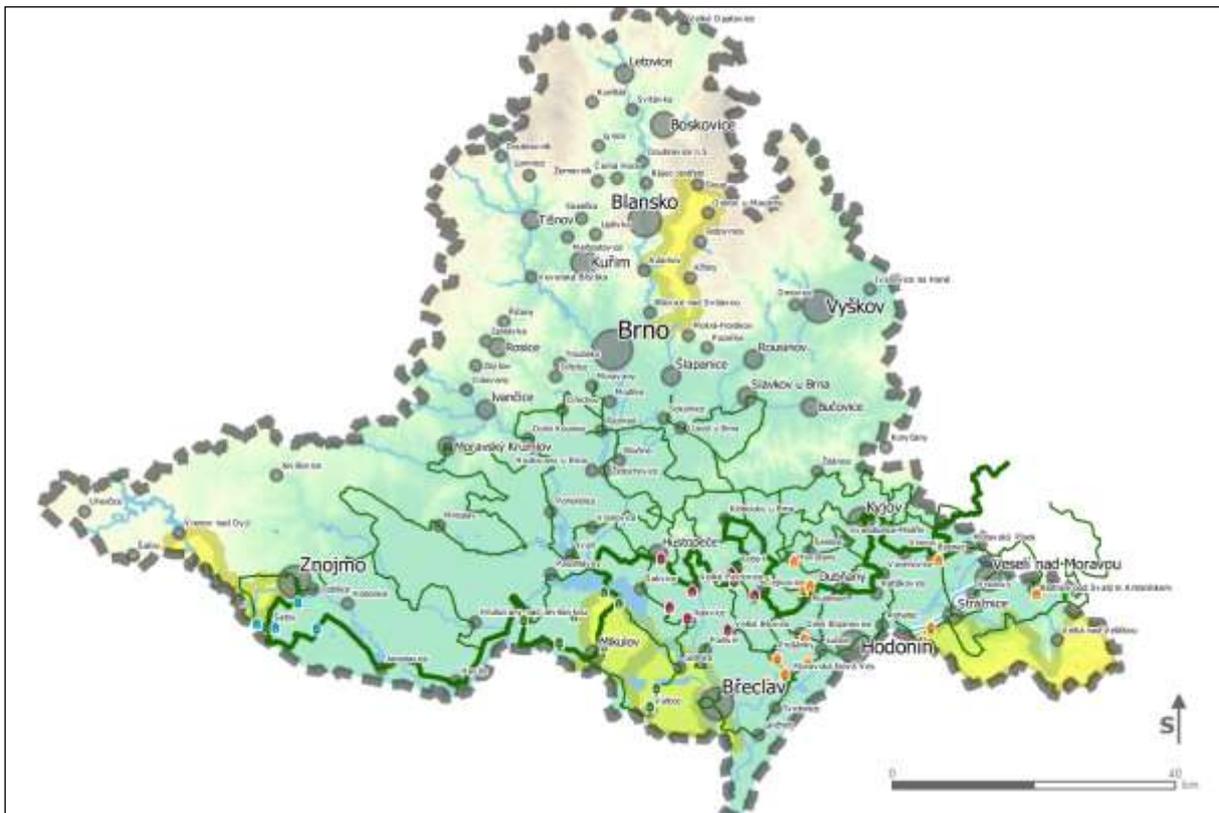

Figure 13: Moravian wine trails

(source: Concept of Cycling in the South Moravian Region for the period 2016-2023)

Besides Moravian wine trails and cycle tracks build up by single municipalities, there is another systematic network for cyclists - the European cycle route network EuroVelo. The EuroVelo routs passing the South Moravian Region shows Figure 14.
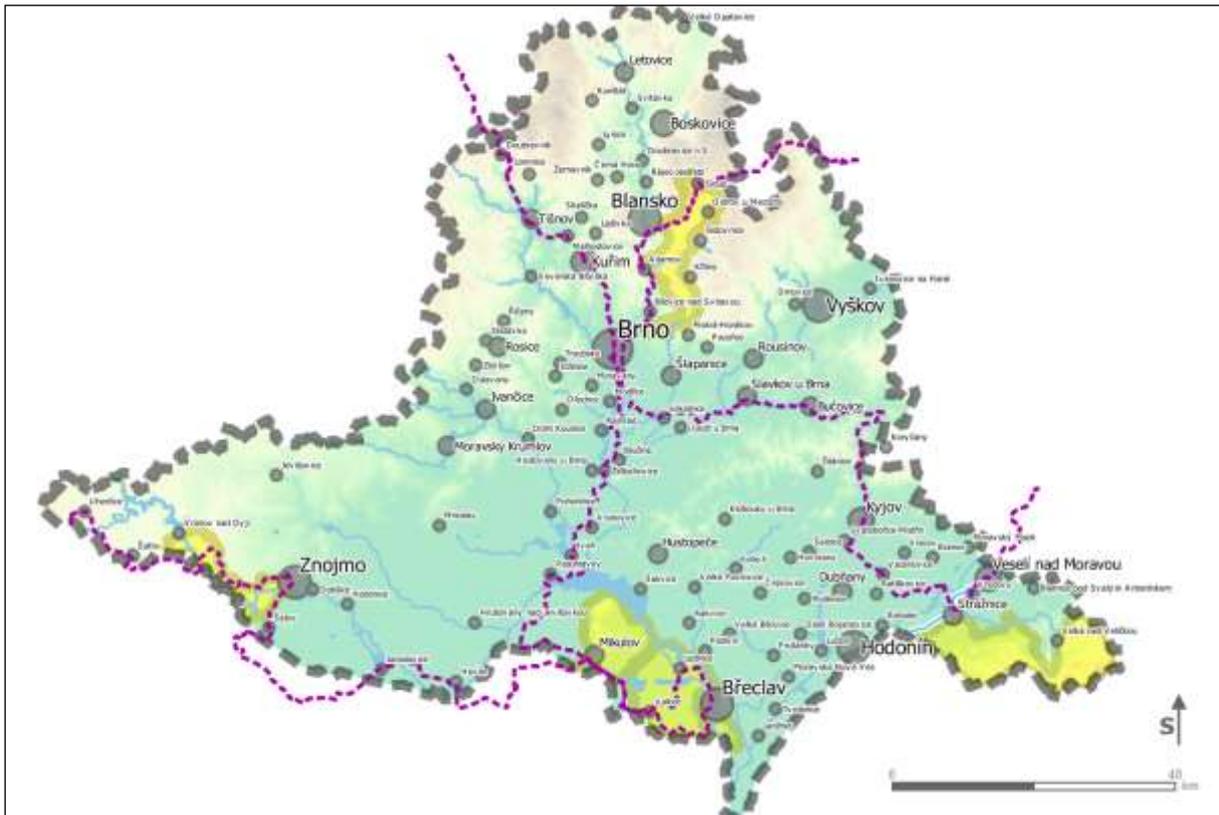
Figure 14: Map of the EuroVelo routes (source: Concept of Cycling in the South Moravian Region for the period 2016-2023)

3.4. Multimodal services

The IDS JMK itself is multimodal service. According to requirements of the South Moravian Region and the City of Brno, KORDIS set rules for the whole system. Within the same conditions, passengers can travel by fast trains, regional trains, regional buses and public transport in Brno and another 8 cities. There is an interval timetable; passengers can use only one ticket for all means of transport. They can choose if they want to buy one-time ticket or pre-paid ticket. The system has central control system and informational systems for passengers.

Multimodality is basic principle of public transport services in the South Moravian Region. The backbone of the network is railway that interconnects main regional centres. Stations in regional centres are concurrently interchange terminal where passenger can change for regional buses. The railway serves as a transport mode which allow to big amounts of passengers, the buses ensures public transport services in wider area from the railway – they are operated in every single village. Territory where railway is not available is served by buses. Also bus lines are interconnected among each other so that passenger can change from one bus to another one and an amount of destinations from one origin is higher.

Figure 15: Figure 1515 depicts Scheme of guaranteed links among IDS JMK trains and buses. The dots represent transfer links in the different time according to the type of a dot. The red lines pictured the railway network and the blue lines are bus lines. The arrows represent directional links between bus or train lines.
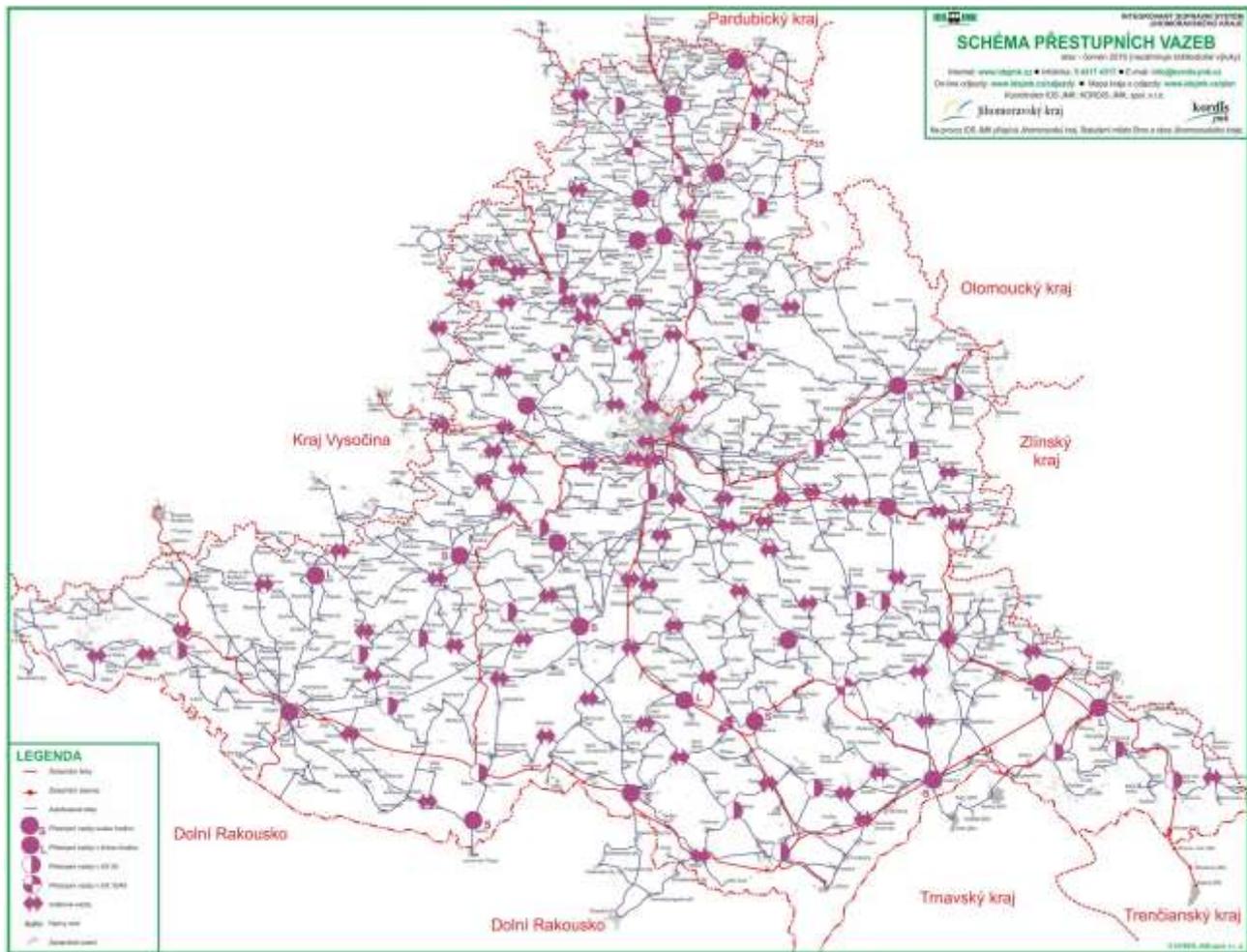
Figure 15: Scheme of guaranteed links among IDS JMK trains and buses (source: KORDIS)

Besides the principle of one ticket that can be used for journey with different public transport vehicles and harmonisation of timetables so that changes between connections in transport nodes are convenient as much as possible, there is another segment where multimodal approach can be applied. Nowadays, the individual transport to a transport terminal may be included in the transport chain. E.g. Park and Ride carparks or cycling become more important issue to be better interconnected with the public transport services.

At most railway stations, there are stands for bicycles but the bottleneck is that people use those stands only sometimes. Some of the stands are not in a good condition, so people do not want to use them. Nowadays there are more possibilities for transport of bicycles – cyclists can use trains or selected bus lines for transportation of bicycles.

Cycling is popular in the southern part of the South Moravian Region because there are better geographical conditions – flat landscape. The *Concept of cycling in the South Moravian Region 2016-2023* claimed that every public transport stop becomes means for further development of cycling, because thanks to public transport connections one can travel far beyond just 5 km.

The South Moravian Region carried out an analysis to identify linkages between municipalities suitable for commuting by bicycles. Figure 1616 shows possible links between municipalities in terms of commuting to work or to school by bicycles.
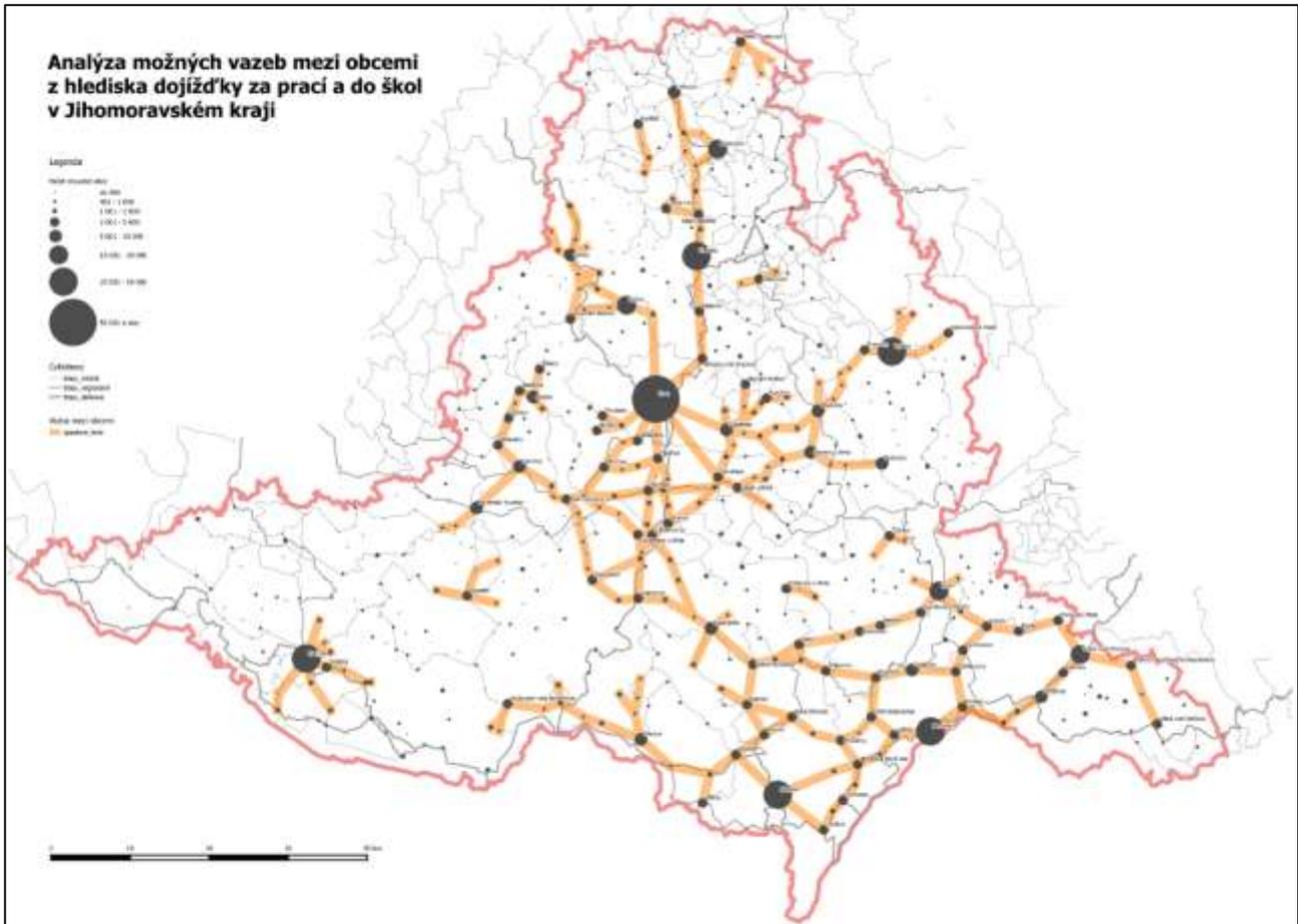
Figure 16: The Analysis of possible links between municipalities in terms of commuting to work or to school in the South Moravian Region (source: The Concept of Cycling in the South Moravian Region 2016-2023)

Different situation for cooperation with provider of cycling services are in cities. In Brno, KORDIS cooperates with a bike sharing company called Rekola. Passenger with seasonal pass for public transport may use the bike sharing with discount.

To sum up, KORDIS will monitor the current European trends in transport and will endeavour to implement several development projects according to the Plan of regional public transport services 2017-2021. This document contains a list of the following issues to be solved within next years:

- increase the number of connections of demand responsive transport

- unification of rules for P+R

- cross-border and cross-region transport offer

- support for the transport of bicycles in the vehicles of IDS JMK

- system solution for traffic at night

- modernization of the passenger clearance process

- modernisation of rolling stock

3.5. Smart mobility

KORDIS has been dealing with smart mobility since the establishment of IDS JMK. Final public transport services comprise many activities that are based on ICT. Specialized software tools support the preparation of timetables with processing of all relevant information inputs (travel time, routes, transport operators, drivers' shifts etc.) A Usage of that software allows sharing of data about timetables between different transport operators, regulatory bodies and general public. Besides that, the SW enables to generate different outputs according to particular users' needs.

Core element in providing public transport services in the South Moravian Region is the **Central Dispatching (CED)**. The IDS JMK managing centre has existed since 2005 but since the beginning of its operation it is continuously upgraded by KORDIS JMK. The key elements of the centre are servers, data links to transport operators (trains, trams, trolleybuses, urban buses) and receivers of GPRS/UMTS which make possible to collect data from regional buses. This centre monitors and direct manages more than 800 regional buses, ensures 34 thousands connections between lines every day and also answers the passengers' queries.

The traffic controller sitting in the Managing Centre can watch all vehicles on a digital map. Actual position of each vehicle is compared with timetables saved in a database on server and actual delay is estimated. The on-board unit enables communication (phone call or SMS) between the particular driver and traffic controllers in the Managing Centre. Thus drivers of feeder lines may be instructed to wait for passengers who are going to change and get on the feeder vehicle based on the estimated delay. The processed data are also used for information services. The estimated time of arrival at a particular stop is displayed on electronic information panels and in mobile app.

Figure 17: Central dispatching centre of IDS JMK (source: KORDIS)

The main communication channel with passengers is nowadays the Internet. Both long-term and short-term information on the public transport services are continuously available on the IDS JMK website www.idsjmk.cz (4,000 visitors a day). Passengers may find all relevant information on connections, timetables, tariff, etc. on one site. For more convenient planning of trips with public transport, a journey planner and interactive map of the service area are available. Everyone can search an address or a name of the stops. If you don't know the address or stop, you can highlight the line and then you can find the stop. Figure 188 shows the IDS JMK website with journey planner and Figure 199 depicts the interactive map.

Figure 18: The main page of the IDS JMK website with the search engine (source: www.idsjmk.cz)

Figure 19: IDS JMK Interactive map (Source: https://www.idsjmk.cz/Map/Map.aspx)

Real time data about location of single public transport vehicles are besides the managing control centre also publicly available in two ways. Firstly, they are displayed on electronic information panels (ELPs) that

show departures and other important information such as delays, route changes, etc. ELPs have been installed at selected stops / transport nodes where changes between connections are frequent. Secondly, data about operation of public transport are used via API by third parties in their mobile app. The ELPs are showed in the Figure 2020.

Figure 20: Electronic information panels (source: KORDIS)

Passengers can also use a smartphone application which is called Poseidon. It helps them with online information – real time departures. They also can buy tickets via this mobile app thanks to QR ticketing. In the POSEIDON, users can find information, plans, maps, timetable, tickets (QR ticketing), on-line journey planner.
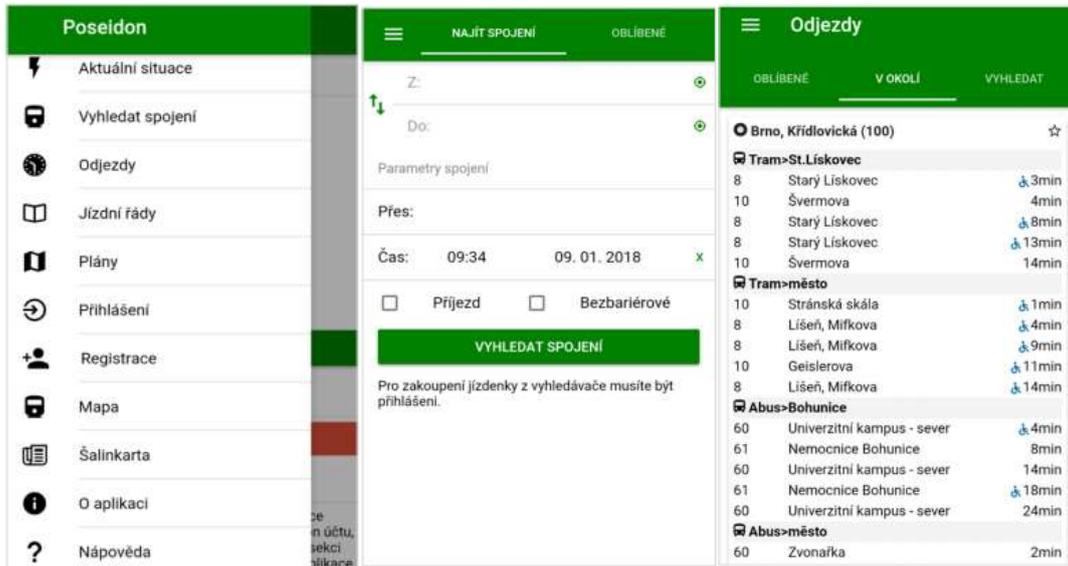
Figure 21: Mobile application – POSEIDON (source: KORDIS)

Apart from the already implemented technologies, 2 further services in preparation may be mentioned to provide full information on the state-of the art analysis regarding smart mobility. It is assumed that the mobile app and web services will be extended with information about occupancy of Park & Ride carparks near railway stations so that drivers can change for trains in more convenient way. Pilot Action in frame of the Interreg CE project SOLEZ is going to be implemented in summer 2018.

Another expected smart mobility service is introduction of new seasonal tickets which will be based on bankcards. Seasonal tickets will be saved in a central database, which allows passenger to use their bank card as identifier in public transport. This technology might bring better knowledge about usage of public transport by holders of bank cards and the fare inspection will be easier.

3.6. Smart governance and marketing

The public transport in the South Moravian Region is coordinated by KORDIS via the Integrated transport system of the South Moravian Region (IDS JMK). IDS JMK integrates all public transport modes in 728 municipalities organized according to same principles. There is a common network of public transport lines and tariff system, transport conditions, information and marketing system. The minimal standards of public transport are 6 connections at working days, 3 at weekends for every municipality. There is an interval timetable and lines link to each other.

The public transport in Brno and the South Moravian Region is characterised by the three level model pictured in the Figure 2222.
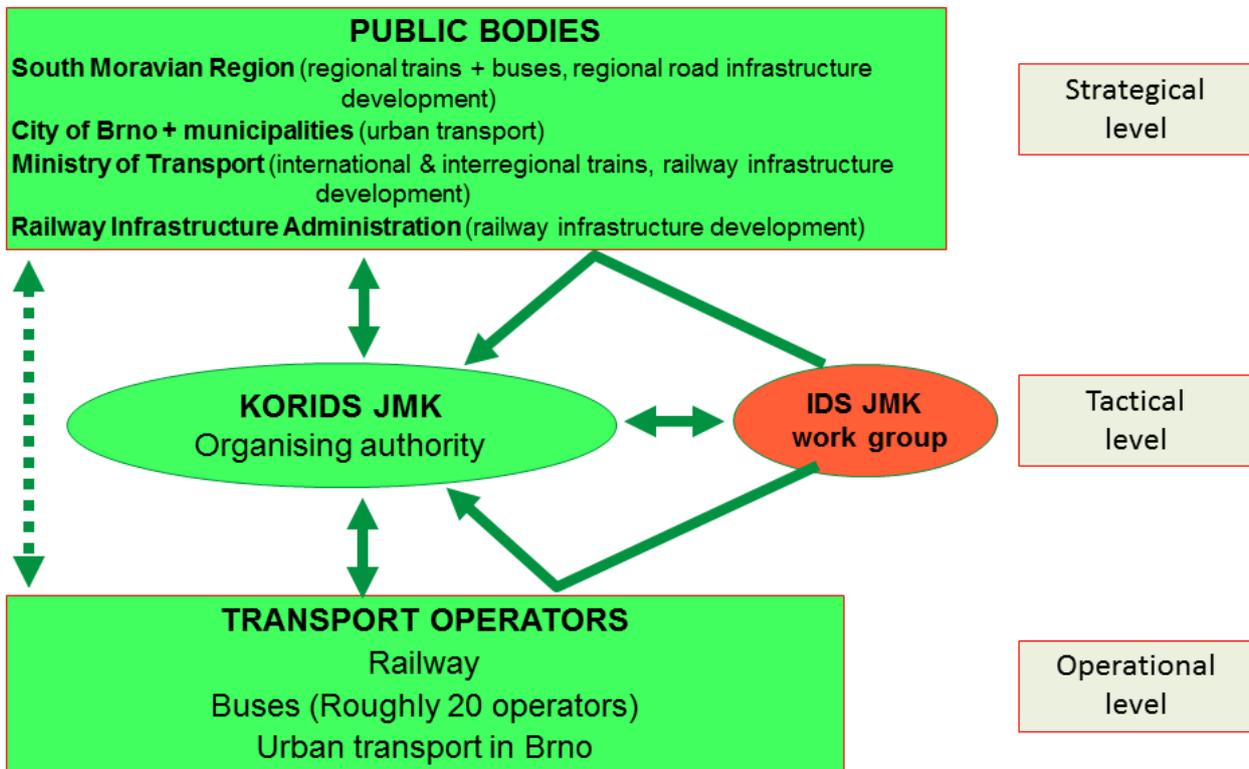

Figure 22: Governance of IDS JMK (source: KORDIS)

Four public bodies are the most important at the strategical level. The Regional authority and the City of Brno have charged KORDIS JMK to manage the IDS JMK. In particular, KORDIS coordinates timetables among rail and non-rail operators, prepares contracts with operators for the regional authority, oversees the quality of traveling, allocates revenues among operators, promotes public transport and consults on infrastructure development or tariff issues. The regional authority subsidises all regional trains and buses outside the City of Brno. Beside that, Regional road network (including interchange terminals) is administered by the same body. In general, the Regional authority is the main decision maker on running of the IDS JMK. A mid-term vision of regional public transport services is drawn up in the Plan of regional public transport services 2017-2021, updates of the plan are annually approved by the regional council of the South Moravian Region.

The Ministry of Transport subsidises Interregional and International trains. That implies the need to harmonise the timetables of Rex and R-trains with S-trains. The trains of higher quality (EuroCity, InterCity) are not integrated into IDS JMK.

The Railway Infrastructure Administration (SŽDC; RIA) is in charge of providing operation, operability, modernization and development of the railway infrastructure. It also allocates path capacity. It is a state-owned body conducted by the Ministry.

KORDIS JMK works on tactical level – in the middle between strategical and operational level. The company was established to carry out two main activities: coordination of transport services in the South Moravian Region and preparation, implementation and operation of the integrated transport system (IDS JMK) in the whole territory of the South Moravian Region.

KORDIS is also responsible for direct managing of the system (coordination of 22 transport operators – esp. regional buses), providing information service for passengers (about tariff system, transport conditions, etc.), implementation of EU funded development projects and cooperation with partner from other regions in the Czech Republic on cross-border mobility services. Representatives of all public bodies that are mentioned above attend regular meetings of IDS JMK Workgroup. This workgroup come together quarterly in order to exchange information on performance of public transport services, planned diversions, changes in operation and legal aspects among all participated bodies.

As for the cross-border cooperation, KORDIS has got in touch with its counterparts from Lower Austria and western Slovakia to provide passengers with cross-border mobility services. Overview of bus lines and trains passing through the south Moravian Border to neighbouring countries is depicted in Figure 2323. The institution that cooperates with KORDIS and the South Moravian Region are: Lower Austria, Verkehrsverbund Ost-Regon, Trnava Region, Town of Skalica. Harmonization between neighbouring areas of different countries is discussed. KORDIS cooperates also through the Regional Authority of the South Moravian Region with ÖBB and ZSSK.
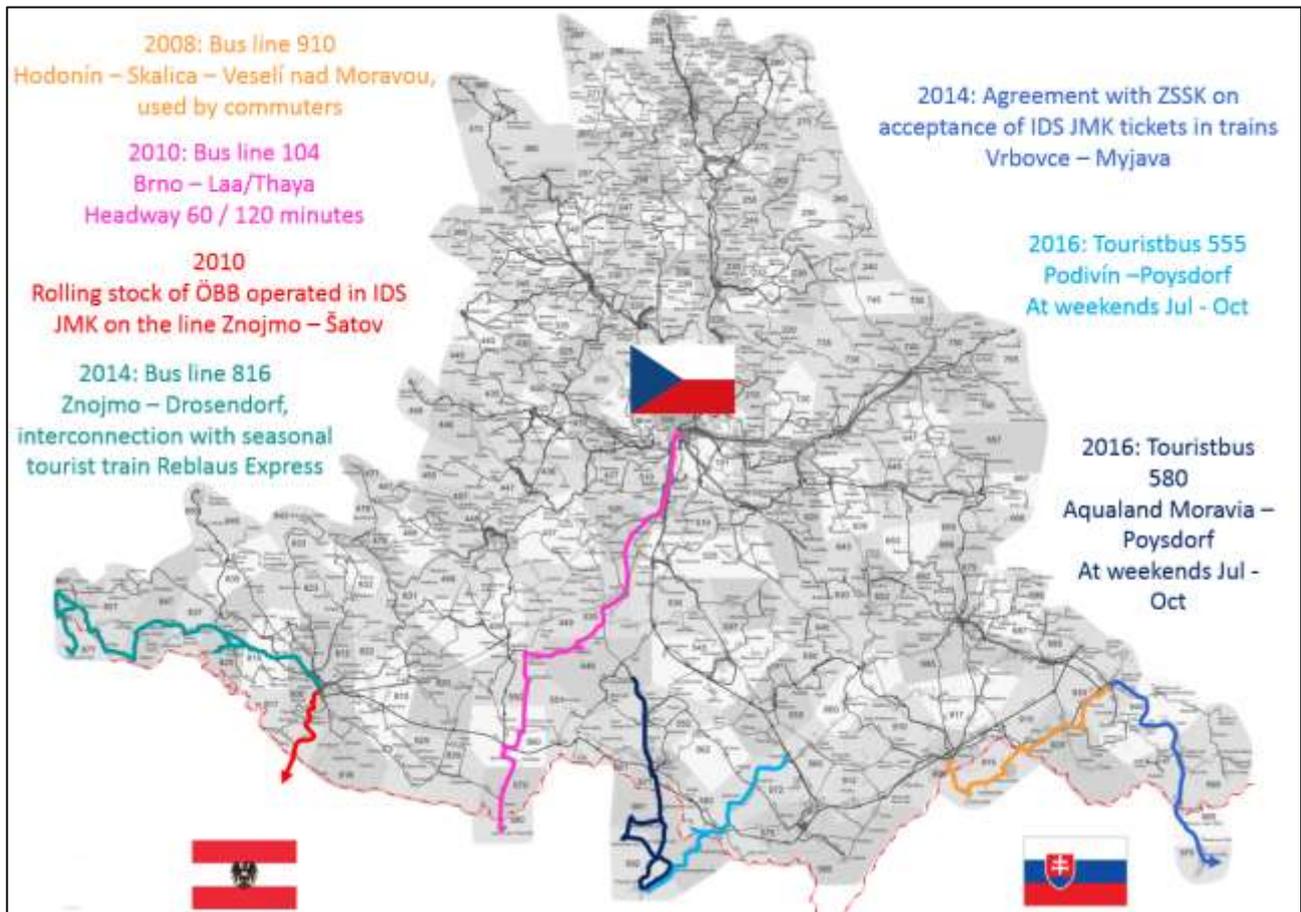

Figure 23: Cross-border regional public transport (source: KORDIS)

Apart from the bodies that are described above, KORDIS also communicate with the demand side – with the municipalities, employers and individual passengers. The communication with clients of public transport is ensured by email, hotline to managing control centre and promotional campaigns (webpage, leaflets, banners on buses, media contacts, etc.) Passengers have a possibility to propose a motion to change of public transport services through their municipal representative or can send directly an email to KORDIS. Marketing activities are targeted in general to all users of public transport. Few information campaigns are dedicated to a particular segment of passengers, e.g. students, seniors, disabled people, etc. Significant group of passengers as for the marketing activities are tourists. These passengers utilize the public transport vehicles especially at weekends when numbers of commuters are lower but the public transport services must be ensured.

In order to entice tourists to use public transport, KORDIS distributes leaflets about public transport to tourist information offices within the whole region and established a partnership with several institutions that provide discounts for public transport passengers. The partners of the discount programme are predominantly museums and providers of bike rental services.

With regard to peripheral areas and bordering regions, the public transport services might be considered as a tool which can improve accessibility and increase attractiveness of that territory. As the public transport services for commuters already exist in each village of the region, a possible next step is to make the public transport more attractive for tourists. This should be done based on consultations with local stakeholders and the negotiating procedure is going to be adopted in the planning process of public

transport services. KORDIS have preliminary identified two different target groups for whom the public transport services might be tailored more according to their needs. The first group are cyclists who might appreciate transporting bicycles for instance in hilly landscape . The Second group was identified among fans of historical trains. There is a historical train which runs between Retz and Drosendorf at the Austrian/Czech border. So within the cross-border cooperation there is a possibility to organize a meeting of historical trains from Austrian and Moravian sides.

The priority is to implement a system of bus lines transporting bicycles. The goal is to develop and implement a promotion campaign focused on cross-border regular and tourist transport and buses for cyclists. A part of the project activities is reporting on the introduction of the new methods supporting the cross-border cooperation in South Moravia. The new bottom-up approach for planning of transport services in peripheral region will be used for the first time in the South Moravian Region. KORDIS supposed that this approach will be applied also in other areas of the South Moravian Region. In case that the debates with local stakeholders will be beneficial for planning of mobility services. In cooperation with train specialists KORDIS attempt to establish cooperation between operators of historical trains from both Austrian and Czech side of the national border. The aim of the cooperation is to create synergy in organising common events and entice tourists to peripheral bordering region and make them use public transport services.

The project pilot action is in accordance with the Plan of regional public transport services 2017-2021 where creation of cross-border transport services and support of carriage of bicycles are mentioned as strategic goals.

3.7. Involved stakeholders

KORDIS consults the project activities with representatives of the South Moravian Region (Transport department), because the implemented measures will be partly included in the IDS JMK public transport services. The aim of the Peripheral Access Project in the South Moravia is to introduce new methods supporting the cross-border cooperation. The pilot action might prove whereas consultations with local stakeholders bring an added value to the public transport planning which has been done based on top-down approach so far.

The main objective of the project activities up to now was the establishment of working group of local stakeholders who will deal with:

- public transport services for cyclists in Znojmo district,
- possible cross-border cooperation between operators of historical trains.

