DELIVERABLE D.T1.2.15

Transnational study on info-mobility systems

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Contents

(For the general introduction of this study please check D-T1.2.13)

1. Thematic transnational focus on INFO-MOBILITY

1.1. Transnational analysis of INFO-MOBILITY

Info-mobility can be defined as "the use and distribution of dynamic and selected multi-modal information to users, both pre-trip and, more importantly, on-trip, in pursuit of attaining higher traffic and transport efficiency as well as higher quality levels in travel experience by the users" (Ambrosino et al., 2010). Indeed, a reliable info-mobility is part of the so-called "pull-measures" (Nocera and Cavallaro, 2011[1]), which aim at encouraging the shift from the private vehicle to more sustainable transport modes by improving the attractiveness of public transport. Info-mobility is typically provided by a Mobility Information System (henceforth, MIS), i.e. a system (in most cases a website or a mobile application) providing information to an end-user.

This deliverable, which aims at describing the MISs available in the areas covered by the project Connect2CE, is structured into four main parts. The first one (section **1.1**) tries to address some important preliminary questions: why is infomobility important for public transport? Which is the benefit that can be provided to passengers? How is infomobility perceived by users? Then, it presents the most important **technical aspects** related to MISs in Friuli-Venezia Giulia, Veneto, South Tyrol, Slovenia, Western-Hungary and Győr-Moson-Sopron, Zagreb County, Pilsen Region, Burgenland and Berlin-Brandenburg. The analysis of the MISs is provided through technical information, relevant images, as well as a final table that summarizes the main characteristics of the different solutions. For sake of clarity, results are divided into four sub-sections:

- general characteristics of the IMSs (Section II.a of the questionnaire);
- pre-trip component of the IMSs (Section II.b of the questionnaire);
- on-trip component of the IMSs (Section II.c of the questionnaire);
- ticketing systems of the IMSs (Section II.d of the questionnaire).

The second part (section 1.2) tries to combine the results deriving from the different pilot areas into a **SWOT analysis**. This analysis summarizes the main aspects that have been raised by PPs, trying to organize them into a coherent framework. Aspects that cover the technical issues (pre- and on-trip information, ticketing issues, and integration of systems) and the geographical scale (with a focus on transnational implications) are mainly addressed.

The third part (section 1.3) presents existing **best practices** found at the EU level, which can be useful benchmarks for the MISs of the project's areas. Also in this case, the selection of the cases is based on the four aspects previously mentioned; furthermore, one of the focuses is the transnational dimension.

Finally, the last part of the document (section 1.4) draws some conclusions deriving from this analysis about MISs, which can be a useful input for the transnational tool, which will be developed into the deliverable D.T1.3.5.

[1] Nocera S., Cavallaro F., 2011. Policy Effectiveness for containing CO_2 Emissions in Transportation. Procedia - Social and Behavioral Sciences, 20, pp. 703-713. DOI: 10.1016/j.sbspro.2011.08.078

[2] Ambrosino G., Boero M., Nelson J.D., Romanazzo M., 2010. Infomobility Systems and Sustainable Transport Services. ENEA Italian National Agency for New Technologies, Energy and the Sustainable Economic Development. Lungotevere Thaon di Revel 7600196 Rome (ITALY). ISBN 978-88-8286-229-9

1.1.1. Introduction: info-mobility and public transport, general concepts

It is commonly acknowledged that one of the main aim of MISs is to increase the attractiveness of sustainable and environmental-friendly travel modes. However, there is less agreement in defining which sustainable travel modes are. Hence, a preliminary theme to be addressed in this section is the definition of sustainability and environmental friendliness. For this purpose, we adopt the approach proposed by the Alpine Space project "AlpInfoNet – Sustainable Mobility Information Network for the Alpine Space" (www.alpinfonet.eu). This choice has a main motivation: the possibility to use an already existing framework, which allows the comparison and the replicability/comparison in other contexts. **Sustainable transport mode** (STM) "represents all sustainable, environmental-friendly and social acceptable transport modes (train, public transport, bicycle, ride sharing, car sharing, walking…). Use of private car is not a STM, but car-sharing and car-pooling are STM. Moreover STM includes soft mobility". In the last few years, an increasing number of additional mobility services has been established (e.g., car-sharing, bike-sharing, car-pooling). Information about these systems is particularly important in rural areas where public transport has usually a lower supply and integrative forms of sustainable modes are necessary. Possible STMs are therefore buses (at different levels, including: transnational, national, regional, local, shuttle buses provided by hotel), trains, boats cycling, bike sharing and rental bikes, walking, car-sharing, car-pooling and car rental, taxi and hailed shared taxi, cableways.

