DELIVERABLE D.T1.2.5

Territorial needs assessment for Slovenia

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1. Overview of the selected region – Slovenia

1.1. Delimitation and basic geographical description of the pilot area

Slovenia is situated in Central Europe touching the Alps and bordering the Mediterranean Sea. Although the country is comparatively small, it offers a rich natural and geological diversity resulting also in transport infrastructure and its operation. In the South-West, Slovenia has a 50 km long share of the Adriatic Sea coast where also the most important Slovenian port, Port of Koper, is situated. Northern part of Slovenia is characterised by the Alps, with the Julian Alps in the north-west as the highest mountain range in Slovenia also influencing Slovenian position within the European transport corridors.

Despite the fact that there are different CONNECT2CE pilots focusing on different peripheral areas of Slovenia (pilots on public transport connections Slovenia-Italy, Slovenia-Hungary and Slovenia-Croatia), within CONNECT2CE project Slovenia is analysed and will be described as a whole country. According to its geographical and historical characteristics, Slovenia is divided into different territorial units.

1.1.1. Standard Classification of Territorial Units in Slovenia

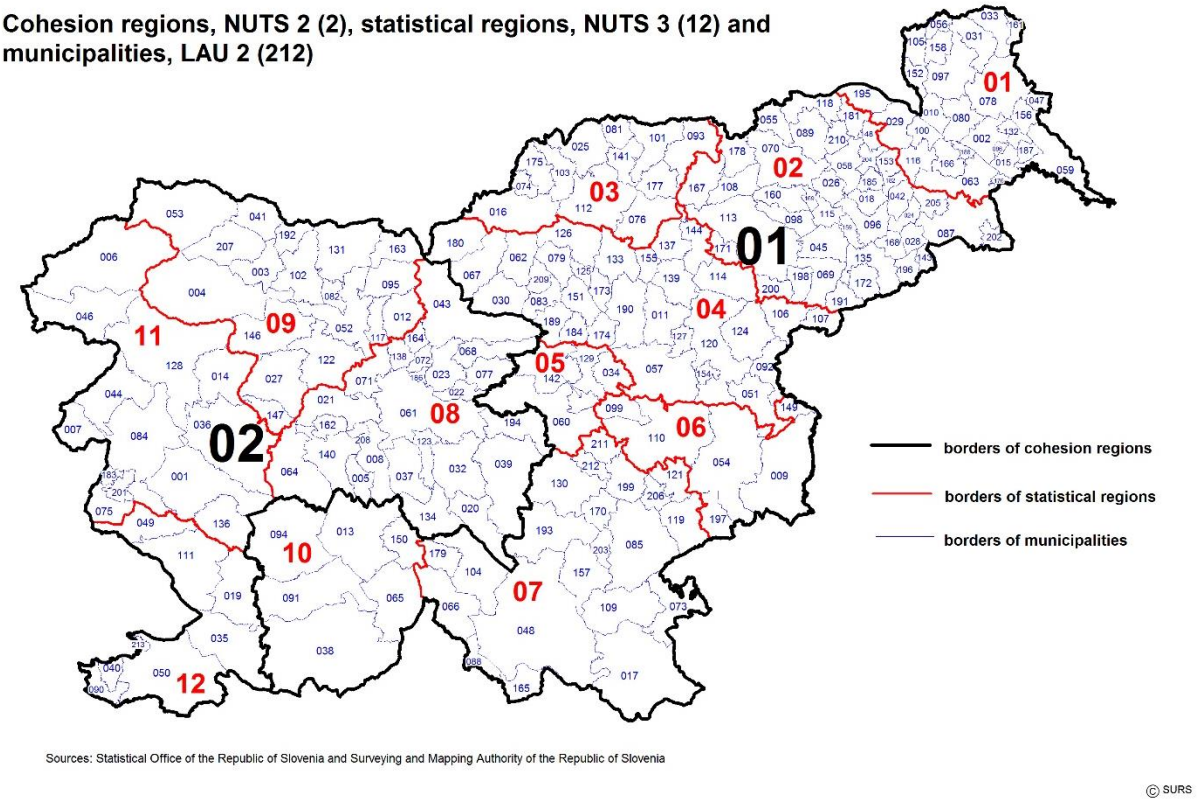
For successfully present division of Slovenia we must underline that the smallest and the only official territorial division in Slovenia is by municipalities. Besides the fact that Slovenia is territorially a small country, that is the main reason that in CONNECT2CE we present Slovenia as a whole country.

On the NUTS 2 level Slovenia is divided in two cohesion regions:

- SI03 is Eastern Slovenia bordering Croatia on the South, Italy on the West and Austria on its Northern borers
- SI04 is Western Slovenia bordering Croatia on the South and East, Hungary on North-East and Austria on North.

By a Decree on Standard Classification of Territorial Units, NUTS2 region of Slovenia were in the year 2000 divided on 12 NUTS3 regions, also called statistical regions. Purpose of statistical regions (further on referred as regions) is mainly to analyse different statistical parameters as they do not have legal effects as autonomous regions. Regions do not have their own regional legislation or even regional budget and are further divided to local administrative units. From June 2011 onwards Slovenia is divided into 212 municipalities. Following figure indicates main NUTS regions and municipalities in Slovenia.

Figure 1: Map of territorial classification for Slovenia



Source: Statistical Office of the Republic of Slovenia and Surveying and Mapping Authority of the Republic of Slovenia, 2016

Pilot actions for CONNECT2CE project in Slovenia will be focusing the three main pilots connecting bordering regions between Slovenia, Croatia, Hungary and Italy. The main pilot actions are influencing the following statistical regions:

- Pilot action no. 2 (D.T 2.2.4.): Elaboration of a cross-border PSO between Slovenia and Croatia will be influencing the PT organisation of the whole bordering region between Slovenia and Croatia and also have influence on the national level.
- Pilot action no 3. (D.T 2.2.5.): Harmonisation of bus and train timetables in the Hungarian border area will mostly influence PT operation within the Mura Statistical region (red number 01 on the map above).
- Pilot action no. 6 (D.T 2.2.6.): Cross-border integrated ticket Italy-Slovenia will be implemented within the Coastal-Karst Statistical Region (red number 12) but will have positive influence on the larger area of Slovenia.

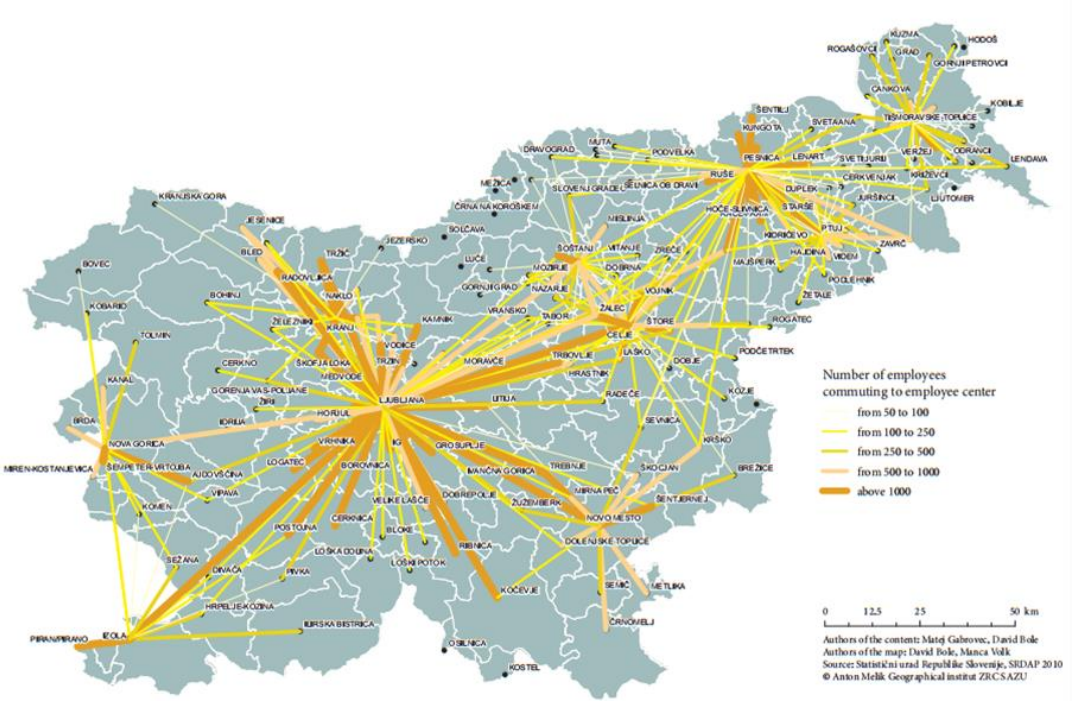
Pilot actions will be mostly influencing border regions between neighbouring countries which are also main attractors and generators or cross border daily commuting. In the following chapter we present the main economic characteristic of pilot area which is in the case of Slovenia covering the whole country.

1.1.2. Economic and touristic characteristic of Slovenia

In Slovenia (data for year 2016) almost two-thirds of people are employed in services, and over one-third in industry and construction. Slovenia benefits from a well-educated workforce, well-developed infrastructure, and its location at the crossroads of major trade routes that are crossing Slovenia. Transport and storage employs around 5 % of all Slovenia labour force.