The first meeting of all relevant stakeholders was called in Znojmo on 1st March 2018. The representatives of KORDIS informed the participants on the project and its goals. In particular, they presented the new public transport services for cyclists in Znojmo district. Since the 14th of April 2018, buses operating on 4 bus lines have been newly equipped with trailers or special racks enabling transportation of bicycles at weekends. The initial timetables have been prepared by KORDIS and the local stakeholders may comment on the service provision by the end of the touristic season in September. A next meeting of the working group is foreseen in autumn when the new service will be evaluated and measures for the next year will be adjusted.

The participants of the meeting welcomed the idea of creating two groups (for tourists and for cyclists). They agreed that if they have some idea about some improvement of cycling in the given region, they will contact the representatives of KORDIS. The second topic – cross-border cooperation between operators of historical trains was mentioned however negotiation with the Austrian counterpart (Verkehrsverbund Ost-Region and Lower Austria) is desirable first of all. This issue will be discussed in May in occasion of another meeting about international railway transport.

Stakeholders who are going to be involved in the project activities are listed below:

Reblaus Express / NOVÖG – operator of tourist train Retz-Drosendorf. The tourist train connects the town of Retz in the Austrian region Weinviertel and Drosendorf an der Thaya in Waldviertel. The Express stops at 11 stations, where you can get off and take some beautiful trips by bus, bicycle or on foot. http://www.reblaus-express.at

Fellowship for public transport in the Southwestern Moravia – SVD JZM (Spolek pro veřejnou dopravu na jihozápadní Moravě) - operator of occasional tourist trains in the border area of South Moravian, South Bohemian and Vysočina Region.

http://www.svd-jzm.cz/

South Moravian Region – Transport Dept., Regional development dept. KORDIS has long been working with the representatives of given departments on improving transport in the South Moravian Region.

City of Znojmo - (about 36 000 inhabitants) The city is administrative capital of the Znojmo District. It is the historical and cultural centre of southwestern Moravia, the city is located along the river Thaya, close to the national park Thaytal.

Znojemská beseda – organization funded by the city of Znojmo, is in charge for arrangement of cultural events, tourism, local wine festivity etc.

http://www.znojemskabeseda.cz/.

Cykloklub Kučera Znojmo – citizen association of cyclists focused on sport, public enlightenment and other cycling activities.

http://www.cykloklubkucera.cz/.

Regional Development Agency of South Moravia (RDASM) – The agency assists in the sustainable development of the region and in growing its competitiveness through the realisation of development and cross-border cooperation projects as well as by supporting investment and innovation. It is a consortium of legal entities and its members are the South Moravian Region, the Association of Communities and Towns of South Moravia and the South Moravian Regional Chamber of Commerce.

http://www.rrajm.cz/en/

Jihomoravské muzeum ve Znojmě – this museum is one of the oldest museums in South Moravia. There are many collections that are from the field of social science and science. At present, a visitor can see a total of ten permanent exhibits that are spread over three objects.

http://www.muzeumznojmo.cz/.

Mikroregion Vranovsko – on its website you can find a lot of information about the southern part of the South Moravian Region called Vranovsko. There is a list of activities that you can do in this region. The activities are divided into many categories, e.g. tips for trips, tips for tourist and cyclists, information about culture and traditions, etc.

http://www.navstivtevranovsko.cz/cs/.

Camp Vranov is situated near the Vranov dam, which is one of the warmest and cleanest dams in the Czech Republic. It is an attractive place for summer family holiday with children, schools stays in nature or corporate events. There are many possibilities how you can enjoy your free time, e.g. cycling, adrenaline experiences, recreation, sightseeing, trips to nature, etc. In the Camp there are several types of accommodation for families, groups or individuals.

https://www.vranovska-plaz.cz/cs/.

Camp Bítov is situated right on the banks of the Vranov dam. In the Camp Bítov you can rent sport equipment, water pedal boats, mountain bikes, beach volleyball, etc. Also you can go for trips around the camp by bike or on foot.

http://www.camp-bitov.cz/.

4. Regional status quo analysis of Friuli-Venezia Giulia region

4.1. Introduction

In this deliverable the state-of-the-art scenario and main critical issues in the field of multimodal services, smart mobility and governance are addressed. The importance of multimodal services comes from the relevant regional planning guidelines and regional policies emphasizing the need of improving the integration among transport modes and services as a main planning goal at regional level. Multimodality has then to be achieved through integration of both transport infrastructures (in particular, nodes) and services. Central to such a strategy is the development of an integrated ticketing system at regional level. Moreover, the need to develop cross-border transport services is underlined, both with respect to Austria and – of particular relevance in Peripheral Access – Slovenia.

The importance of smart mobility also comes out from various regional planning documents and policies. In particular, it is stressed the need to develop smart and innovative transport services in peripheral and rural areas. Indeed, such a strategy is formally recognized by identifying "flexible" and "third level" transport services which have to be supported by smart tools and new technologies. Seemingly, the role of smart ticketing (integrated ticketing system supported by smart tools) is emphasized. Eventually, the goal of developing info-mobility systems (traveler information system) is particularly emphasized in planning documents to support transport users in mobility choices and trip planning.

As for the governance issues, it should be recognized that the current regional model turns out to be rather effective and well designed. This is the reason why we would not address it significantly.

4.2. Area characterization

The Friuli-Venezia Giulia region is one of the 20 regions of Italy, a national administration unit corrensponding to the statistical NUTS level 2. The Region is made up of four NUTS3 areas, corresponding to the italian units „Province". The region covers an area of 7,380 square kilometers and it has a population of 1,24 millions inhabitants (see table 7).

NUTS 2		NUTS 3		Number of Municipalities	Population	Population (%)
Region	CODE	Province	CODE			
Friuli-Venezia Giulia	ITH4	Pordenone	ITH41	51	318.062	25,6%
		Udine	ITH42	136	544.129	43,9%
		Gorizia	ITH43	25	144.024	11,6%
		Trieste	ITH44	6	234.645	18,9%
			TOT	218	1.240.860	100%

Table 7: NUTS classification and regional population (by provinces)

The regional territory consists of 47 municipalities with a population of less than 1,000 residents, 84 municipalities with a population between 1,000 and 3,000 units, 24 municipalities with a population between 3,000 and 5,000 units and 40 municipalities with a population above 10,000 residents. As mountain areas prevail (covering some 50% of the whole territory), average population density turns out to be rather low – some 150 inhabitants per square kilometer - below the national average. The proportion of population living in larger municipalities is just 35%. Still, the incidence of elderly people is significant – some 23%, above the national average.

Demographic features and spatial distribution of the population show how the regional territory is characterized by vast areas of weak (or very weak indeed) mobility demand and, at the same time, by a limited number of strong axes (in fact, those involving to the regional capitals).

Main socio-economic and territorial features are displayed in the following figures, where employment and local units numbers are shown.
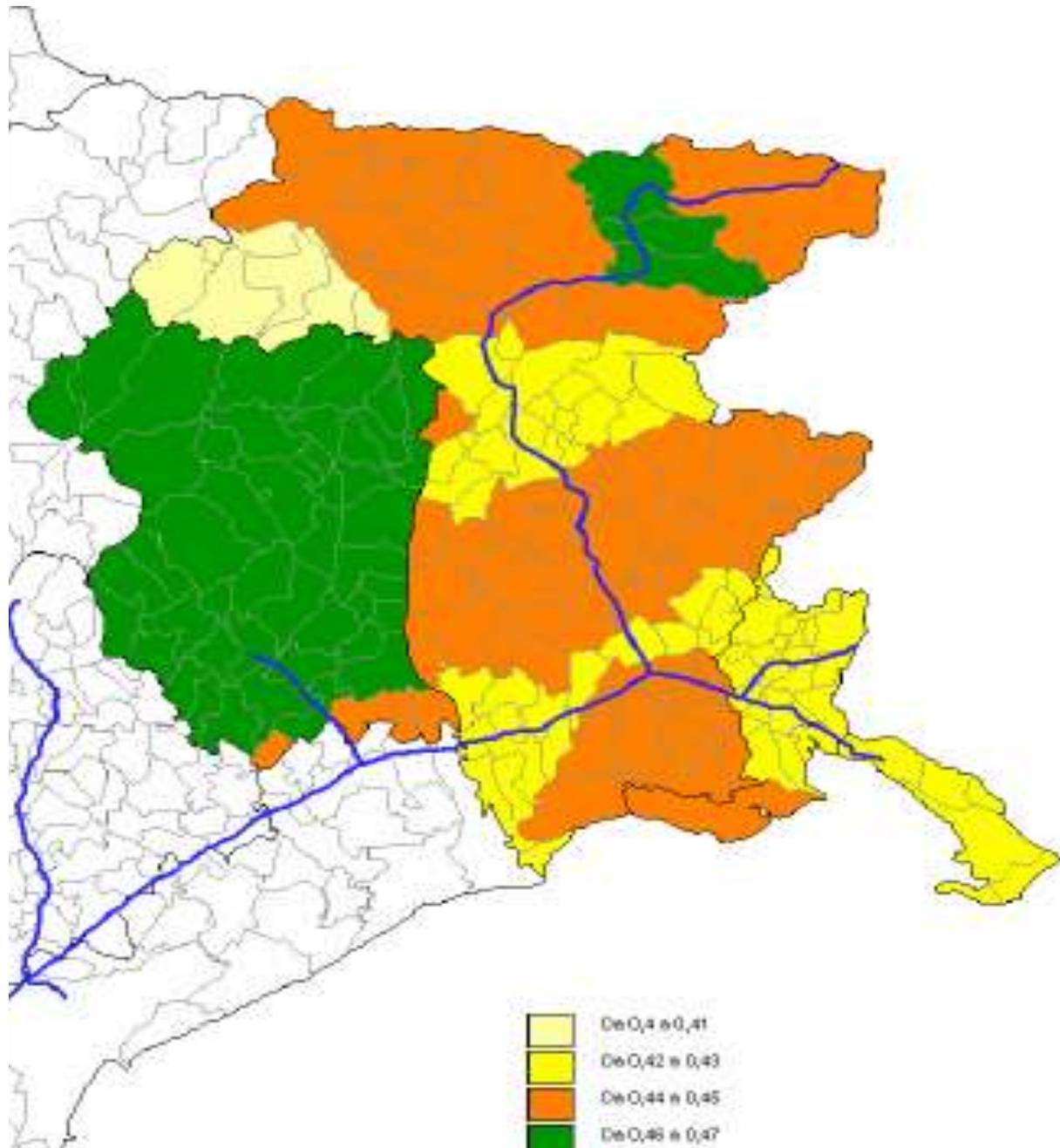

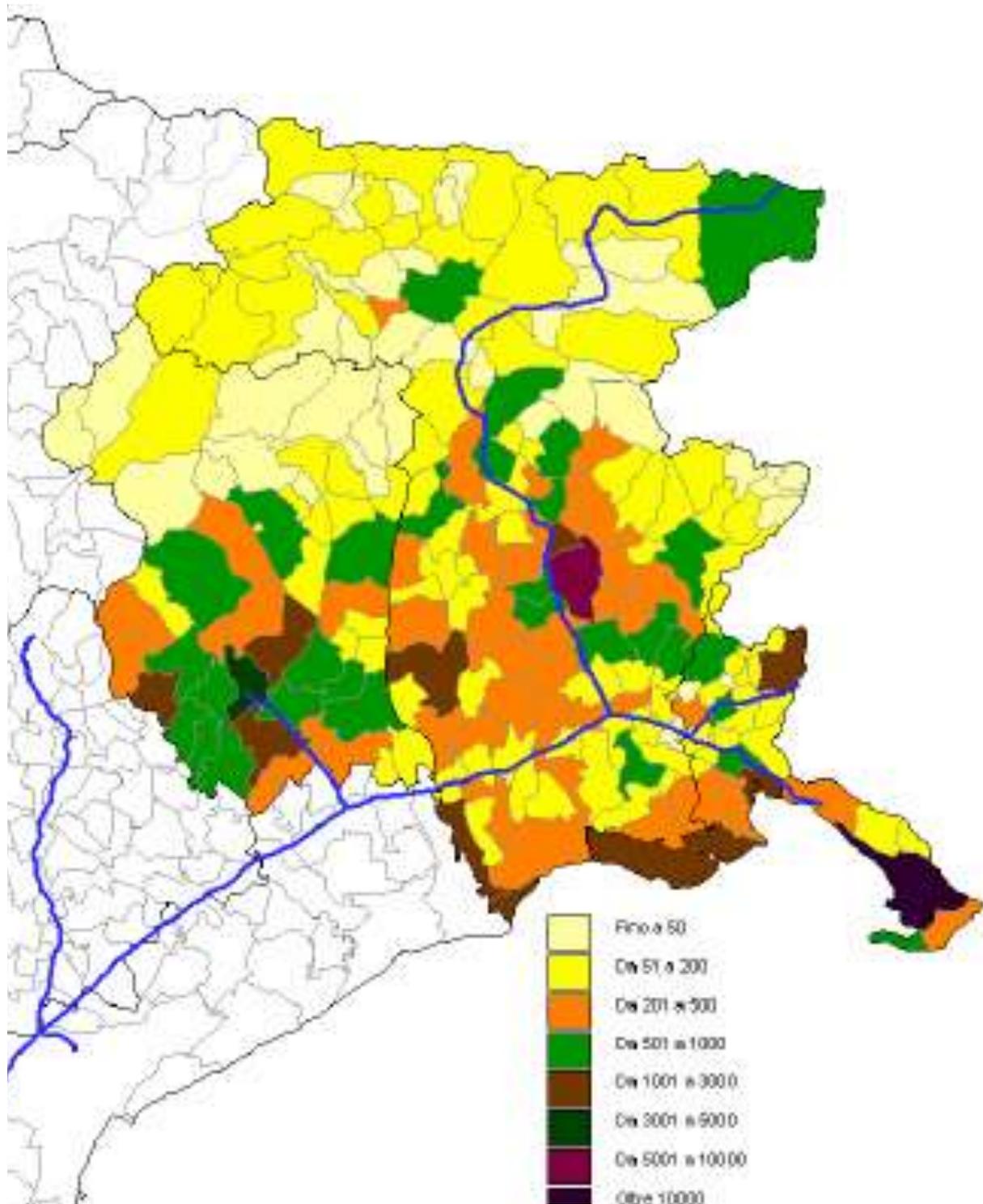*Figure 24: Employment ratios (employed people/total residents)*

Figure 25: Regional local units

Concerning the use of the local public transport (source: ISTAT 2016), one third of the regional population (aged 14 or more) uses the train at least once a year. The train users in 2016 recorded an increase of almost three percentage points compared to 2015. Satisfaction with the service offered, equal to 68% for frequency (66% in 2015), 60% for punctuality against 57% in 2015 and 82% for ease to get a seat compared to 79% of 2015.

The regional passenger trains operated by Trenitalia under the service contract with the Region FVG on time or with delay within 5 minutes is 97.3% compared to 95.7% in 2015. 25.9% of the population aged 14 or more living in FVG in 2016 used the bus (increasing 1.5% from 2015 and more than 3 percentage points compared to 2014). It was stated much or enough 77.1% of users were satisfied with the frequency of rides (national data 53.6%), compared to punctuality of the vehicles 83.5% (national data 52.3%) and 68.8% on the availability of seats (national data 49%).

TRAIN TYPOLOGY	DELAY'S CATEGORY	YEAR		
		2014	2015	2016
Regional Trains	Up to 5 minutes	93,1	95,7	97,3
	Up to 15 minutes	98,4	98,7	99,3
Udine-Cividale	Up to 5 minutes	97,5	97,5	98,7
	Up to 15 minutes	99,9	99,6	99,8

Table 8: Punctuality of the train per delay's category (%) – year 2014-2016

4.3. Overview of transport infrastructure (incl. SWOT analysis)

The regional infrastructure system related to the provision of public transport services turns out to be rather well-developed. It can be sorted out in two sub-sectors, namely:

- Infrastructures devoted to passenger modal shift (the so-called "regional modal interchange centres"[1]) – something related to the strategic regional goal to foster multimodality;
- The so-called essential facilities – such as depots, garages and repair shops, etc.

Currently, the infrastructure system devoted to modal shift is given by three type of infrastructures: multimodal centres, road terminals and stops. Prior to 1997, the Region planned and managed the system by means of a specific governance model for which the Provinces were in charge of providing financial contributions to public and private operators based on three-years programs. Nowadays, most of the planned infrastructure investments are already carried out or are under development. The state-of-the-art situation in the field of transport infrastructures are shown in the following table.

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[1] The Italian acronym is "CIMR – Centri di Interscambio Modale Regionale"

Localizzazione		Stato di fatto relativo alle Autostazioni/CIMR	
Comune	Provincia	Struttura	Stato della progettazione
Cormons	Gorizia	programmata	progetto definitivo in corso di redazione
Gorizia	Gorizia	esistente	
Grado	Gorizia	esistente	
Monfalcone	Gorizia	pianificata	
Ronchi dei Legionari (aeroporto)	Gorizia	programmata	progetto preliminare
Casarsa della Delizia	Pordenone	pianificata	
Maniago	Pordenone	esistente	
Pordenone	Pordenone	in corso di realizzazione	progetto definitivo
Sacile	Pordenone	pianificata	
San Vito al Tagliamento	Pordenone	in corso di realizzazione	progetto definitivo
Spilimbergo	Pordenone	in corso di realizzazione	progetto definitivo
Muggia	Trieste	esistente	
Trieste	Trieste	in corso di ristrutturazione	progetto definitivo
Cervignano del Friuli	Udine	programmata	progetto preliminare
Cividale del Friuli	Udine	di recente realizzazione	
Codroipo	Udine	programmata	progetto preliminare
Gemona del Friuli	Udine	esistente	
Latisana	Udine	esistente	
Lignano Sabbiadoro	Udine	pianificata	
Manzano	Udine	programmata	progetto preliminare
Palmanova	Udine	programmata	progetto di massima
Pontebba	Udine	pianificata	
San Daniele del Friuli	Udine	programmata	progetto preliminare
San Giorgio di Nogaro	Udine	programmata	progetto definitivo
Tarcento	Udine	programmata	studio fattibilità
Tarvisio	Udine	programmata	progetto preliminare
Tolmezzo	Udine	esistente	
Udine	Udine	esistente	

Table 9: state-of-the-art scenario of regional public transport infrastructures

Starting from 2004, the State has transferred most of the institutional competences in the rail sector to the Region, thus significantly changing the development of the infrastructure system, particularly in the field of multimodality. The increasing role of the Region in the rail sector has emphasized the importance of the strategic goal of fostering intermodality through the development of interchange platforms within a coherent planning framework as well as the need of dealing with essential facilities. This way, the CIMRs were established as major strengths of the regional system. They aim at promoting modal shift between:

- public transport services of different transport modes (rail, road, sea and air transport);
- public transport services and private transport.

The regional modal interchange centres (CIMRs) are classified in two levels, the first including the four regional capitals and the regional airport (Ronchi dei Legionari). On top the CIMRs, railway stations and road service stops are of importance as well as the provision of the so-called essential facilities.

As for the specific rail sector, infrastructures are owned and managed mostly by the national operators (infrastructure manager and rail operator), with some minor role of the Region.

An overall SWOT analysis of the regional system is finally displayed as follows:

STRENGHTS	- Good development – both quantitative and qualitative – of regional infrastructure system - Status of planned projects
WEAKNESSES	- Rail network performance - Road network performance in peripheral and rural areas
OPPORTUNITIES	- Intermodality development - Regional transport goverance
THREATS	- None

Table 10: SWOT analysis

4.4. Multimodal services

The current provision of regional rail services – which are managed mostly by the Region, while the State retains competences over some axes – shows an annual regional output of some 3,3 millions trains-km. During a typical weekday some 236 trains are operated by the regional network, with a daily output of some 21,000 trains-km. Main regional origin-destinations are displayed in the following table.

linea	partenza	arrivo	treni per direzione		totale treni/gg	km relazione	trenikm/gg	paxkm/gg	di cui a contratto Regione FVG		
			→	←					treni/gg	km assegnati	trenikm/gg
fuc	cividale	udine	24	24	48	15,30	734	n.d.	48	15,30	734
14	venezia s.l.	udine	16	16	32	135,01	4.320	706.815	31	61,61	1.910
13	trieste c.le	venezia s.l. (via portog.)	14	13	27	153,44	4.143	767.689	9	85,66	771
14	trieste c.le	venezia s.l. (via udine)	13	13	26	217,42	5.653	1.054.030	9	144,03	1.296
236	portogruaro c.	casarsa	11	11	22	21,12	465	15.653	22	21,12	465
14	udine	trieste c.le (via gorizia)	10	8	18	82,41	1.483	132.466	18	82,41	1.483
13	portogruaro c.	trieste c.le	4	1	5	85,66	428	45.239	5	85,66	428
14	sacile	venezia s.lucia	4	3	7	73,39	514	41.605	0	73,39	0
233	pinzano	sacile	3	2	5	52,76	264	5.013	5	52,76	264
15	trieste c.le	tarvisio b. (via cervig.)	3	1	4	160,80	643	64.455	4	160,80	643
15	cervignano a.g.	carnia	3	3	6	68,01	408	12.647	6	68,01	408
15	carnia	udine	3	3	6	39,67	238	8.868	6	39,67	238
15	cervignano a.g.	udine	2	1	3	28,34	85	2.080	3	28,34	85
15	trieste c.le	udine (via cervig.)	2	1	3	72,01	216	23.567	3	72,01	216
14	trieste c.le	sacile	2	1	3	144,02	432	40.640	3	144,02	432
15	tarvisio b.	cervignano a.g.	2	0	2	117,13	234	9.370	2	117,13	234
233	aviano	sacile	1	1	2	16,11	32	252	2	16,11	32
15	carnia	trieste c.le	1	1	2	111,68	223	9.985	2	111,68	223
14	sacile	udine	2	0	2	61,61	123	9.272	2	61,61	123
14-233	casarsa	aviano	1	1	2	44,06	88	787	2	44,06	88
15	udine	tarvisio b.	1	0	1	88,79	89	533	1	88,79	89
15	udine	gemona del fr.	1	0	1	28,20	28	909	1	28,20	28
13	cervignano a.g.	portogruaro c.	1	0	1	42,00	42	1.396	1	42,00	42
13	latisana l.b.	venezia s.lucia	1	0	1	81,72	82	24.844	0	81,72	0
233	maniago	pinzano	1	0	1	20,54	21	62	1	20,54	21
233	sacile	maniago	1	0	1	32,22	32	630	1	32,22	32
15/14	tarvisio b.	trieste c.le (via gorizia)	1	0	1	171,20	171	3.328	1	171,20	171
15	gemona del fr.	trieste c.le	1	0	1	100,21	100	5.156	1	100,21	100
					233		21.293	2.987.288	189		10.558

Table 11: number of programmed trains per regional origin-destination

From the table one realizes that some 80% of regional rail output is concentrated on just 6 axes.

The current provision of road services consists of a total annual output of some 42 millions of vehicles-km, some 23 of which are produced in peripheral and rural areas. In particular, in the areas around Trieste – which is the pilot area in Peripheral Access – public transport routes are many (193), however the distances covered are mostly short (some 85% of local output covered less than 200.000 a year).

Public transport services in peripheral and rural areas turn out to be concentrated on peak hours. Peripheral and rural networks are thus characterized by strong differences in the within-the-day quality of service and a significant deterioration during holidays. As such, the current supply of peripheral services targets specific demand components – mainly, regular demand – with a strong attention to asset utilization.

Overall, the regional coverage of public transport services is large (see next figure).
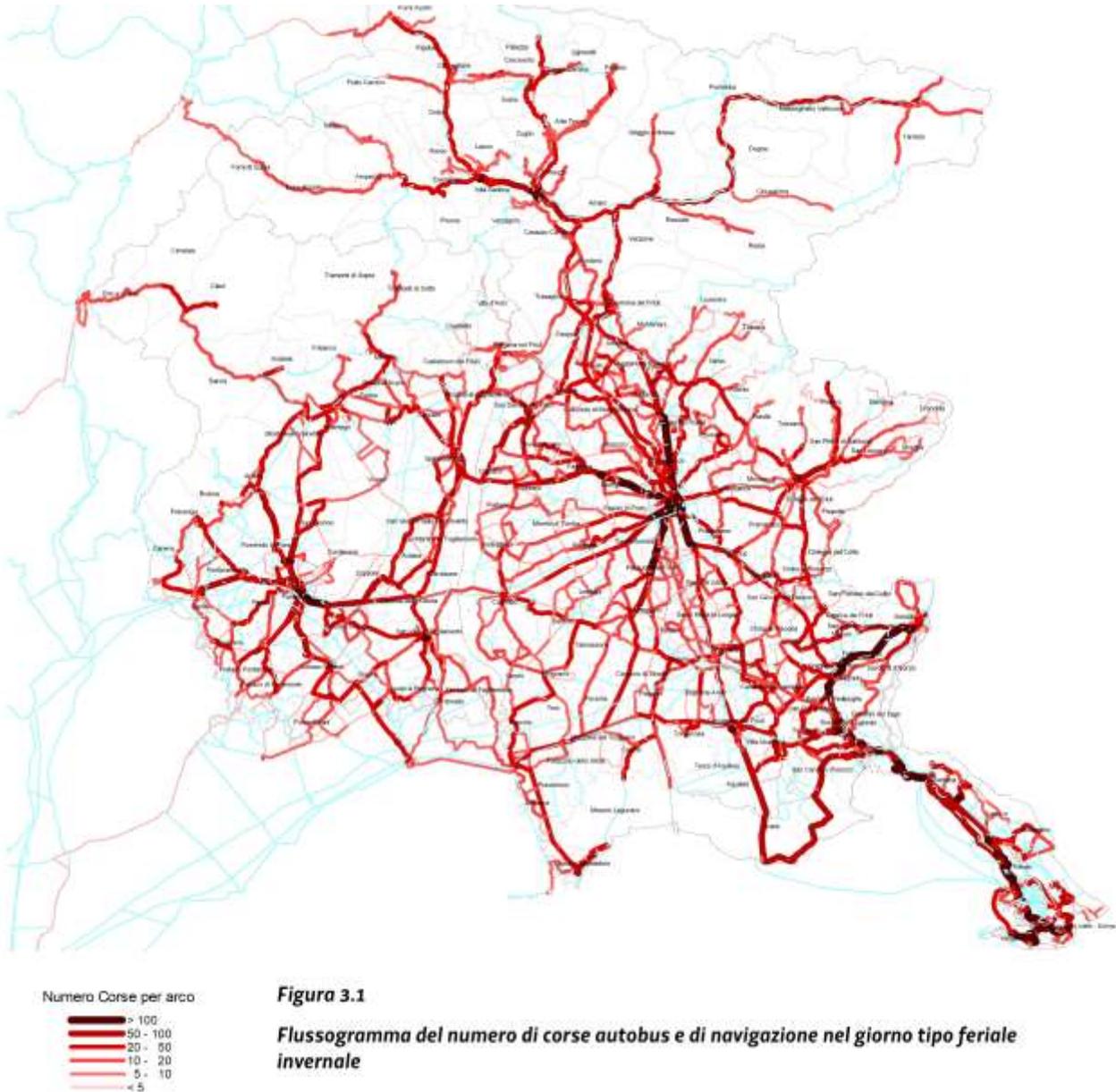
Figura 3.1

Flussogramma del numero di corse autobus e di navigazione nel giorno tipo feriale invernale

Figure 26: number of regional bus routes

Looking at the timetables of regional public transport services, it emerges how mode integration strategy is not well developed yet.

Importantly, in the field of road public transport services, regional planning documents identify the so-called "third level services" and the correspondent transport network. Third-level services consists of flexible transport options like on-demand services. The foreseen structure of such services is shown in the next figure.
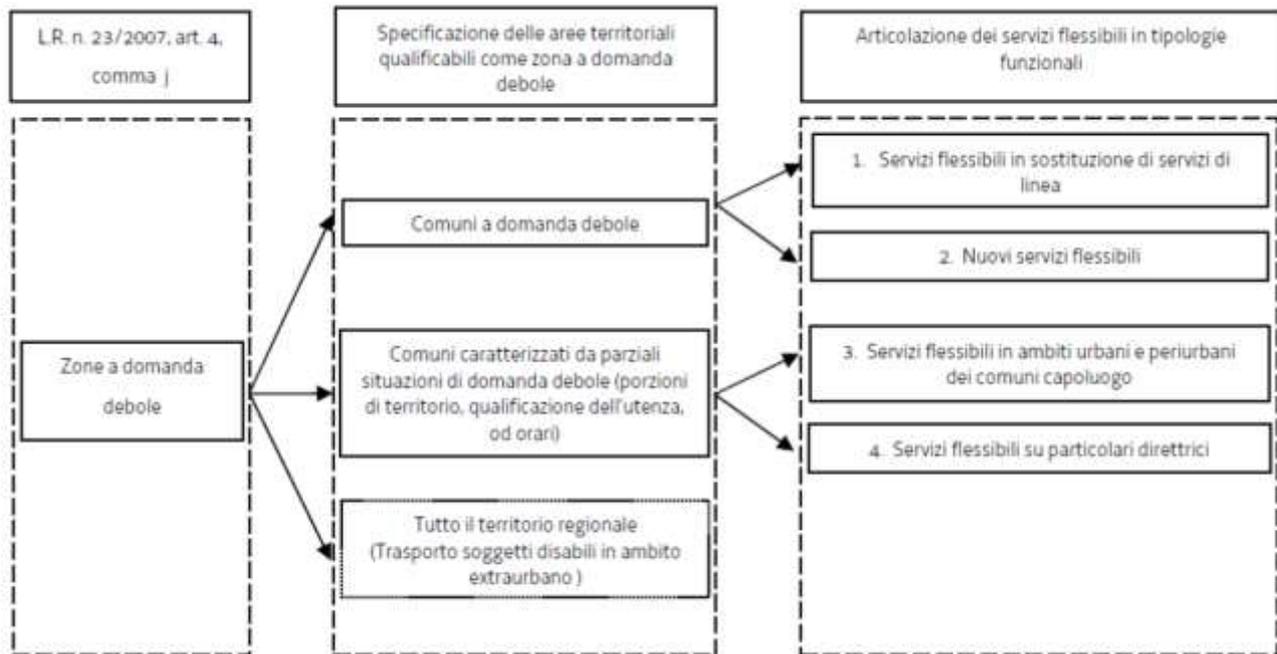
Figure 27: third-level/flexible public transport services framework at regional level

Plainly, this type of services are central in Peripheral Access. As shown in the figure, various types of business models exists when developing on-demand services. In weak-demand municipalities – meaning, with less than 5,000 residents – flexible services have the aim of:

- improving public transport quality of service in areas already served by traditional routes;
- extending already existing public transport traditional services.

In the first case, some 10 territorial areas with weak-transport demand are identified[2]. Flexible services are associated to non-regular transport demand (random mobility) by substituting existing traditional services in off-peak hours. The critical issue here is that regular demand is distributed over many dispersed origin-destinations in those areas and demand is generally low. Something that make traditional services inefficient and ineffective.

In the second case, the territorial coverage comprises all the weak-demand municipalities. In such a case, flexible services aim at:

- extending the existing public transport network to areas not already served;
- enhancing existing weak connections.

In any case, flexible services are to be devised with a view of integration with traditional ones.

As for maritime services, current supply provides for some 51,700 marine miles a year. By and large, services are seasonal (in the summer time), with the only exception of the route Trieste-Muggia which is annual and provides for 55% of overall output.

Regarding the specific aims of Peripheral Access project, two best practices inn FVG Region may be briefly described in this document. The first one is a best practice for its methodological approach and the second one for the lesson learned.

In 2001, a feasibility study has been performed in order to evaluate the effectiveness of implementing a Demand Responsive Transport Service (DRTS) in the municipality of Muggia, which is a small town in the province of Trieste characterized by a low population density and mobility demand. Its territory is served by seven bus lines, that refer all to the main station situated in the city centre of Muggia; this station

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[2] The Italian acronym is ADD (Aree a Domanda Debole)

represents an important interconnection transport node, as it offers an efficient connection from and to Trieste, thanks to the presence of a quite high-frequency bus line.

The traditional public transport service within the municipality of Muggia is able to provide a widespread coverage in space but not in time, since routes often have a low frequency. Therefore, considering the geographical and demographical properties of the town and the features of the transport supply, the realization of a DRTS has been considered a solution that could potentially increase the performances of the mobility system in Muggia, entailing advantages both for the service provider and the users.

The first step of the planning process consisted in the analysis of the characteristic of the territory in which the new transport system was intended to be implemented, along with a detailed examination of the current mobility service; the structure of the local public transport service was investigated both in terms of lines, routes and time schedule, and of organizational aspects of the transport company, i.e. the shift of vehicles and personnel.

The analysis of the status quo of the service supply and of the practicability represented an initial fundamental phase, because it constituted the starting point for planning future advancements and, consequently, the principal frame of reference. Later on, preliminary activities for the creation of the software work environment were carried out: in fact, data and information were gathered in relation to mapping, road network features, bus stop locations, parking areas, etc. After that, due to the limited territorial extension of the examined town, an analysis of the current mobility demand was performed through some on-board surveys on all bus lines and for every route; the number of passengers loaded and unloaded at each bus stop was determined with reference to three specific days, that were considered to be meaningful, and only to afternoon hours, during which the entity of passenger volumes is really low.

According to the data on passenger flows collected by the bus drivers, a DRTS was designed as a feeder service to the main station in Muggia: this service was meant to be run from 2 p.m. to 10 p.m., adopting a booking system by phone or via internet, which accepted transport requests at least an hour in advance, and using the smallest vehicles currently available by the transport company; the operations centre was supposed to be established in the main station of Muggia. Finally, the planned DRTS was evaluated by performing some simulations, considering two different scenarios of intervention: in the first one, the traditional public transport service was completely substituted by the flexible one; on the other hand, the DRTS was integrated with the conventional service, as its most efficient line remained entirely operational. It turned out that the full replacement of the seven traditional lines was not so convenient both in time and in travelled distance, involving no major benefits in the transport supply and no remarkable financial advantages, even employing a limited number of buses. Indeed, the additional introduction of the DRTS, as a support to a line of the conventional transport service, was simulated taking into account different possible alternatives, in order to define the most valuable strategy: in fact, by changing a few parameters like the number of vehicles and the width of the operational time window, the integrated mobility system proved to be economically feasible and capable of providing good technical performances. In conclusion, even though the DRTS in the municipality of Muggia has been only simulated and not actually implemented, it can be considered a best practice of the flexible transport service because it represents a valid example of the design of a particular Intelligent Transport System.

Overall, from state-of-the-art regional analysis some critical issues and evidences emerge:

- the rail service supply is strongly in needs of some improvements in terms of connections, travel times and connecting schedules. Such critical issues should be definitely tackled to promote mode integration and attract demand, particularly random users. More specifically, there is the need to promote project of coordinated timetables;

- the road service supply shows good standards, namely with respect to regular users. Nevertheless, improvements are needed to attract random users. Of particular note is the need to strengthen services devoted to weak-demand areas by means of innovative business models;

- the maritime service supply shows a poor geographical coverage of the regional coasts and the connections with adjacent regions.

- Thanks to previous experiences, mature competence and tools exist in the field of design and management of DRTS.

Cross-border services

Main regional cross-border rail axes consist of:

- connections to/from Austria, particularly with Villach and Klagenfurt;

- connections with Slovenia – of specific interest for Peripheral Access – particularly on the Gorizia-Nova Gorica-Sezana-Trieste-Koper and the Trieste-Lubljana axes.
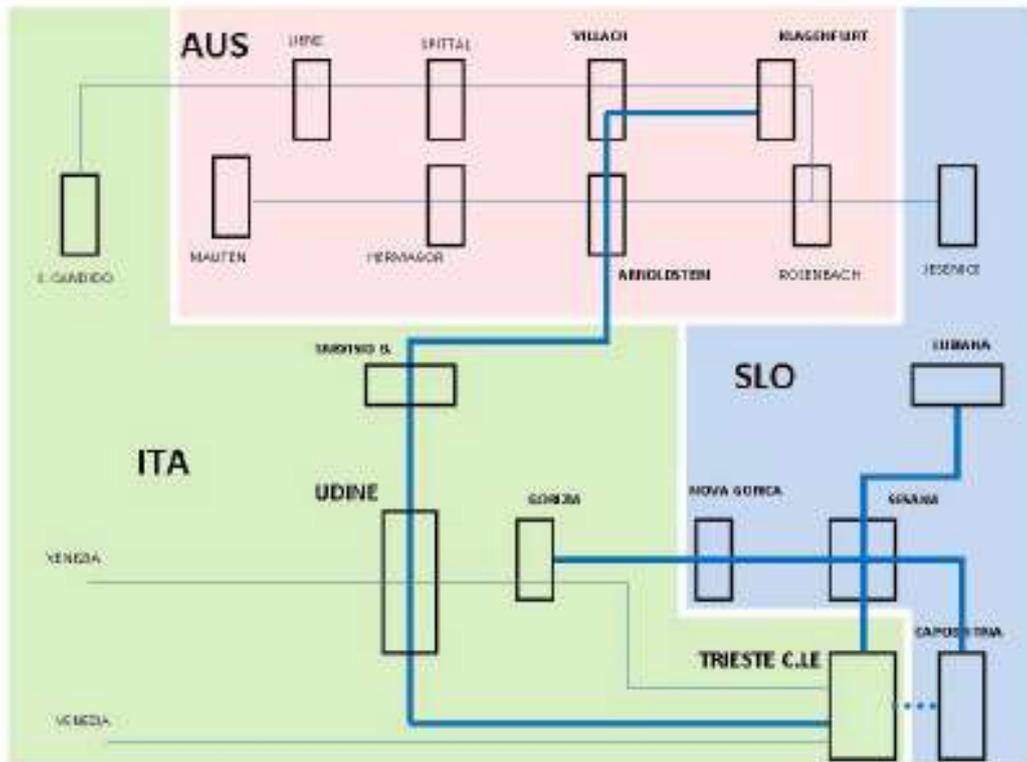
Figure 28: main regional rail cross-border connections

Connections with Slovenia – centered around the main nodes of Gorizia, Nova Gorica, Sezana, Trieste, Koper – are the subject of development projects involving larger territories.

As for road services, starting from 2008 cross-border services are formally defined by the Region and the Ministry of Transport as those arriving and departing within areas determined by a distance (40 kilometres of radius) starting from borders. As a result, one gets nine areas, among which that of interest for Peripheral Access is the one centered around Trieste involving Fernetti, Sezana, Lipica, Pese-Kozina, Rabuiese-Skofjie and S. Bartolomeo. Current state of cross-border connections with Slovenia is presented in the following table.

Relazione	Numero corse A+R
Nova Gorica - Erjavceva MP/S.Gabriele – Gorizia	10
SV. Gora - Nova Gorica – Gorizia	2
Nova Gorica – Gorizia	2
Sezana – Trieste	3
Postojna - Sezana – Trieste	1
Ajdovscina - Sezana – Trieste	1
Capodistria – Trieste	4
Piran - Capodistria – Trieste	1
Izola – Capodistria – Trieste	1
Obrov - Kozina – Trieste	2

Table 12: state-of-the-art of cross-border road connections with Slovenia

From the table one realizes that the number of daily connections is rather limited. This represents a critical issue nowadays. Current policies leave to specific projects – including EU projects – the task to address such a critical issue. Such projects should take into account the opportunity to integrate cross-border services with public transport services already provided at regional level so as to improve overall competitiveness and accessibility of public transport. The integration of services must be developed around the main interchange nodes (eg, CIMRs).
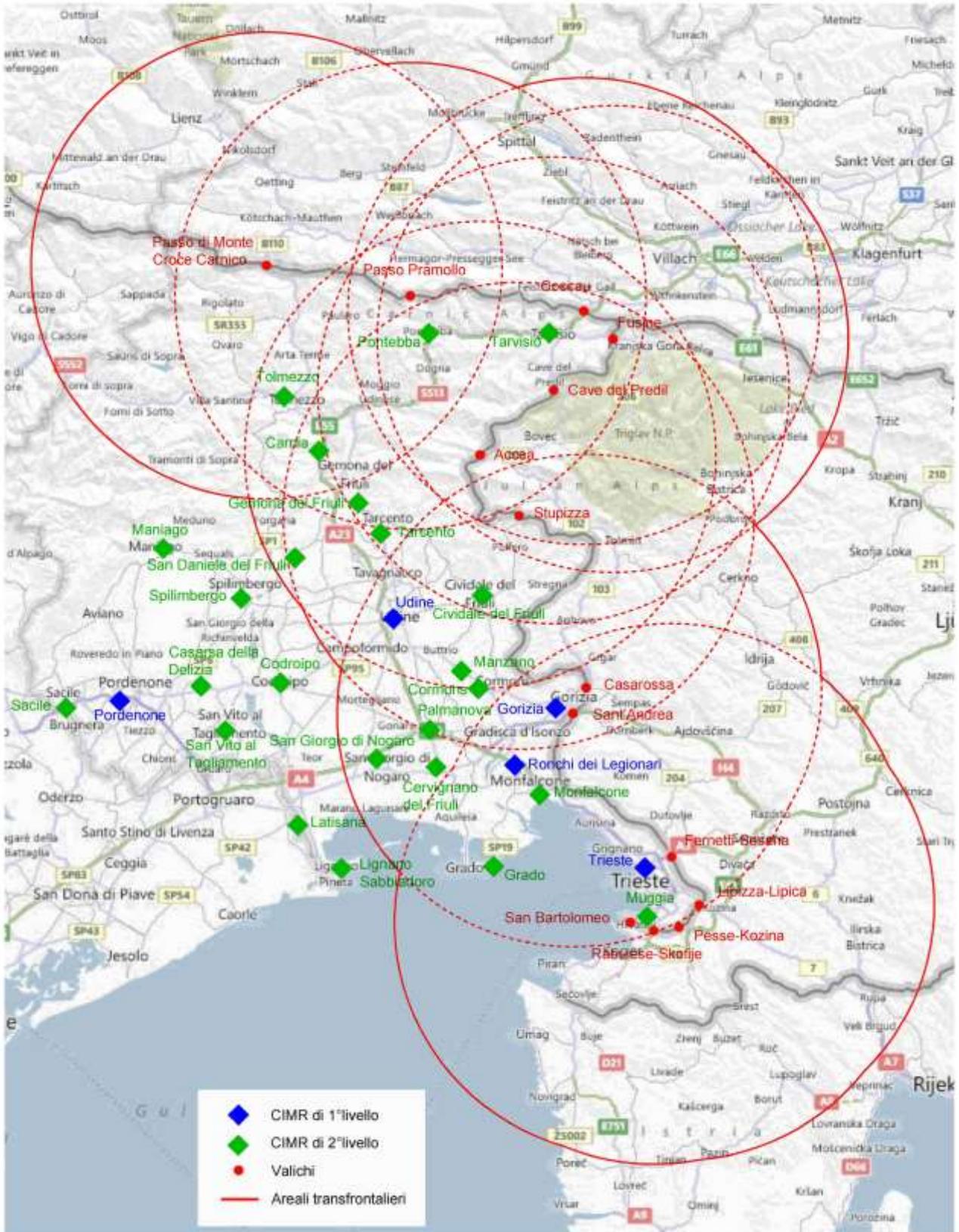
Figure 29: cross-border areas and main interchange nodes

In the field of cross-border maritime services, only the connection Trieste-Piran-Rovinj-Pula exists, which is subsidized by the Region and employs a hydroplane in the summer time.

4.5. Smart mobility

Besides smart mobility issues related to flexible/on-demand public transport services – already discussed – a regional law and other policies provide for a regional integrated ticketing system supported by innovative technologies (smart ticketing). Current ticketing system shows a rather good conformity of rates over various sub-regional areas and between road and rail services – which is something definitely uncommon at national level. This fact constitutes a requirement for the development of an integrated and smart ticketing system. Ticket integration can be:

- unimodal, between different road services. In such a case, public transport companies can stipulate agreements of ticketing system management (simple and season tickets for integrated urban-peripheral services);

- multimodal rail-road. Currently, such a system is only provided on the Tarvisio-Gemona-Udine connection.

An additional feature of the current state of regional smart mobility is represented by the development of infomobility system, that is, smart tools supporting the users in various mobility choices (traveller information system). So far, a good number of on-board vehicle equipment has been deployed, both on rail and road means. In particular, the AVM-AVL system has been completed along with the deployment of variable message dashboards and on-board audio equipment.

UdG	Sistemi telematici/elettronici	Numero
Goriziana	Paline elettroniche a led luminosi (rete urbana di Monfalcone)	5
	Sistema AVM	Intero Parco
Pordenonese	Sistema AVM	Intero Parco
Udinese	Sistema AVM	Intero Parco
Triestina	Paline elettroniche a led luminosi	11
	Autobus dotati di sistema contappasseggeri	58
	Sistema AVM	220

Table 13: Current state of infomobility systems

However, some critical issues can be identified with reference to differences among various types of equipment and infrastructures supporting users' information deployed at stops, railway stations, multimodal nodes and road terminals.

Additional critical issues of road services consist of:

- missing activation of audio-visual equipment on-board vehicles;

- scarce availability of variable message equipment at stops and differences between provided information and actual service.

In the rail sector main critical issues are the following:

- too old or absence of video equipment at some railway stations;

- mismanagement of information provided to users, particularly on the occurrence of emergency events (delays, incidents, etc.) due to lack of coordination between the infrastructure manager and the rail operator;

- missing updating of information at stations.

In the field of multimodality, critical issues are:

- lack of smart tools to support users when planning the trip;
- information mismanagement;
- lack of information provided to users supporting modal shift, both at nodes and on-board vehicles.

4.6. Smart governance and marketing

In the Region of Friuli Venezia Giulia, the governance of the transport field is entrusted to the Regional Administration, which is responsible for its strategic, operational and financial planning and management, both for the infrastructural and organizational aspects.

The Regional entity has defined the main lines of action regarding local public transport by releasing a document called "Piano Regionale del Trasporto Pubblico Locale" (PRTPL - Regional Plan of Local Public Transport): it provides a well structured and efficient governance model, based on a tendering system defined by the regional administration, for guaranteeing the right of mobility to the inhabitants of the whole territory.

The principal goal of this plan is to realize an integrated planning of the different modes of public transport, thanks also to the contribution of technological tools, in order to obtain a significant shift from the private to the public transport, which entails a higher environmental quality and network decongestion. The directives contained in this regional regulatory instrument concern transport services of all the three levels of classification and can potentially be redefined by contractors, with the aim of enhancing the system effectiveness or of adjusting the project to the context variations.

The concept of integration can be found in the Regional Plan of Local Public Transport in relation to some other specific issues of the local public mobility, such as the cross-border transport and the pricing system: in fact, movements towards the surrounding European countries, like Austria and Slovenia, are strongly supported within this guideline for increasing the cohesion between the regional and cross-border populations; while an integrated charging scheme is definitely in line with the objective of intermodality and, consequently, of a seamless fruition of the transport service by users.

The current governance model of the local public transport service in Friuli Venezia Giulia is well defined and very effective. It is based on a tendering system managed by the Friuli Venezia Giulia Region, and it is considered by many studies and statistical analysis as one of the best models in Italy, for service quality, vehicle fleet age, territorial coverage, innovation and rate of passengers, especially in urban areas.

Today the service is organized into four management units, corresponding to the territories of the four provinces (Trieste, Udine, Pordenone and Gorizia). The service is operated since 2001 by four transit Companies, winners of a European tender: Atap in Pordenone, Apt in Gorizia, Saf in Udine and Trieste Trasporti in Trieste. The four transit Companies carry out the bus connections provided for in the Regional plan of local public transport, based on the indications of the Friuli Venezia Giulia Region, which is the administrator and the owner of the service.

The ownership of the four transit Companies is constituted by public and private partners. Atap and Apt are companies with a public majority. In Saf and Trieste Trasporti, on the other hand, there is a strong private presence: the reference partner is in fact Arriva Italia, an Italian holding company of the English group Arriva (owned by Deutsche Bahn). Arriva Italia has a 60% stake in Saf and 40% in Trieste Trasporti, and in both cases expresses the CEO.

Arriva Italia holds about 5% of the Italian passenger transport market, both in urban and extra-urban services, and currently manages, at national level, a portfolio of 8 transit Companies, with around 100 million kilometers a year, 2,400 vehicles and 3,500 employees. In Trieste, the collaboration between the Municipality of Trieste (which is the majority shareholder of Trieste Trasporti) and Arriva is very positive and has never caused conflicts between workers and the Company. For his part, Arriva brought a great experience and managerial expertise to Trieste Trasporti. The Municipality instead allows a constant interlocution with the territory.

After the first ten years of the tender, in 2011 the Service Contract with the four transit Companies was extended several times up until 31 December 2018. Meanwhile, the Friuli Venezia Giulia Region banned a new tender in 2014, and decided to entrust the service of local public transport (land and sea) to a single

operator. The goal is a strong intermodality with the railway and airport services, a reduction in costs for the public administration and an increase in quality.

The tender launched in 2014 was attended by two transit companies: BusItalia-Autoguidovie and Tpl Fvg, a consortium formed by the current four regional public transport Companies, with a 25% stake for each company.

Due to an appeal to the administrative court by Busitalia against the Region FVG, the 2014 tender was cancelled. In 2016 the Friuli Venezia Giulia Region re-proposed the tender notice, after having modified it according to the indications of the judges of the Council of State. The two companies have resubmitted the offers. In January 2017, the Region decided that the winning Company of the tender is the company Tpl Fvg. BusItalia-Augtoguidovie has however submitted a new appeal to the Regional Administrative Court (TAR) against the outcome of the tender. The judges of the Council of State, on March 8, 2018, rejected the requests of Busitalia-Autoguidovie and definitively closed the matter, confirming the award of the tender to Tpl Fvg.

At the same time, in May 2018, Friuli Venezia Giulia voted for the renewal of the regional council: this fact made further the signing of the Service Contract between the Region FVG and the Company Tpl Fvg. The contract will be signed by summer 2018 with the new regional government, and the new service of Tpl Fvg will start in the first few months of 2019.

The four provincial transit Companies will continue to exist, but they will make available to Tpl Fvg personnel, vehicles, IT systems, knowledge and planning.

Tpl Fvg will manage more than 40 million kilometers a year, will have 1,900 employees and will transport about 8.5 million passengers a month, and will be one of the major Italian operators in the public road passenger transport sector.

With the new management of the local public transport service the Friuli Venezia Giulia Region will save about 12 million euros a year: the cost of the service for the public administration will in fact fall from the current 132,279,294 euros per year (for the four companies) to the future 120,238,919 euros, with 7 per cent of kilometers more than the current ones (from 40 to 43 millions).

The new contract also includes an upgrade of the school transport service, direct connections to the main hospitals in the area (+10,200 km/year) and new flexible on-demand services.

There is also an additional 714,551 km per year for bus connections between the main urban centers of the region and the hinterland municipalities; 95,772 km per year are dedicated to tourist transport and to reach the main cultural and naturalistic sites. Intermodal services and the transport of bicycles with an additional 184,000 km / year are encouraged to link the various interchange hubs.

The service contract commits the new operator Tpl Fvg also in terms of investments with a renewal obligation of the bus fleet over the next 10 years for a value of 135 million euros for 540 new buses. In this regard it should be noted that Trieste Trasporti has always invested substantial resources on its fleet, with a renewal rate of more than 30 buses per year. Today, Trieste Trasporti is one of the European companies with the youngest fleet (4.2 years) and with the lowest emissions into the atmosphere.

Approximately 7.3 million will also be allocated to investments in technology and innovation, with digital systems to ensure information to travelers, electronic ticketing systems, a Wi-Fi network on all vehicles in the fleet, an on-board video surveillance system connected in real time with police stations, informative monitors at waiting stops and counting devices on all vehicles.

There are also 2.7 million investented in favor of disabled people (on-board communication technologies, bus equipped with disabled wheelchair-accessible platforms, flexible services), investments that will allow the integration of existing devices and technologies.

From the start of the new services people can travel throughout the region with a single ticket or subscription, with significant savings also on costs (today in each management unit you need to use a different ticket).

The tariff policy of the local public transport service in Friuli Venezia Giulia is currently decided each year by the regional government. Following the signing of the new Service Contract between Tpl Fvg and the Region, a new tariff policy will be designed, with lower costs for users.

4.6.1.   The new service of Tpl Fvg

The general objectives of Tpl Fvg are the following:

- to connect all parts of the territory also contributing to eliminate architectural barriers;
- to ensure maximum mobility of people, supporting intermodal services;
- to promote sustainable mobility, reduce energy consumption, use vehicles with low environmental impact;
- to promote a balanced economic and social development of the territory;
- to promote flexible and on-demand services in Friuli Venezia Giulia region;
- to reduce the costs of the service for the public administration.

The new local public transport service will have to connect schools, hospitals, tourist sites, rural and mountain areas, peripheral areas.

The network of the local road public transport system currently covers more than 5,100 kilometers in Friuli Venezia Giulia and it has more than 8,000 bus stops. It is a very widespread service.

Currently the service is aimed primarily at transit dependent riders, or those customers who do not have the ability to use a private vehicle; the new service will have to satisfy the so-called choice riders, or those customers that can choose whether to use the car or public transport.

Within two years from the start of the new service, Tpl Fvg will increase the total kilometer production by road from the current 40 million kilometers to around 43 million kilometers. Of these, a substantial part will have to concern flexible on-demand services.

The Regional plan of local public transport provides a dense network of flexible connections to meet the demand of people living in areas with weak demand (ADD), disabled people and in general of all those areas where demand could be better met with innovative and non-conventional services.

The new services will be realized with vehicles compatible with roads and peripheral itineraries today mostly ignored by the traditional local public transport service. The call for tenders requires that flexible services must be designed and activated within 18-24 months from the start of the service for a total distance available of about one million kilometers.

The project also includes an increase in the number of travel ticket resales, especially in rural and peripheral areas of the region. Today there are 1,603 resales. With the new service, they will be 1,767. The ratio between resales and resident population will pass from 1.13 to 1.24 per thousand inhabitants, with an increase of 10.23 percent. The new stores will also be information points: therefore, training courses for retailers will have to be done. The stores will give information on routes, timetables and routes. The objective of Tpl Fvg is to cover at least 35% of the costs of the service with revenues from the sale of tickets.

Until today there are no data or experiences on which to base the design of flexible transport services in Friuli Venezia Giulia: an initiative was started at the beginning of the 2000s in Trieste between Trieste Trasporti and Softeco Sismat, a leading company in the ICT market and smart mobility, but it was a project that was not considered useful to complete.

For flexible services, Tpl Fvg proposed to apply the normal rates of ordinary local public transport services.

4.6.2.   The Tpl Fvg service in the province of Trieste

In Trieste, Trieste Trasporti buses currently travel more than 13 million kilometers a year. The service is very widespread and highly appreciated by the people who live in Trieste, as the customer satisfaction confirmed. Tpl Fvg will increase the service kilometers in Trieste by about 5%. The increases will be agreed with the Region FVG and with the Municipality of Trieste. The objectives are to strengthen intermodal services, connect peripheral and rural areas, contribute to the development of the economy and above all tourism (which is an increasingly important asset for Trieste). Moreover, the services for the

scientific centers in the area will be enhanced (Trieste has one of the highest European presences of scientists in relation to the population).

4.6.3.   Link with the Trieste Transport pilot action in Peripheral Access

For the Peripheral Access pilot action it is planned to activate, on an experimental basis, a flexible on-demand service to complete the offer of the local public transport service in the less-served and more peripheral areas of the territory. The pilot action, in particular, involves the activation of a fixed route link backbone between the towns of Opicina and Basovizza, with a series of on-demand diversions to the more peripheral and less connected karst places (including Grozzana, San Lorenzo, Draga Sant'Elia, Gropada and Banne).

The route runs along the Italian-Slovenian border and is at the service not only of the people who live in the most outlying areas of the province of Trieste but also of cross-border workers who live in neighboring areas of Slovenia (such as Duttogliano, Sesana, Divaccia, Lipica, Cosina).

Opicina, the starting point of the route, is the main interchange node on the Trieste plateau: from Opicina the historic trenovia connects the plateau with the city center, and in Opicina there is the second railway station of the province (the Villa Opicina station) from which every day 6 trains depart from Ljubljana with a service operated by the Slovenian railways.

The activity of Trieste Trasporti within the Peripheral Access project is combined with the activity that the Company is carrying out in the Connect2CE project (CE886), funded by the ERDF under the Interreg Central Europe Transnational Cooperation Program. Lead partner of Connect2Ce is the Central European Initiative (Executive Secretariat). Trieste Trasporti participates as an associated partner in the project.

Connect2CE aims to strengthen the planning capacity of public transport in all its articulations (road, rail, sea, bike sharing) at regional and transnational level, with a specific focus on peripheral areas and their connection with the main nodes of the network. Within the project, an experimental pilot action is planned for the introduction of a single integrated cross-border multimodal ticket (Italy-Slovenia), in partnership between the Slovenian railways and the local public transport service operated by Trieste Trasporti.

In order to ensure the operation of the new railway service and the pilot action, it is necessary to reactivate the connection previously operated by Trieste Trasporti at the rail station of Villa Opicina: currently the connection is suspended due to the bad conditions of the access road to the railway station.

The activities of the Connect2Ce project make the pilot action provided by the Peripheral Access project even more useful and functional: the two projects can in fact make Opicina one of the main intermodal centers in the province of Trieste and an important gateway between Italy and Slovenia.

The on-demand transport service that will be activated as part of the Peripheral Access project is an absolute innovation for Trieste, where in the past no such services have ever been operated. The pilot action will allow assessing the demand from people living on the Trieste plateau and in the neighboring countries of Slovenia, producing a database that will allow Tpl Fvg to structure and better prepare the on-demand service provided by the tender and which will have to be activated by 2020.

The activation of the pilot action must be authorized by the Friuli Venezia Giulia Region, because it will be included in the local public transport service activities.

In Peripheral Access, Trieste Trasporti and VIU will also check the current laws in order to allow, in the future, the activation of a cross-border local public transport service: current laws do not allow cross-border connections with intermediate bus stops. Peripheral Access will be an important opportunity to discuss the topic not only with the Friuli Venezia Giulia Region but also with the Italian municipalities of the Trieste plateau and with the Slovenian administrations. The discussion should lead to a working hypothesis with the aim of intervening on the regulations in force to guarantee suitable cross-border connections by bus, especially for cross-border workers.

The management of the on-demand service will be the same as Tpl Fvg. Customers can book the service with a certain notice (the interval is to be defined), in order to allow the collection of reservations and the definition of the route, which must be communicated to the bus driver. A mobile app will also be activated to support the pilot action. Currently the app has not yet been chosen. Several are the solutions that the managers of the IT office of Trieste Trasporti, in collaboration with VIU, are evaluating: the goal

is to provide a service that is easily accessible and easy to use. At the moment the best option seems to be that one proposed by the company MyCicero, which is a partner of the Arriva group and sells in Italy one of the most widespread and appreciated mobile apps for mobility services. With MyCicero, we are evaluating the possibility of customizing the mobile app to the specificities of the territory of Trieste and to the needs of the Peripheral Access project. As an alternative, Trieste Trasporti and VIU are evaluating the proposal of Softeco Sismat, a leading company in the smart mobility sector. In the past, Softeco had already collaborated with Trieste Trasporti.

4.7. Involved stakeholders

The involvement of the Stakeholders have been conducted with respect to the project pilot of Peripheral Access project realized by the project Partners Trieste Trasporti (as the Public Transport Operator) and VIU (as the scientific support and coordinator). For the time being, some contacts have already started with the two main public actors (i.e. Regione Autonoma Friuli-Venezia Giulia and the Municipality of Trieste), with the aim of presenting the pilot's objectives and collecting some preliminary feedbacks. In the main, the involvement of the remaining stakeholders will be undertaken as soon as the whole pilot's plan will be detailed.

In the following table, the map of stakeholders is depicted, in relation to the type, name and status/prevision of involvement.

TYPE	STATUS QUO IN 2016	OUTLINE OF ACTIVITIES
Regional public authority: Friuli Venezia Giulia Region	Comprehensive knowledge about the aim of the pilot, also discussed in the phase of preparing the project's proposal.	The involvement of the regional authority concern the authorization procedures for running the pilot.
Cross Border public authority (Italy): • Municipality of Trieste • Municipality of Sgonico • Municipality of -San Dorligo della Valle	High interest/request of operating a new service for improving the accessibility of their territory.	Active participation to the pilot in promoting the service to the users at local level
Cross Border public authority (Slovenia) • Municipality of Sesana • Municipality of Erpelle-Cosina	Not aware about the aim of the Trieste pilot case	Active participation to the pilot in promoting the service to the users at local level
Potential users of the service: • Inhabitants of the peripheral villages covered by the new service • Commuters of SISSA (Research center located within the area of the new service)	High interest/request of operating a new service for improving the accessibility of their territory.	Usage of the service

Local public actors for touristic promotion: GAL Carso	High interest/request of operating a new service for improving the accessibility of their territory.	Support in promoting the service to the users at local level
Transport operators (partners of holding for the regional public transport): • SAF Udine • ATAP Pordenone • APT Gorizia	Not aware about the aim of the Trieste pilot case	Demonstrate the feasibility of testing innovative solutions for improving the accessibility of the rural peripheral areas
Association of the Italian public transport companies: • ASSTRA	Not aware about the aim of the Trieste pilot case	Demonstrate the feasibility of testing innovative solutions for improving the accessibility of the rural peripheral areas
Trieste Trasporti owner group: • ARRIVA (Italy) • ARRIVA (UK)	Not aware about the aim of the Trieste pilot case	Demonstrate the feasibility of testing innovative solutions for improving the accessibility of the rural peripheral areas

Table 14: the map of stakeholders is depicted, in relation to the type, name and status/prevision of involvement.

5. Regional status quo analysis of Ljubljana urban region

5.1. Introduction

Regional status quo analysis in this documents is a summary of public transport in Ljubljana urban region (LUR) study. LUR covers 26 municipalities of the Ljubljana urban region including Ljubljana. The biggest and the most important national scientific, research, educational and cultural institutions are located here.

The current state of public transport within LUR, its deficiencies and advantages are described below. The document describes good and bad practices related to multimodality and intermodality, ICT and smart governance. Since the pilot activities of the project in LUR focus on demand responsive transport (DRT) the status quo analysis is trying to identify most critical areas in terms of lack of public transport, especially those with low population density. Those areas got the potentials for introducing DRT. Multimodality and intermodality topics are explained in more detail than ICT and smart governance.

5.2. Area characterization

The LUR covers 12% (2.555 m2) of entire area of Slovenia. Ljubljana urban region (Central Slovenia Statistical Region, NUTS 3) n is located in central Slovenia in Ljubljana basin that is surrounded with highlands (the Alps in the north and Dinarides in the south). It is the biggest region in Slovenia in terms of population (547.893 of inhabitants) and its number increases every year – 26% of the entire population of Slovenia lives in LUR (Figure 30).The average age of the population was the lowest (41,5 years) in Slovenia in comparison to other regions in the year 2016.

GDP per capital in LUR is the highest in comparison with GDP in other regions of Slovenia. LUR has generated 37% of the national GDP or more than EUR 25.000 per capita in 2015. The unemployment rate (6,5%) is lower that the Slovenian average in LUR, there is almost no gender differences in unemployment rates and the average level of education is higher than in other regions.

77.000 people come to work in Ljubljana urban region every day from other regions, most of them are from Southeast Slovenia (SE of LUR) and Gorenjska (NW of LUR) region (Figure 31). The vast majority of the working population of LUR works in this region (91%), which is not the case in other regions.
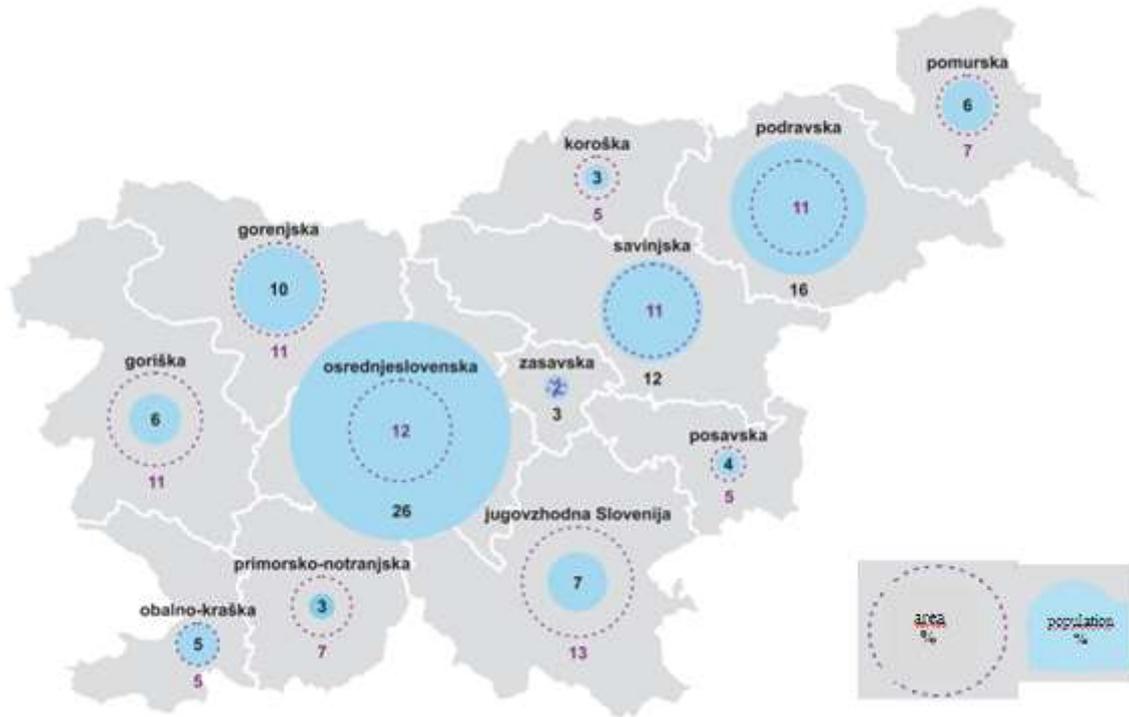
Figure 30: The share of the area and the share of the population in LUR and in other Slovenian region (source: SURS, 2018)
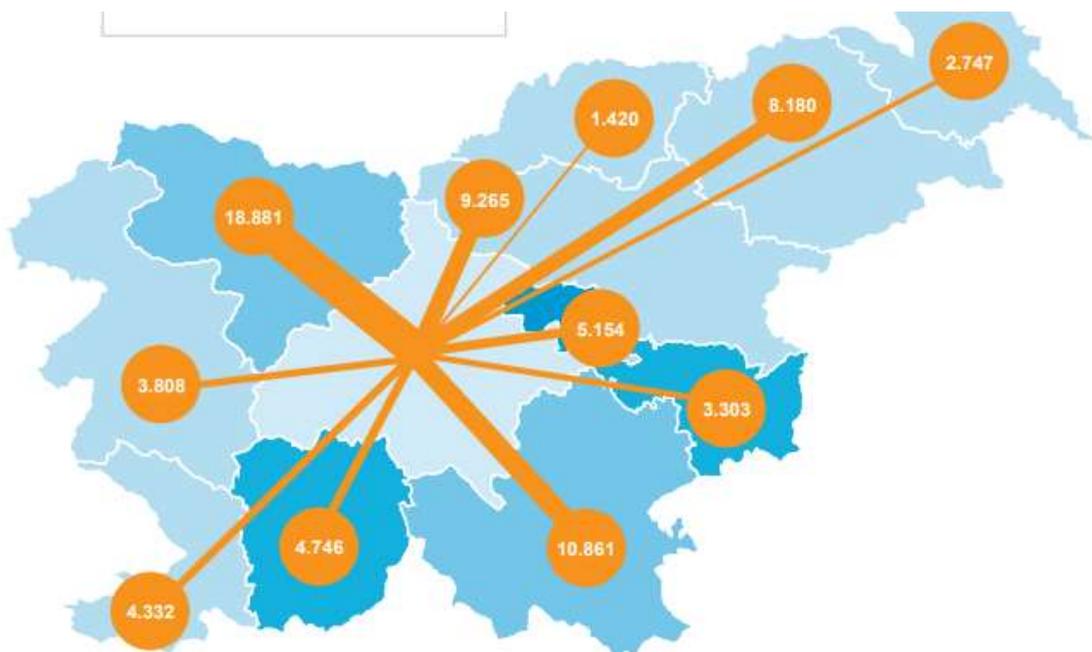
Figure 31: Commuters between regions, 2014 (blue: share of daily commuters to other regions),

(Source: SURS, 2018)

58% of all Slovenian students study in LUR (Figure 32). Less than half of all students in the region are permanent residents of this region, the others migrate daily or weekly from the rest of Slovenia.

region of residence   region of study
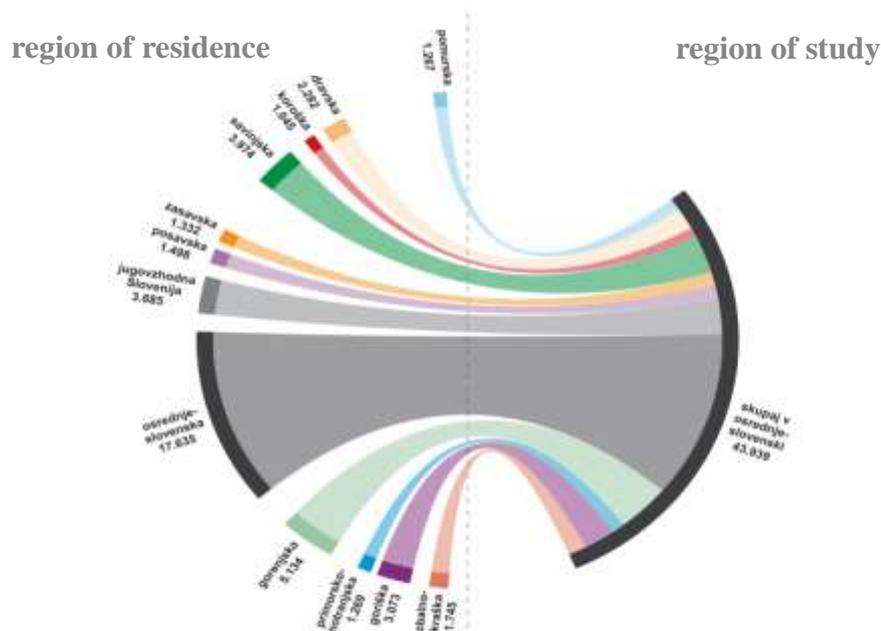
Figure 32: Residence of people, studying in LUR
(source: SURS, Regije v številkah, 2018)

Nearly 1.2 million tourist overnight stays were created in LUR in 2014, of which 92% were generated by foreign tourists. In LUR the share of foreign overnight stays of tourists compared to the domestic ones is the largest in the whole country. The number of tourists is increasing every year, in the city of Ljubljana even at the rate of 10% and in some periods is starting to exceed the maximum capacity that city can absorb.