Following the urbanisation processes in the last decades, Slovenia is becoming more and more urbanised country with decrease of population in the peripheral regions. With 49 % of total population leaving in the urbanised areas and 0,18 % annual rate of increase of urbanisation rate (SURS, 2017) main commuting points of Slovenia have centralised to main urbanised areas e.g. Ljubljana, Maribor, Kranj, Novo Mesto, Celje and others. Ljubljana as a capital with more than 280.000 inhabitants also accepts around 130.000 daily commuters as it can be seen from the figure below.

Figure 2: Daily commuters in Slovenia in the year 2012



Sources: http://zgs.zrc-sazu.si/Portals/8/Geografski_vestnik/vestnik-84-1-bole-gabrovec.pdf

Slovenia offers tourists a wide variety of natural and cultural amenities. Despite the fact that the tourist gravitational area is considerably large, the tourist market is quite small. Ljubljana is increasing the number of visitors in every year. From Ljubljana there is an option for many daily visits around Slovenia. At the bordering regions with Italy and Croatia there are also many natural karstic landscapes, landmarks and caves. In the North-East and East of the country, close to Hungarian and Croatian border there are many spa's (e.g. Moravske toplice, Čateške toplice) and various recreation areas for possible tourists arriving by train from Hungary or Croatia.

The best-known caves are Postojna Cave and the UNESCO-listed Škocjan Caves. The region of Slovenian Istria meets the Adriatic Sea, where the most important historical monument is the Mediterranean town of Piran. Portorož attracts majority of crowds in summer, which mostly arrive to the cost with private cars. As European and domestic tourists create more than 90% of Slovenia's tourist income, the PT connections to the neighbouring countries are of great importance for development of Slovenia and its bordering regions.

1.2. Recent population and demographic trends

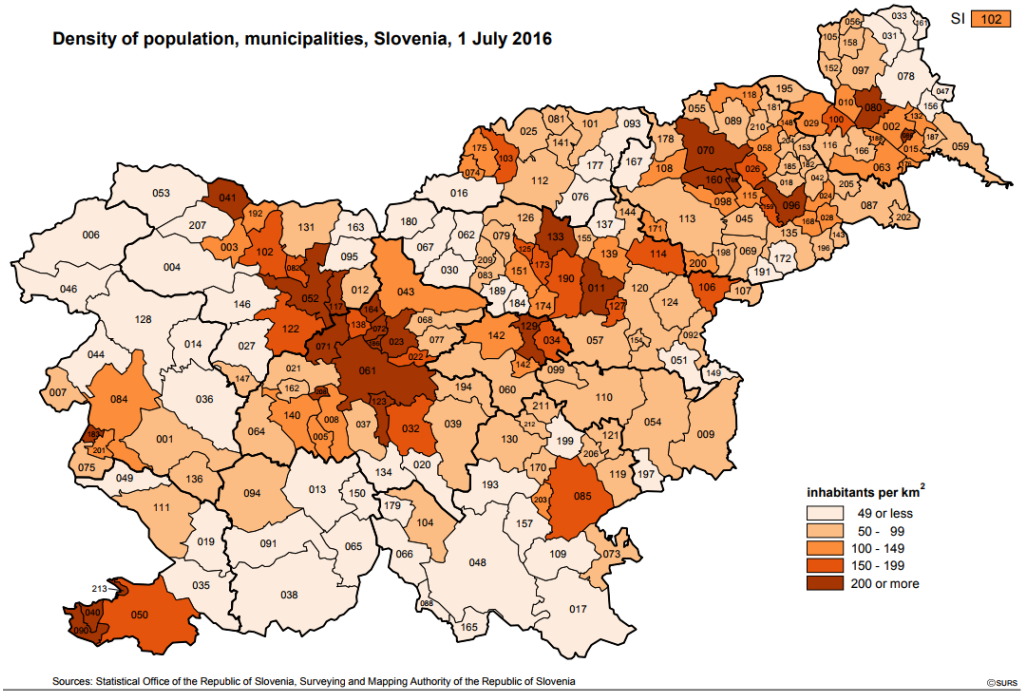
At the end of the year 2016, Slovenia had a population of around 2.064.000 inhabitants. Similarly to other modern societies, the country has been facing demographic issues, such as ageing and low birth rate. Slovenia's population is slowly declining as the year 1993 was the first to see a negative demographic trend. From the year 2006 onwards the overall natural trend is positive.

With 101 inhabitants per square kilometre, Slovenia ranks low among the European countries in population density. The Notranjska-Kras statistical region has the lowest population density while the Central Slovenian statistical region has the highest. Population density is low at the bordering areas with Hungary and Croatia where CONNECT2CE pilot actions with PT improvements will take place.

Due to a low birth rate and increasing life expectancy Slovenia is among the European countries with the most pronounced ageing of population. Almost all Slovenian inhabitants older than 64 are retired with no significant difference between the genders. Also the difference among the genders regarding life expectancy is still significant. In the year 2015, it was 77.7 years for men and 83.4 years for women.

According to the 2011 census, Slovenia's main ethnic group are the Slovenes (83%). At least 13% of the population were immigrants from other parts of Former Yugoslavia and their descendants. Relatively small but protected by the Constitution of Slovenia are the Hungarian and the Italian national community. The number of people migrating to Slovenia has been steadily rising from 1995; and has been increasing rapidly in recent years. Since Slovenia joined the EU in 2004, the yearly inflow of immigrants has doubled by 2006 and tripled by 2009. In 2007, Slovenia was one of the countries with the fastest growth of net migration rate in the European Union which changed at the times of economic crisis in 2008. From the picture below we can see that the Slovenian population is dense in the lowlands of the central parts of Slovenia.

Figure 3: Population density in Slovenia in the year 2016



Source: Statistical Office of the Republic of Slovenia and Surveying and Mapping Authority of the Republic of Slovenia, 2016

1.3. Transport network and accessibility conditions in Slovenia

As a part of large European regions – Alpine, Mediterranean, Danube and Central European – Slovenia takes an active role and uses its geo-strategic position. Public transport infrastructure thus contributes to forming cross-border regions with neighbouring countries, which is important for the development of hilly and less accessible areas with numerous problems related to economic and demographic stagnation, as well as for the developmental cross-border connection of urban areas in the coastal region, Goriška, the lower Sava River and Štajerska regions.

1.3.1. Road network

The construction of the motorway and expressway network, along with good road and transport connections with neighbouring countries, has significantly improved connections between regions and accessibility by private motor in Slovenia. General activities (education, health care, administration) are concentrated in major urban centres, which are, given their functional application, distributed among centres of the highest and high levels (Figure 4). These centres are quite accessible to the majority of the population with private cars, although accessibility with public passenger transport is lagging behind. Weaker accessibility is noted mostly in the Posočje, Cerkljansko, Kočevsko and Bela krajina regions.

Figure 4: Road netwok of Slovenia Motorway system in Republic of Slovenia

Source: DARS, 2017

1.3.2. Railway network

The public railway infrastructure (PRI) of the Republic of Slovenia comprises a total of 1,207.7 km of main and regional railway lines, out of which 333.5 km are double-track and 874 km are single-track railway lines. This is presented in next figure. The length of tracks is 1,541.2 km. The vast majority of railway lines are opened for the mixed traffic of passenger and freight trains. Length of the railway lines, intended exclusively for the freight transport is 106 km and 2 km of railway lines are opened only for passenger traffic. The majority of electrified lines of Slovenian railways (Slovenske železnice) operate under a Direct Current system (DC) with a rated voltage of 3 kV, with Alternating Current system (AC) available at border sections applying the voltages used by the neighbouring countries Austria (15 kV, 16.67 Hz) and Croatia (25 Hz, 50 Hz).

Figure 5: Main and regional lines (single/double track)

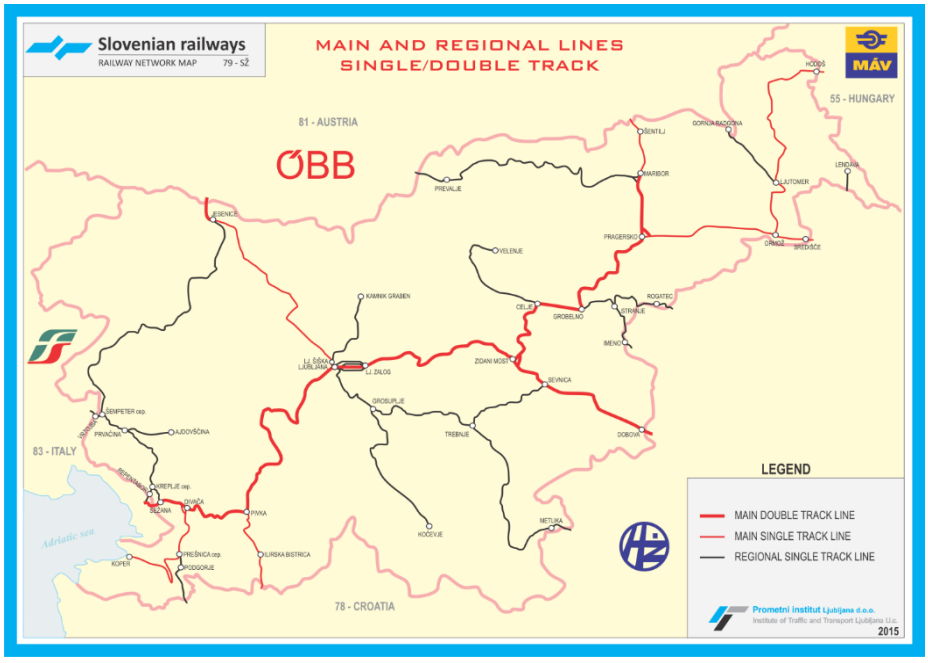
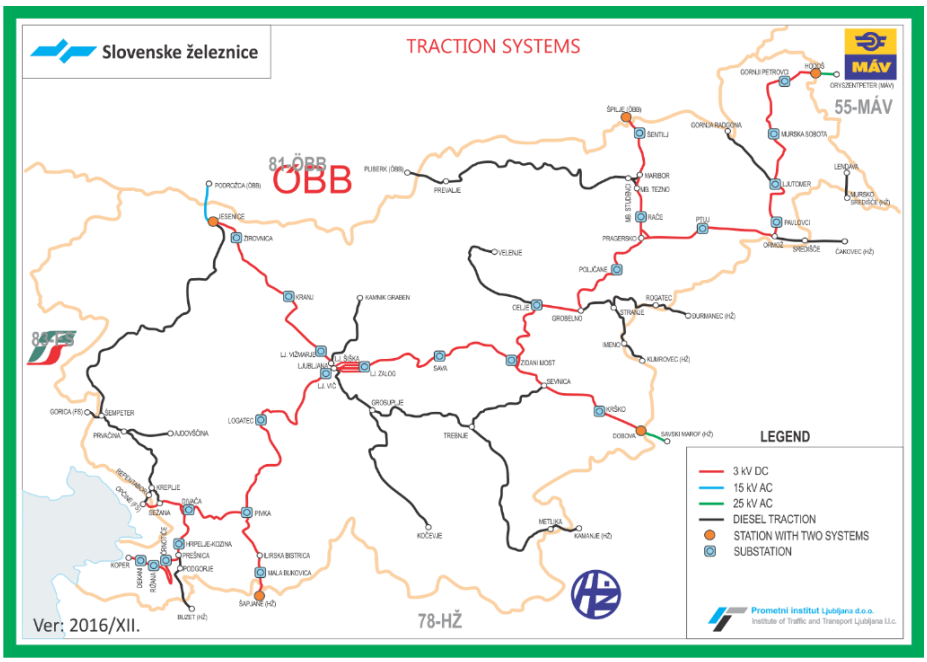


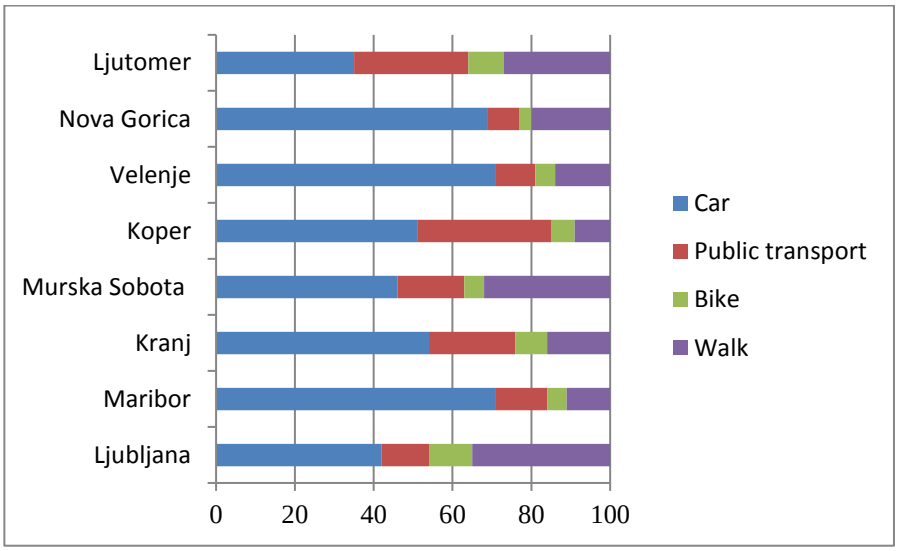
Figure 6: Traction system



1.3.3. Modal split in Slovenia

Since the pilot region within CONNECT2CE project is the whole country the most important modal split is also indicated on the same level. In the year 2010, from which the last data is available, the modal split of passenger kilometres in Slovenia was 86,5 % for cars, 10,7 for regional busses and 2,7 % for rail. Additionally we collected data also for urbanised areas of Slovenia where data on modal split is provided for different years. Last modal split analysis for Ljubljana (280,310 inhabitants) and Kranj (37.553 inhabitants) was performed in year 2013 while for Maribor and Murska Sobota only data from lest census in 2002 was available. The figure below indicates modal split in selected cities for car usage, public transport, walking and cycling.

Figure 7: Modal split in major Slovenian cities (data from 2002 to 2013)



Source: TEMS - The EPOMM Modal Split Tool, 2016; other available data from cities.

From the figure above we can see that the share of cars modal split is in general around 50 % in selected Slovenian cities, while share of public transport varies from 8 % in Nova Gorica to 29 % in Ljutomer. Share of cycling is the lowest since it is estimated to be around 8 % with maximum in Ljubljana where bike share in 2013 was around 11 % and it kept on rising. Modal share for walking grows from 9 % in Koper to 35 % in Ljubljana. As presented above the data is different for general modal split of the whole Slovenia.

1.4. Organisation of transport sector and key stakeholders

In Slovenia, there is no framework act that would uniformly regulate public passenger transport (PPP). Arrangement of passenger transport is regulated by sectoral laws, which separately regulate the conditions and operation of passengers transport in railway and bus transport. According this legislation the financing of public passenger transport is shared between the state and local authorities.

At the national level, the PPP regulator is the Ministry of Infrastructure, and its tasks are determined by the legislation regulating the field of road and rail transport separately. Within the Ministry, the Public Transport Department is responsible for carrying out tasks on the field of PPP. At the local level, municipalities are responsible for the management of urban transport. The tasks of municipalities in the field of urban traffic management are defined in detail by local regulations. Decision process is usually performed within the department for transport of municipality.

PPP services are provided as compulsory or optional public utility services (GJS). Rail passenger transport service and public long-distance regular passenger services in road transport are defined a compulsory

public utility service defined by the state. According to data from the year 2015, services are carried out by the total number of 36 carriers, of which only one carrier operates rail passenger transport, and 35 carriers operate public long-distance regular passenger transport in road transport on the basis of concession contracts. More than half of the road public transport carriers can be classified as smaller carriers, which, according to the current timetable, carry up to 20,000 registered kilometres of services. 17% of concessionaires can be classified as medium-sized carriers that perform between 40,000 and 70,000 registered kilometres a month and 36% of carriers can be classified as major carriers transporting over 100,000 registered journeys per month.

The provision of public passenger transport of passengers in road transport is the responsibility of city municipalities. Only in the case of urban municipalities with more than 100,000 inhabitants (the city municipality of Ljubljana and Maribor) urban transport services are provided as compulsory public utility services, while in smaller municipalities as optional services. Public passenger transport of passengers in road transport is established in a total of 14 urban municipalities in Slovenia. In Ljubljana and Maribor urban transport services are carried out by two public companies established by the city municipalities, while in other municipalities 6 private carriers are providing transport services on the basis of concessions contracts. In three municipalities (Nova Gorica, Postojna and Velenje), city bus transport is established as a free transport.

On the basis of the analysis carried out the table below indicates the number of carriers according to the type of PPP they perform and the way they have established an electronic ticket system for operation of public passenger transport.

Tabela 1: Passenger transport operators (status in a year 2015)

System of a public transport		Number of operators*			
		Electronic ticketing system is established	Usage of electronic ticketing system from other PT operator	No electronic ticketing system	SUM
1.	Regional public transport	22	3	4	29
2.	Regional and urban public transport	6	0	0	6
3.	Urban public transport*	1	0	0	1
4.	Rail PT in a framework of urban public transport	1	0	0	1
	SUM	**30**	**3**	**4**	**37**

* Within operation of urban transport there is no electronic ticketing system in 4 municipalities (Novo mesto, Nova Gorica, Velenje and Postojna). Transport operators in those municipalities have established electronic ticketing systems, but they operate it in regional lines.

2. Territorial needs assessment

2.1. Connectivity

2.1.1. Transnational public transport timetable coordination

Cross-border timetable coordination process among Slovenia and neighbouring countries varies depending on the transport mode. For the **inter-urban bus** transport among countries the timetables are proposed by the bus operators. Based on the preferences of the transport providers, proposals are than submitted to the Ministry of Infrastructure. Ministry checks the possible overlapping and other inconsistencies in the proposed timetables and to endorse the timetables after shortcomings have been recovered. Since cross-border lines of urban and interurban transport are not part of the PSO sponsorship there is no timetable coordination established among bordering countries.