The largest city and the centre of LUR is the city municipality of Ljubljana (286.300 inhabitants). Population is scattered throughout the region, the highest settlement density is within the cities of Ljubljana, Domžale, Grosuplje, Kamnik, Logatec, Litija and Vrhnika. Municipalities with population over 20.000 are Domžale, Kamnik and Grosuplje. The average population density is 212 people per square kilometre, that is two times higher than the Slovenian average (102 people/km^2) and it varies from 38 people per km^2 (municipality of Dobrepolje) in rural areas to 1109 people per km^2 in very urbanised areas (municipality of Ljubljana) (Figure 33).
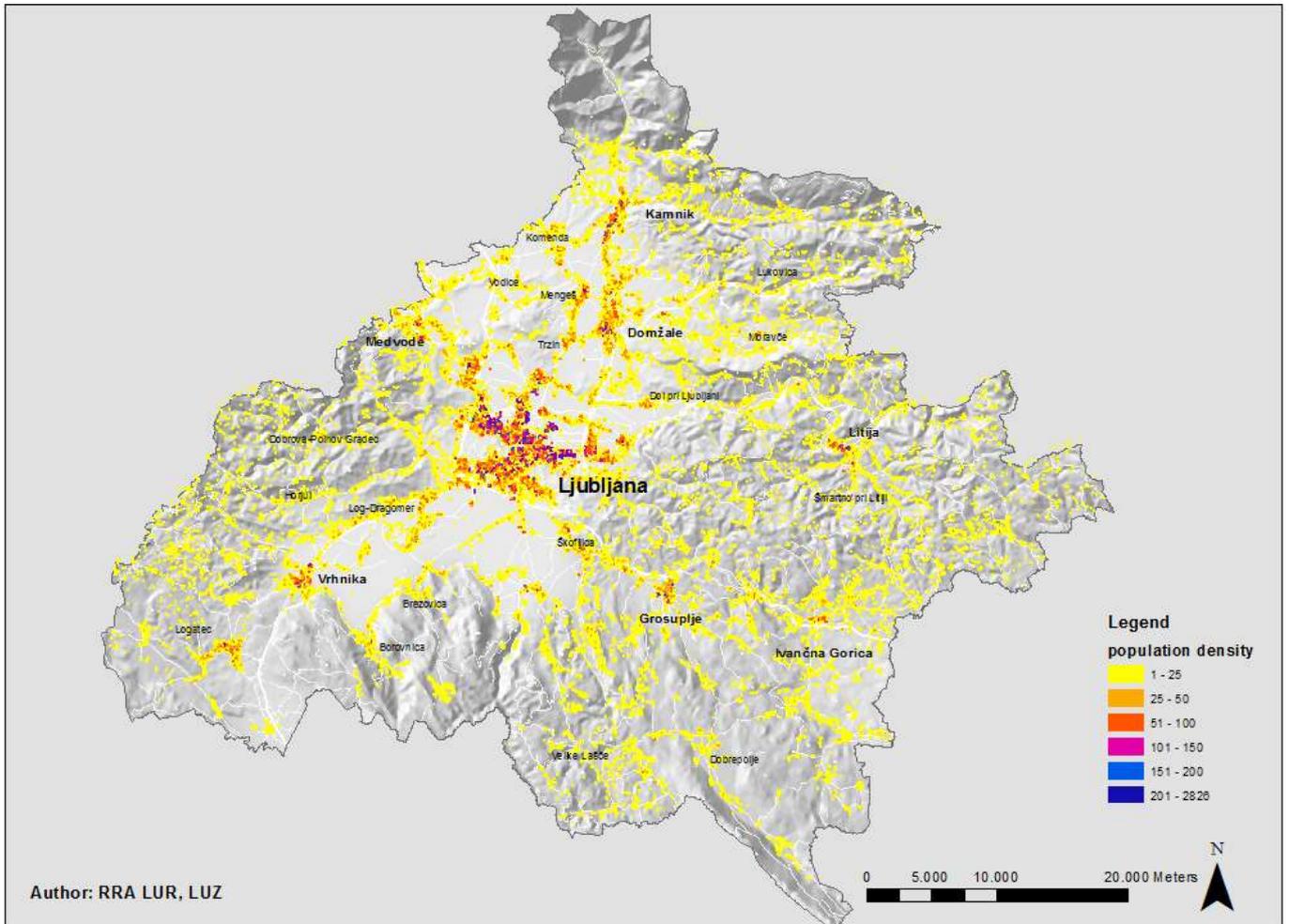
Figure 33: Settlement scheme - population density in Ljubljana urban region (source: MNZ, GURS, 2018)

The highest number of daily commuters within the region are between the municipalities Domžale-Ljubljana (8.000 commuters) in the north and Grosuplje – Ljubljana (5.000 commuters) in the south (Map 4). Domžale, Kamnik, Grosuplje and Trzin are also secondary employment centres (with over 5.000 working places each). More than 2.500 people come to work in Ljubljana every day from municipalities of Kamnik, Medvode, Vrhnika, Ivančna Gorica and Litija each.

If Ljubljana is not taken into account the highest number of commuters coincides with secondary employment centers of Kamnik, Domžale and Trzin in the north, Grosuplje (with Ivančna Gorica) and Vrhnika (with Logatec) in the south and Litija in the east (Figure 34).
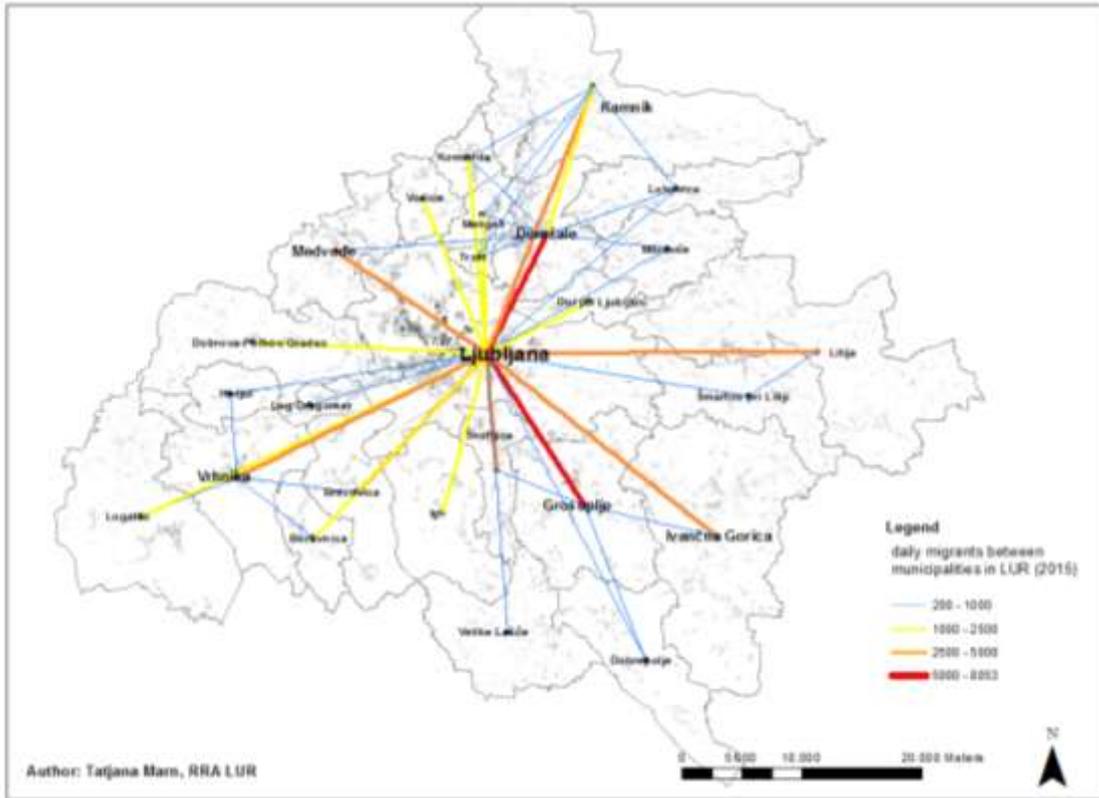
Figure 34: Daily commuting between the municipalities, 2015 (source: GURS, SURS, 2018)
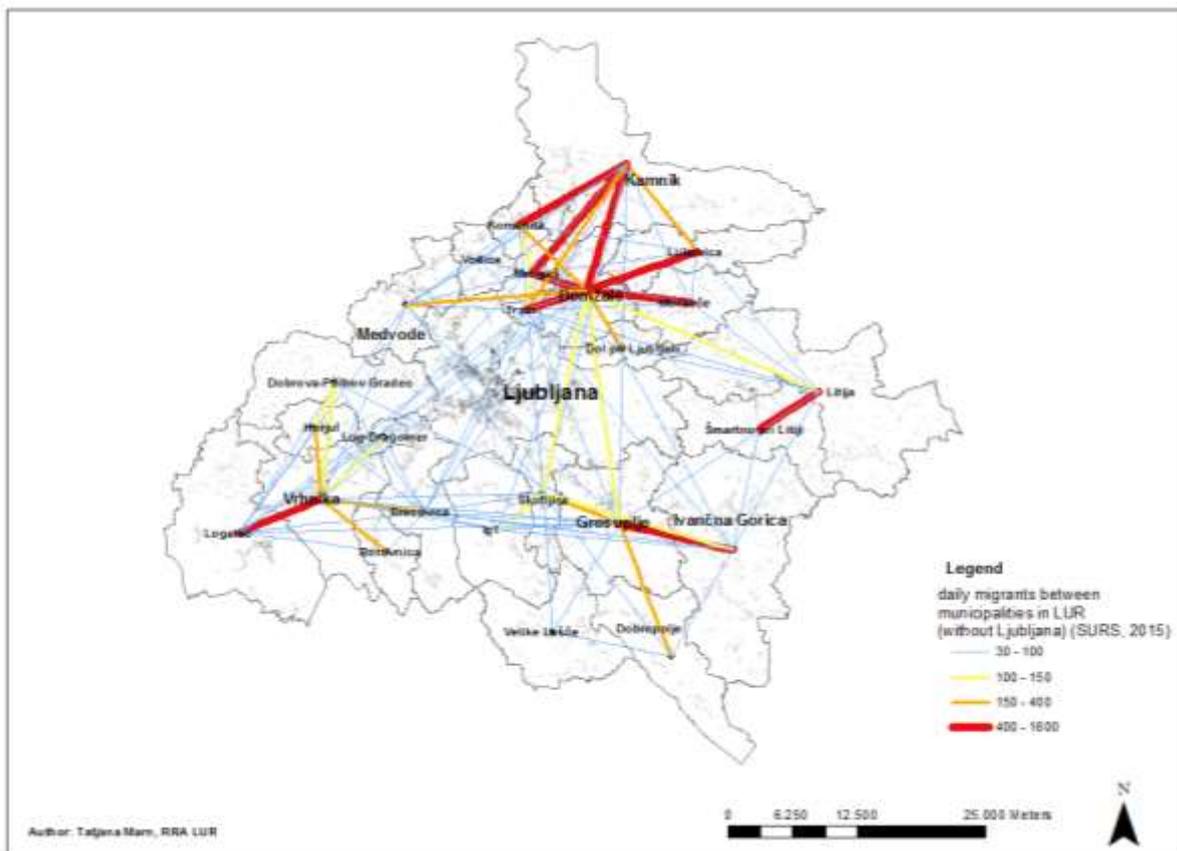
Figure 35: Daily commuting between the municipalities (without the municipality of Ljubljana), 2015 (Source: GURS, SURS, 2018)

5.3. Overview of transport infrastructure (incl. SWOT analysis)

Road infrastructure in LUR consists of motorways and expressways, main and regional roads, city roads, public paths and public bicycle paths. The Ljubljana ring road is a motorway road around the city of Ljubljana. The ring road forms the main hub of the Slovenian motorway network. The highways are spreading in the direction of north west, north east, south west and south east from the city of Ljubljana thus connecting surrounding municipalities and forming the highway cross of Slovenia (Figure 36).

LENGTH OF ROAD [km]	Motorways, expressways	Main and regional roads	Local roads	City roads	Public paths	Public bike paths
LUR	327.886	657.793	19.772	4.462.065	499.477	2.555.066
SLOVENIA	1.412.366	5.348.878	612.464	12.166.058	1.197.461	18.727.474

Table 15: Structure of roads in LUR (Source: SURS, 2018)
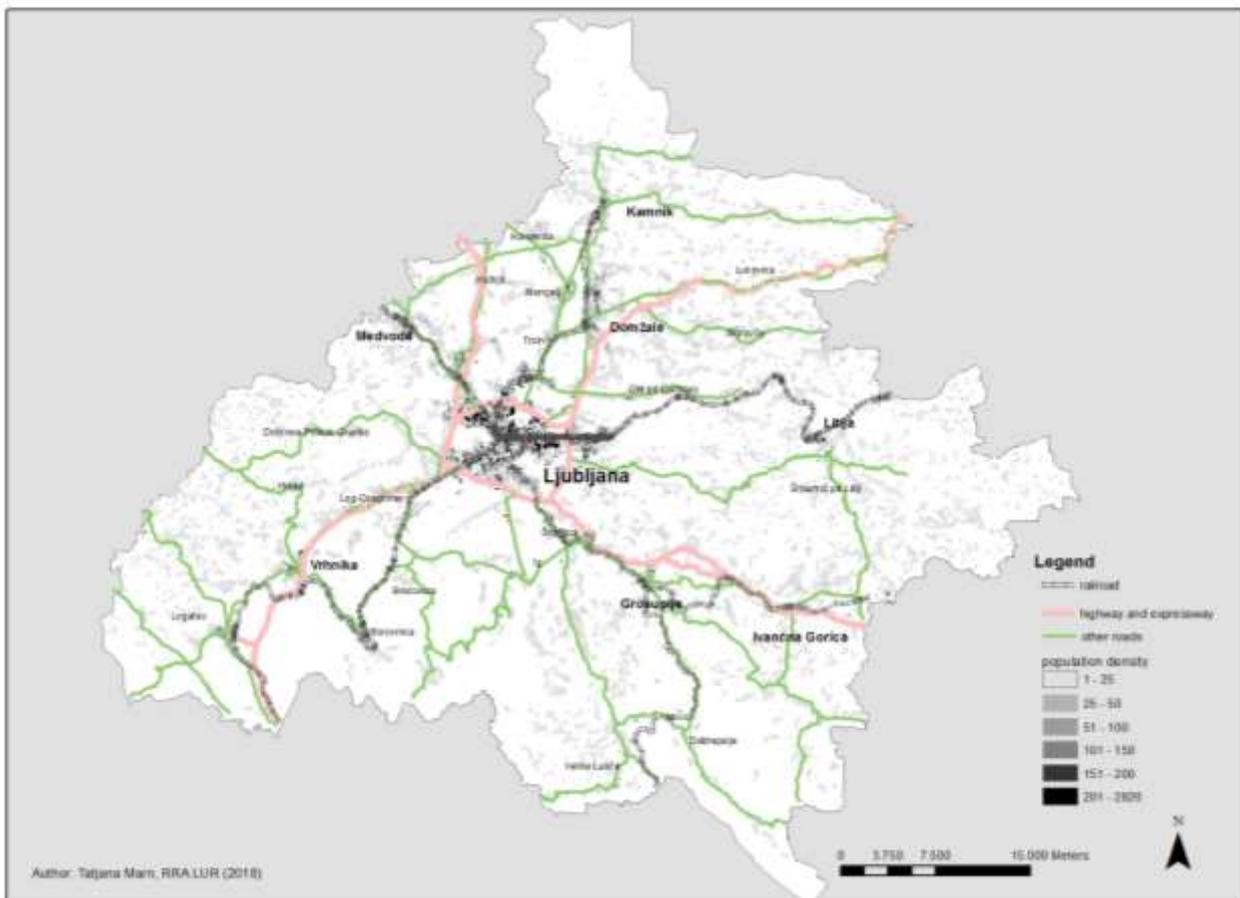
Figure 36: Transport infrastructure in LUR – roads and rail, 2018

The main railway line runs along the transport corridor 5 (Baltic-Adriatic Corridor) in the direction from Logatec to Litija, and in Ljubljana it splits towards Medvode and Kamnik and from Grosuplje it splits towards Kočevje. The 50km railway line between Grosuplje and Kočevje is currently in renovation and it is planned to come into function again for the passengers transport (after 50 years) in 2019.

The railway infrastructure in Slovenia is state-owned, which is why it is considered as the public railway infrastructure. It is operated by Slovenske železnice – Infrastruktura, d.o.o. A strong under-investment in the reconstruction and development of public railway infrastructure over the last 20 year has resulted in more than 75% depreciation of the main lines network. Together with strong investments in highways at the state level in the last two decades the increasing motorisation has taken place. This has intensified the process of suburbanisation and changes in settlement pattern that developed along the highway.

Three out of five rail lines are oneway track. Another problem is that Ljubljana train station is the end station for all trains that are passing through. The study from 2012 (Modernization of rail transport in the Ljubljana Urban Region, PNZ), made within the European Railhuc project shows that situation could be improved by implementing the relatively small investment in bypass rail track in Tivoli. Afterwards, clock face scheduling with relatively sufficient intervals could be introduced. The project is now in the consideration at the state level.

In the past, for different reasons the railway stations were in some cases built too far away from the centres of the settlements that were located along the regional roads (Vrhnika, Mengeš, Velike Lašče, Videm..). Dispersed settlement pattern as a consequence of newly built Slovenian highway cross even made situation more difficult in terms of access to rail stations.

A large part of the railway crossings is unsecured, they are only marked with a traffic sign. All railway crossings should be protected, as there are many traffic accidents on unprotected crossings. The stops should also be made accessible to physically handicapped persons.

Figure 37: Bad practice - unprotected railway crossing (source:Slovenske novice, 2017)

The best performance in terms of travel behaviour shows the service on the railway line Ljubljana - Litija, where the travel time by road is not much lower compared to travel time by rail. The same accounts for travel to Kamnik and Borovnica. All those cities/towns are characterized by high frequency of trains and absence of direct acces to highway.
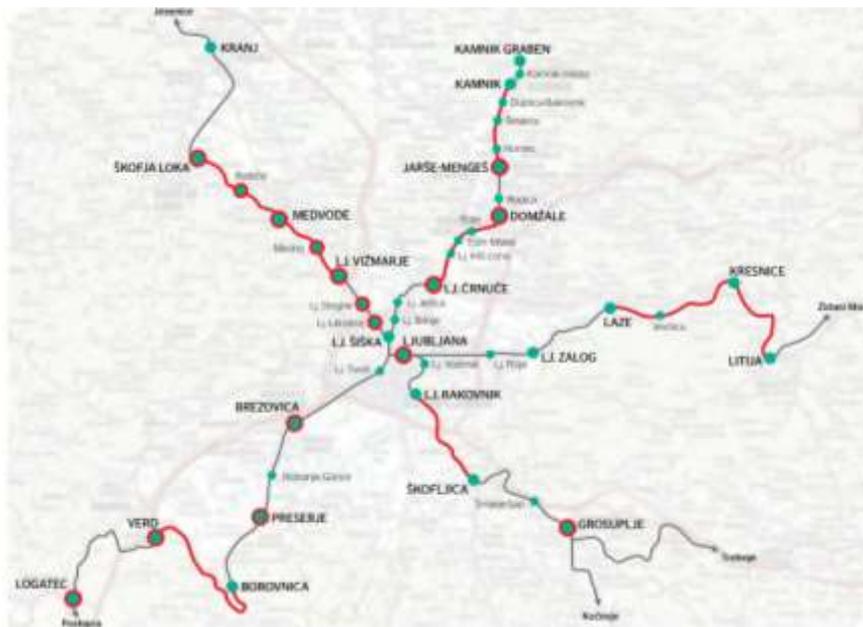
*Figure 38: The scheme of rail lines and rail stations that need upgrading - in red
(source: PNZ, 2012)*

The main bus station (for long distance buses) in Ljubljana is outdated and there is a plan for new bus and train station in 2020 (PNZ, 2012)

Strenghts	Opportunities
The railroad is connecting the traditionally most densely populated settlement area of the region.	Continuation of introducing the yellow lanes prioritized for buses.
Motorisation rate in Ljubljana urban region is lower than motorisation rate at the state level.	Increasing popularity of bicycles use and walking will be encouraged with corresponding spatial and mobility planning.
Recent investments in train compositions and ongoing investment in rail stations (renewal and new stations)	Municipalities in the region would continue with implementing parking management, restricting individual road traffic and introducing intermodal points.
Implementation of park & ride schemes that are planned to become intermodal points with new train stations.	Planned investments in new rail stations and train composition with more spaces for bicycles.
Prolonged routes of city bus lines into the region, using the same paying system (e-Urbana), integrated with other services.	Building of new, modern and functional main train and bus station in Ljubljana.
Partially implemented project for single ticketing system (for students) for all means of public transport of Slovenia.	Full integration of single ticketing system for all means of public transport of Slovenia
Experimental buses with possibility of transport of bicycles between the municipality of Ljubljana and municipality of Dobrova-Polhov Gradec.	New investments in the regional cycling paths.
The transportation of bicycles on other means of PT (buses, trains) on long distance lines is usually possible if there is enough space.	Train connection airport Brnik – Ljubljana. Demand responsive transport in peripheral areas complementing the existing public transport.
Intergrating school buses and public transport.	New regional mobility strategy will make a solid arguments for improving rail, bus, cyclying and other sustainable modes of transport in the region when negotiating with the state level.
Cases of adapting school schedule to optimize the lines of school buses, increased popularity of walking bus and cyclying train.	
Restrictive parking policy, introduction of yellow lines for buses and bike sharing system in the city of Ljubljana.	
Increased awareness of importance of public transport in the region by the mayors, cooperation between them (in the topics of cycling paths, railway lines).	

Weaknesses	Threats
Dispersed settlement pattern as a result of geographical characteristics of the region.	Solutions for the traffic jams will still be seen in widening the roads and other investments in the road infrastructure.
More than 100.000 cars are coming into the city of Ljubljana from the region and elsewhere every day.	Delays in investments in rail infrastructure and main train and bus station.
Lack of investments in public transport and strong investments in highways at the state level in the last two decades caused the increasing motorisation, suburbanisation and settlement pattern developed along the highway and declining use of the public transport.	Delays in full integration of single ticketing system for all means of public transport of Slovenia.
Some rail stations are located outside the settlements which obstructs the use of trains.	Introduction of autonomous vehicles and giving priority to electric cars (road space and parking policy related) could lead to competitive advantages of individual transport to public transport.
Lack of long distance cycling paths between cities in the region for the purpose of daily mobility.	

Table 16: SWOT analysis

5.4. Multimodal services

There are several types of public transport in the LUR area. Besides the train network there is a very well developed network of city buses in the municipality of Ljubljana, while other cities are connected with Ljubljana by suburban and long distance buses. LPP is the operator of the city buses, while long distance buses are operated by many other bus providers (Arriva, Avrigo, Integral Zagorje, Kambus...). One of them is LPP that has been prolonging its city bus lines into the region lately. Their users are part of the same pricing system of Urbana and the prolonged bus lines perform well in sense of number of users.

The arrangement of bus stops along the bus lines is relatively dense and evenly distributed. In Ljubljana there is a possibility of improvement through the implementation of tangential lines that would avoid the strict center of the city and would allow for faster travel.

As the picture shows many buildings in peripheral areas of LUR lie away from the main bus and train lines, especially in the highlands around the Ljubljana basin, in the eastern, northeastern and western part of the region.
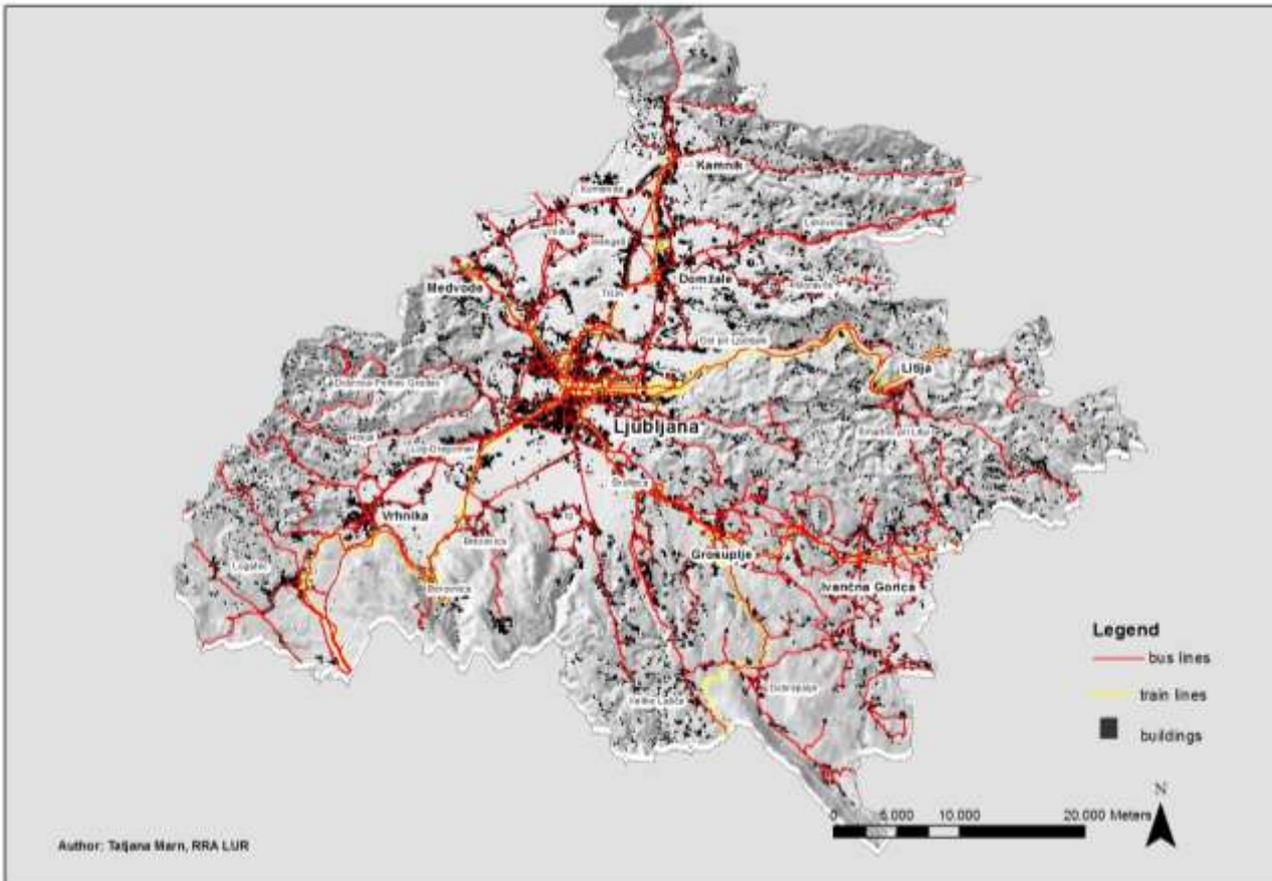
Figure 39: Bus and train lines in relation to buliding's location in Ljubljana urban region (source: LUR)
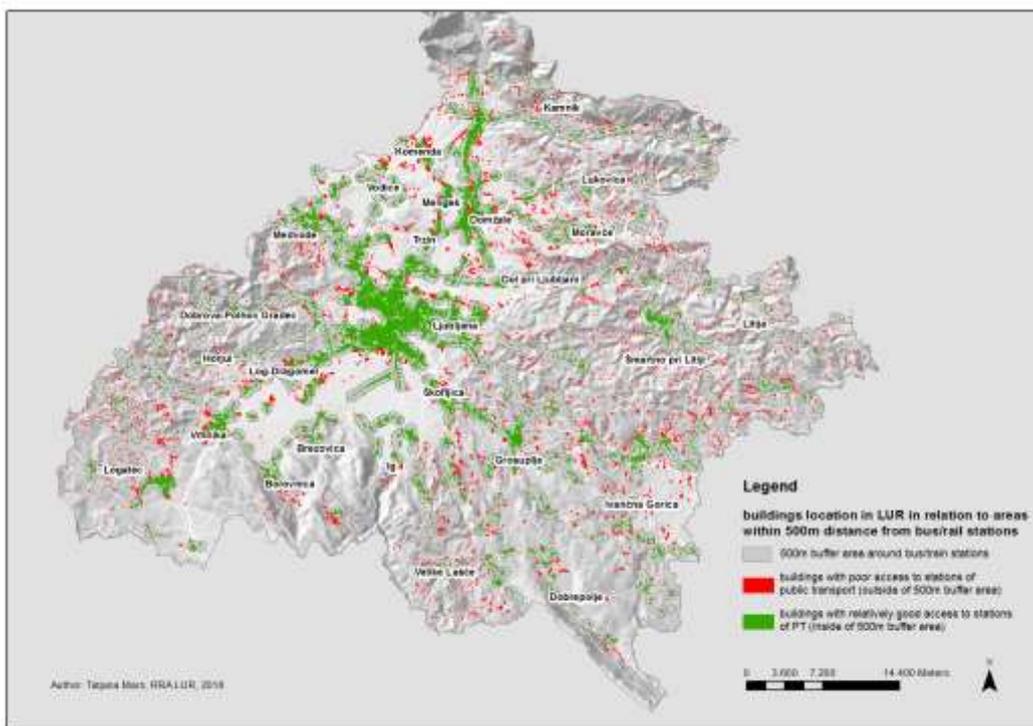

Figure 40: Building's location in relation to bus and train stations in Ljubljana urban region (source: OPSI, 2018)

Municipality	Area (km2)	Population	Density (p./km2)	Number of buildings located more than 500m away from bus or train station in the municipality/ number of buildings located more than 500m away from bus/train station in the region	Number of buildings located more than 500m away from the bus or train station in the municipality/ number of all buildings in the municipality
Borovnica	42	4.200	100	1	33
Brezovica	91	11.850	130	2	23
Dobrepolje	104	3.950	38	2	34
Dobrova – Polhov Gradec	118	7.550	64	3	41
Dol pri Ljubljani	33	5.650	175	2	33
Domžale	72	34.950	483	6	25
Grosuplje	134	19.950	149	5	27
Horjul	33	2.950	91	1	36
Ig	99	7.100	72	2	21
Ivančna Gorica	227	16.050	71	11	51
Kamnik	266	29.400	111	7	33
Komenda	24	5.900	245	3	49
Litija	221	15.000	68	8	50
Ljubljana	275	286.300	1041	11	8
Log-Dragomer	11	3.600	328	1	43
Logatec	173	13.750	79	6	45
Lukovica	75	5.650	75	4	61
Medvode	78	15.950	205	4	28
Mengeš	22	7.550	337	2	30
Moravče	61	5.200	85	3	54
Škofljica	43	10.150	234	3	35
Šmartno pri Litiji	95	5.500	58	3	55
Trzin	9	3.850	447	0	12
Velike Lašče	103	4.200	41	4	64
Vodice	31	4.800	152	1	26
Vrhnika	116	16.650	144	5	35

Table 17: Area, population, density and building's location in relation to bus and train stations in Ljubljana urban region (source: SURS (2015), RRA LUR (2018))

73% of all buildings in the region are located less than 500m away from bus/rail station. However, there are some municipalities with more than 50% of all buildings located more than 500m away from PT station. These municipalities are mainly in the eastern and southeastern part of the region with the average density below the national average (102 p/km2). They are located in the hilly landscape of Posavsko (in the east) and Krimsko hribovje (in the south). The smallest part of buildings located more than 500m from the PT station has the municipality of Ljubljana (8%).

Intermodal integration is difficult in those areas where the train station is located out of the settlement centres. The solution could maybe lie in a call bus that would connect the stations of different transport modes.

Timetables between trains and buses are often not well harmonized and there is a need for introducing clock face scheduling for trains and buses. The timetables of buses are better harmonized. PT services are in general very rare or even absent during the weekends which makes it difficult to use them when making travels for touristic purposes.

There has been some new park and ride locations implemented in the last few years inside the region and some are planned in the near future (Figure 41). Some of P&R sites have the potential to become intermodal points especially those which are planned to be upgraded by the train stations.
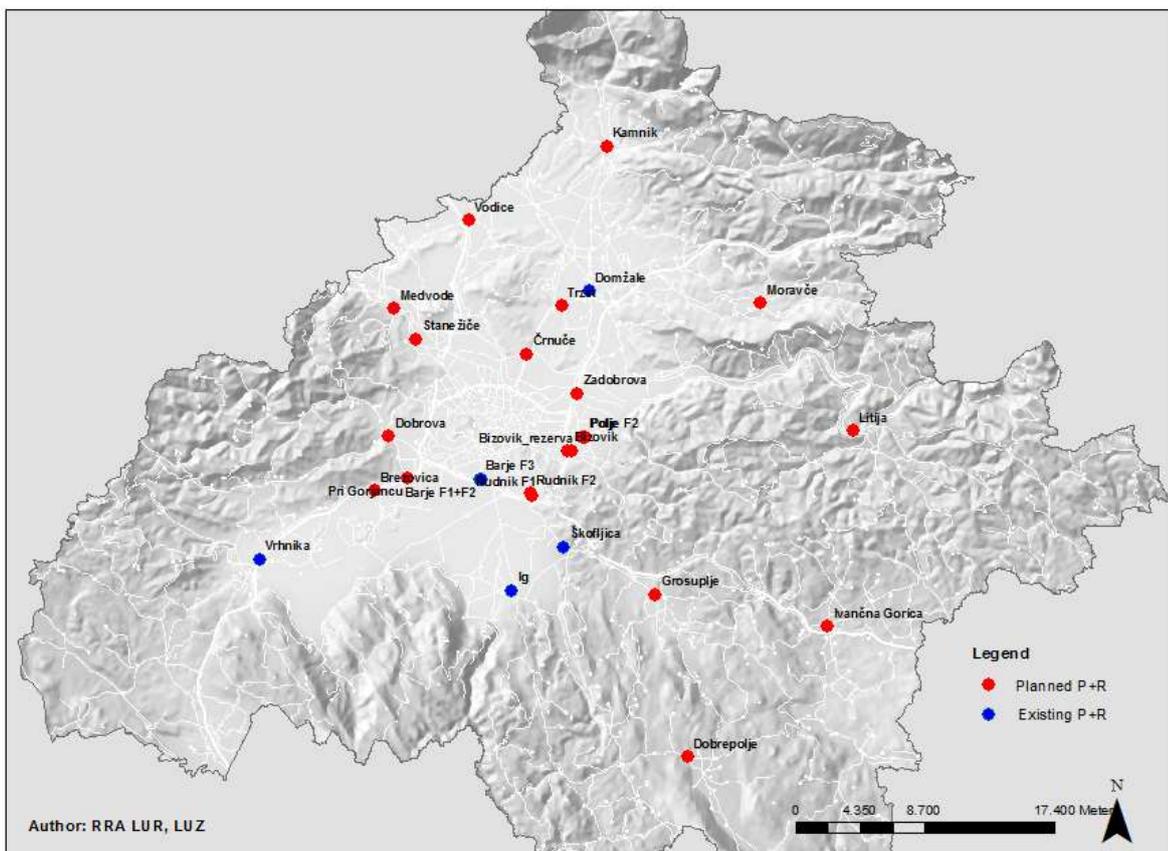
Figure 41: P+R locations outside of the city of Ljubljana – planned and existing
(source: RRA LUR, LUZ, 2018)

There are 41 industrial-business parks/zones located in the LUR region (Figure 42). Those in Komenda and Logatec do not have the PT station within the 500m. Yellow coloured zones on the map do have station nearby but either the frequency of service is low either the timetable of PT is not suitable. Some large employers in the region have organised buses for their workers in the past and those buses in some cases are still running even though the company might not exist anymore.
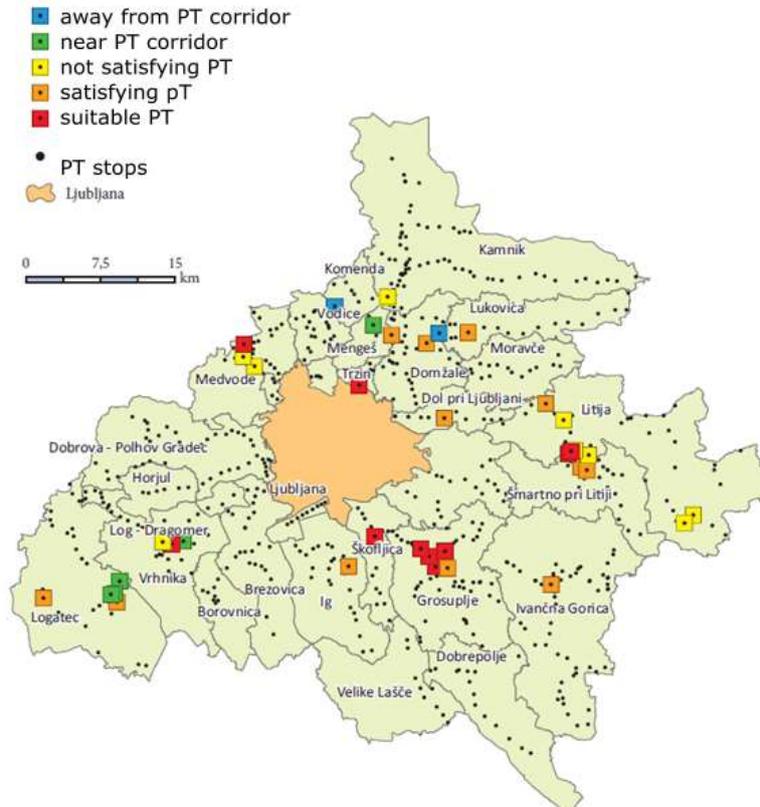
Figure 42: Access of business zones to public transport, red – suitable PT, blue – not located at the corridor of PT (source: SAZU, 2012)

Figure 43: Frequency of PT during the working days: red – suitable, blue – not suitable (source: SAZU, 2012)

Analysis of frequency of the public transport (Figure 43) shows the frequencies are satisfactory only on the main corridors (from Ljubljana to Vrhnika, to Grosuplje, to Kamnik and to Medvode). The study shows that there is no need to significantly change the network of lines and location of the stations but there is a need to improve the frequencies of the existing services (SAZU, 2012).