In the case of transnational **railway transport** Slovenian Railways – Passenger Transport draws up a proposal of timetable that is related to the negotiated transport volume stipulated in the PSO contract proposed by the Government of Republic of Slovenia. Once per year timetable changes are endorsed by the Government.

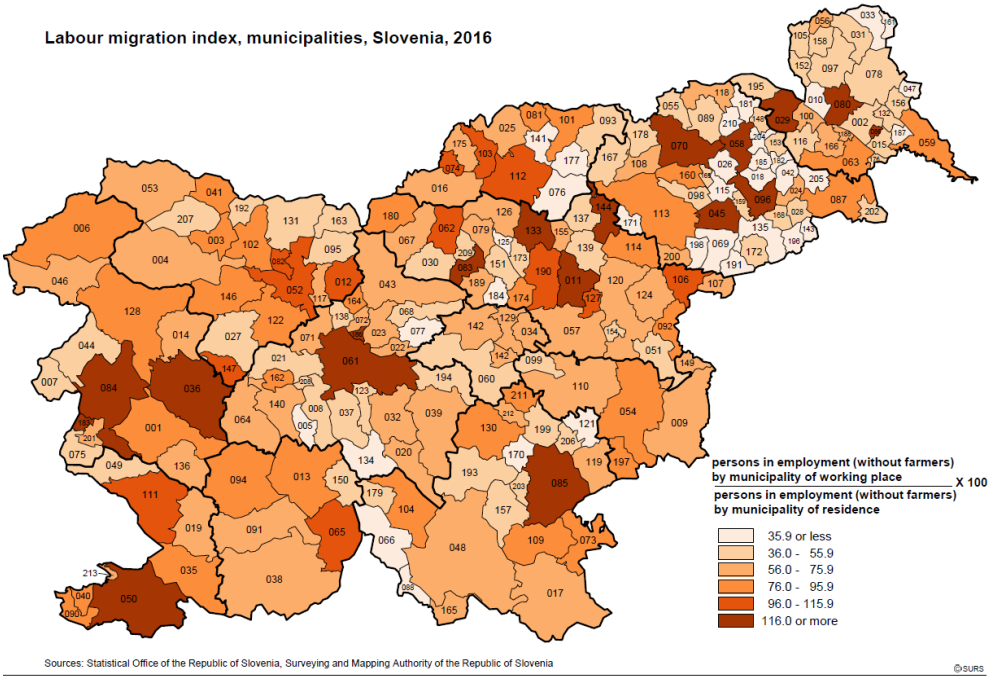
Currently coordinating of timetables among different public transport modes is not yet established. Timetable coordination of inland public transport is held on regularly level before the timetable change – the dates of change is pre-fixed. For bus transport the coordination is easy and takes place 4 times a year 60 days before the timetable change. Coordination process in railways is more complex due bond with the international timetable. Coordination of internal railway timetable starts one year before the timetable implementation. Ministry of infrastructure of Republic of Slovenia is in the process of authorisation of an integrated public transport authority. It is foreseen that authority will also coordinate and harmonize timetables between bus and rail operators – but only on the level of inland transport. This authority will be authorised for coordination of intermodal timetables and envisages to employ 3 transport engineers to work on this field.

2.1.2. Commuting and touristic cross-border transport flows

When analysing the main aspect of cross-border travel we must take into consideration that there are many different purposes within the cross-border transport. Depending on the purpose of the journey, length of the journey, mode of transport we can mostly distinguish cross border transport among **commuting and touristic travel to Slovenia.** Despite the fact that the main scope of the CONNECT2CE project is daily commuting across borders, we also present some data about cross-border touristic travel.

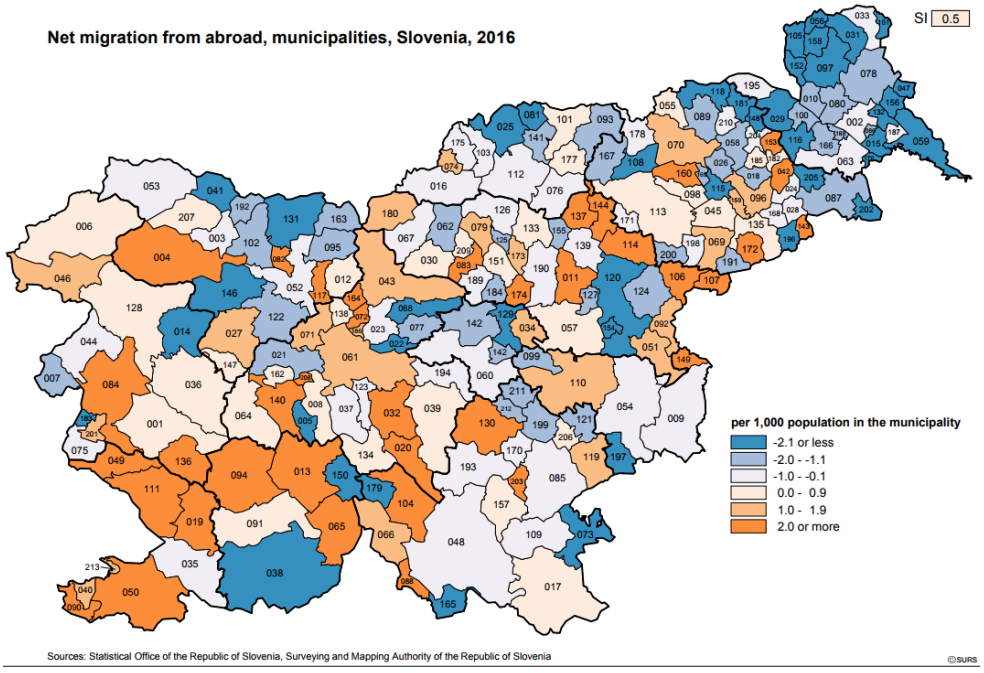
The level of cross-border mobility on the labour market is highly diversified in the European Union. The greatest flow of employees is observed in the border regions from Croatia to Slovenia (1.447 in the year 2016) and from Italy to Slovenia (862 daily commuters). There is no available data about daily migrants from Slovenia to neighbouring countries. The data indicates that there was an increase of 10 % of commuters from the year 2009. Analysis shows that modal split of daily commuters and tourists in highly in the favour of personalised car since 87 % of them travel by car, 10 % by bus (Surs, 2011; Own calculation, 2017). Since Slovenia is a highly transit country (even in the main touristic months) purpose of the trip is in 70 % for leisure and around 30 % work related. The share highly changes in the main touristic months when share of leisure trips reaches beyond 90 %. Data indicates that 81 % of cross border commuters are of male gender and 19 % are female. Despite the fact that there are no data on the profession type of the commuters we believe that majority is employed in construction, service and industry business. Following table presents the number of immigrants from abroad per 1.000 population in the municipality of Slovenia.

Figure 8: Labour migration index in Slovenian municipalities, year 2016.



Despite the fact that data indicates only Slovenian residents, it can clearly be seen from the figure above that the majority of daily migrants are employed in central in the West and South-West parts of Slovenia e.g. municipalities Trzin, Šempeter-Vrtojba, Ljubljana, Murska Sobota (North-East Slovenia). Since there is no map that would show work-related migration from other countries to Slovenia, the following map indicates the overall net migration (not necessarily work related) on the municipal level in the year 2016.

Figure 9: Net migration from abroad in Slovenian municipalities (2016)



2.1.3. Performance of transport operators in Slovenia

The volume of passenger transport demand has been increasing in Slovenia for several decades, primarily due to the growth of the most unsustainable modes – passenger cars and air transport (especially after 2002). The growth stopped after the economic recession in 2008. Trend of the public transport modes has been declining for decades, especially the proportion of bus services. In the last decade the proportion of public transport stabilized, but on much lower level then it was before 1991 when Slovenia became independent. Passenger car ownership in Slovenia in last 20 years almost doubled. Despite the fact that motorization level in Slovenia exceeds the rate of motorization in EU and also in numerous economically more developed EU countries, passenger car ownership in Slovenia after 2008 is growing more slowly as a result of the economic recession. Latest data indicates that motorization level in Slovenia in 2015 was 523 cars per thousand inhabitants (Slovenian environmental agency, 2017).

High car ownership results also in results with modal split and distances of commuting trips. National statistics indicate that almost 40 % of the trips are long up to 5 km, 28 % of the trip are from 6-20 km, 22 % if the trips are long from 21 to 50 km and around 10 % of trips are longer than 50 km. The longest distances are covered with rail, since average trip with railway covers 46 km in distance. A little shorter on average are trips with car which are in average 44,5 km long, following with bus distances which are 29,1 km long in average one-way commuting trip. Data also indicate that half of the trips (51 %) in Slovenia are lasting from 31 to 60 minutes while 43 % of the trips are shorter than 30 minutes. Only 6 % of all the trips (including all modes) take longer than 1 hour in one way. If we divide the average one way trip time among the transport modes the longest times are spend on a train where an average trip takes from 47 minutes to 1 hour. Bus trips last around 40 minutes and on average 27minutes in spend in a car for a one way commuting trip in Slovenia.

2.1.4. Economy of scale of the cross-borders public passenger transport in Slovenia

Transport of passengers in internal and cross-border regional railway transport in Slovenia is ensured by the state as a public asset with mandatory public utility service. Service is organised in a scope as stipulated by the transport policy in public passenger transport. The provider of mandatory public utility service for railway must provide for effective management and stimulate this form of public transport by ensuring quality transport. Mandatory public utility service for passenger transport in cross-border regional railway transport must be provided continuously in accordance with timetable.

The provider of mandatory public utility service and transporter for cross-border railway public transport is the company Slovenske železnice, d. o. o. that performs public passenger transport in internal and cross-border regional railway transport. The state and the mandatory public utility service provider conclude a contract on the implementation of the mandatory public utility service. The duration of the contract on the implementation of mandatory public utility service for national railway is from 20 to 30 years. Legal framework of operation for railway is *Railway transport act* (Official Gazette of the Republic of Slovenia, num. 99/15) and *Decree on the mode of providing public service obligations in inland and cross border regional railway passenger transport* (Official Gazette of the Republic of Slovenia, num. 99/08). Contracted costs per km for rail are 4,26 EUR per train kilometre, while operating costs are 8,5 EUR per vehicle kilometre. Slovenian Railways – Passenger transport cover 49,9 % of their total operating costs through fare collection. Subsidy devoted by public authority for covering the costs of railway PT is 43,8 million euros for Slovenia.

Legal framework for interurban bus transport and international road passenger transport is Road Transport Act (Official Gazette of the Republic of Slovenia, num. 6/16). The activity of international road passenger

transport is road transport of people performed by companies by motor vehicle for passenger transport or a combination of such vehicles for payment in EU Member States. The right to perform the activity is acquired with a Community licence for which the company must meet the prescribed conditions. There are different bus transport companies that operate cross-border connections from Slovenia to other countries. Fare revenue per vehicle kilometre is 0,6098 EUR, while 1,73 EUR is an average operating cost per road vehicle kilometre. Data from the Ministry of Infrastructure indicate that 35,2 % of the total operating costs are covered with fare collection, while overall 20 million euros of subsidy is devoted by public authority for covering the PT costs.

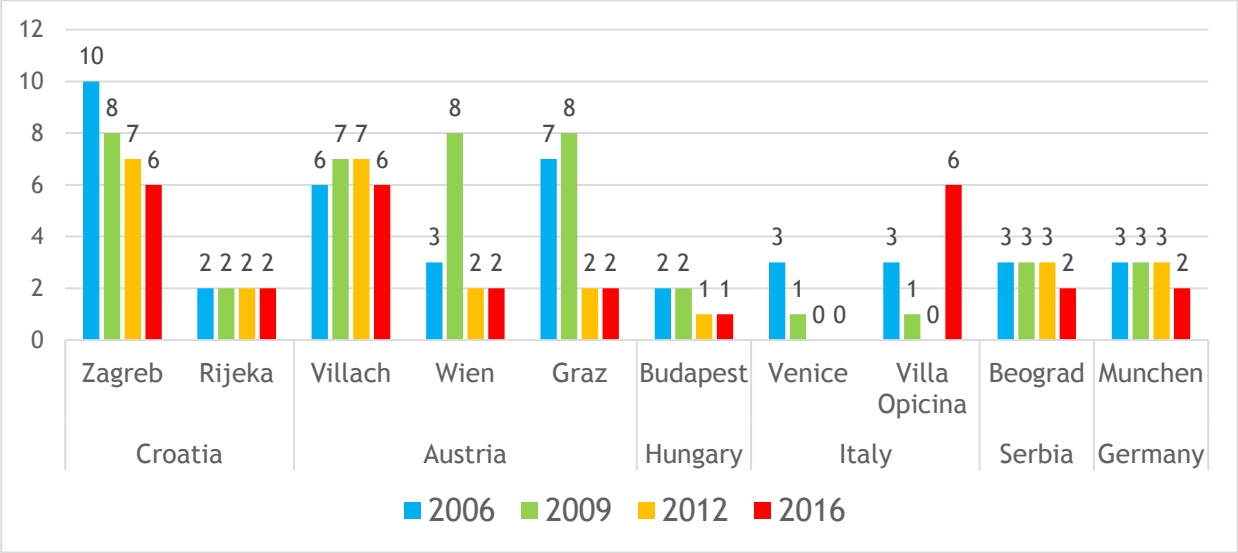
2.1.5. Cross-border connections of PT services

Best connections of international trains are daily connecting Slovenia with the neighbouring countries Croatia and Austria. In the year 2016 to its final destination in Zagreb there are operating 6 pairs of trains per day, while there are two pairs of trains in function to Rijeka (Croatia).

There are 6 pairs of connections from Ljubljana to Villach but from Ljubljana (passing Maribor and Graz) to Vienna there are only 2 pairs of daily connections. Two pairs per day are connecting Munich and Ljubljana. Important improvement is shown in the re-established of a local border connection in the direction to Italy (Opicina) with the 2016 timetable, where there are 6 trains daily connecting Slovenia and Italy.

The connection to Hungary is established through Hodoš and Maribor, where there is operating one rail passenger train. Also there are only two pairs of trains to Belgrade (Serbia).

Figure 10: Figure of pairs of trains from Slovenia (Ljubljana and Maribor) to important cities in neighbouring countries.



Analysis of cross-border busses indicates that there are the following public transport connections from Slovenia to Italy by Avrigo bus operator:

- Nova Gorica (SLO) – Gorizia (I): 12 connections daily
- Sv. Gora (SLO) – Gorizia (I): 2 buses daily, including Sunday connections
- Postojna – Sežana (SLO) – Trieste (I): 2 busses daily
- Ajdovščina – Sežana (SLO) – Trieste (I): 1 bus daily

Bus operator Arriva Štajerska d.d and Arriva Dolenjska and Primorska cover public transport connections which are:

- Ljubljana main bus station – Karavanke cross border (AU) — Walserberg

- Ljubljana main bus station – Bregana cross border(CRO)-Zagreb: 6 connections daily
- Ljubljana AP – Fernetti cross border – Trieste: 3 connections daily

On the area of the pilot action no. 4 (PSO for micro PT transport AT-HU) AP Murska Sobota has no cross border connections. According to the transport operator cross border connections to Austria was problematic because of very scattered working posts on different locations in Austria which were hard to connect in coherent cross-border lines. Additionally many construction workers in Austria do not have a fix working time, so fixed timetables were less likely to be used. Railway connection between Gornja Radgona (Slo)-Bad Radkersburg (A) was in operation in the past but it is no longer active. The study for revival the connection has been in course of preparation.

We have received from the operators data on the service quality. Responds indicate that lifetime of the train PSO service is from 20 to 30 years whereas PSO for bus lasts for around 15 years. Average speed of the trains in Slovenia were (in the year 2016) around 51 km/h. In general users are rather satisfied with the service of rail PT, since the average score is 6,72 (on the level from 1 to 10) or 3,36 (on level from 1-5). Since there is only one railway operator in Slovenia the prices for international transport are set by each railway undertaker. For Slovenia there are special cross border prices which are set by the bilateral agreement among the authorities. According to the railway operator there are approximately 10 to 15 minutes of border procedures delays at the railway border crossings.

Summary of the PSO chapter is included in the overall summary of territorial needs assessment of Slovenia.