Currently, 216 city buses in Ljubljana are in use: 17 midi, 55 single and 144 articulated buses. Single low-floor buses are 12 meters in length, The articulated low-floor buses are 18 meters in length. The average age of vehicles is 8.06 years; 216 vehicles are air-conditioned, 165 have video surveillance system, 217 vehicles with space for people with impediments and prams, 217 vehicles with audio trailers intended for blind and partially sighted, 181 vehicles are equipped with a wheelchair for passengers on wheelchairs and passengers with baby carriages. New buses use CNG or methan.

Recently, Slovenian Railways and Swiss Stadler Rail signed a contract worth EUR 169 million in Ljubljana for the purchase of the first 26 new passenger's sets, including two-track trains. In addition, the implementation of the 3.2 million euro worth project of the renovation of seven existing railways stations (within the LUR: Tivoli, Litostroj, Brinje, Jezica, Vodmat, Stegne and Medno) and the construction of new railway stations Dolgi Most and Lavrica is starting. The renewal of the rail network should contribute positively to the use of sustainable mobility modes.

Slovenian Railways offer transport of bicycles on trains (for the price of 3,4 EUR for the whole day), but not all trains are suitable for this, thus preventing a smooth, simple and comfortable combination of means of transport. It's possible to take a bycicle on a long distance buses as long as there is enough place for other passengers. All the final bus stops in the city of Ljubljana are eqipped with bycicle stands.

There are many cycling paths planned in the near future in the municipality of Ljubljana as well as long distance cyclings paths between the cities in region for daily commuting (Figure 44).
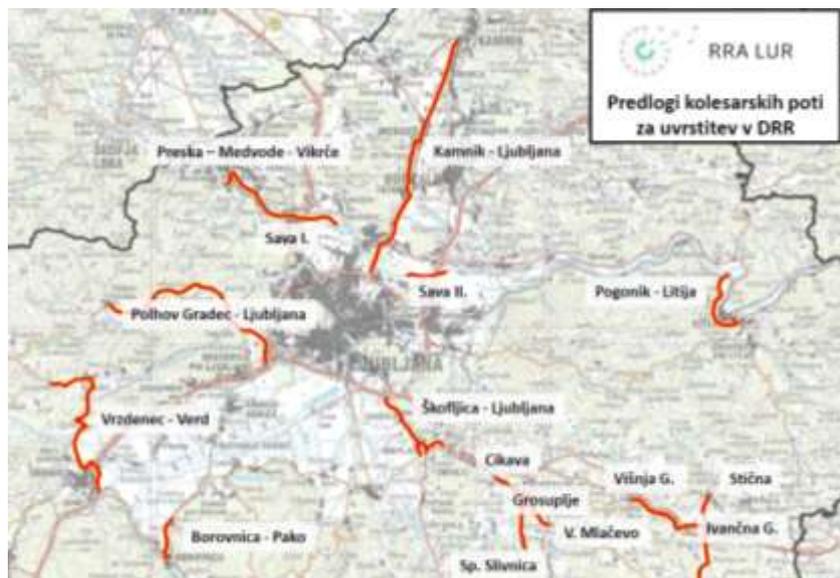
Figure 44: Proposal for building the cycling paths in the region – proposal for regional development agreement (source: RRA LUR, 2018)

A feasability study on introducing the PT service on a river of Ljubljanica from Vrhnika to Ljubljana was elaborated recently but the project is not getting implemented yet.

Comparison of travel behaviour in LUR between 2003 and 2013 (UM FG, RM plus, 2014) shows that higher share of travel was made by walking in 2013 (from 13% in 2003 to 27% in 2013 – it's also result of the changed methodology), the share of cycling has slightly dropped and the share of PT has remained the same.

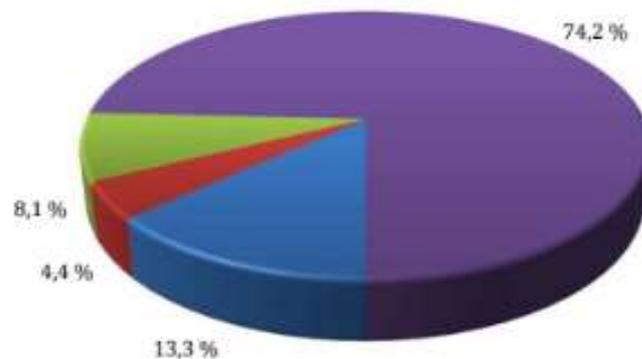*Travel behaviour, 2003*
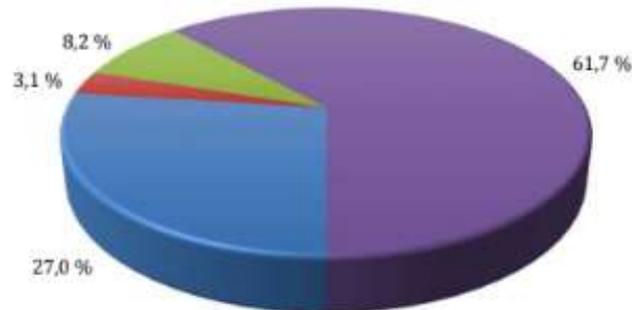
Travel behaviour, 2013

Figure 45: travel behaviour in LUR in 2003 and 2013, violet – cars, blue – walking, green -PT, red - bicycle (source: UM FG, RM plus, 2014).

5.5. Smart mobility

In Ljubljana and its nearby municipalities with bus lines of Ljubljana passenger traffic (LPP) a real-time monitoring application for bus arrivals is available to users on ijpp and at some of the bus stops. Journey planner Google transit also provides the information of timetables but the data it uses are outdated. Application Prominfo is providing some additional mobility information for the municipality of Ljubljana such as:

- amenities for pedestrians (car free zones and pedestrian footpaths, location of pitts, public toiletts…),
- locations of counters of cyclists, bycicle stands, bycicle paths,
- location where you can charge the Urbana card, city bus lines, bus and train stops… ,
- taxis, park & ride locations, locations of electric filling stations, traffic density,
- car and bike sharing locations…

Unfortunately there is no existing map (in analog form) with bus and train lines for Ljubljana urban region available. Such map exists only for municipality of Ljubljana and for those municipalities where LPP provides the service.

The payment of a city (and LPP regional) bus tickets is possible by Urbana card or a mobile application. Urbana card can also be used for other purposes: payment of a parking fee, in libraries, bike sharing scheme.... Card can be charged on-line, on Urbanomats (on the streets) or in the special selling points.

The area LPP covers is divided into three zones. The price in the first zone (the biggest one) is 1,2 eur per trip and it lasts for 90 minutes regardless how many changes you make.

In Ljubljana, there is an existing bicycle sharing network (BicikeLj), which operates with the Urbana card. There are currently 58 locations with 580 bicycles and network is constantly updated (Figure 46). By using a web site and mobile application users can identify the number of bikes on a particular site. Users pay 3 eur per year if they use it less than half an hour per trip. The average use is 15 minutes. Other municipalities in the region are also interested in bicycle sharing scheme but the operators of BicikeLJ are currently not interested in extending the system. Therefore they seek for information about other bike sharing possibilities.
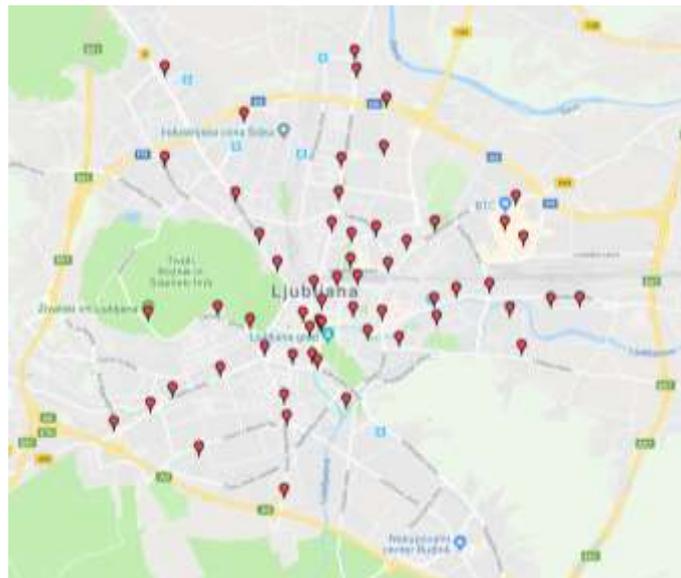
Figure 46: Bike sharing BicikeLJ location map (source: Prominfo, 2018)

Throughout Slovenia, a single integrated ticket IJPP for students has been introduced for various transport providers (train and buses). Unless you are a student it is still not possible to buy a train ticket online but Slovenian railways have declared that in year 2018 this will finally be solved.

Introducing integrated ticketing system was part of the Integrated public passengers transport project which planned for integrated ticketing and harmonized timetable with one national management center for the whole area of Slovenia. It was commissioned by the Ministry of infrastructure, the activities were carried out by the consortium led by Slovenian railways – passenger transport, but the system as a whole is not functioning yet. Nevertheless, they got the first price award at 2017 Transport Ticketing Global Awards in London for the most innovative customer serving operator.

Figure 47: Real-time monitoring application for bus arrivals (Vir: CIVITAS LJUBLJANA, 2010)

The connection with major European cities and airports is ensured by the demand responsive private transport service provider GoOpti. GoOpti offers road passenger transport services across Europe. Within LUR it offers a service to Jože Pučnik Airport, Brnik.

Figure 48: GoOpti transport scheme in Slovenia (source: GOOPTI, 2018)

An alternative to car ownership in urban areas has recently been introduced in a form of private electric car sharing system Avant2go. In Slovenia, people can use [Avant2go](#) in 4 cities, within LUR only in Ljubljana.

Slovenia is very well covered with charging stations for electric vehicles and so is the LUR. The country currently has 470 charging stations. In addition to the well-covered highway system, almost every town has a slow-charging station

[Peer to peer car sharing alternative](#) system is developing but it is not functioning yet.

Peer to peer car ridesharing system is available through the web application [prevozi.org](#). The application was established by IT professional and upgraded by the help of RRA LUR It's working on non profitable basis so nobody charges for the service. It is extremely popular within student population but also other people.
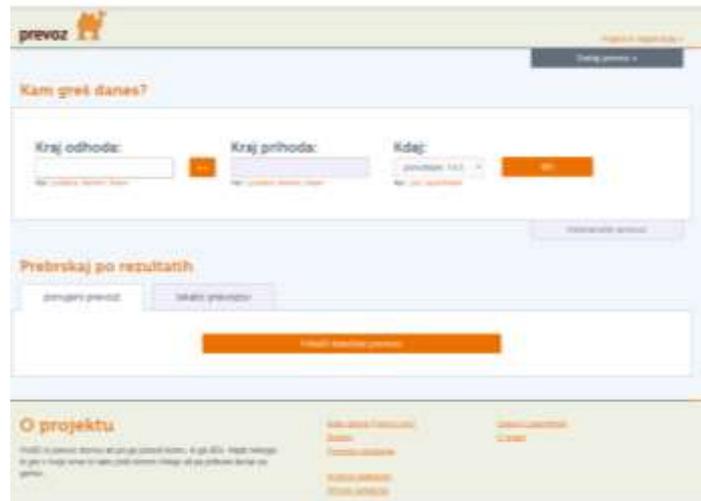
Figure 49: Ridesharing system prevozi.org (source: Prevozi.org, 2018)

In april 2018 an agreement was made between BTC city - the main shopping center in Ljubljana, company for buliding highways (DARS) and national car society (AMZS) to make the shoopping center a testing polygon for autonomous vehicles. The project is supported by Ministry of infrastructure. The agreement has raised many concerns mainly related to safety. In the last few years BTC has made many positive changes related to improved conditions for pedestrians, cyclists and access to PT therefore the decision has opened the debate of relation between introduction of autonomous vehicles and sustainable mobility. The first autonomous vehicle in BTC City will be shuttle for public transport use.

City bus operator of Ljubljana (LPP) has recently introduced the experimental demand responsive transport service e-Urban using the electric cars. Currenty it's been running just on one line but they LPP is trying to find a suitable model for getting it implemented throughout the region.

For disabled people there is call on demand service available by LPP.

Figure 50: E-urban fleet of electric vehicles (source: Bicikel, 2018)

5.6. Smart governance and marketing

The ministry gives the concession for bus services to the different concessionaires for different areas based on their offer. Which lines with bus services will be subsidized by the state is decided at the state level, and local communities do not have a special influence on timetables and lines. They may however give their wishes to the Ministry of Infrastructure. This applies to all services except for the city services (so even for the lines between two towns in the same municipalities). The concessions are not yet granted on the basis of a uniform standard of accessibility but there is a plan to regulate this.

Nine out of 26 municipalities in the region, including Ljubljana have elaborated the SUMP in 2017. Ljubljana has set itself the following goals: until 2020 33% of all journeys will be made by walking and cycling, 33% journeys will be made by public transport, 33% of all journey will be made by cars (modal share now is 29% - cycling and walking, 13% PT, 58% cars). The regional mobility plan is being elaborated by RDA LUR and especially municipalities without SUMP are looking forward to get the first strategy (bY November 2018) that will cover there area.

In Slovenia, in places without public transport, special transport is provided for school children, and so is the LUR. The transport is provided for those for children that live more than 4 km away from the schools. The transport is provided also in those areas where the conditions for walking or cycling to school are not suitable (share of school children walking or cycling to school has significantly decreased in the last decades therefore some initiative such as walking or cycling bus are gaining in popularity). Transports for school children is carried out by different means of transport: buses, minibuses and vans, depending on the number of children. Municipalities pay for the services and often this represents quite a big financial burden for them. In some municipalities where the conditions for walking and cycling were substantially improved consequently the costs for school buses have significantly decreased. City bus operator LPP is integrating school buses with public transport in many municipalities. The problem is that the schedule does not respond to the actual needs since those services usually run too late for the commuters and other users in the morning and too early for them in the afternoon. Municipalities with other concessionaires than LPP often wish to integrate school buses with public transport as well. Interviews with the mayors show that sometimes they face difficulties since the process of accomplishing that (by submitting the application by the service provider to the ministry, together with the consensus of the municipality) is not very clear so they seek for information and support.

Prolonging the city lines of LPP into the other municipalities in the region was mentioned in the chapter of multimodality. This is easily accomplished only in those municipalities where the concessionar is LPP. In other municipalities, for the lines that are served by other concessionar, he has to approve it and they are cases when the other concessionair refuse to give an approval. Prolonging the line by LPP is often wished for by the municipalities but the financial burden is often too big. The financial structure therefore has to be negotiatied between different municipalities and the service provider.

Very good cooperation between the municipalities was proven when designing the long distance bicycle paths (that connect different municipalities) proposal in LUR. Many of those paths were part of the proposal for regional development agreement. Regions define the priorities that need to be financed by EU thorough priority axes 4.4. The proposal is at the moment being reviewed and negotiated at the Ministry of economy and other ministries.

No known smart marketing campaign has yet taken place even though many data are being gathered with the card and mobile phone that are being the only payment means for buses in the city of Ljubljana.

There are cases of creative marketing such as promotion videos with Slovenian acrobatic group Dunking devils doing [acrobat tricks](#) or [playing basketball](#) on running train. Those campaigns are made in cooperation with Slovenian Railways. Slovenian Railways often promote their services with the help of sport activities and successful atlets. They are very successful at organizing the train trips to the massive sport events.

Figure 51: acrobatic tricks on train for the marketing purposes (source: SŽ, 2018)

Marketing campaign of Slovenian railways include events for children in railway musem in Ljubljana, running of old musem trains, steam locomotive etc.

Ljubljana city bus operator (LPP) has introduced this winter the so called Triglav bus by in Ljubljana where passengers could watch the [ski jumping championship](#) in Planica. 30% passengers have watched the event. Innovative use of screens in buses has proved to be positive experience for the passengers since it encouraged communication between them.

In the old (car-free) part of city of Ljubljana there are five electric vehicles Kavalir available for free for the people who have difficulties walking. They are also use being used for promotion of PT.

5.7. Involved stakeholders

Stakeholders involved in status quo analysis were the following:

-    the city bus provider LPP,

-    regional bus operators,

-    Slovenian railways,

-    Ministry of infrastructure,

-    Municipalities,

-    the experts,

-    stakeholders that have participated at implementing demand responsive transport.

Personal meetings and interviews were carried out with some of the municipalities in the region, city bus operator LPP and some of the experts (SAZU, Slovenian cycling society...). Some other interviews are planned in the next two months. The interviews that will be carried out in the process of developing the sustainable mobility strategy of the region in the following month will be taken into account.

Main sources of literature and data were Statistical institute of Slovenia, Geodetic institute and domestic and foreign research studies.

6. Regional status quo analysis of Metropolitan Area of Styria

6.1. Introduction

In general the aim of Peripheral Access is to support the improvement of mobility in rural areas. In order to achieve this goal the following three areas of action are scheduled in the project:

- WP 1: the integration of transport modes through multimodal mobility points
- WP 2: new ways to employ ITS and ICT in transport/smart mobility
- WP 3: enhanced institutional cooperation by means of transport authorities and cross-border marketing approaches.

These topics formed also the basis for the regional analysis in the Metropolitan Area of Styria. But a particular focus is put on the topic **multimodality**, because in this region the implementation and testing of an „intermodal hub" is provided. Also an enhanced institutional cooperation by means of transport authorities and cross-border marketing approaches is very important for our region, because for the further development and optimization of the traffic situation and the mobility offers, a co-operation of different stakeholders from different levels from the strategic traffic planning is necessary.

Since the beginning of 2018 also a new law, with the aim to reinforce the regional and interregional cooperation, entered into force in the Metropolitan Area of Styria[3]. This new *Styrian Regional Development Law 2017* regulate the cooperation of the Styrian government, Styrian regions and municipalities and ensure the basic financing of regional activities. The aim is to develop the region as an attractive working and living space for people and companies by creating and securing jobs, developing attractive locations for businesses, designing target-group-oriented mobility solutions, improving the quality of education and care infrastructure and creating attractive leisure infrastructure and conserving natural resources.

For the first time, this law defines the tasks of regional development by the legislature and provides them with clear implementation tools and coordinated (strategic) processes. Therefor the regional status quo analysis is also very helpful to find out some regional bottlenecks about the topic mobility solutions for rural areas.

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[3] Regionalentwicklungsgesetz 2018.

6.2. Area characterization

The functional, economic and demographic centre of Styria is known as its "metropolitan area". It includes the districts of Graz, Graz-Umgebung & Voitsberg. With its 52 municipalities it covers about 1.900 km². Approximately 481.000 inhabitants live in the region, this leads to an average population density of 254 IN/km2 (City of Graz included), which is the highest population density in whole Styria. Regarding the single values in the two districts Voitsberg and Graz-Umgebung, the population density varies from 20 IN/km2 in very rural areas to 100 IN/km2 in peripheral-rural and 600 IN/km2 in (sub)-urban municipalities in the south of Graz. Beside the City of Graz there are two sub centres in the western part of the area: the cities Koeflach & Voitsberg.
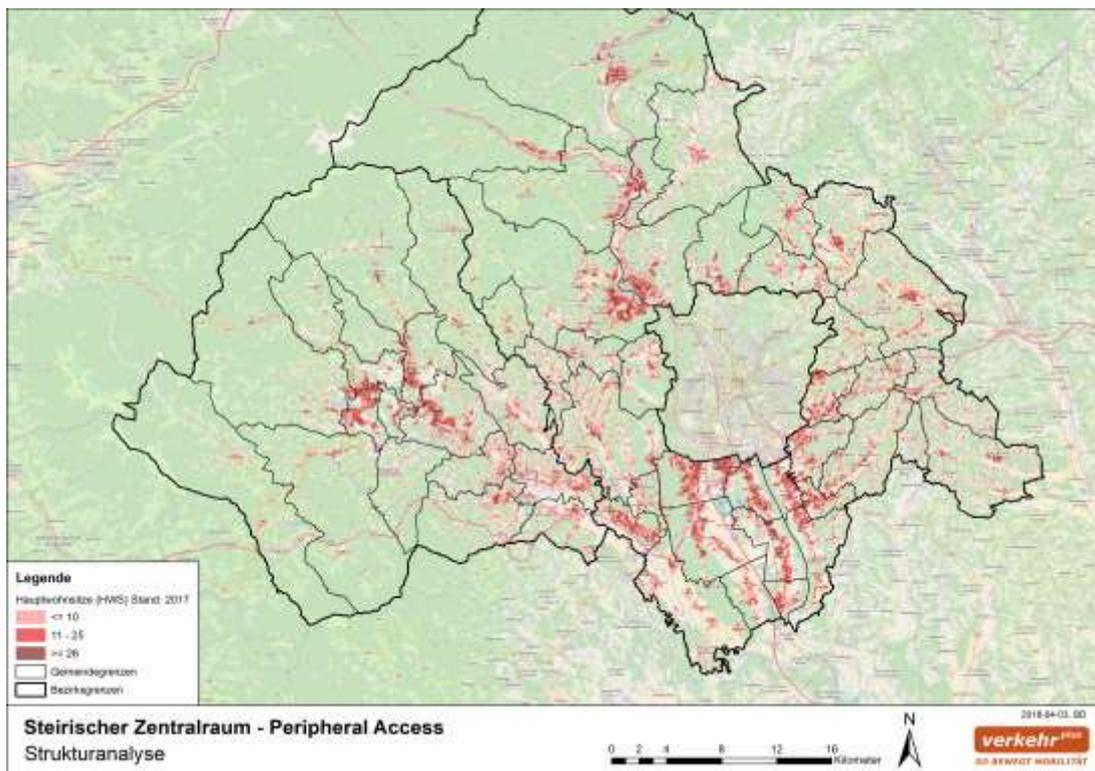
Figure 52: Planning area Styrian central area without Graz with main residences, district and municipal boundaries. (source: Verkehrplus 2018)

With regard to the geographical framework, the area is embedded in the south eastern Alpine foothills, not far from the border between Austria and Slovenia. The northern and eastern transition zone of the city region of Graz is affected by a relatively abrupt switchover from urban to rural areas once from a geographical & topographic and twice from a functional point.

Subsequent some general information about the **economic situation** in the Metropolitan Area of Styria is shown. But before looking at the specifics economical background in the region the **demography** of the Metropolitan Area of Styria will be described[4].
The Metropolitan Area of Styria is a young region with the highest population and the most dynamic population growth throughout Styria. However, the demographic development in the region is divided into two parts. Population growth is particularly noticeable in the City of Graz and the district Graz-Umgebung, while the municipalities in the district of Voitsberg are increasingly seeing population decline, especially among younger people. The forecast for 2016-2030 shows 15.5% growth in the City of Graz, 7%

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[4] All information relate to Landesstatistik Steiermark 2015/2016/2017.

in Graz-Umgebung and a decrease of 3.6% in Voitsberg. The table below (Figure 53) shows the population by sex and age.

Population

247.299
WOMEN
50,8 %

239.306
MEN
49,2 %

486.605

Population

18,3 %
under 20 years of age

63,8 %
20 up to below 65 years of age

17,9 %
65 years and older
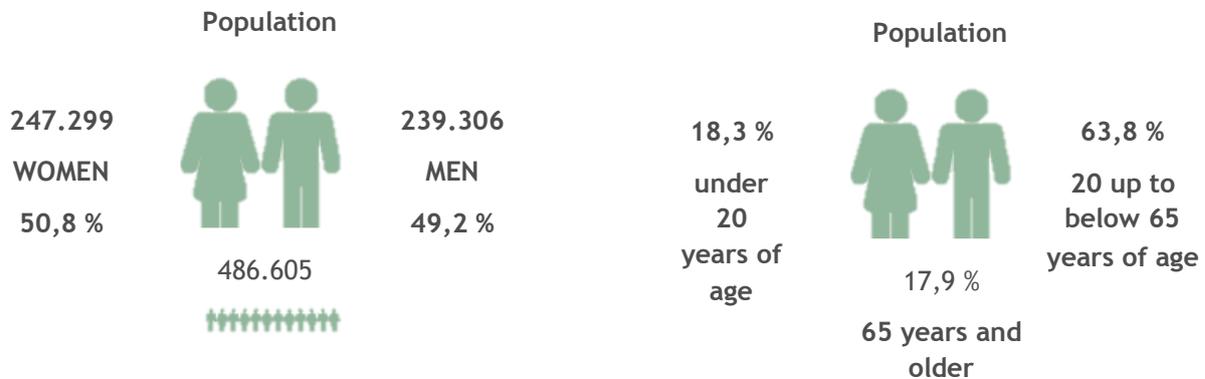
Figure 53: Population by sex and age in the Metropolitan Area of Styria by 01.01.2017.

(source: Landesstatistik Steiermark 2017)

Regarding to the **economic background** in the Metropolitan Area of Styria Figure 54 shows the working population by sex.

Working Population

136.268
MEN
53,4 %

118.900
WOMEN
46,6 %

255.168

Figure 54: Working Population by sex by 31.10.2015 (source: Landesstatistik Steiermark 2017)

Referring to **economic sectors** more than three quarters (79,9 %) of employees work in the tertiary sector. The secondary sector employs 19.7 % and the primary sector 0.4%. In total there are 14.785 employer companies and also there is a **start-up scene** in the Metropolitan Area of Styria. For example, in 2016 there were 2.446 enterprise creations in the region. Regarding to the amount of work 68,2 % (51,0 % women; 82,8 % men) work full time and 31,8 % work part time (49,0 % women; 17,2 % men). Concerning the **average income per month** there are differences in the region. In the City of Graz, the average income per month includes 2.550 euros per month in 2015 (women 2.036 €; men 2 941 €) and thus corresponds exactly to the average Styrian average income of 2.505 €. In Graz-Umgebung this is with 2.850 € (women 2,090 €; men 3,536 €) above the Styrian average value, as well as in the district Voitsberg with 2.510 € (women 1,867 €, men 3,077 €).

The **unemployment rate** is 9.8 % (men 11.0%, women 8.6%) in the Metropolitan Area of Styria. Observed by age, the proportion of unemployed aged over 50 is one quarter (25.5%), compared to 12.2% among those who are younger than 25 years of age.

Due to the focus of the project, the main part of the analysis is limited to the peripheral rural areas (districts Graz-Umgebung and Voitsberg) of the Styrian central area. However, the traffic connections to and from Graz are included in the analysis. In total, around 205,000 people live in these two districts. These are divided into a total of 51 municipalities, with 15 located in the district of Voitsberg and 36 in the district of Graz-Umgebung. The main areas of settlement are around Graz, along the Mur and in the area of the regional centers Köflach and Voitsberg.

6.3. Overview of transport infrastructure (incl. SWOT analysis)

The infrastructure for transport and mobility in the Styrian Central area is generally considered to be very good. The enormous attraction of the city of Graz requires a high quality of mobility offers compared to other regions.

Regional facts: railway infrastructure around 135km, road network (main axes) around 160km, municipal roads extend (without Graz) around 4,700km, bicycle routes about 200km.

The orientation towards the core city of Graz is an essential basis for all mobility offers in the Styrian Metropolitan area – the focus on the accessibility of Graz from the region is always evident, both at the S-Bahn, at Regio-Buses and at micro-public transport offers.

In the peripheral-rural area (without the city of Graz), about 133,000 people (65% of the population) have access to public transport stops with more than 20 departures per day in a walking distance (500m catchment area) from their main residence. 14% of the population have access to PT stops with under 20 departures a day. In contrast, however, there are 44,000 main residences (21% of the population) outside the bus stop basins of 500m – these persons do not have direct access (on foot) to public transport.
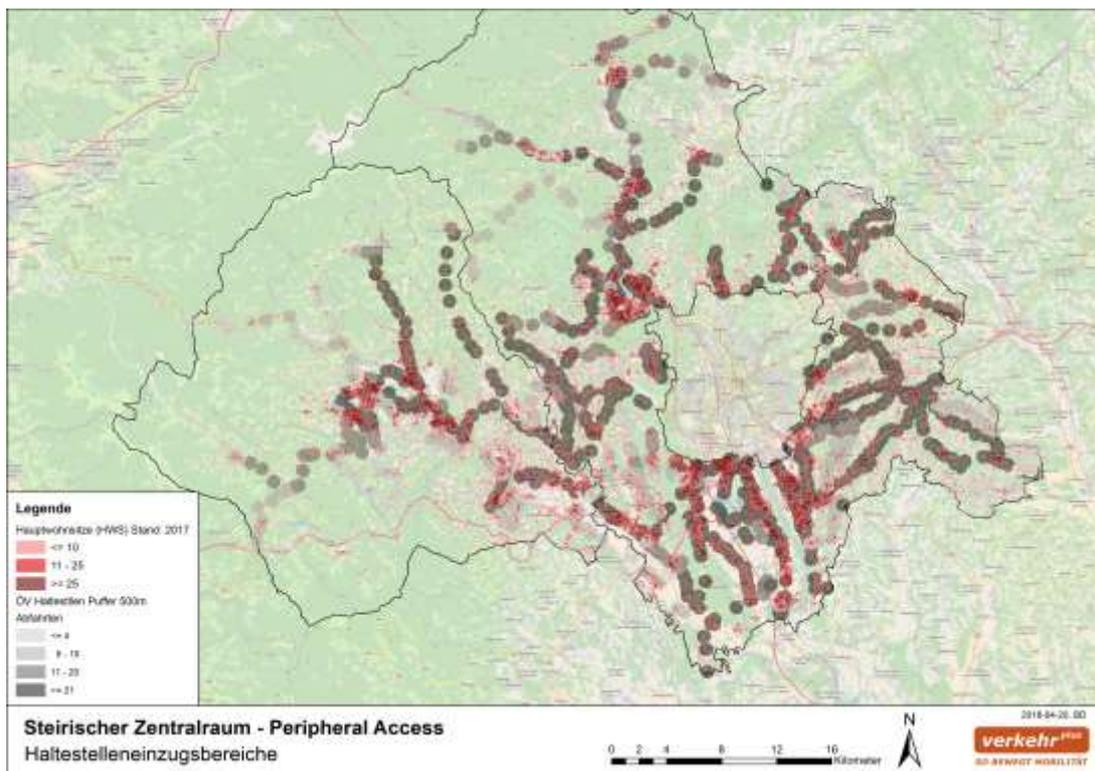
Figure 55: Catchment areas of PT stops (500m) Metropolitan area without Graz with main residences, district and municipal boundaries. (source: Verkehrplus 2018)

According to the method of the demand-dependent minimum public transport offer for regional transport in Austria, this minimum offer in the Styrian Metropolitan area is fulfilled in 86% of the settlement cores (from at least 251 inhabitants per settlement core) and in some cases even significantly exceeded.

Some of the remaining 14% of the settlement cores do not include a public transport stop with appropriate public transport services, others are isolated from the intensively operated main corridors. Apart from the cores of the settlements, public transport, especially bus transport, is adapted to school traffic.
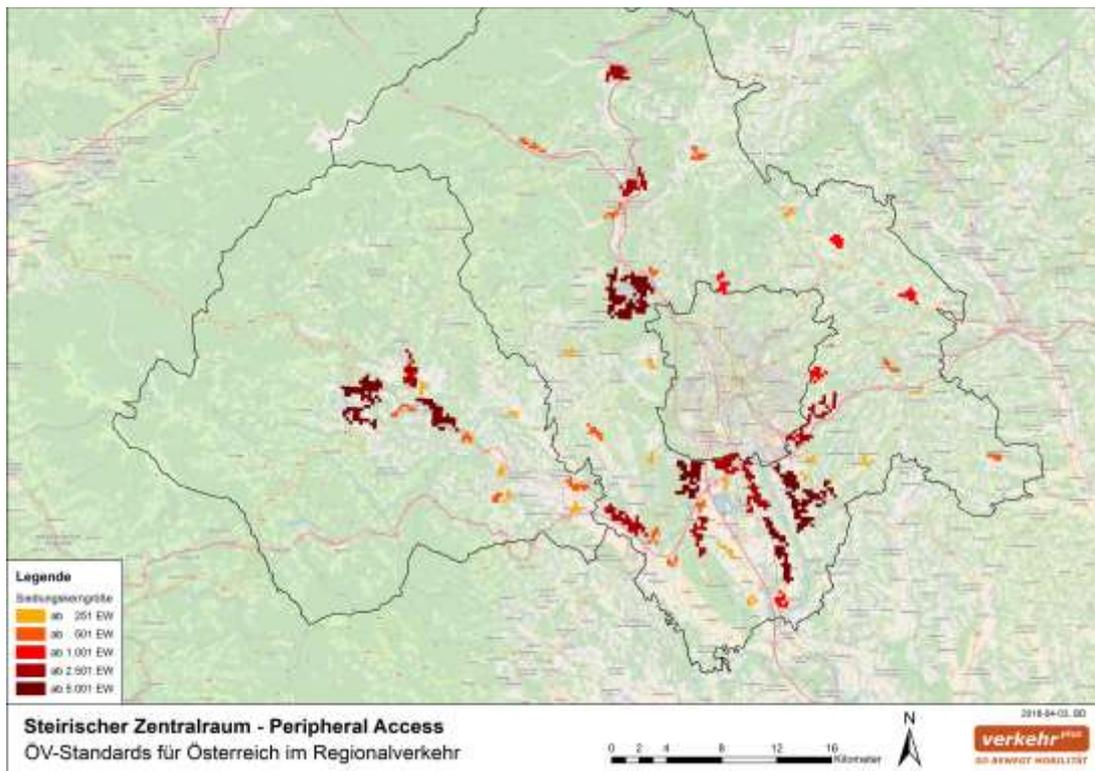
Figure 56: Settlement centers in the Metropolitan Area of Styria according to Austrian PT standards in regional transport with settlement sizes from 251 EW (as of 2017). (source: Verkehrplus 2018)

The travel time ratio of travel times in public transport and motorized individual traffic between the (sub) regional centres with the city of Graz is -based on the six-part evaluation scale (A to F)- exclusively on the three highest quality levels A to C. Although the travel time ratio in the presence of a railway connection tends to better in the sense of public transport than ratios with bus connections.
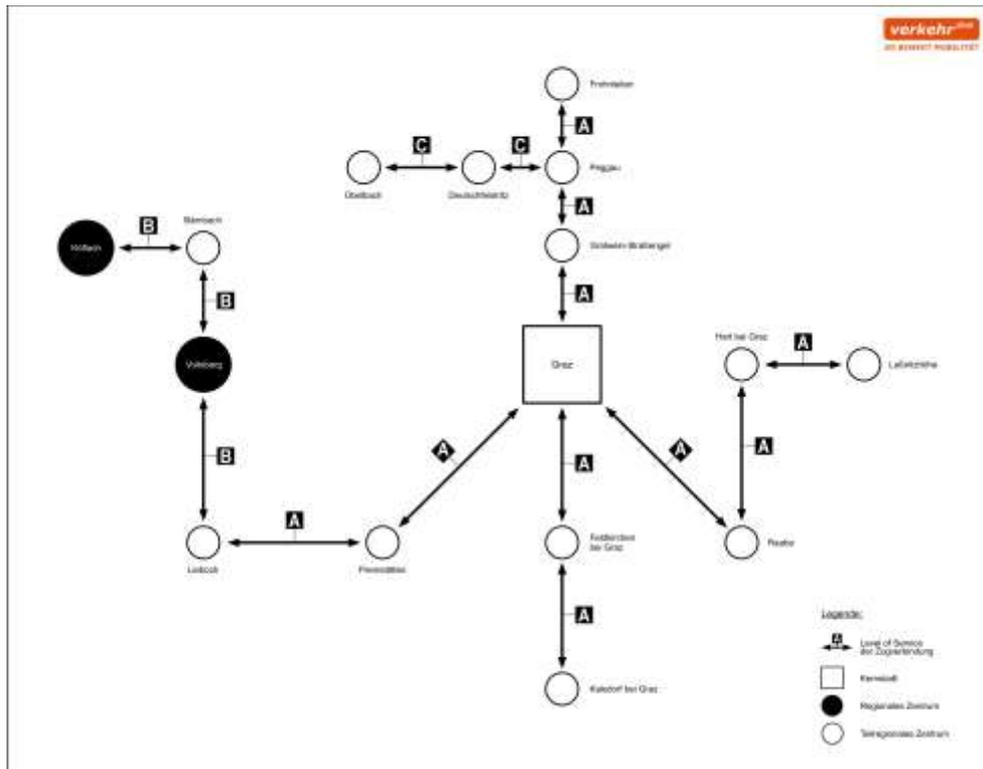
Figure 57: Level of service of the railway connections in the Styrian central area from / to Graz.   (source: Verkehrplus 2018)

A detailed analysis of selected public transport nodes shows that the accessibility is dependent on the chosen means of transport and the location of the bus stations. Accordingly, selected public transport nodes of up to 2,800 pedestrians can be reached from their main residence in a maximum of 10 minutes. Other public transport nodes can be reached from up to 10,000 people by bicycle within 10 minutes.
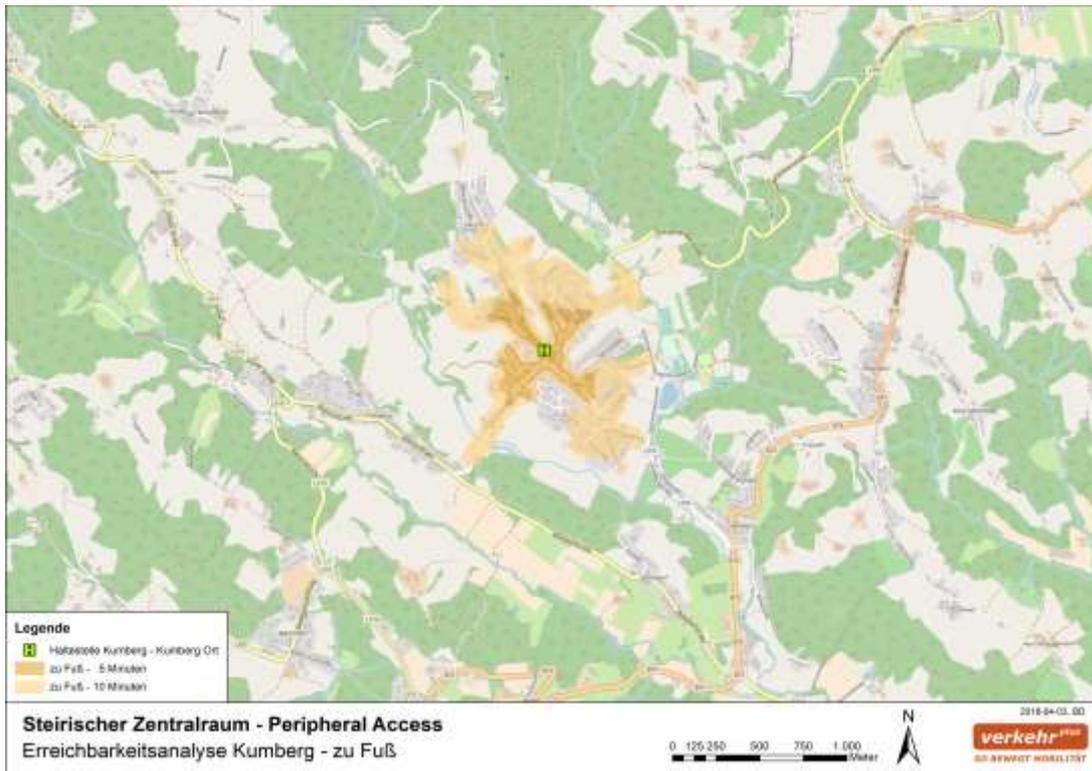
Figure 58: Access map 5 and 10 minutes walk for the municipality of Kumberg. (source: Verkehrplus 2018)
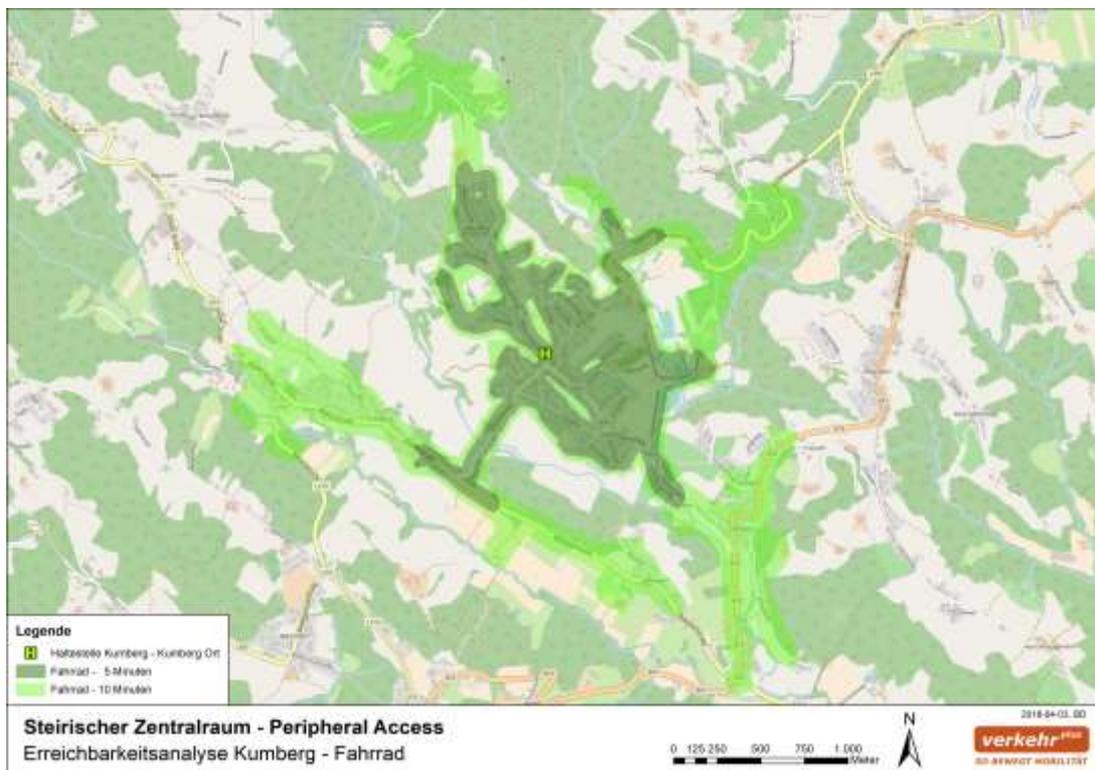
Figure 59: Access map 5 and 10 minutes by bycicle for the municipality of Kumberg.

(source: Verkehrplus 2018)

6.3.1 SWOT-Analysis

STRENGHTES	WEAKNESSES
• Will of the stakeholder to expand regional mobility offers • Main target group of pupil-transport is well developed • The planning region is the area in Styria with the most significant growth (econom. & population)[5] • Stock of mobility plans and mission statements highlighting mobility and environment issues[6] • Strong link with the capital Graz • S-Bahn as the backbone of public transport (huge passenger increase since the start in 2008)	• Public transport "thinking" is missing in many community stakeholders (political and administrative) • Clarity of timetables is suboptimal • Inconsistent public transport offer (summer vs school schedule and -offers) • Information partly not comprehensively available - missing interest on the part of the municipalities and the citizens • Historically grown public transport network – in some parts a reorganization of public transport offer is necessary
OPORTUNITIES	RISKS
• Improve accessibility of public transport stations by foot and bicycle • Improve the quality of access to public transport (lighting, no impediments) • Priority ranking for public transport feeder: Walking, bicycle, demand-based feeder, motorized private transport • Promote pedestrian traffic as the lowest-cost feeder traffic to public transport • Using existing structures in terms of communication and information • In addition to pupils, PT offer should be coordinated and developed for commuters • Smart ticketing: Users should be the focus, not organizations or transport providers • Test run of high-density public transport (based on success example S-Bahn Styria) • Develop consistent public transport offer (no temporal, seasonal differences) • Ensure accessibility for information • Revision of the historically grown line network • Municipalities close to Graz or along development axes are expected to increase their population • Encouragement through external framework conditions (specifications by the EU, nationwide plans, etc.)	• Accessibility to information should be ensured • Partly missing need for DRT and multimodality • Lack of interest in extensive information (responsibilities unclear) • Unclear timetables / information • Historically grown network of lines (difficult to restructure) • Financing of innovations • For communities that are not close to Graz or along development axes, a population decline is forecast, esp. in Voitsberg[7] • Standstill of action planning and implementation would lead to uncontrolled development, which may be detrimental to society[4] • Compatibility with external framework conditions (EU guidelines, nationwide plans, etc.)

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[5] Regional Mobility Plan (RMP) Metropolitan Area of Styria (2016)

[6] RMP 2016, RVK GGU, LEP 2009, LEB 2013, RELB 2014, REPRO 2016

[7] and [4] Regional Mobility Plan (RMP) Metropolitan Area of Styria (2016)

6.4. Multimodal services

Both for different purposes and within a travel chain, many people are considering more and more different modes of transport rather than just one (mostly their own car). This trend is also dependent on the quality of the transport offer (connections in public transport, cycling infrastructure, sharing offers) and by the awareness about the offers (mobility marketing).

In principle, public transport junctions are sensible locations for multimodal nodes and sometimes already in this function. In the Styrian central area, it is primarily railroad stations that offer the S-Bahn, as the S-Bahn is the backbone of the public transport in Styria and the Styrian central region. Subsequently, central public transport stops in the RegioBus main corridors are predestined as multimodal connection points.
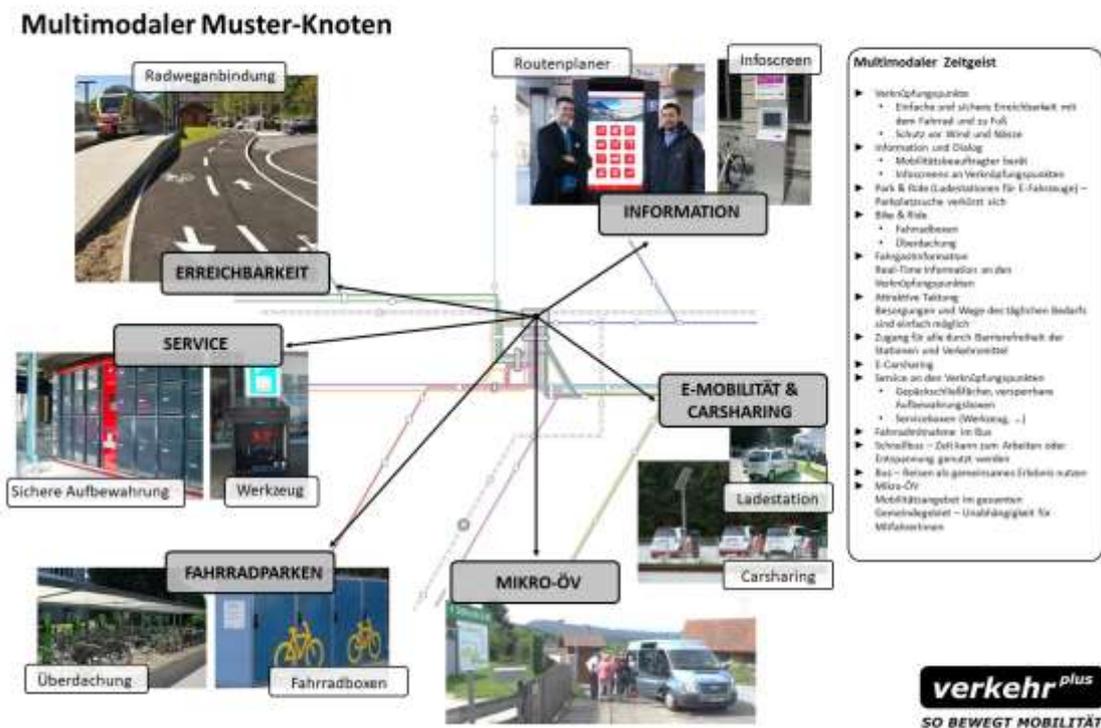
Figure 60: A Multimodal Node in Theory. (source: Verkehrplus 2018)

Based on the existing tim locations of the city of Graz, the REGIOtim initiative was launched. In the process, multimodal points of interconnection are to be implemented in cooperation with municipalities in the Styrian central region in the districts of Graz-Umgebung and Voitsberg. The aim is to integrate a wide range of mobility offers and to make users easily accessible at one location:

• Train
• RegioBus
• micro-public transport
• Bicycle traffic (connection, parking facilities, lockers)
• E-car sharing and car sharing
• Rental car
• E-bike sharing
• Public e-charging stations

Figure 61: tim. Multimodal Node in the City of Graz. Holding Graz Kommunale Dienstleistungs GmbH.

The implementation and testing of a multimodal node in Kumberg which is part of Peripheral Access serves as a pilot project for all other REGIOtim projects.

Furthermore, there are already some e-car sharing offers in the district of Graz-Umgebung, which are implemented and operated by or with the support of the municipalities. The locations of these e-car sharing offers may also be seen as sites for multimodal nodes or developable. In the district of Voitsberg no Carsharing projects are ongoing at the moment (despite a touristic one at Spa "Therme Nova").

E-Car-Sharing projects in the region			
NAME	AMOUNT E-CARS	DESCRIPTION	MUNICIPALITY
„e5-Gemeinde Semriach"	1	Booking by telephone or via Community homepage (with registration)	Semriach
„buchmi"	2	Registration at the municipal office, online booking platform, access via key card	Gratwein-Straßengel
„elektro-mobil"	2	Registration at the municipal office, online booking platform, access via key card	Raaba-Grambach
„MyEgo"	2	E-bikes, e-scooters, e-cars, online booking platform, access via key card	Zwaring-Pöls
„Elektro-Mobilität"	2	Registration at the municipal office, online booking platform, get key via pin	Premstätten
„Family of Power"	1	Online Registrierung und Buchung, Zugang via Schlüsselkarte, lokaler Betreuer	Kalsdorf

18. Table: E-Car-Sharing projects in the region

Multimodal connection points at S-Bahn junctions and bus stops on the main corridors have enormous potential for increasing the multimodal traffic behavior in the Styrian central region because of their high quality (esp. S Bahn). In addition, and as a feeder demand responsive transport option is sometimes crucial. Read more about one existing regional project in the next chapter.

Recommendations of actions for the field of Multimodality

- Assurance of existing and partial expansion of the S-Bahn service in the Styrian central region

- Expansion of RegioBus corridors and alignment of regional bus supply standards

- Voting and rigorization of S-Bahn and RegioBus as well as their use as backbone for multimodal mobility services

- Preparation and decision of a step-by-step plan for the systematic development of uniform multimodal points of interconnection in the Styrian central region in cooperation (municipalities, state, transport association etc.) with the goal of establishing at least one or two multimodal connection points in each community

- Analysis, planning and consistent expansion of the high-quality accessibility of the S-Bahn stops and bus stops, especially by bike and on foot

6.5. Smart mobility

The networking of communities in the region, taking into account the local structure and individual needs of each community is essential for the further development of multimodality and smart mobility.

Especially in the field of smart mobility and ICT there is considerable potential for development in the Styrian central region. Networking via a higher-level platform (eg. Verkehrsverbund Steiermark) represents a meaningful development opportunity for uniform information provision beyond the borders of the Styrian central region.

In the field of demand responsive transport there is one regional best practice example concerning ICT ongoing:

GUSTmobil

The GUSTmobil is a cross-community micro-public transport offer in the district of Graz-Umgebung. 29 out of 36 municipalities participate in this mobility project.

Around 1,800 collection points connect the communities with each other and the communities with the city of Graz and their public transport stops on the outskirts.

The system is running from 6am to 12pm from Monday to Saturday and from 6am to 10pm on Sundays and public holidays.

The intelligent disposition software in the background makes an efficient routing and pool rides possible. People can book via App, which provides real time data incl. existing PT, or Phone.

The ticket price consists of a distance and occupation-dependent tariff. Since the start of operation (July 2017) up to 3,500 people per month use the offer.
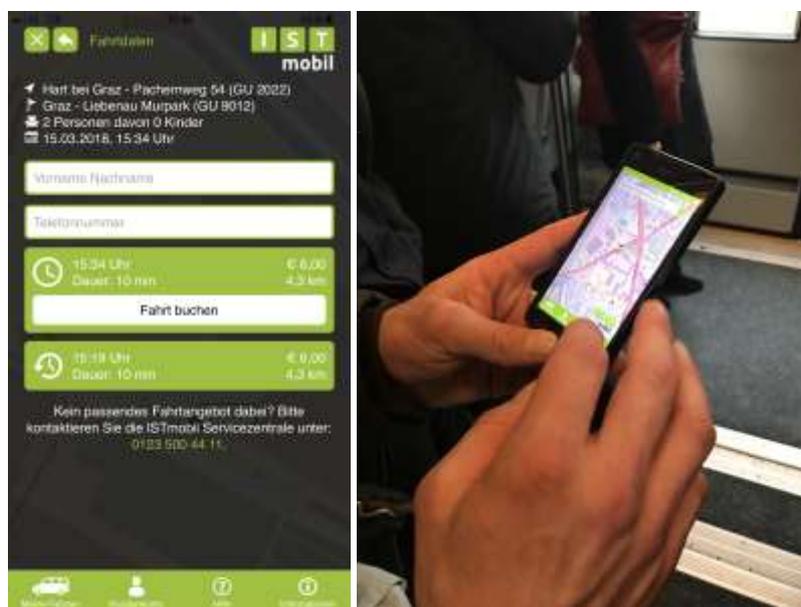
Figure 62: GUSTmobil App.

Another application with real time PT information is the "BusBahnBim" site from the Styrian Transport alliance. People can check several existing public transport connections in whole Styria. There is no connection with GUSTmobil or tim yet, but people can choose different options for example if they want to bring a bicycle or use a P&R space outside the city.

https://verkehrsauskunft.verbundlinie.at/bin/query.exe/dn?L=vs_stvg

Recommendations of actions for the field of "Smart Mobility"

- Development of real-time timetable information for S-Bahn and RegioBus at all stops of the main corridors

- Smart ticketing as a starting point for future developments in the field of public transport and in the context of multimodality (for example electronic "one-for-all" card in the sense of increasing the comfort for customers in the Styrian central area)

- Development of a study in the field of smart ticketing in the Styrian central region in cooperation (municipalities, federal state, federal government, transport association, transport companies, mobility providers etc.) on all mobility offers

- Implementation of a pilot operation in the field of smart ticketing in a subregion in the Styrian central region (expansion of existing e-car sharing offers)

- Use of IT tools for the distribution of multimodal mobility services in the Styrian central region

6.6. Smart governance and marketing

For the further development and optimization of the traffic situation and the mobility offers, a co-operation of different stakeholders from different levels from the strategic traffic planning of the province of Styria up to the municipal detailed planning in the region is necessary. The most important basis for this is the Regional Mobility Plans (RMP), which have been agreed and developed in cooperation. In a highly participatory process, involving many regional decision-makers and participating in workshops, sustainable results are achieved, set as strategic objectives and priorities, and recorded in final reports and regional maps. These definitions form the basis for the further, regionally effective sectoral strategies, plans, programs and measures.

In the course of the development of the RMP subregion Voitsberg, community representatives were asked about mobility in general and public transport:

The densification of the development in residential areas and in the catchment area of public transport is widely accepted. In addition, further urban sprawl should be counteracted by prudent land-use planning, because low density of settlements and urban sprawl promote the increase in the number of residential areas.

The community representatives are rather sceptical about the introduction of a general speed limit on national roads of 80 km / h and a municipal mobility tax for mobility services offered by the environmental association (foot, bicycle and public transport).

Figure 63: © Province of Styria.

The involvement of the population works by passing on information regarding traffic and mobility, on the part of the community, using various media channels and participation processes. The right time to involve the population is an essential aspect of civic participation, because too early involvement can lead to a poor understanding of unconcrete development ideas and too late integration often allows no more adjustment options in the planning process. In principle, however, the involvement of the population should map the needs in the area of transport and mobility and, as a result, implement them accordingly.

Political decision-makers at the municipal level act within their means in the sense of the demands and wishes of their citizens. The diversity of demands in the field of mobility is evident and requires sensitivity and objectivity of the community representatives.

The annual obligatory citizens' meeting in municipalities of Styria opens up the possibilities of informing citizens on the one hand about local developments and, on the other hand, of finding a platform to discuss with the community leaders.

However, many municipalities also organize various citizens' events on the subject of traffic and mobility on their own initiative. In the district of Graz-Umgebung in the course of the development of the bicycle traffic concept Gratwein-Straßengel and Gratkorn a citizen event under the title "Planungsforum Fahrrad" took place. On the one hand information about the development of the two municipalities in the field of bicycle traffic was presented by specialist planners and on the other hand there was the opportunity to discuss with community leaders and planners and to deposit concrete planning wishes.

At the municipal level, citizens' surveys on mobility and transport are very often conducted. Municipalities can query or handle the following aspects:

• wishes and suggestions

• Criticism and problem areas / fields

• potential for development

Longer-term public participation processes accompanied by experts (moderation, process support and sectoral planning) at local level partly lead to high-quality results and valuable foundations for the planning and further development of the topic of transport and mobility.

One result of the workshop in the context of this analysis was the still lacking awareness at the local level about mobility wishes (politically and from the population). Fetching the needs better here and communicating new measures better are bottlenecks for the region.

The workshop also showed that exchanges at regional level brings an added value to all stakeholders and could be institutionalized. As part of the project Peripheral Access, the regional management would like to take a closer look at possible structures for it.

Recommendations of actions for the field of Smart Governance and Marketing:

• Establishment of a structure for organization and information for the entire network of mobility services in the Styrian central region

• Execution of the holistic administration, organization and marketing of the mobility offers in the Styrian central region

• Participation, feedback and optimization of all mobility services on media channels with low access barriers (especially through digital media)

• Marketing through cooperation with companies, educational institutions and institutions in the field of (multimodal) mobility

• Sharpening the communities in the field of awareness Mobility - communities encourage citizens to think: Mobility in every situation!

6.7. Involved stakeholders

Introduction of involved stakeholders:

1. Province of Styria

Together with the offer management of the Styrian Transport Alliance the province planes and funds PT in Styria. Planning goal is the more efficient use of budget funds to guarantee public transport in Styria. Due to the EU Regulation 1370/2007 and the recent adaptation of national laws, a change in the order of services and in the tariff order was required. On the basis of the previous good experience of cooperation with local transport companies within the Styrian Transport Association, the Province of Styria intended to create new framework conditions so that the existing concessionaires can continue to provide their good services.

2. Styrian Transport Association

Concerning the organization of local and regional public transport (ÖPNRV), the legal basis is the Austrian Federal Law "Öffentlicher Personennah- und Regionalverkehrsgesetz".

This law regulates in addition to the organization especially the financial basis for the operation of the ÖPNRV in Austria. On operational side, there is the "Syrian integrated transport Association" – a cooperative institution by virtue of private law contracts between the (alliance financing) authorities on the one hand and the regional authorities and individual transport companies on the other hand. It offers passengers the benefit of a joint ticket covering all involved scheduled transport operators. The Styrian network fare system entitles people to use the services of about 60 transport companies and their approximately 500 network lines.

3. City of Graz – Transport Planning

The role of the City is – also for the periphery – very crucial. The transport department does a strategic, multimodal concept planning, a detailed planning for pedestrian and bicycle traffic, motorized private transport, public transport and stationary traffic, and awareness-raising mobility management to achieve changes in vision and behavior in the sense of sustainable urban mobility.

4. Holding Graz

The Holding Graz - Kommunale Dienstleistungen GmbH (formerly: Grazer Stadtwerke AG or Graz AG) is a holding company in which several Graz municipal service companies are bundled.
The Lines / Energy division is headed by Managing Director Mag.a Barbara Muhr and includes, among others, 83 trams and 159 buses operating under the name Graz Linien (GL) for more than 107 million annual passengers. At the same time, in cooperation with the City of Graz and the subsidiary company e-mobility Graz GmbH, new environmentally friendly forms of mobility are beeing developed. Chairman of the Supervisory Board is the Mayor of Graz, Siegfried Nagl.

In the course of the regional analysis, a workshop was held with interested stakeholders in the field of transport and mobility under the title "Mobility in the Styrian Central Region - Opportunities and Risks?" on 20th of April 2018.
During this workshop, the future development opportunities of the Styrian central region were discussed. It was organized by the Regional Management and content-related moderated by the External Expert Verkehrplus GmbH. The contents of this workshop are incorporated into the regional SWOT analysis.
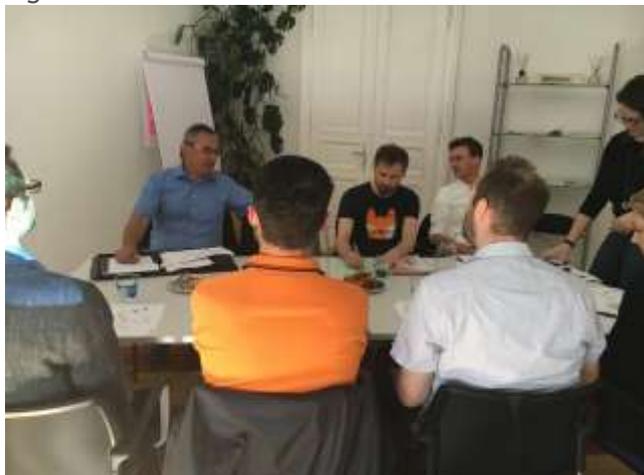

Figure 64: Workshop "Mobility in the Styrian Central Egion - Opportunities and Risks?", 20th of April 2018.

The following list of institutions reflects the main stakeholders mentioned above:

INSTITUTIONS
Province of Styria, Department 16 – Verkehr und Landeshochbau
verkehrplus
verkehrplus
Regionalmanagement Metropolitan Area of Styria
Regionalmanagement Metropolitan Area of Styria
Holding Graz
Province of Styria, Department 16 – Verkehr und Landeshochbau
Regionalmanagement Metropolitan Area of Styria
Province of Styria, Department 16 – Verkehr und Landeshochbau
Styrian Transport Alliance
City of Graz – Department of Transportation Planning

7. Regional status quo analysis of Elster Railway Line

7.1. Introduction

The Zweckverband ÖPNV Vogtland plans to tap into the potential of the cross-national Elster Valley Railway as part of the Central Europe project. These include increasing awareness and improving marketing to ultimately attract more passengers. Below, in a first step, a status analysis of the Elster Valley Railway, which includes the three areas

- Intermodal infrastructure in peripheral areas
- Intelligent mobility and use of intelligent communication technology as well
- Smart governance in peripheral areas and marketing.

The route of the Elster Valley Railway runs from Gera via Plauen to Cheb and thus through the German Federal States of Thuringia and Saxony as well as the Carlsbad region in the Czech Republic. The landscape of the countryside is very attractive and characterized by the Vogtland and the river course of the White Elster. The Elster Valley Railway passes through a structurally weak region that, like many regions in Europe, is shaped by demographic change. Declining populations and an aging population are symptomatic of this. In addition, the purchasing power of households is below average compared to the respective state. Hope, however, in recent years, makes falling unemployment rates and an increasing number of workers in parts of the study area.

The recreational value of the region is high due to a variety of recreational facilities as well as hiking and biking trails along the route, although the region does not have outstanding recreational facilities of supraregional appeal. Responsible for the tourism marketing in the region is the tourist board Vogtland e.V., which is well connected in the region and markets the Vogtland across the border of Saxony and Thuringia. In recent years, a market adjustment has taken place in tourist accommodation in Vogtland, in the course of which no longer competitive farms have disappeared from the market. The region has benefited only marginally from the positive development of tourism in Germany in recent years.

The route of the Elster Valley Railway is not consistent, but requires a change in Weischlitz. The 30 stations and breakpoints have very similar equipment features in some areas, while in others the equipment and especially the possibilities of intermodal linking differ considerably. The possibilities at the stations for an intelligent mobility system on the Elster Valley Railway are also only partially exploited.

7.2. Area characterization

The route of the Elster Valley train runs from Gera (Germany) to Cheb (Czech Republic), passes through the German states Thuringia and Saxony and ends in the Czech region Severozápad / Northwest Czech Republic. At NUTS 3 level, it traverses the independent city of Gera (DEG02, Thuringia), the district of Greiz (DEG0L, Thuringia), the Vogtland district (DED44, Saxony) and Karlovarský kraj / Karlovy Vary Region (CZ041, Severozápad / Northwest Czech Republic). The travel regions on the German side are the Thuringian Vogtland in Thuringia and the Vogtland in Saxony.

In the following communities are the total of 30 stations / breakpoints of the Elster Valley Railway:

- **Thuringia:** Gera, Wünschendorf/Elster, Berga/Elster, Nemühle/Elster, Greiz
- **Saxony:** Elsterberg, Plauen, Oelsnitz (Vogtland), Eichigt, Adorf/Vogtland, Bad Elster, Bad Brambach
- **Northwest Czech Republic:** Plesná, Vojtanov, Žírovice-Seníky, Františkovy Lázně, Cheb.

Borders
— states
— regions
— district (D) / NUTS3
■ municipalities with stops of the Elster valley railway

Cities with…
• 50.000 - 100.000 Inhabitants
• 20.000 - 50.000 Inhabitants
• 5.000 - 20.000 Inhabitants
<5.000 Inhabitants

Traffic
— Highways
… Railway network (D)
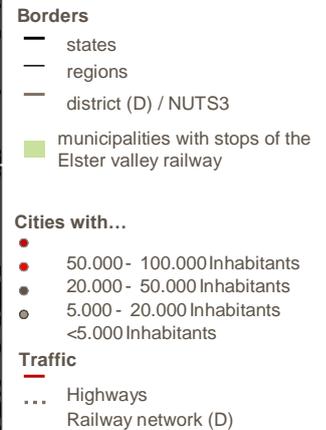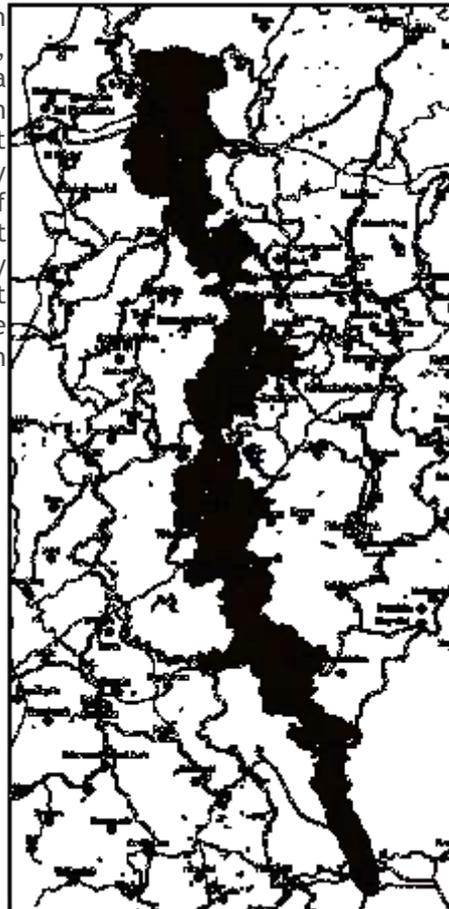
Figure 65: Location of the route of the Elster Valley Railway (source: dwif 2018, map basis: GfK)

With Gera and Plauen, there are two main centers on the route of the Elster Valley Railway serving to meet the specialized needs of households for goods and services. Its catchment area covers between 200,000 and 300,000 inhabitants. The two centers Greiz and Oelsnitz / Vogtland take over the supply of the population in the surrounding area with goods and services of the higher need. Its catchment area covers approximately 30,000 to 35,000 inhabitants. Berga / Elster and Adorf / Vogtland are basic centers that serve to cover the basic needs of the local population. Its catchment area covers around 7,000 to 10,000 inhabitants.

The landscape on the German side is dominated by the Vogtland low mountain range and the Elster mountains in the area around Bad Brambach and Bad Elster, which extends to the northern part of the Czech Republic.

The river White Elster accompanies the route of the Elstertalbahn already briefly on the Czech side to Gera and determines the landscape significantly. To cross the river valley impressive bridges were built in many places, which are also along the route of the Elster Valley Railway. By Cheb, the destination of the Elster Valley Railway, flows the Ohře / Eger River, which gave the region the name Egerland.

In addition, the Vogtland is one of the most volcanically active areas in Central Europe. Among the warm springs located in the area, the spa towns of Bad Brambach, Bad Elster and the Czech side of Františkovy Lázně / Františkovy Lázně can take advantage.