2.2. Infomobility systems

2.2.1. General

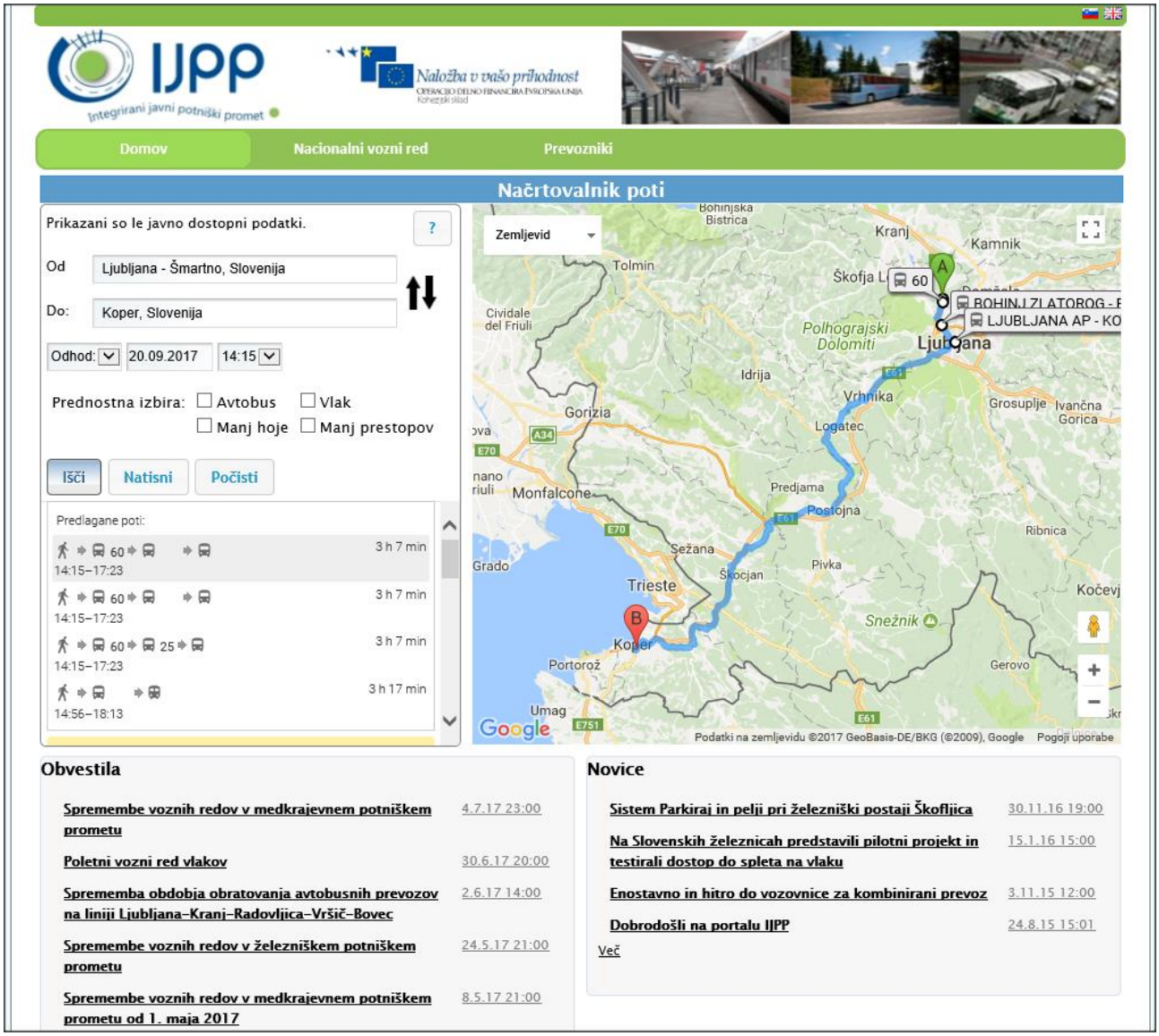
In Slovenia more than 30 bus transport operators and one railway operator provide service in inter-urban public passenger transport. All bigger transport operators also provide their own infomobility systems, often in combination with urban bus and railway infomobility. Additionally, a national Integrated Public Passenger Transport Authority (IPPTA) provides transport information on complete inter-urban public transport system as well as some urban systems on one information site. Furthermore, on its information site IPPTA also provides the information on integrated ticketing that comes as additional service to the inter-urban and urban public transport systems.

To assess territorial needs on infomobility systems of 5 major bus operators, the railway operator and IPPTA were taken into account. Although transport operators generally provide transport as well as infomobility services on the whole territory of the country or at least connect the sub regions to the capital of Ljubljana, the surveyed operators as well provide services to all listed CONNECT2CE pilot areas in Slovenia. Also information on cross-border and transnational transport is available in operators' infomobility systems, unlike on IPPTA site as those routes are not PSO-provided.

Infomobility systems in Slovenia cover more than 18.000 interurban bus lines, covering 5.244 bus stops on more than 50.000 km of length and additionally also urban bus lines which only in the biggest system in Ljubljana amount to 42 lines with 502 km linking 650 stops. The railway information system covers more than 100 lines on 1.208 km linking 262 railway stations and stops.

Practically all information systems are beside Slovenian also presented in English, or in the language of the cross-border country (e.g. Italian). All infomobility systems are planned to extend other language availability.

Figure 11: http://jpp.si/web/guest/domaca-stran - trip planner by IPPTA



2.2.2. Characteristics of pre-trip and on-trip information systems

Owner, provider; All information systems at the transport operators are privately owned, as well as IPPTA as public controlled body is the owner of the infomobility system. Financing of the IPPTA infomobility system is provided through Ministry of Infrastructure (public).

Start of operation; Most of the digital infomobility systems have been implemented in the years between 2005 and 2008, the first one has been put in operation in 2001 by Alpetour transport company. Development of the infomobility system goes hand in hand with the advancement of digital ticketing systems which are constantly being improved by new features and technologies.

Information platform; Infomobility systems are presented to the users as web sites which were developed by Slovenian technology providers as a custom solution. Information platform is based on standard software platforms: OS: MS Windows Server, database: Oracle DB & & MS SQL Server &MySQL, web server: IIS & Apache. Recent technical development of the infomobility systems converge to the MS platforms.

Functionality; All infomobility systems provide pre-trip information as map of line (or routes), timetables, travel times and additional services, trip planning based on origin and destination as well as information

on station facilities and vehicles. Dynamic search of connections powered by Google Maps is only available at the biggest bus operator company LPP (domicile in Ljubljana) and IPPTA which also makes publicly available the corresponding GTFS files using WGS84 geographic coordinate system.

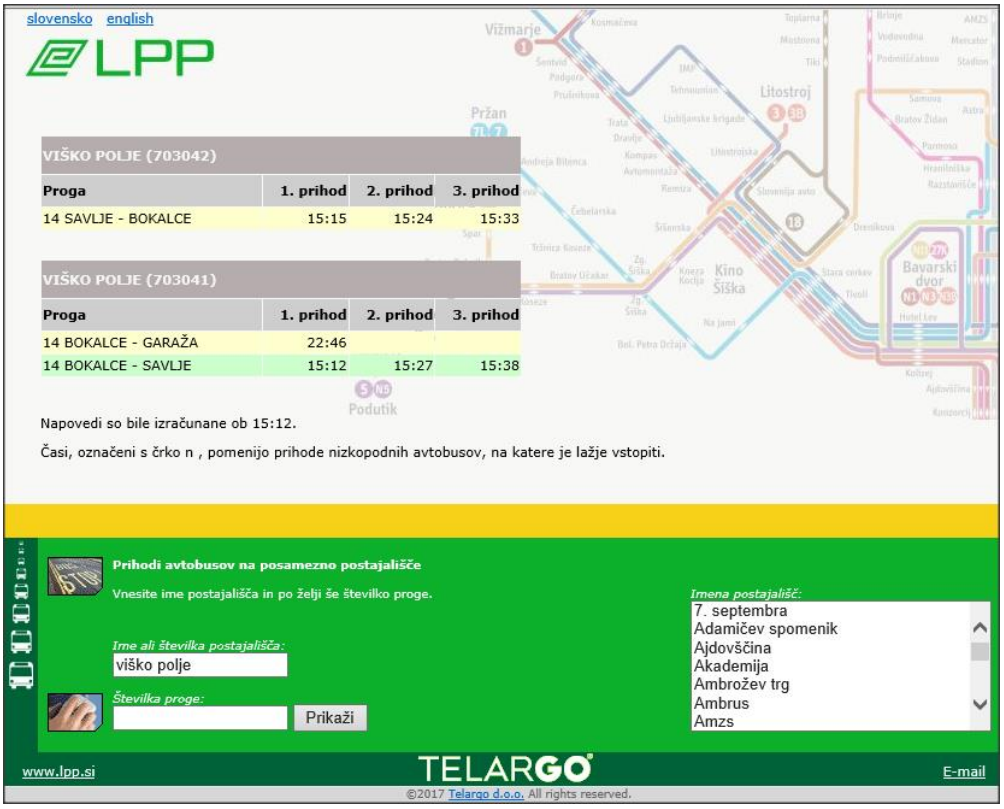
On Slovenian Railways' portal users can also find on-trip information on traffic disruption and delays. Currently real-time information on the Railways is provided on human monitoring of the trains on the network; automatic overview of train location is planned shortly. LPP urban and inter-urban bus operator in the Ljubljana region as well as Marprom, the city bus operator in Maribor, provide on-line on-trip information giving expected time of arrival displayed on city buses and station displays (variable message signs) and also via mobile SMS and web infomobility system. The systems are based on GPS localisations of buses and mobile data to exchange the information with the server. The other operators plan to extend their infomobility systems for on-trip information as well as capability of multimodal trip planning in the near future.

Interfaces; There is still under-development of additional human interfaces. Only Slovenian Railways and LPP provide additionally mobile interfaces, smartphones apps and stationary terminals but also the other operators tend or plan to implement smartphone apps shortly.

Information sharing and technical restrictions; General information on all infomobility systems is freely accessible to the users. Only on-line ticketing uses user/password as well as personal digital certification security schemes. The infomobility systems technology platform is commonly SQL database and PHP script language. Information on route calculation is available by using HTTP/XML or SOAP protocol. IPPTA travel planner powered by Google Maps therefore Google Maps API or URL link to Google Maps can be used. The operators generally disagree with sharing of HTML code fragments for external use.

Ticket payment system; On-line payments are currently available for seasonal passes at the Slovenian Railways and some bus operators offering subsidized seasonal passes for student. On-line purchased seasonal passes are stored on smart cards or mobile phones. Single ticket can only be purchased at LPP by using mobile app and voice data transfer on mobile (called Moneta). On-line purchase doesn't affect the fares.

Figure 12: On-line expected time of arrival announcement system (LPP – Ljubljana city transport)



2.2.3. Summary

Infomobility systems in Slovenia are available at all major transport operators in rail and bus in urban as well as interurban transport. The majority of them only provide static information on timetables, station infrastructure and vehicles, added by the trip planning based on origin and destination lying on the same transport line.

In the recent years all information systems are subject to substantial enhancement, driven by the faced limitations of the existing infomobility systems and with the technology development on one hand and with the inception of the integrated public passenger transport in Slovenia in 2016 that needs additional functionalities related to the development of electronic integrated ticketing system and multimodality. Integrated multimodal ticketing has changed the behaviour of the passengers who require new information on trip planning, ticket purchase and ticket validity. On the other hand also the need to exchange information among the transport operators and IPPTA urged the operators to upgrade and renovate their legacy information systems which as consequence also ensued in renovation of infomobility systems.

On-line purchase didn't find high availability yet as it is still confined to certain passenger categories on the railways and users of NFC mobile ticket in Ljubljana city transport. Due to high public demand all operators plan to support on-line purchase but real expansion is expected in the framework of the integrated public passenger transport, especially when it is extended from student population to all passenger categories.

Infomobility systems are indispensable for occasional travellers as well as commuters who want to check the latest information not being ready to wait at the station more than a couple of minutes. Therefore development should continue, especially in integrated transport schemes. Flagship of infomobility systems' development in Slovenia are LPP urban and interurban bus operator in Ljubljana and IPPTA. LPP first leads with very efficient on-trip information on bus arrivals accessible on web, mobile phone, variable message signs on the bus stops as well as in the buses (announcement displays). IPPTA on the other hand has integrated timetables of all Slovenian public transport into a single pre-trip infomobility system based on GTFS and thus available on the ubiquitous Google Transit web information system.

2.3. Integrated ticketing and tariff schemes

2.3.1. General

Urban bus public transport service has been organised in 15 cities and towns in Slovenia (Jesenice, Kamnik, Koper, Kranj, Krško, Ljubljana, Maribor, Murska Sobota, Nova Gorica, Novo Mesto, Piran, Velenje, Škofja Loka). Transport is organised and co-funded by the local municipalities with PSO obligation in Ljubljana and Maribor. In addition to the PSO bus transport in Ljubljana the Slovenian Railways offer a city transport card valid for the Ljubljana township as part of the PSC contracted with the Government of Slovenia.

Interurban and national public transport features concession model applied in bus transport (47 private concessionaires) and PSO transport model in the railways (1 public operator). The public transport is contracted by the Ministry of Transport in bus transport and by the Slovenian Government in railway transport.

Since September 2016 an integrated public passenger transport (IPPT) has been put in operation encompassing complete national and inter-urban transport as well as urban transport of Ljubljana, Maribor and Murska Sobota. IPPT is regulated, controlled and co-funded by the IPPT Authority (IPPTA), provisionally organised at the Ministry of Infrastructure. Currently only students can benefit from integration but it will be extended to the passenger categories in a few months.

2.3.2. Financing model

A gross financing model is applied for urban bus transport and railway transport where all transport costs are reimbursed by the local municipality and the Slovenian government, respectively, deducted the fare revenue.

Financing of concessionaires in inter-urban and national bus transport is subject to quasi-net financing model. The concessionaires need to compete for the income (fare and other sources of revenue) themselves. If the operator's revenue is smaller than threshold of 1.75 EUR/km the operator is eligible to co-funding of maximum amount of 0.5 EUR/km, limited by the set threshold.

The quasi-net financing model entails the right of the bus operators to draw timetables on their own. The timetables are submitted to approval of the concedent (Ministry of Transport) checking compliance to the timetable standards as stipulated by the Ministry of Transport (concedent).

Integration of the public passenger transport didn't bring change to the financing model but to the fare revenue sharing (including need for a sale commission). Integrated ticket fare should be distributed among the operators taking part in the part of the multi-operator transport where the same ticket has been used. As integrated ticket fare sharing raises income risk for the operators IPPTA has adopted solution of the transitional period where total fare revenue has been secured on the proportion of ticket sales in the selected base year. Fare revenue sharing model is still under development and testing.

2.3.3. Ticket mediums

Operators in all modes of transport accept paper tickets, except of Ljubljana city transport where only electronic tickets stored on smart card or NFC smart phone is available (users of mobile phone can also buy ticket on the bus by using voice data transfer – ref. Moneta). Also entitlement to railways transport in Ljubljana township is only stored on smart card. Smart cards are actually issued by all operators when it comes to periodic travel passes. Barcode is used mainly as a security element on general and print@home paper tickets.

A multi-application smart card has been rolled out with integration of public passenger transport (PPT) used for storing integrated tickets as well as other products of the card issuer (e.g. operator). Integrated ticket smart card application has been standardized at the IPPTA.

2.3.4. Tariff system

In Slovenia all urban transport applies zone tariff systems. Multiple zones are charted only in Ljubljana city transport, the other transport systems use a single zone with a flat tariff.

As opposed to the urban transport all inter-urban and national transport, be it bus or railway, applies distance based tariff system. Bus and railways tariffs are mapped in different tariff classes: 5 km for bus and 10 km for railways.

Integrated tariffs paid by the customer are the same whoever sold the ticket and with whichever transport operator has been used. It doesn't necessary imply the same total price remunerated to the operator by the IPPTA. Tariff integration in Slovenia is based on the same ticket price for the passenger and different total ticket price per operator. As this should take very demanding revenue clearing IPPTA has adopted a temporary solution to share ticket income on agreed flat rate shares. With aim to consolidate the total ticket price IPPTA has been putting a lot of effort to find a satisfactory tariff scale accepted by all operators.

In urban transport users can mostly buy a single ticket or a monthly pass, except for special passenger categories with unlimited access to the transport. Full selection of period travel passes (week, month, semi-annual, annual) are available to the passengers on interurban and national transport. We have seen

that carnet tickets are being replaced by electronic purse (Ljubljana), while return tickets in inter-urban transport are being pushed out by the daily passes. Daily passes are already available in railway city transport in Ljubljana.

At inception the integrated ticketing has rolled out only periodic travel passes. Single tickets will come up later, after the consolidation of fare revenue clearing.

2.3.5. Technical support for ticketing

All ticketing systems in Slovenia are fully technically supported in the phases of ticket sale, ticket validation, ticket control and ticket management and reporting. This implies that all tickets are issued on the electronic medium or are digitally coded on the paper to allow machine control (smart card reader/writer, barcode reader/writer). Financial clearing still has no automatic (algorithm based) support; IPPTA is working on development and testing of the algorithm.

Tickets on the buses are validated on fixed validation machines at the front door, serving also as ticket sale point in the vehicle. Ob the other hand all tickets at the railways are still validated by the conductor which makes a big issue to catch all integrated ticket users in time for a check-in control. Ticket validation namely justifies its use at the transport operator and thereby the right on fare revenue share.

IPPTA has made available ticket sale application, validation devices to be fixed on the buses and handheld validation devices for ticket sale/validation and control on the railways (control - also on the busses) to all transport operators giving transport (or sale) services in the integrated public passenger transport. The operators are faced with an issue to operate and maintain double equipment which is especially annoying for the handheld operation. The operators that will join the integrated ticketing system can opt between hiring the devices from IPPTA (upon availability) or to employ their own devices after passing certification procedure in compliance with IPPTA standard.

2.3.6. Ticket sale network

Each transport operator provides a counter ticket sale network through its own or contracted staff putting up complete product assortment of ticket mediums and ticket products. Smart cards can only be obtained at the counter.

Automatic ticket counters (ATC) are only available in Ljubljana city transport and at the railways. Only monthly travel pass purchase and e-purse up-topping are available. The railways don't offer e-purse but make additionally available single tickets.

In the vehicle it is usual for a passenger to buy paper single ticket, except in the urban transport where single ticket can be bought using e-purse on the smart card (automatically on the validation device). All interurban and national operators generally also allow renewal of ticket passes (for another period).

On-line sale is currently only available at Slovenian Railways. Only extensions of travel passes are available on the web.

IPPTA is using the existing operators' sale network points by providing its own ticket sale application at the counters and ATC-s selling the integrated tickets. The IPPTA sale application is exchanging sale data with the transaction server at IPPTA's in real-time. All tickets need to be purchased prior to boarding the vehicle. Sale commission still remains the open question to be solved.

2.3.7. Implementation and follow-up on integrated tariffs and ticketing

Integrated public passenger transport (IPPT) in Slovenia is based on:

- integrated tariff for the user (currently only student tickets are available),

- integrated ticket in interurban and national transport which is multi operator and multimodal
- single ticket medium – electronic smart card that stores beside integrated tickets also separated tickets for urban transport systems
- multiapplication smart card storing IPPTA ticketing products as well as products of an issuer (the card can also be issued by the operators (LPP, AVRIGO…).

IPPT is regulated, controlled and co-funded by IPPT Authority (IPPTA) at the Ministry of Infrastructure who also launched the project of public transport integration. Integrated system doesn't actually interfere with the existing tariff and ticketing and other operators obligations but only complements and upgrades the existing transport system where necessary.

Main tasks of IPPTA in development, implementation and operation of the integrated ticketing system:

- has issued integrated distance table and tariff scale and integrated timetable
- has issued multi-application smart cards with IPPTA application to store integrated tickets,
- has issued terms and conditions of use of the IPPT system for the users (passengers) as well as for the providers (transport operators),
- has provided technical standard for all SW and HW at the operators (and fitted the existing operators),
- has provided central information to exchange data with the operators,
- web based infomobility system for passengers
- has provided sale, validation and control service as well as service for information and handling of complaints,
- operation, control funding and regulation of the system.