In the four NUTS3 regions, a total of around 720,000 residents lived in approximately 356,000 households in 2017. The number of inhabitants has declined in all four regions over the past ten years. This is accompanied by a shift in the age structure: the proportion of over-65s in the population continues to increase. In 2016, more than a quarter of the population in the three German NUTS regions was already 65 years old and older. On the Czech side this is true for about one fifth.
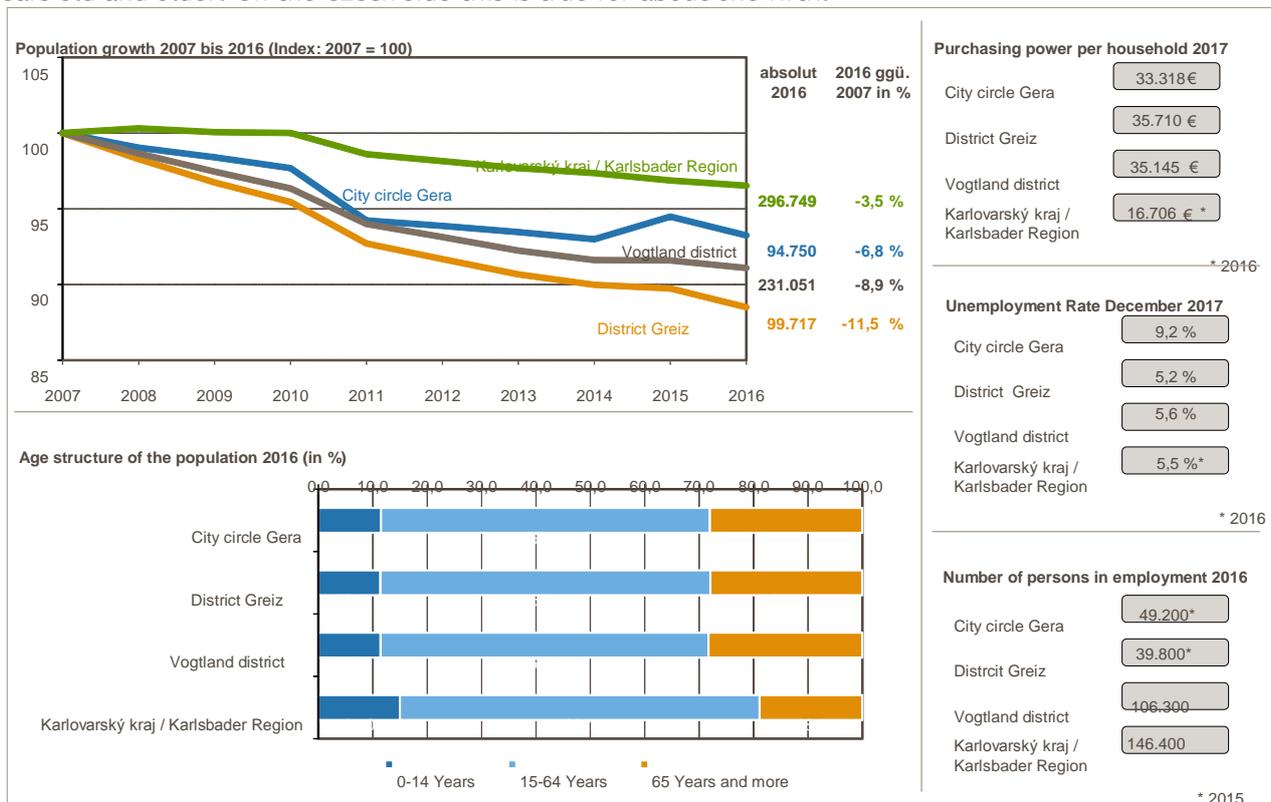
Figure 66: Structural data of the region (source: dwif 2018, Data: GfK, Federal Statistical Office, State Statistical Office of the Free State of Saxony, Thuringian State Office of Statist., Czech Statist. Office)

More key figures at a glance:

■ The unemployment rate has declined in all four regions studied in recent years. As of December 2017, the highest unemployment is in the district of Gera (9.2%). In the other regions, the unemployment rate is significantly lower at 5.5% in the Karlovy Vary region (as of December 2016), 5.6% in the Vogtland district and 5.2% in the district of Greiz. For comparison: the unemployment rate in the federal state of Saxony is 6.2%, that of the federal state of Thuringia at 5.6%.

■ The research area recorded a total of around 342,000 persons in employment in 2016, although the numbers in the four regions under review have developed differently in recent years. An increase of 5.6% has been achieved in the Karlovy Vary region since 2012. In the district of Greiz, on the other hand, the number of employed persons has remained stable, whereas it has declined in the Vogtland district and in the district of Gera.

■ The purchasing power per household is below average in the regions considered. The highest is still in the district of Greiz in Thuringia with 35,710 euros. On the other hand, in the Thuringia average, the comparable figure for 2017 was € 36,939. Slightly lower was the purchasing power per household in the Vogtland district in Saxony l with 35,145 euros in 2017 (Saxony: 35,797 euros). The purchasing power

in the Karlovy Vary region is significantly lower than in the German regions, and at 16,706 euros it is also below the Czech average (18,656 euros).

Tourism development in the region

In the two travel areas Vogtland (Saxony) and Thuringia Vogtland there were as of July 2017 216 opened accommodation establishments (from 10 beds), which offered 11,428 beds. Both the number of businesses and the number of beds available have decreased significantly in the last ten years as a result of market shakeout.

In the Vogtland (Saxony) and in the Thuringian Vogtland, a total of around 520,000 guests were welcomed in 2017 in accommodation establishments, which generated around 1.76 million overnight stays. The development of overnight stays in the two travel destinations has been subject to considerable fluctuations in the past ten years. Overnight stays in the Vogtland (Saxony) have risen steadily since 2014 and were 4.0% higher in 2017 than in 2008. In the Thuringian Vogtland, however, the number of overnight stays declined again after a few top years and was only 1.2% in 2017 above the value from the year 2008. Compared with the respective federal states, the overnight stay development in both Vogtland regions is strongly below average (Saxony: +20.6%, Thuringia: +7.4%).
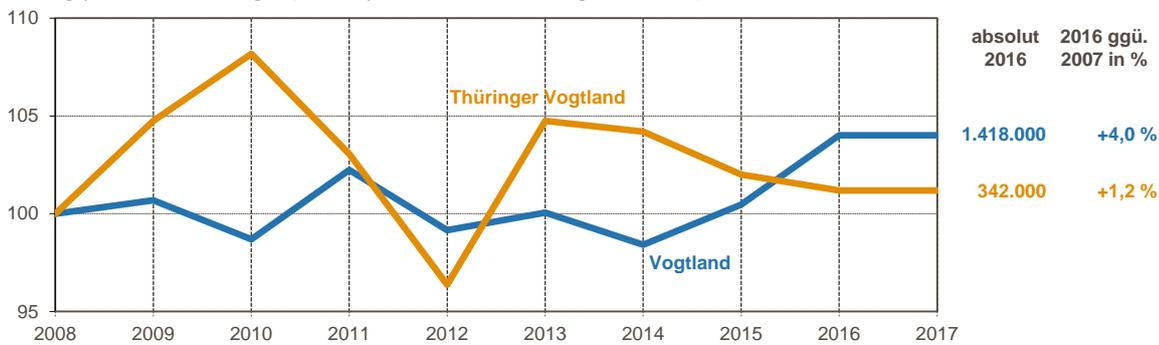
Figure 67: Overnight stay development 2008 to 2017 (Index: 2008 = 100) (source: dwif 2018, Data: Statistical State Office of the Free State of Saxony, Thuringian State Office of Statistics)

Leisure offers

Along the route of the Elster Valley Railway lies a variety of recreational facilities, which are interesting for both the local population as day visitors and for overnight guests. The range of offers is varied and ranges from historical monuments (eg Göltzschtalbrücke), smaller local museums and larger museums (eg Upper and Lower Castle Greiz) to three bathing pools in the spa towns of Bad Brambach (bathing and sauna area), Bad Elster (Soletherme & Sauna World) and Františkovy Lázně / Franzensbad (Aquaforum). The target groups of regional leisure facilities include (regional) culture and history buffs as well as families with children. Even guests who want to be active in nature, get their money's worth: attractive cycling and hiking trails with various sights complete the offer.
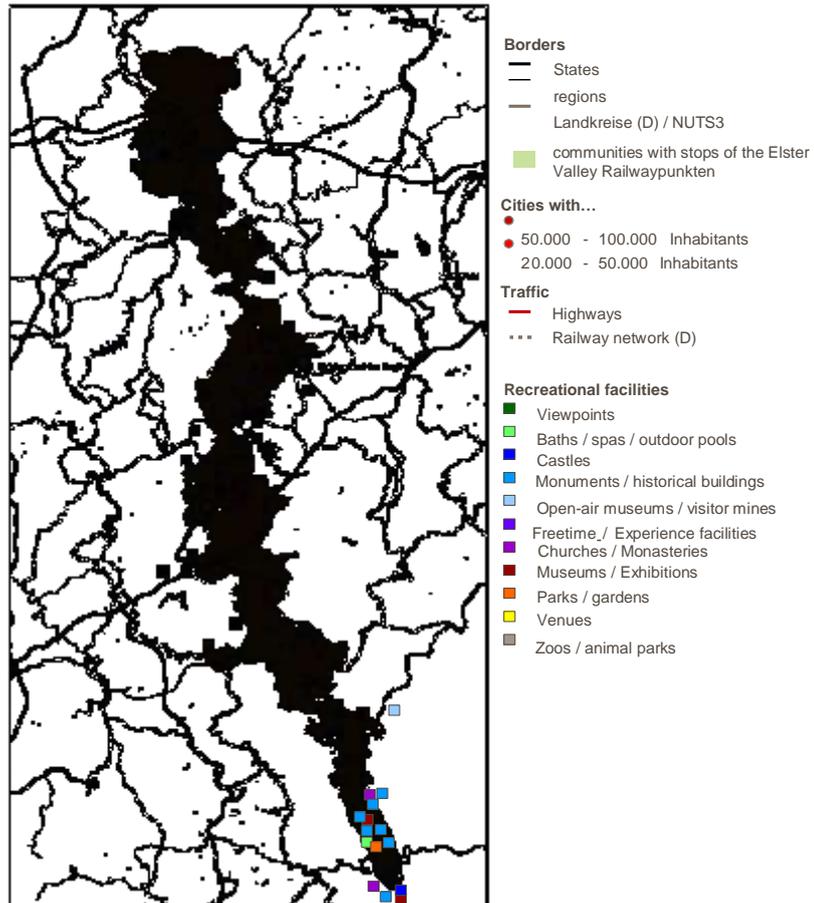
Figure 68: Leisure facilities along the route of the Elster Valley Railway (source: dwif 2018)

However, the supraregional appeal of most recreational facilities is limited. Offers that have an outstanding unique selling proposition and therefore form the sole reason for visiting an overnight stay in the region do not exist.

7.3. Overview of the transport infrastructure

The Elster Valley Railway is about 125 km long and is operated by regional trains. A continuous daily connection between the stations Gera and Cheb does not exist. On the route are regional express trains of the line RE 3 Erfurt - Gera - Greiz (-Elsterberg), regional trains of the line RB 4 Gera - Plauen-center - Weischlitz and the line RB 2 (Zwickau - Plauen Ob. Bhf - Weischlitz - Cheb) on road. Compared to connections via Hof and Marktredwitz or Aš, the Elster Valley Railway is the fastest connection between Gera and Cheb. A ride between both cities takes 2 h 48 min and requires a change in Weischlitz with a 22-minute stay. This trip is possible four times a day.

The Elster Valley Railway follows the course of the White Elster. A comparable route guidance in the passenger car traffic is possible on the federal highway 92 and lasts similarly long as the railway journey. Thus, in the intramodal competition ÖPNV-MIV, the rail connection performs comparatively well just when destinations on the route are addressed.

Table 19 shows that the Elster Valley Railway can be subdivided into six sections with regard to the operating range. On these, the offer varies considerably between 4 and 18 trips per day and an hourly and approximately two-hourly rate. The operating period also varies considerably: the start of operation varies by about two hours and the shutdown time even by six hours.

		route length [Km]	travel time [Min]	speed [Km / h]	Operating period	driving clock	Rides number
RE 3, RB 4	Gera – Greiz	32,1	36	54	4:58 - 23:42	1 h (Mo-So)	18 (Mo-So)
	Greiz – Elsterberg	5,2	5	63	5:46 - 20:54 (Sa-So: 19:46)	1-2 h (Mo-Fr) 2 h (Sa-So)	13 (Mo-Fr) 8 (Sa-So)
	Elsterberg – Weischlitz	24,0	31	47	6:02 - 21:30	1-2 h (Mo-So)	13 (Mo-So)
RB 2	Weischlitz – Adorf	23,7	21	68	6:42 - 22:36	1 h (Mo-So)	16 (Mo-Fr) 12 (Sa-So)
	Adorf - Bad Brambach	16,8	18	56	7:03 - 21:20 (Sa-So: 19:20)	1 h (Mo-So)	9 (Mo-Fr) 7 (Sa-So)
	Bad Brambach – Cheb	24,4	31	47	9:21 - 17:52	~2 h (Mo-So)	4 (Mo-So)
	total	126,3	166[8]	46	7:04 - 17:52	~2 h (Mo-So)	4 (Mo-So)

Table 19: Data about the Elster Valley Railway and its sections

The differences in operation can be attributed to the fact that different traffic functions overlap on the route. The southern section, for example, is predominantly about the handling of leisure traffic, while close to the Gera and Plauen regional centers, a significant proportion of the demand is for commuters.

The update 2017/18 of the Destination Strategy of the Tourist Association Vogtland (TVV) provides a comprehensive SWOT analysis for the tourism destination Vogtland, which describes the chances and risks of the Elstertal Railway aptly and is thus modified in the following table. The characteristics of the route recorded in the present status analysis are included as far as possible as strengths and weaknesses.

[8] including 22 min transfer time in Weischlitz and 1 min each stay in Elsterberg and Adorf.

Strengthen	Weaken
■ partial hourly ■ good connections in Gera ■ stepless access to most stations and stops ■ WLAN and Passenger Information Display Equipment is provided ■ printed communication materials in the trains ■ dynamic information on punctuality at 70% of train stations (though in significantly different quality) ■ relatively good in travel time comparison to the MIV ■ Real-time information is available (via the internet), but is difficult to get along the way ■ good performance integration: bicycle transport integrated, public transport system-wide tickets (EgroNet)	■ no continuous offer; transfer time in Weischlitz ■ Relation Leipzig - Plauen / Cheb is faster over Chemnitz / Werdau than Gera ■ Connections in Cheb ■ in the southern section no offer in daytime locations ■ numerous strengths of the destination Vogtland are not developed directly by the Elster Valley Railway (for example: ski region Oberes Vogtland, musical instruments locations like Markneukirchen, health resort Bad Elster, Vogtlandarena Klingenthal, MTB-center Schöneck) ■ Train crew only in 31% of the trains between Gera and Weischlitz ■ lack of orientation for passengers in tariff issues ■ Cycling can fail due to lack of space ■ different, partly unexplained ownership of the stations ■ Destination advertising in the Vogtlandbahn mainly refers to destinations in other regions
Opportunities	**Risks**
Cooperation with muncipailites and ministries ■ good cooperation with the responsible ministries and marketing companies of the Free States and the State Tourist Board of Saxony ■ almost all municipalities and many tourist service providers are members of the TVV attractions / destinations in the catchment area **Attractions / destinations in the catchment area** ■ top potential including leading infrastructure / products and demand relevance in nature-active complex, in the area of family vacations ■ five certified quality hiking trails in the region, well-developed network of hiking trails ■ high quality cultural landscape, many special individual buildings and ensembles interregional context ■ access to funding opportunities of Saxony and Thuringia ■ image enhancement through further dissemination of the VOGTLAND brand by brand users, as well as cooperation with the regional economy through the project "umbrella brand Vogtland" ■ deepened cooperation with the city of Gera, the Bavarian and Bohemian Vogtland **Development in the targed groups and -markets** ■ demographic change (increase in the proportions of Vogtland target groups in the total population) ■ still Growing Markets Hiking and Health - Addressing new, distant source markets possible, in addition potentials, especially during a short break (hiking, winter, cycling) ■ targeted investments in (tourist) infrastructure	**Importance of tourism and service in the region** ■ low supra-regional awareness of the destination ■ lighthouse thinking of some responsible persons ■ quality / service thought not sufficiently available, few hotels with more than 3 stars **Development in the tourism sector of the Vogtland** ■ demographic change (shortage of skilled workers, vacancy, succession finding) ■ lack of gastronomy (especially on long-distance trails) ■ insolvencies in the hospitality industry and impending sanctions, especially in small businesses, e.g. Apartments (succession, missing online affinity) ■ lack of service and quality thinking ■ long-term shrinkage and obsolescence of previous source markets ■ too low willingness of service providers to contribute financially and at the same time to high expectations of the new destination management organization **Competition to other destinations** ■ low and often only temporary budgets make market penetration difficult ■ product life cycle tourism, increasing competition ■ low income level ■ missing online affinity / transfer rates, availability

Table 20: SWOT analysis of the Elster Valley Railway based on the SWOT analysis of TVV 2016

On the one hand, the strengths lie in an established culture of cooperation with ministries and associations as well as municipalities. These structures should be used The numerous attractions and destinations along the route can be valued by the Elster Valley Railway. In this way, a number of the mentioned weaknesses can be mitigated: Thus, those individual attractions, which do not have a transregional charisma on their own, in the context of quite attention to the Vogtland. It will be important to replace the lighthearted thinking of many responsible persons in favor of a networked destination profile. In the effort to promote quality and service in the region, the Elster Valley Railway should be included. In this analysis, researched success stories of many other regional railway lines show that targeted investment and effort by

- acceleration of supply (speeding up, reduction of transfer times),
- introducing an attractive tact over the entire route (including an extension of the operating period),

- use of modern train material (e.g. low-floor technology, air conditioning, train services),
- modernization of detention points (accessibility, easy accessibility, quality of stay, rebuilding of stops close to settlement areas and other important transport destinations),
- Links with other transport services and tourist offers (nearby destinations, hiking trails, cycle routes, mountain bike routes, trails etc.)on the one hand on the other

could lead to a significant increase in passenger demand. In part, the Elster Valley Railway already has very good approaches (for example, part-time clock, stepless access to most stations and stops, decision to wireless equipment), which has to be picked up.

Among the opportunities and risks, there are some that work in both directions: the demographic change in the Vogtland itself is leading to a shortage of skilled workers, on the other hand, the target group 50+, which can be won over for natural and cultural activities, will grow. Regardless of growth in the target group, the target markets (business units) offer further development potential: the (mega) trends are health, active holidays, deceleration, "back to nature", regionality.

The chances of the Elster Valley Railway exist above all in the interregional context of the Vogtland: Since it extends across Thuringian and Saxon parts equally, a degree of destination has now been achieved which, according to the tourism strategy Saxony 2020, allows maximum funding rates. Cooperations with neighboring Bavarian and Bohemian parts of the Vogtland should contribute further development potential and lead to synergy effects.

In turn, there are risks in the weak state of development of the tourism sector - which offers positive potential for development. In addition, compared to other regions, the Vogtland has low budgets and a low income level, which, in combination with weaknesses in digital development, creates competitive disadvantages.

7.4. Multimodal services

The stations and breakpoints have very similar equipment features in some areas, while in others the equipment and especially the possibilities of intermodal linking differ considerably. With four exceptions, all stations are steplessly accessible, in Gera and Cheb can also be organized entry and transfer assistance. This is important for the goal of barrier-free accessibility. However, there are only in the two stations and also in Gera-south lockers, so that short trips are only possible if the baggage with it does not bother.

WCs and shops play a role in the convenience of changing trains at the station. These can be found next to the two terminus stations only in Gera-Süd and Františkovy Lázně.

With regard to multimodality here specially the connection of different means of transport on one and the same way (Intermodality) is interesting: At 5 (out of 30) stations there is a taxi rank, at 14 there are car parking spaces, which make P + R possible, at 10 stations bicycles can be connected (B + R). More than half (16 out of 30) of the stations can be transferred to the public road transport. The integration of the Elster Valley Railway into public transport will be described in more detail below.

Stop	stepless access	Transfer / change help	Lockers	WC	traveling needs	taxi stand	Parking spaces	bicycle parking	Public road transport connection
Gera Main Station	yes	only by appointment	yes	yes	yes	yes	yes	yes	yes
Gera Süd	yes	-	-	yes	yes	yes	yes	yes	yes
Gera Zwötzen	yes	-	-	-	-	-	yes	-	yes
Wünschendorf North	yes	-	-	-	-	-	-	-	-
Wünschendorf	-	-	-	-	-	-	yes	yes	yes
Berga (Elster)	yes	-	-	-	-	-	yes	-	-
Neumühle (Elster)	yes	-	-	-	-	-	-	-	yes
Greiz	yes	-	-	-	-	yes	yes	-	yes
Greiz-Dölau	-	-	-	-	-	-	-	-	yes
Elsterberg	yes	-	-	-	-	-	-	-	-
Elsterberg - Kunstseidenwerk	yes	-	-	-	-	-	-	-	-
Rentzschmühle	yes	-	-	-	-	-	-	-	-
Barthmühle	yes	-	-	-	-	-	-	-	-

Plauen Mitte	yes	-	-	-	-	-	yes	yes	yes
Kürbitz	yes	-	-	-	-	-	-	-	-
Weischlitz	yes	-	-	-	-	-	yes	yes	yes
Pirk	yes	-	-	-	-	-	-	yes	-
Oelsnitz	yes	-	-	-	-	-	yes	yes	yes
Hundsgrün	yes	-	-	-	-	-	-	-	-
Adorf	-	-	-	-	-	-	yes	yes	yes
Bad Elster	yes	-	-	-	-	-	yes	-	yes
Sohl	yes	-	-	-	-	-	-	-	-
Raun	yes	-	-	-	-	-	-	-	-
Bad Brambach	yes	-	-	-	-	-	yes	-	yes
Plesná	yes	-	-	-	-	-	-	-	-
Voijtanov	yes	-	-	-	-	-	-	-	-
Žirovice-Seníky	yes	-	-	-	-	-	-	-	-
Františkovy Lázně	-	-	yes	yes	yes	yes	yes	yes	yes
Františkovy Lázně Aquaforum	yes	-	-	-	-	-	-	-	yes
Cheb	yes	yes	yes	yes	yes	yes	yes	yes	yes

Table 21: Features of the stations and stops (VVV information)

The integration of the Elster Valley route into the supra-regional rail network is important for the accessibility of the tourist destinations and infrastructures along the route, since the main source markets of the Vogtland are Saxon cities, Thuringia, Berlin, North Rhine-Westphalia and Bavaria. In this respect, connections to the long-distance hubs in Leipzig and Erfurt as well as to regional hubs are of great importance. Since so far only few international guests come to the Vogtland - and among them are especially many from the Czech Republic - the connection via Cheb can be important for the success of the tourism strategy.

A coordination of timetables is desired between the various task forces, but technically and organizationally not easy to accomplish. Thus, the Thuringian actors NVS and Greiz County are aiming to align public transport services to a 00 node in Gera station in order to be able to secure further connections there and also in the wider network. The situation is similar with connections to the Czech Republic at Cheb station and towards Saxony at Werdau station (on the RB 2 line). However, the speeds that can be achieved on the Elster Valley Railway do not allow these compulsory points to be optimally connected, so that inconveniently long transfer times arise in Weischlitz. With the aimed on the Czech side 30-knot in Cheb it might make sense to operate the Elstertal train in full length between Gera and Cheb.

The Elster Valley Railway is also linked to offers of road-bound public transport at some stations (see Table 21). This concerns different public road transport products. For the year 2019 it is planned to put far-reaching changes in the ÖSPV into operation. The debates surrounding the Plauen - Bad Elster connection have shown that changes are not excluded.

The changes to be expected for 2019 will lead to a profiling of the individual public road transport offers, which should provide important stimuli for the marketing of the Elster Valley Railway and the connections made through it. First and foremost is the link with the plus buses in Plauen, Oelsnitz and Adorf, which are operated at an hourly rate. But also the numerous Regio-busses (every 2 hours), city buses, citizen buses and Call-busses can be put into better value with successful connection with the Elstertal train. Specifically, the prospects for a successful link between the bus and the train depend on the schedules being developed.

The combination of train rides with private bicycle use is particularly important in tourism. In this context, it is crucial whether and how the stations are integrated into the touristic cycle network. The cycle concept of the Free State of Saxony, drawn up in 2014, identifies a number of cycling routes of supraregional and regional importance. The guidepost lifts the concept according to the Elster Railway Line the cities Gera, Greiz, Plauen, Oelsnitz and Adorf out and linked in the vicinity of the cities Werdau, Reichenbach, Auerbach, Klingenthal, Aš, Hof and Zeulenroda with the stations on the Elster Valley Railway. According to the Saxon concept, the following cycling routes have a high relevance for cycling tourism:

- Elsterradweg (parallel to the railway),
- cycle route Saxon low mountain range (Plauen, Sohl),

- Götzschtalradweg (Greiz),
- Falkenstein-Oelsnitz (Oelsnitz),
- Musician Cycle Route (Adorf, Bad Brambach),
- cycle path network in the district of Greiz,
- Thuringian Town Chain (Gera)

Further conceivable cycling routes should be worked out or researched in the following work on the development and marketing concept of the Elster Valley Railway in exchange with the TVV. In this course, could also be a preoccupation with the so far less prominently treated wheel segments road bike, mountain bike (Schöneck) and e-bike done on the Elster Valley Railway.

Furthermore, the combination with the pedestrian traffic deserves a lot of attention. This applies initially in the everyday traffic for the accessibility of the stations from the settlement areas and also from a tourist perspective for the network planning and hiking trail designation. For the Vogtland the TVV points out the large number of attractive hiking trails the following three, according to the criteria of the German Hiking Association (DWV) certified quality hiking trails (here mentioning the stations where the Elster Valley Railway is crossed):

- path way Erzgebirge-Vogtland (Adorf),
- Vogtland Panorama Trail (Plauen, Kürbitz, Weischlitz, Pirk, Oelsnitz, Raun, Bad Brambach),
- Elsterperlenweg (Greiz, Neumühle, Berga, Wünschendorf)

In addition, the TVV's destination strategy mentions another 20 top-themed routes suitable for half-day or full-day tours. Incidentally, it would also be helpful to point the way to the relevant objectives of water sports, in particular at the Pirk dam, and possibly also at the Pöhl dam, for recreational traffic.

7.5. Intelligent mobility and use of intelligent communication technology

Intelligent mobility in the narrower sense is based on the use of information and communication technologies at the station, on the train and on the Internet for the purpose of informing and controlling passengers. Above all, it aims to provide more and more satisfied customers on the Elster Valley Railway. So the technology is used meaningfully if it facilitates the access to the public transport or makes its use more comfortable.

In a broader sense, intelligent mobility also includes the tools of marketing in the areas of product and pricing, distribution and communication to pursue the above goals.

The following two chapters deal on the one hand with the design of intelligent mobility through intelligent mobility services on the Elster Valley Railway in the status quo as well as suitable improvement measures. Afterwards special status quo and meaningful possibilities of the use of intelligent communication technologies will be shown.

7.5.1 Intelligent mobility

Currently, the possibilities at the stations for an intelligent mobility system on the Elster Valley Railway are only partially exhausted: Dynamic information on punctuality is available on approx. 70% of the stations. Within the next two years, this ratio should rise to 100%, at least on the German side. The quality of information displayed on the Elster Valley Railway between stops is clearly different. Only 3 stations have multi-train displays (Figure 69). The other stations are equipped with dynamic font indicators (DSA) (Figure 70).

Figure 69: Multi train display at the main station Gera (picture material: VVV)

Figure 70: Dynamic font display in Greiz-Dölau (picture material: VVV)

Not only is the usability of the DSA significantly worse for the passenger (egg. less readable in sunlight, slower information acquisition), the amount of relevant information is also smaller. Thus, information only appears if there is a deviation from the timetable. Multi-train displays always indicate the next train on the appropriate track, any deviations from the timetable and additional information about the vehicle itself. Verbal announcements at the stations are also possible if they are equipped with DSA or multi-train displays.

On the trains themselves, apart from the printed communication materials, there are no information or communication technologies that promote intelligent mobility. It is planned to set up WLAN and passenger information displays in the trains of the Elster Valley Railway, which at least show map timetable data. The train attendants, who are present in the Gera - Weischlitz section for approximately 31% of the journeys and the Weischlitz - Cheb section for almost 100%, are currently an important component of the existing mobility system as a means of contact for passengers. In the event of a breakdown, they ensure that the dynamic information from the control center is forwarded to the passengers. The low attendance rate on the section Gera - Weischlitz leads to a reduction in the current and accurate information of the customers.

On the Internet, by SMS or telephone are available via the transport association Vogtland, Deutsche Bahn and the Vogtland train real-time information on the regional trains of the Elster Valley Railway. Passengers can check them before or during their journey. The TVV also integrates this information in its "Vogtland App". All of this electronic information is linked to the same background system. However, getting to the current driving time or connection on the Internet or the app is cumbersome for the passenger, since many steps must be completed and the operation is very much in need of explanation.

The distribution of tickets currently takes place via many channels:
- Onlineshop on vogtlandbahn.de, bahn.de, egronet.de or vogtlandauskunft.de
- Mobile phone ticket of Deutsche Bahn (DB Navigator) or mobile ticket Germany
- Vending machines in the vehicles of the Vogtland train
- machines at five stations of the Elster Valley Railway
- Agencies of RUs and points of sale of Deutsche Bahn

The very diverse range of tariffs for different validity periods and durations is difficult to see through for the rare and occasional users of the Elster Valley Railway (EgroNet ticket, tour ticket, day tickets, Saxony-Bohemia ticket). This complexity is not reduced by the current design of the distribution, as for the visitors of the Elstertal train neither a hierarchization of tickets is made, nor an intelligent online ticket consulting takes place. The uncertainty of choosing the right and cheapest ticket therefore remains high.

A simple use of the offer for cyclists is facilitated by the possibility of taking bicycles with some package tickets (EgroNet ticket and touring ticket). The EgroNet ticket enables the use of all public transport throughout the EgroNet region and also makes travel in the Elster Valley railway region much easier. The integrated ticketing is already strongly developed.

The target groups of the Elster Valley Railway are primarily leisure users who, as hikers, cyclists, groups and families, want to explore the region's leisure activities.

Implementing an intelligent mobility system for these target groups and encouraging them to be used further offers a broad range of measures in which costs and benefits must be weighed. Above all in the

area of intelligent communication and sales, the potential on the Elster Valley railway line is great, reducing the barriers to use and the offer with high cycle density and its additional services such as to market bicycle transport to the target groups.

The target group of recreational users, who are also often casual or even rare users in public transport, would like to see strong reinsurance and support in the use of public transport. The following pre-selection of measures of intelligent mobility services is conceivable for the Elster Valley Railway. These are rated differently according to their feasibility.

Measure	Feasibility
Real-time information on the train's current delay on the train and on the Internet	Easy implementation with planned monitors and existing background system
Real-time information on departure times of connecting means of transport on the train and on the Internet	Easy implementation with planned monitors and existing background system
Real-time information on alternative connections in the event of a delay on the train and on the Internet	Easy implementation with planned monitors and existing background system
Online information about equipment and utilization of the Bicycle parking spaces in the train	More time-consuming implementation to establish system for recording the utilization
Online information about equipment and services at the stations	Simple implementation with low maintenance costs
Online routing from / to the train station	Simple implementation by integration of a standard routing service in the online presence
Intelligent ticket distribution	Simple communicative implementation possible More complicated implementation in the case of online ticket consulting

Table 22: Selection of measures for the implementation of intelligent mobility for the Elster Valley Railway

The technical infrastructure for recording real-time information in vehicles and a data hub are already in place. The information should be made easily accessible to the customers - a revision of the electronic timetable information in the frontend, for example, based on existing apps other transport companies in the various media (website, app) is very useful.

The current departure times and delays of following connections as well as the possible delay of the own train should be available in particular in the vehicles - in combination with a train attendant, who is available for further questions, the uncertainty can be taken in case of accident. Fallback level should be the train attendants, as only he can verify the information.

For the target group of cyclists, it is important to know if they can transport their bicycles on the train. Above all, the display for the utilization of the parking spaces makes sense in order to be able to be sure as a customer whether there is room for your own bike. For this purpose, a system is conceivable, which draws on the train attendant by indicating this in his mobile terminal when the parking spaces are occupied. Passengers may be able to switch to another connection or choose a different entry stop.

A reservation system for bicycle parking spaces in the train is conceivable, but in the implementation of very complex, since the distribution system with integrated and the current tariffs would have to be aligned.

For the experience of the journey, the station as entrance to the public transport is a very important interface. Bike + Ride courses, safe bicycle shutdowns, bicycling equipment such as publicly accessible air pumps contribute significantly to the simplification of use and the positive perception of the public transport experience. The equipment of the stations and stops with bicycle parking spaces, travel supplies and luggage lockers are information that are essential for travel planning and should be easily accessible and up-to-date on the Internet.

Furthermore, the leisure facilities in the region around the Elster Valley Railway play an important role for the destination group of day trippers, so that arrival information, dynamic routing from the train station and to the train station should be made available online.

In the area of distribution, intelligent mechanisms should be used, which considerably simplify the ticket choice for the user. The hierarchical placement of suitable tickets for the different purposes on the websites of the association and the RU is a first measure. This also applies to other tariff and distribution notices on trains and at stations. An online rate advice is a next step for the users to the accessibility: which ticket is the right one for the special purpose of the passenger? An automated answer to this question is possible either with the help of a standardized questionnaire or, better yet, via chatbot. The train conductor is also in this case the fallback level to ask questions about tariffs.

7.5.2 Use of intelligent mobility technology

The basis for an intelligent communication concept is easy-to-read, easy-to-understand and multilingual passenger information on the timetable, fare and sales. The classic variant here is the provision of information as a fixed notice at the stations and on the train. In addition, the information should be available in digital form, but train attendants are also the central point of contact for customers and should be able to provide information in this regard. The pure information on the timetable and fare is available on site today, but not all requirements.

In addition to timetable, fare and sales information, it is particularly important for the Elster Valley Railway to provide additional information for the target groups. This includes z. B. tourist POIs, or cycling and hiking trails in the vicinity.

The 30 stations along the Elster Valley Railway are run by different owners - seven belong to the DB Group, two are owned by the local authority, eleven are private individuals and ten are open to the owners question at the present time. The existing station buildings along the Elster Valley Railway are largely without function, partly in need of renovation and act rather dissuasive than inviting. There is no information on tourist destinations at the stations themselves today.

DB Station & Service AG operates all stations on the German section of the route. The recommendations for action developed here should be coordinated with those responsible on site at an early stage. For the design of the direct station environment there is already a working group with the necessary participants, in which the appropriate measures should be introduced.In the trains, information from the network is provided in sufficient numbers - in particular the customer magazine of the "Vischelant" association and individual flyers, e.g. to the "Vreizeitnetz". The materials are provided by Verbund and designed by the employees of the Vogtland train. As another information medium, the daily newspaper "Freie Presse" is available on the train.The Vogtlandbahn advertises in trains with posters for certain travel occasions, but mostly for supraregional destinations, e.g. for the year of Luther in 2017. A marketing of the numerous existing local destinations along the Elster Valley Railway takes place only slightly and primarily online: Travel information to destinations in the vicinity gives the Vogtlandbahn on the Internet. Likewise, all basic information on the timetable, fare and distribution on the Internet on the pages of the Vogtlandbahn (www.vogtlandbahn.de) and the Association (www.vogtlandauskunft.de) are available.

In the ZVV association meeting on 5.9.2017 the provision of free WLAN in the trains of the Vogtlandbahn for the year 2018 was decided. The installation of passenger information displays in the trains is also in preparation. Both are welcomed by the expert and taken up in the further recommendations for action

Measure	Feasibility
Uniform posting concept and revision of information	Easy implementation; Coordination with DB Station & Service AG and Vogtlandbahn
Elster Valley Railway-specific advertising campaigns at stations and in trains	Easy implementation; Coordination with DB Station & Service AG and the Vogtlandbahn for the use of free space
Information on tourist destinations through panels or posters	More elaborate implementation through a high degree of research work and cooperation with tourism associations and municipalities regarding the acquisition of information and the structural implementation possibilities

Information and directions to cycling and hiking trails	More complicated implementation; Close cooperation with the tourist office required
Elster Valley Railway-specific flyers in trains	Simple implementation, analogous to existing processes with the Vogtlandbahn
Creation of a welcome culture	Easy implementation; Voting with the Vogtlandbahn
Training of train accompanying personnel	Simple creation of the training concept by VVV More elaborate training by Vogtlandbahn.
Provision of Wi-Fi and QR codes to Elster Valley train-specific pages	Wi-Fi already decided Easy implementation of QR codes

Table 23: Selection of measures for the implementation of intelligent communication technologies for the Elster Valley Railway

As a measure for the increase of recognizability, easier orientation as well as the simplicity of the use of the public transport at stations serves a uniform notice concept. At the same time, the information regarding the above-mentioned requirements of readability, comprehensibility and multilingualism should be revised. At least Czech is to be used on the German section and German in the Czech section.

Certain tariff products for use of the Elster Valley Railway or Elster Valley Railway-specific advertising campaigns should take the form of posters on existing open spaces, e.g. be placed in existing showcases and poster frames.

A further measure at the stations is the implementation of hints to tourist destinations through panels or posters to sights in the vicinity, the history of the place or the station and to peculiarities of flora and fauna. This information should also be available on the Internet, with supplementary information or routing functions as appropriate. The connection should be made possible by QR codes which are integrated in the notice board. At larger stations, these could also be provided by large touchscreens.

Another measure for tourist target groups is the placement of information and direction to cycling and hiking trails in the form of maps in the immediate vicinity of the station and direction signs to the individual paths and destinations at the station. The train stations should, if not yet done, be integrated into cycling and hiking trails.

All measures should be designed to resist vandalism in order to ensure their longevity. Similarly, existing vandalism damage should be eliminated, otherwise the newly introduced measures will be hampered in their appearance.

In the trains of the Vogtlandbahn also Elster Valley Railway-specific information, e.g. be installed for the marketing of sights. The existing poster frames can be used for this.

Also, flyers on topics around the track should be designed. These can also combine different types of information, e.g. Information on timetables and fares as well as excursion destinations analogous to the Schöneck Flyer in the "Vreizeitnetz".

In order to increase the quality of stay in the trains, a welcome rather than a ban culture should be created by revising the pictogram concept.

In order to offer passengers the best possible service on the train, an increase in the quality of advice is necessary. This can be done, for example, by training the train attendants on the subject of timetable and fare information as well as on further information about excursion destinations around the Elster Valley Railway.

In order to provide optimal information opportunities for passengers, the free provision of WLAN in the trains of the Vogtlandbahn has already been decided. By automatically forwarding to a customer portal or to a specific website after the WLAN registration, the attention of the passengers can be directed specifically to Elster Valley Railway-specific topics. This can also serve QR codes that are applied in different areas of the train.

7.5. Smart Governance in peripheral areas and marketing

The development of the Elster Valley Railway affects different areas of responsibility and expertise in politics, administration and business. The achievement of the project objective depends on the efficient coordination of the actors involved and their respective actions.

In regional development, the interests of transport, settlement, tourism and the economy are bundled and treated in their interdependence. The regional plans concerning the Vogtland were drawn up on the one hand for East Thuringia and on the other for the region Chemnitz. In East Thuringia, the Elster Valley has the rank of a tourist infrastructure axis, which bundles among other cycling and hiking trails. The regional plan Chemnitz formulates this in principle 1.8.6 in a comparable way. The regional plans are drawn up in extensive consultation and coordination processes. The Regional Planning Association East Thuringia and the Planning Association Region Chemnitz are therefore suitable partners for the further development of the Elster Valley Railway.

The clientele of the Elster Valley Railway is not uniformly regulated. It can be differentiated according to the individual lines used by the Elster Valley Railway:

- Responsible for the RB 4 Gera-Weischlitz are the Nahverkehrsservicegesellschaft Thüringen (NVS), a wholly owned subsidiary of the Free State of Thuringia, and the Zweckverband Public Transport Vogtland (ZVV), an association of the Vogtlandkreis and the county seat Plauen. The RB 4 is part of the bundled Vogtland network. The operator is the Länderbahn, a subsidiary of Netinera, which also operates rail transport in other regions of Germany. The contract runs until December 2027.
- The responsibility of the RE 3 Erfurt-Gera-Altenburg / Elsterberg is the NVS. The trains driving the section Erfurt-Gera are winged in Gera, for the Elster Valley Railway the section Gera-Greiz-Elsterberg is relevant. The RE 3 is part of the bundled Thuringian tilting technology network. Individual trains will be extended from Greiz to Elsterberg to reinforce the RB 4, while the short section from the state border to Elsterberg will be financed by the ZVV. Operator is the DB Regio. The contract runs until December 2021, an extension to the closure of the electrification gap on the center-Germany-connection - expected end of 2025 - is provided.
- Responsible for the RB 2 Zwickau-Bad Brambach (and further to the national border) is the ZVV, for the extension to Cheb this is the Czech Karlovarský kraj. A part of the line (Zwickau-Weischlitz) does not belong to the Elster Valley Railway, this also applies to the also counting to RB 2 section Plauen-Hof, which is used in both directions twice a day in daytime margins and for the Free State of Bavaria funding beyond the state border. The RB 2 is like the RB 4 part of the as a bundle until December 2027 awarded Vogtlandnetzes, operator is therefore also the country railway.
- In addition, as part of its railway nostalgia program, which has been in operation for more than twenty years, the NVS organizes the "Elstertal Express", a special train Gera - Cheb that operates as a direct connection. In the autumn of 2018, the "Elstertal Express" is scheduled for three days in September and October.

The following documents are relevant for the individualized public transport offer planning:

- Free State level: In Thuringia there is a national transit plan, which is dedicated to the development of the SPNV and has been updated several times, most recently until 2017. In Saxony, the responsibility for the SPNV has no longer been with the Free State for about twenty years, but with the local traffic areas that are the same as the Zweckverbände or Verkehrsverbünden.
- District level: In the Czech Republic, local public transport planning for public transport is integrated at the district level, such as public transport. For the Elstertalbahn the Plán "dopravní obslužnosti územního obvodu", prepared for the Karlovarský kraj, relevant. His term extends to 2028.

- County level: Local public transport plans are drawn up for the rural districts of Vogtland (integrated rail and public transport) and Greiz (together with the independent city of Gera, only for public transport). The currently valid updates extend to the years 2020 and 2018.

In each case, the targeted public transport service is recorded for the planning areas, taking into account various municipal objectives (in particular public services, transport integration, economic efficiency). The participation of politics, the public, transport companies and public authorities takes place.

The infrastructure of the Elster Valley Railway is owned by DB Netz and its Czech counterpart Správa železniční dopravní cesty (SŽDC). Overall, the Elster Valley Railway between Raun and Voijtanov crosses the state border seven times, therefore there are sections in which the management of each of the foreign train is responsible. The infrastructure boundary of both operators lies between Bad Brambach and Plesná. All stations on the German section are operated by DB Station & Service AG, but the ownership of the station buildings is very different and partly unclear.

The VVV sells the tickets in the "EgroNet", which connects the cities and municipalities of the Euregio Egrensis. The Euregio extends next to the Thuringian and Saxon Vogtland also parts of Upper Franconia, the Upper Palatinate and Northwest Czech Republic. In addition to the VVV, the EgroNet cooperative network includes other individual districts, independent cities and associations from the three federal states and the Czech Republic.

In the tourism sector, the destination management organization Tourismusverband Vogtland (TVV), to which a few years ago the two separately operating Saxon and Thuringian tourism associations have joined forces, is the first point of contact. Both the Vogtland district and the district of Greiz are members, as many district municipalities and the city Schleiz (Saale-Orla-Kreis). The TVV is a member of the state tourism association Saxony e.V. (LTV), participates in working groups of Tourismus Marketing Gesellschaft Sachsen mbH (TMGS) and works closely together with Thüringer Tourismus GmbH (TTG). In this way, the various territorial activities in the German-speaking Vogtland bordering the Elster Valley Railway can be bundled via the TVV. The TVV also maintains regular contact with colleagues in the Czech Republic.

The Elster Valley Railway is also relevant for local companies, as shown by the concentration of supply in the catchment area of the two regional centers Gera and Plauen, which are designed to meet the needs of commuters. Added to this is the considerable expansion of supply in the ÖSPV planned for commissioning in 2019, which will improve the accessibility of the railway from the area and for the population living there. Regional contact should be on these issues the IHK, in detail the IHK East Thuringia to Gera and the IHK Chemnitz - there the regional chamber Plauen. Both IHKs work together with the TVV on questions of tourism promotion, but beyond that there is no regular occupation with projects like the one of the Elster Valley Railway marketing. In this respect, it is quite conceivable, the development issues in the transport committees of both Chambers of Commerce, in the case of the IHK Chemnitz suitably in the transport committee of the regional chamber to handle the development of the Elster Valley Railway. It is also conceivable to explicitly include the Elster Valley Railway in queries on location satisfaction and subsequent evaluation interviews. In East Thuringia, the evaluation talks are scheduled for autumn 2018. The Chemnitz Chamber of Industry and Commerce also regularly collaborates with Czech colleagues and organized with them from time to time traffic conferences (the next in June of this year), for concerns such as the development of the Elster Valley Railway and their marketing can be used.

8. Regional status quo analysis of public transport of Lubin Region

8.1. Introduction

The aim of the study is to analyze existing solutions for the organization of effective public transport services in the Lubin County in terms of the introduction of new solutions taking into account:
- adapting them to real passenger needs,
- ensuring adequate accessibility for disabled people,
- uniform passenger information system,
- reduction of negative impact on environment,
- reduction of risks for health and safety of residents,
- increasing the economic efficiency of public transport.

The analysis cover the following three deliverables:

D.T.1.2.6. Status quo analysis of intermodal mobility solutions in Lubin County

D.T.2.2.6 Thematic regional status quo analysis (ICT/ITS use) for region Lubin

D.T.3.2.6 Thematic regional status quo analysis (smart governance and marketing) for region Lubin.

The analysis will take into account three basic priorities:
1. Intermodal mobility solutions - due to the need for a significant expansion of this type of connections in the Lubin County, which due to the specificity of the region are determined by the support of its development on one branch of the mining industry is currently practically devoid of modality in public transport.
2. Smart mobility solutions - the first solutions in this area are relatively recent and relate to public transport only, which has now been replaced by a county public transport spanning the area of three municipalities in the Lubin County. However, the intensive development of information technologies and the increase in the universality of the use of mobile services by the society forces the necessity of constant development of intelligent solutions enabling the development of mobility.
3. Smart governance and marketing approaches - in the near future, in the city of Lubin (after nearly 10 years) rail transport is to be restored. It will allow for long-distance journeys using the rail connections with the main node in Wroclaw which will require adjustment of the local transport by creating Lubin interchange and its corresponding communication with all means of public transport and, consequently, appropriate promotion of these solutions among the local community accustomed to using individual means of transport.

> The scope of the area analysis covers the area of the Lubin County consisting of 4 communes. The subject of this document includes:

– the communication network infrastructure used for public collective transport,

– assessment and forecast of transport needs including: a) the location of public facilities, b) population density and c) providing access to public transport for disabled persons and persons with limited mobility,

– preferences regarding the choice of the means of transport,

– organization of the information system for passenger,

– planning directions of development of public transport.

When developing the analysis, issues which depict the current situation in the public transport in the Lubin County were considered, as well as the characteristics and functioning of the transport system, its infrastructure and the demand for transport services. Based on the above diagnosis for the Lubin County, the standard of communication service for passengers was defined, which should be guaranteed by the organizer, rules for the organization of the transport market and the passenger information system, as well as financing public transport.

8.2. Area characterization

The Lublin County was established on January 1, 1999 as part of the administrative reform. County (Powiat), which is based in the city of Lubin, is located in south-western Poland, the central part of the Lower Silesian Voivodship. The Lubin County is located in the Śląsko-Łużycki Lowland (southern and central part of the county) and Wał Trzebnicki (the northern part of the county). From the east and the north, the border of the county coincides with the course of the river Oder.

The county include:
- Municipal Commune of Lubin,
- Commune of Lubin,
- Town and Commune of Ścinawa,
- Commune of Rudna.

Lubin County borders with the following counties: wołowski, górowski, głogowski, polkowicki and legnicki. It is located within the Legnica-Głogów Copper Belt (LGOM) of the urban-industrial area, which is the main center of the copper industry in Poland and one of the largest centers for the exploitation of copper and silver in the world.

The Lubin County has 106 355 inhabitants, of which 48.8% is men and 51.4% women The population density is 149 people per 1 km^2. The area of the County is 711 km^2 and its urbanization rate is 78.8%.

The average age of residents is 41.8 years and is comparable to the average age of the inhabitants of the Lower Silesian Voivodship and comparable to the average age of the entire population of Poland.

Lubin County has a positive natural increase of 48. This corresponds to a natural increase of 0.5 per 1000 inhabitants of the Lubin County.

	Indicator	2012	2013	2014	2015	2016
1.	Population	106,973	106 966	106.818	106.512	106 433
	in the Lower Silesian Voivodship	2 917 242	2 916 577	2,914.362	2,909, 997	2,908,457
2.	Working people	28.512	28 254	28 195	27,745	bd
	in the Lower Silesian Voivodship	782 782	785, 659	778 249	794,138	bd
3.	People in the pre-working age	19,099	18 969	18 723	18 569	18 409
	in the Lower Silesian Voivodship	507,299	501 508	495 714	490,561	488,422
4.	People of working age	71 236	70 288	69.375	68 155	67 133
	in the Lower Silesian Voivodship	1 916 259	1 903 301	1 887 089	1 867 285	1 846 755
5.	Post-working age people	16,638	17 709	18,720	19,788	20,891
	in the Lower Silesian Voivodship	493,692	511 768	531.559	552 151	573 280
6.	Unemployment rate [%]	9.7	9.7	10.6	10.9	8.8
	in the Lower Silesian Voivodship	13.1	12.4	13.5	13.1	10.6
7.	Natural increase [per 1000 population]	2.4	2.3	0.7	0.3	1.4
	in the Lower Silesian Voivodship	-0.1	-0.6	-1.1	-1.6	-0.9
8.	Migration balance [per 1000 population]	-3,4	-1.7	-0.9	-2.6	-1.1
	in the Lower Silesian Voivodship	0.3	0.5	0.4	0.3	0.0

Table 24: Demographic indicators of the Lubin County on the background of the Lower Silesia Voivodship (s*ource: Local Data Bank, Central Statistical Office)*

There were almost 10 000 business entities in 2016 in the Lubin County. The mining industry dominates in the industry (KGHM Polska Miedź SA). The presence of copper ore deposits and their exploitation by KGHM enables the development of cooperating companies. Additional industries that should be mentioned are: food, textile, construction and combined heat and power. The domination of one branch in industry, dependent on the size of copper ore deposits, is associated with the risk of stopping the county development in the event of mining operations stopping in KGHM mining plants (analogously to the case of the cities of the Lower Silesian Coal Basin after its liquidation in the 1990s). In order to avoid a similar problem in the area of the county, as well as the entire Legnica-Głogów Copper District, activities aimed at developing other branches of industry and increasing the share of the services sector are carried out. The Lubin Economic Activity Zone with the size of area of over 400 ha has been just recently created in Lubin, which in the future due to the planned employment will determine the shape of local public transport.

There are primary schools, middle schools, general high schools, technical schools and post-secondary schools in the Lubin County. In the school year 2013/2014, almost 5 7000 students attended elementary schools, over 3 000 students attended junior high schools and over 3 200 students attended high schools.

Institution	Number of branches [pcs]	The number of students
Pre-schools	23	3,533
Primary schools	23	5,682
Secondary schools	15	3,010
Basic vocational schools	10	589
Vocational schools and technology	8	1,930
General secondary schools	5	1,699
Secondary schools for adults	8	793

Table 25: Education in the Lubin County in the school year 2013/2014

(Source: Local Data Bank, Central Statistical Office)

8.3. Overview of transport infrastructure (incl. SWOT analysis)

Municipal Commune of Lubin

The urban commune, which covers the city of Lubin is located in the central part of the County and is surrounded by the Lubin Commune. It is inhabited by 77 400 residents and covers the area of 41 km^2. There had been a Lubin Górniczy junction railway station, through which the following railway lines crossed: Legnica - Rudna Gwizdanów, Lubin Górniczy - Polkowice. There is the following road intersection in the city - national No. 3 connecting Jakuszyce (border with the Czech Republic) with Świnoujście (through Legnica, Lubin, Polkowice, Zielona Góra and Gorzów Wielkopolski), national No. 36 Ostrów Wielkopolski - Ścinawa - Lubin - Prochowice and provincial roads: No. 323 Leszno - Lubin and No. 335 Lubin - Chojnów. There is an active airport in Lubin which allows for private passenger flights.

Community of Lubin

The rural commune of Lubin includes the following villages: Bolanów, Buczynka, Bukowna, Chróstnik, Czerniec, Dąbrowa Górna, Gogołowice, Gola, Gorzelin, Gorzyca, Karczowiska, Kłopotów, Krzeczyn Mały, Krzeczyn Wielki, Księginice, Lisiec, Lubków, Łazek, Miłoradzice, Miłosna, Miroszowice, Niemstów, Obora, Osiek, Owczary, Pieszków, Podgórze, Raszów, Raszowa Mała, Raszówka, Siedlce, Składowice, Szklary Górne, Ustronie, Wiercień, Zalesie and Zimna Woda. It is located in the southern and central part of the county and surrounds the city of Lubin, from the north it shares a border with the commune of Rudna and from the east with the urban - rural commune Ścinawa. From the south, it borders with the following municipalities: Prochowice, Kunice, Miłkowice, Chojnów (Legnica County), from the west and north with the municipalities of Chocianów and Polkowice (Polkowice County). It is inhabited by 14,8 thousand residents and covers the area of 290 km^2. The railway area runs through the commune: Legnica - Rudna Gwizdanów and Lubin Górniczy - Polkowice and roads: national No. 3

connecting Jakuszyce (border with the Czech Republic) and Świnoujście through Legnica, Lubin, Polkowice, Zielona Góra and Gorzów Wielkopolski, national No. 36 Ostrów Wielkopolski - Ścinawa - Lubin - Prochowice and provincial No. 323 Leszno - Lubin and No. 335 Lubin – Chojnów.

Town and Commune of Ścinawa

The urban-rural commune, covering areas of the following villages: Buszkowice, Chełmek Wołowski, Dąbrowa Środkowa, Dębiec, Dłużyce, Dziesław, Dziewin, Jurcz, Krzyżowa, Lasowice, Parszowice, Przychowa, Redlice, Ręszów, Sitno, Turów, Tymowa, Wielowieś, and Zaborów. It is located in an eastern part of the county and borders on the Lubin Commune from the east and from the north Commune of Rudna. From the east it borders with the following gminas: Wiosko and Wołów (the Wołowski poviat), from the south with the commune of Prochowice (Legnica County). It is inhabited by 10 300 residents (including 5 800 in Ścinawa) and covers the area of 164 km^2 (of which 14 km^2- the area of Ścinawa). The railway lines run through the area of the commune: Wroclaw

Main - Szczecin Central Port and Kobylin - North Legnica (dismantled on the section Rawicz - Ścinawa) and roads: national No. 36 Ostrów Wielkopolski - Ścinawa - Lubin - Prochowice and provincial roads ie: No. 292 Nowa Sól - Ścinawa - Lisowice, No. 340 Oleśnica - Ścinawa, No. 372 Ścinawa - Prochowice.

Community of Rudna

The rural commune, comprising: Brodowice, Brody, Bytków, Chełm, Chobienia, Ciechłowice, Gawronki, Gawrony, Górzyn, Gwizdanów, Juszowice, Kębłów, Kliszów, Koźlice, Miłogoszcz, Mleczno, Naroczyce, Nieszczyce, Olszany, Orsk, Radomiłów, Radoszyce, Rudna, Rynarcice, Stara Rudna, Studzionki, Toszowice, Wądroże, Wysokie. It is located in the northern part of the county and borders the Commune of Lubin and the Ścinawa Commune from the south. From the south-east it borders with the Wiosko Commune (the Wołów County), from the east and north it borders with the communes of the Góra County: Jemielno and Niechlów, from the north-west it borders with the Pecław Commune (Głogów County), from the west with the municipalities of Grębocice and Polkowice (Polkowice County). It is inhabited by 7 700 residents and covers the area of 217 km2 . The following railway lines cross the territory of Rudna Commune: Wroclaw Main - Szczecin Harbor Center, Legnica, Poland – Rudna, Rudna Gwizdanów and Gwizdanów - Smelter Cedynia. The following provincial roads run through the territory of Rudna Commune: 292 Nowa Sol - Ścinawa - Lisowice, No. 323 Leszno - Mountain - Radoszyce - Rudna- Lubin and No. 331 Chocianów - Rynarcice.

8.4. Multimodal services

Regional passenger railway transport

The railway transport system of the Lubin County consists of the following train lines:

- No. 273 (**Wrocław Główny - Szczecin Główny)** is a two-track, electrified railway line which is active in passenger and freight traffic and runs through Ścinawa and Rudna. It is administered by PKP PLK SA.

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- No. 289 (**Legnica - Rudna Gwizdanów**), is a single-track, electrified primary line, which is currently active only in freight traffic. It is administered by PKP PLK SA.
- No. 971 (**Lubin Górniczy - Lubin Kopalnia PLK**) is a single track, electrified line which is used for freight traffic only. It connects Lubin with Polkowice. From the line a siding network goes to mining and ore enrichment plants. It is administered by PMT Linie Kolejowe Sp. zoo.

The main railway line passing through the poviat is the railway line No. 273 Wrocław Główny - Szczecin Główny. There are stations: Ścinawa and Rudna Gwizdanów in the poviat and stops: Chełmek Wołowski and Rudna Miasto. The TLK train of the company PKP Intercity SA (stopping in Ścinawa and Rudna Miasto only) and REGIO of the company Przewozy Regionalne sp. zoo. operate on this line. At present, no passenger traffic is carried into the city of Lubin. This situation is caused by the poor technical condition of the railway line No. 289 connecting directly Lubin with Legnica and Rudna, and indirectly with Głogów and Wrocław. Significantly extended travel time was the main reason for the low turnout and the lack of profitability of railway connections , which were suspended on 01.09.2010. Passenger traffic is carried out only on the railway line No. 273 running through Ścinawa. There are mainly connections from Wrocław to Ścinawa, Głogów and Zielona Góra.

Heavy freight traffic is carried out on the above railway lines. The lines support the process of production of copper and silver from copper ore mined in mining plants located near Lubin and Polkowice, whose concentrate is transported by rail to smelters located in Orsk, Legnica and Głogów.

Transport road

Regular road transport of people is carried out in all municipalities located in the Lubin County, with a clear differentiation in the level of communication service of individual municipalities.

In total, 147 transport lines crossing the boundaries of municipalities are launched in the Lubin County. The vast majority of communication lines in road transport originate in Lubin, from where most connections start in the direction of Legnica, Głogów, Polkowice and Wrocław. For this reason, the highest saturation of services is characteristic for the Lubin Municipal Commune (141 lines) and the Lubin Commune (97 lines) surrounding the County's seat . There are 21 communication lines in the Ścinawa Commune, and 15 lines in the Rudna Commune public transport systems.

The most communication lines are operated by PKS Lubin SA (53 lines) and INTERTRANS PKS Głogów (10 lines), however, most often those are connections running a few times a day, usually on school days. The carriers operating on 1 or 2 communication lines dominate Within the Lubin County.
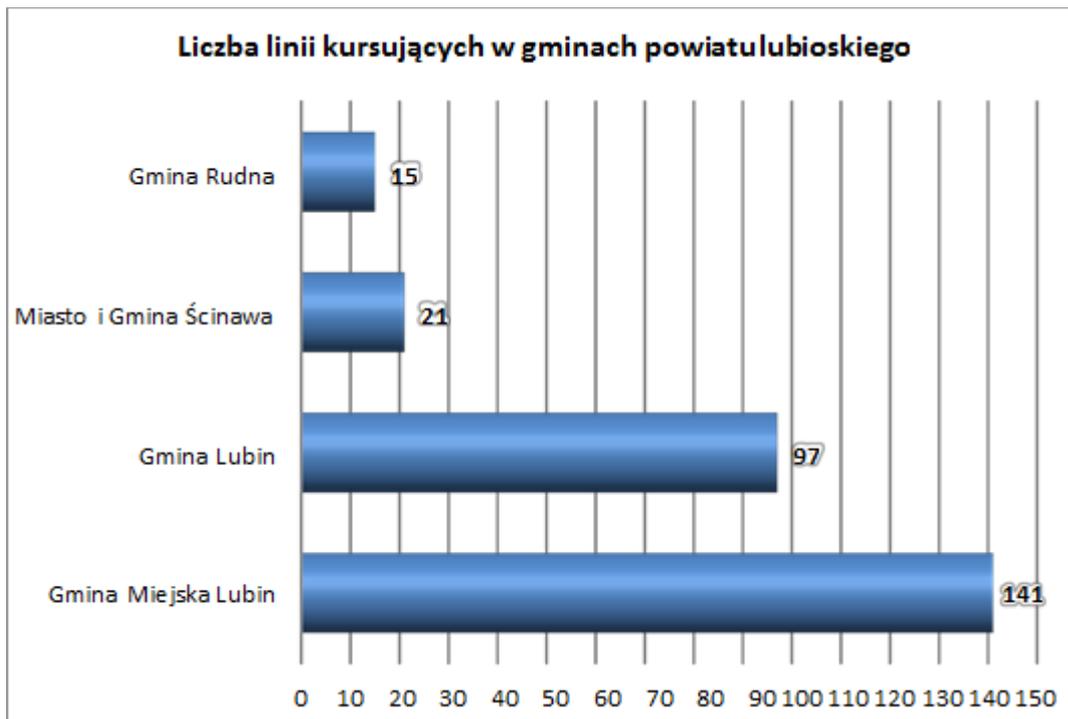
The graph was prepared on the basis of own data of Lubin County.

Public transport connections are offered by 47 transport companies in the Lubin County.

In total:

- 1160 courses on a working day school,
- 923 courses on a working day holiday,
- 719 courses in Saturday,
- 460 courses in Sunday,

  take place in the Lubin County.

The number of courses in individual municipalities is similar to the number of communication lines. Most of the courses operate in the Lubin Municipal Commune and Lubin Commune, and the smallest in the Ścinawa Commune and in the Rudna Commune.

Most connections are launched on County communication lines. The highest number of connections on working days is provided by PKS Lubin SA, in the commercial connection segment.

The transport needs of the inhabitants of the Lubin County are best met in the Lubin Commune, where on working days the indicator of the number of connections in road transport per 1000 inhabitants is the highest. This indicator takes the lowest value in the Municipality of Rudna. On non-working days (ie on Saturdays and Sundays), the number of connections is rapidly decreasing, what leads to provision of inadequate public transport services in the entire County (Rudna is the municipality where the decrease is the highest).

Due to the low level of communication between Rudna and Ścinawa on one side and Lubin on the other and the very low interest in rail transport due to relatively large distance from the railway stations from the central County seat (approx. 15 km), the multimodality in public transport practically does not function or is very small. The use of rail connections by Lubin residents, who constitute the overwhelming majority of public transport passengers, is unjustified for several reasons:

- Economical - the cost of transport to Ścinawa or Rudna with own transport due to the lack of appropriate number of connections in public transport,

- Functional – relatively large distance to the nearest railway station and travel time to them, and too few railway connections from this station,

- Social - insufficient conditions for rail travel due to low comfort and high travel time to the center of Wrocław and Zielona Góra from Lubin through Ścinawa or Rudna.

8.5. Smart mobility

The person who is planning a trip must make a decision on which transport medium he will use, his choice depends on the individual assessment of available individual transport means. It may happen that some types of public transport may not be available in certain areas. In the worst circumstances, the residents might be forced to travel with individual transport (car, bicycle, etc.) only, because some towns do not have access to any public transport. The lack of this type of transport is conducive to the implementation of a pro-automotive transport policy, which limits or minimizes passenger flows in public transport, and this may lead to a reduction of the transport offer or even (in the extreme case) to the total liquidation of public transport in certain areas.

It is in the public interest to limit such trends by introducing a different transport policy, based on the strategy of sustainable development of public mass transport. This type of policy should apply solutions which will reduce traffic congestion in individual transport, and should improve the attractiveness of collective public transport system.

A traveler when choosing a type of transport makes it on the basis of quality measures, which, in comparison with the transport demands of a given traveler, are used to assess individual means of transport for the most effective travel. One of the most important measures is information and access to it in the shortest possible time, that is, dissemination.

The most important information that should be available to the passenger is: name of the carrier, name of the communication line, all stops on which the vehicle stops, the day of entry and the validity of the timetable, distance between stops, days of the week or periods of the line , hours of arrivals / departures from stops or frequency of running. Passenger information in public transport plays a key role. It should be comprehensive and multi-functional and based on the latest handheld technology solutions. It should be also well marketed. Its task is to help passengers to get information in all places where they can need this information and, as a result, to increase travel comfort. Currently, in addition to timetables on the premises, information about the arrival is posted on the carrier's website. This allows more people to reach it and gives passengers the opportunity to plan their routes still at home, at work or in a different location outside the stop.

Traditional ways of posting information on timetables at bus stops are very helpful, but nowadays they do not allow one hundred percent to meet the needs of passengers. They expect (especially the young generation) more convenient solutions that give the possibility of reaching information more effectively. The IT and electronic technologies used allow, by means of image and sound, to present passenger's offer in many places, also those far from the communication network.

Passenger information in vehicles

Elements of the passenger information system functioning in vehicles are:
- outdoor tables - on the front and on the right side of the vehicle showing the name of the communication line and direction
- indication of the bus line on an external display at the rear of the vehicle; the display contains information regarding: the ticket tariff, transport regulations with operator's contact details and rules of behavior,

- display inside the vehicle presenting information on the direction of travel, route, current date and time, etc.
- route scheme for all lines managed by organizer,
- indication of the organizer and operator.

Passenger information system

The passenger information system on the public passenger transport organized by the Lubin County, has been posted on the carrier's website (PKS) since October 2016. Thanks to the use of GPS technology in all vehicles used for transport it is possible to determine in real time both the actual location of a vehicle and the timetable of each of the communication lines at each stop with information on courses carried out from the moment of access to information and the clock schedule. On the current map of Lubin County, both the location of each vehicle with information about possible delay as well as the routes of all or selected communication lines are indicated. However, introduced less than two years ago, the system seems not to meet the needs of passengers in terms of obtaining the necessary information mainly due to the difficulty of comprehensively planning a trip in the event of switching between the starting point and the destination despite access to the website also from the mobile devices.

However, the fact of dispersion of information on various means of transport (district communication, buses, railways, long-distance bus transport) results in the use of them is difficult and therefore time-consuming.

Therefore, in the near future it will be necessary to create such an information system that will require the passenger to only provide the access point, destination and desired arrival time and the system itself will search the network of connections.

8.6. Smart governance and marketing

At present, the Lubin County is the organizer of county public passenger transport carried out by outsourcing the transport service to an external company selected in a tender procedure. The contract concluded with the operator (PKS) is valid until June 2019 and concerns the organization of public passenger transport on the network of following communication lines:

Number of communication lines	Relation _(in italics, places outside Lubin County were marked)_
0	Lubin- Krzeczyn Wielki – Lubin
1	Szklary Górne- Obora - Lubin
2	Lubin- Krzeczyn Wielki - Lubin
3A	Lubin - Obora - Lubin
3B	Lubin- Obora - Lubin
4	Kłopotów - Osiek - Lubin - Obora - Lubin
5	Lubin - Chróstnik - Lubin- Krzeczyn Wielki
6	Lubin - Miroszowice
7	Obora - Lubin
8	Gola - Lubin - Gola

100	Gogołowice - Miłosna - Niemstów - Osiek- Miroszowice - Lubin - Gola
101	*(Chocianów - Chocianowiec - Raków - Trzebnice - Michałów - Żabice - Ogrodzisko -)* Gorzyca - Krzeczyn Mały / Krzeczyn Wielki - Lubin
102	Lubin - Księginice - Składowice - Ustronie - Dąbrowa Górna (Network - Czerniec)
103	Czerniec - Siedlce - Księginice - Lubin
104	Buczynka - Miłoradzice - Raszowa Mała - Raszówka - Raszowa - Pieszków - Osiek – Lubin
105	Bukowna - Lisiec - Zimna Woda - Wiercień - Zimna Woda - Karczowiska - Raszówka - Gorzelin - Chróstnik - Lubin
112	Ścinawa - Turów - Siedlce - Lubin

Table 26: communication lines (source: The table was prepared on the basis of own data of Lubin County)

Guaranteed frequency of bus courses

In order to ensure the attractiveness of the planned communication network, the recommended frequencies of communication lines have been determined, which will guarantee optimal transport service for all towns located in the Lubin County. The recommended frequency of circulation of the line depends on the category assigned to defining the minimum frequency of circulation.

The categorization of the lines consists of 6 categories of intervals of different lengths, in descending order - from the most frequent lines (category I) to the least frequent lines (category VI). The proposed intervals are divisors or multiples of 60, allowing the introduction of a repeatable and easy to remember departure times (eg. departures from Lubin to Ścinawa is always 45 minutes past the hour). This solution also ensures the possibility of synchronization of departure hours on common route segments so that higher joint circulation frequencies will be obtained (eg. buses from Lubin to Ścinawa on the common section of the route should run not less often than every thirty minutes in hours peak).

The most important communication lines operate from 5:30 till 22: 00, the other lines in the ranges limited. The frequency of running depends on the type of day - due to the variability of the size of passenger flows, separate standards were adopted for the business day as well as Saturdays and Sundays. During the summer school holidays it is permissible to lower the frequency of courses in peak hours due to lower demand for public transport services.

Arrival with a 4-minute delay and 1 minute earlier than according to the schedule is considered as acceptable (except for situations independent of the operator - e.g. traffic jam).

In case of vehicle failure, the carrier must provide a vehicle replacement.

Travel comfort indicator shall be taken as the filling level of a vehicle. It is allowed to fill out buses without exceeding 80% of occupied all seats provided by the manufacturer. After exceeding the filling limit of a given type of vehicle, a more capacious or additional vehicle will be used.

Public transport management in the Lubin County is carried out by a unit placed in the organizational structure of the transport organizer and by its employees. This model was adopted in June 2016 after analyzing the structure of transport and the way it was organized, as well as the costs related to the

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possible entrusting transport management to an external company or creating a separate organizational unit that would manage public transport within the entrusted task. With a relatively small network of public transport connections that currently functions, there is no need to change this management method.

8.7. Involved stakeholders

At present, in Lubin County, arrangements and works are underway to rebuild the public transport model based on County transport carried out as part of the bus connections between Lubin and satellite towns around it. In connection with the ongoing modernization of the railway line No. 289 between Wrocław - Legnica - Lubin - Głogów - Zielona Góra, which is to be completed in September 2019, it is planned to restore railway connections between Zielona Góra, Lubin and Wrocław initially realized with the help of twelve pairs of connections. Analyzing the current development directions of the City of Lubin and the planned investment projects in the field of road infrastructure, creating an industrial zone, recreation and higher education, it should be noted that the currently operating scheme of connections in public transport will have to undergo major changes adapting to new traffic generators as well as new railway connections. Thus, the Lubin Municipality closely cooperates with the Lubin County in the field of organizing public mass transport. Representatives of these units meet with the authorities of PKP PLK responsible for the reconstruction of the railway line 289 in terms of adapting the railway infrastructure to the needs of the city and future changes in the communication system. In order to provide travelers with comfortable connections and conditions for travel, the construction of a transfer center in the railway station's region is planned which will connect all means of transport functioning in the area of the Lubin County, but also functionally communicate the city with trans-European transport networks. Ongoing talks and arrangements with the management of PKP PLK concern, among others location of underground passages with exits to railway platforms and the location of a car and pedestrian tunnel with a communication stop that will serve the area of the future railway station. The newly designed interconnection system will be fitted with a transfer center with an infrastructure allowing for all types of public transport located in the city and the County to be placed in one place.

Another aspect in which talks are conducted with representatives of companies producing vehicles for public transport is a statutory obligation to increase electromobility in public transport. Preparing for changes forced by the provisions of the Act, and bearing in mind the necessity of announcing another tender and selecting an operator in county passenger transport, talks are held with VOLVO representatives of the Swedish Embassy business department on the introduction of rolling stock servicing communication lines of hybrid vehicles or a fully emission-free electric system. When planning the shape of the future public transport system, it should guarantee trouble-free implementation of solutions currently perceived in Lubin area as future-proof, if only in the scope of the possibility of topping up passenger electric vehicles left in the interchange center as well as electric public transport vehicles servicing the interchange center. The investment plans created in this respect cover the period of the next 10 years, therefore it is justified from the point of view of the city and the county authorities that they include solutions that allow the use of new technologies that are not yet allowed by Polish law on unmanned autonomous vehicles.

9. Index

9.1. Figures