Follow-up activities in integrated transport system development:

- expansion of the system to other passenger categories with adoption of consolidated single tariff for all inter-urban transport operators,
- development of sale commission model (with integrated tickets a ticket fare beneficiary is not identified in advance),
- development of fare revenue clearing model based on actual ticket use (provided check-in control on the railways),
- accession of the remaining urban transport systems in the integrated transport scheme,
- development of combined products of urban and inter-urban transport (e.g. reduced urban ticket in combination with inter-urban ticket),
- harmonisation and streamlining of the integrated timetables with main and feeding lines,
- transfer of IPPTA from the ministry to the professional private organisation,
- development of mobile electronic ticket (NFC…) and app
- development of web personal account system for integrated ticket management and review.

3. SWOT analysis

Analyse and categorize (according to the SWOT) the findings of the Overview and the TNA chapters, than fill in the strength, weaknesses, opportunities, threats table with the main outcomes.

According to the literature there is in the table below the SWOT analysis for Slovenia for all three chapter on connectivity, infomobility and integrated ticketing and tariff schemes for Slovenia. SWOT analysis indicates:

- Strengths: characteristics of the business or project that give it an advantage over others
- Weaknesses: characteristics of the business that place the business or project at a disadvantage relative to others
- Opportunities: elements in the environment that the business or project could exploit to its advantage
- Threats: elements in the environment that could cause trouble for the business or project

Strenghts	Weaknesses
• Implemented passengers integrated infomobility systems as single information point (GTFS format); • Timetables for trans-national road public transport are proposed by the bus operators and transnational rail connections are negotiated within the PSO contract in Slovenia; • Know-how to establish multi-operator and multi-modal integrated ticket (passengers can freely choose among multitude of opportunities for a travel from the same origin and destination); • Established multi-application electronic ticketing in Slovenia which allows ticket issuers to provide their own products on the same ticket medium; • Integrated travel information system in Slovenia is based on Google transit, which is world standard and is based on routing tools; • Technology standard issued by IPPTA makes the integrated system open to all participants and further development; • Technology support allows “over the air” update of electronic ticket data; • Separation of urban and interurban tickets leaves local communities the authority to issue their own tariff scheme, while	• IPPTA is organised as a public body at the Ministry which is not focused on operational work required for the IPPTA; • Lack of harmonised timetables among operators, especially intermodal, and different set dates for timetable updates for bus and train transport; • Lack of transnational PT connections to neighbouring countries; • Separation of urban and interurban ticket tariffs hinders IPPTA to produce combined ticketing products; • Financial clearing system is based on sharing of ticket income on agreed flat rate shares; • Certification body is needed to test technical and operational compliance of the devices used in the integrated system, which entails additional costs, staff and effort of IPPTA; • Transport operators’ infomobility systems mostly provide only basic pre-trip information (static timetables, route map and presentation of stations – only few provide on-trip information; • Division of authority of integrated ticketing at IPPTA and transport operation at the operators also brings discrimination of service delivery accountability and

keeping the tickets on the same ticket medium (e.g. contactless card); • Implementation integrated ticketing products in Slovenia has widened sales network and accessibility; • Involvement of transport operators in Slovenia to many new developing projects (e.g. on-board WiFi, new web portals and ticketing systems with new distribution channels-mobile ticket etc.); • Online operation of the integrated system; • Inclusion of cross-border train connections in national PSO; • Integrated tariff for the passenger (single price regardless the transport operator) doesn't necessarily imply the same full ticket price for all transport operators – the operators can maintain their own tariff schemes.	claims; discrimination of accountability should be internal; • Slovenian Railways don't provide check-in control (at the entrance of the carriage) – until having check-in system established the Railways could be subject to loss of revenue from ticket fare clearing; • Further development of operators' infomobility systems depends on their participation in IPPT; • integrated tariff for the passenger (single price regardless the transport operator) doesn't necessarily imply the same full ticket price for all transport operators.
Opportunities	Threats
• Standardisation of a Slovenian national electronic ticketing scheme makes the system open and available for other regions to copy and thus make the technology providers to cooperate in the environment where everybody protects their unique solutions; • Standardisation in Slovenia made a sound basis for further technology development (mobile ticketing, on-line purchase, passenger personal web account…); • Possible improvement of transnational communication and connectivity among the PT transport operators in neighbouring countries; • Attractive integrated tariff can make car commuters to change their way of commuting to PT; • All transport providers who have electronic ticket validation can benefit from additional data captured at validation (un-personalized) • Separation of sale and transport operation in single integrated ticket business environment makes opportunity for	• Transport operators tend to adopt the ticket validation technology by the single provider who was part of the system development team; this could ensue in monopoly; • Separation of financial authorities in urban transport and inter-urban bus and railway transport makes it difficult to consolidate tariffs for interurban transport providers on urban areas where both types of transport intertwine; • Open access check-in control system (without checkout) can hinder development of a transport system of a seamless travel with a single payment by the passenger and a back-end settlement between IPPTA and the participating providers (sale and transport); • Technical and tariff integration without timetable harmonisation is futile; • Complete integration needs good technical support (pre-processing of timetables for automatic ticket validation, on-line data exchange and financial data post processing), on the other hand excessive technology can make the system to

focussing better on core business – new ticket sale agencies with additional programs may pop up; • Integrated ticketing products may be a driver for the transport operators to reconsider offer of their own transport products; • Integration of transport may impact redistribution of passengers to the most convenient transport options; • Active cooperation of transport operators in international project and activities in order to increase cross-border connections and know how; • Involvement of Railways in international strategic group ITA-SLO where additional international train connections could be established; • Increase of cross-border commuters to which transnational PT can be promoted as a mode of transport for daily commute; • Railway PSO enables the operator to demand compensation for service development (e.g. purchase of new rolling stock).	expensive and unmanageable; • Slovenian Railways don't provide check-in control (at the entrance of the carriage) – until having check-in system established the Railways could be subject to loss of revenue from ticket fare clearing; • Integrated ticketing raises income risk as ticket sale doesn't necessarily ensue in ticket use at the same transport operator; • Integration of transport may impact redistribution of passengers and thereby ticket fare revenue; • Division of authority of integrated ticketing at IPPTA and transport operation at the operators also brings discrimination of service delivery accountability and claims; discrimination of accountability should be internal; • Keeping organisation of IPPTA as a public body may slow the pace of further development of integrated services due to administrative hindrances and lack of highly skilled professionals; • Government hasn't assured balanced development of road and railway public transport sector – insufficiency of railway investments.

4. Overall conclusion

Improvement of public transport connections from Slovenia to neighbouring countries is one of the main needs of Slovenia in the terms of connectivity. Despite the fact that timetables the trans-national road public transport are proposed by the bus operators and transnational rail connections are negotiated within the PSO contract in Slovenia, there is still lack of PT trans-national connections. Currently coordinating among different transport modes has not yet been established, and there is a need for close cooperation on the field.

Modal split among countries is not in favour or PT operation, since around 85 % of cross border commuting is performed by car and only 10 % by means of public transport. Majority of cross-border commuters are male, but there is no clear data on profession type of cross-border daily commuters. Collected data also indicate that there is a need to make PT connections faster in order to make it more attractive and more usable by potential users. Differences among transport modes are indicated also in the contracted costs per km. For rail contracted costs are 4,26 EUR per train kilometre, while operating costs are 8,5 EUR per vehicle kilometre while fare revenue per road vehicle kilometre is 0,6098 EUR and 1,73 EUR is an average operating cost per road vehicle kilometre.

All major transport operators provide their own infomobility systems. The operators mainly provide pre-trip information as route map, static timetables, trip planning between the stations on the same route. On-trip information is only available in Ljubljana and Maribor city transport and on the Slovenian Railways. All transport operators use electronic tickets for seasonal travel passes and usually a paper single ticket. Ljubljana city transport only uses electronic tickets but users can also pay their fare by using a mobile voice communication. On-line ticket purchase is not really developed in Slovenia. Only Slovenian Railways provide extension of the seasonal pass by using all standard on-line payment means.

All transport operators plan to develop their infomobility and ticket sales systems but the development is strongly correlated with the development of a Slovenian integrated ticketing system. As planned nearly all ticket products at inter-urban bus operators will be replaced by the integrated products. This will also reduce the need to keep operators' own infomobility systems. The operators even reflect the idea to replace the existing validation and control devices with the IPPTA devices. The situation at the railways partly differs as the railways provide many special products and need to be compliant with the international railway transport and UIC commitment. Railway infomobility system will still be kept and developed but provided technical and operational compliance with the integrated public passenger transport system.

Integrated passenger transport in Slovenia has integrated a tariff, ticketing medium, integrated technical solution and integrated sale network and established the integrated public passenger transport authority as a support, control, regulation, development and co-funding body. Currently only products for the students are provided. Shortly it is planned for the products to be available to other passenger categories as well.

Lessons learned in the Territorial needs assessment for Slovenia will be later in the process used in the preparation of transnational tools, implementation of pilots and preparation of territorial strategies.