A second aspect to be mentioned is the **type of information** that can be provided by MISs. In this case, a distinction between pre-trip and on-trip information can be made. Thanks to the pre-trip MISs, the user can get information about how to travel from A to B using different transport modes, select the options that fit best to his/her characteristics and plan the journey accordingly. These MISs are also known as journey planners. Generally, two kinds of journey planners can be identified: those for long distance trips (e.g. national railway) and those for local mobility (to move in a specific region or in a city). Some journey planners combine the long distance and local mobility information, thus granting a more comprehensive service. On the other hand, on-trip MISs provide another type of message, mostly related to real time information, which is not useful when the user plans his/her journey in advance, but rather when he/she is travelling and some unexpected circumstances occur. This type of information includes hints about road works, incidents, alternative travel routes and delays of PT, as well as tailored suggestions about how to optimize the trip. It can be provided through the journey planner or the App used for the pre-trip phase, but also on-board of the vehicles or by the departure monitors.

The **trip chain** is a third main feature of the MISs. It includes all the phases that a user have to cover from the origin to reach his/her destination. The most complete is the provision of a **door-to-door** information, but some parts of the journey (typically, the first and last miles) are a critical part of the chain. To cover the entire trip, some MISs can include specific transport modes. Walking is the most important one, but also others can be recalled. They are normally referred to as "additional mobility services" and may include hotel buses, taxis, car sharing and carpooling services, etc. Information about these systems is particularly relevant in rural and transboundary areas, where public transport supply is quite low and the use of alternative systems may constitute a valid option alternative to the private vehicle.

A fourth characteristic of MISs is related to the **users' needs**. There is a lot of competition in digital mobility services and people tend to use those tools that provide global services and are integrated in established online services (Google Transit is a typical example). Consequently, a MIS has the challenge to compete against this standard service, which do not always offer the best result in terms of final output, but are rather known and integrated in a broader context. The strength of these services is that they are easily accessible and require a minimal apprenticeship from users, because they are part of broader service-offer the users are familiar with the basic interaction-principles. For this reason, to evaluate the quality of a MIS, providers should not think at a technical-oriented approach, but rather they should prefer a customer-oriented approach. In other words, the aim is not to develop or to adopt technologies and systems that are as much sophisticated and innovative as possible, but rather to adopt those that follow a user-oriented approach.

In this light should also be seen the fifth aspect mentioned here, which is specifically related to the trans regional or **transnational scale**. Here, political decisions or difficulties on finding agreements on common platforms between providers can create a geographical fragmentation. As a result of this condition, several alternative local MISs can be provided, each of them covering only limited parts of the territory. This condition can be useful for local mobility, but cannot grant a reliable and comprehensive transnational solution.

The aspects mentioned in this section have been included in the questionnaires and in the TNAs of the different project areas to understand the main technical characteristics of MISs. Hence, from the results obtained by such documents it is now possible to provide a detailed overview of the MISs and their functionality.

1.1.2. General characteristics of the systems

The **main aspects** addressed in this part of the report deal with the type of information provided by the info-mobility system, the transport modes, the territory and the languages covered, the management, the stakeholders' involvement and images/screenshots of the layout. More in detail, the general features of each MIS are presented and compared, by grouping this information into two main parts: the management framework (**MANAGEMENT**) and the number of transport modes covered (**MULTIMODALITY**). Subsequently, other specific information provided by questionnaires and TNAs are presented for each pilot area (under the label **SPECIFICATIONS**). Finally, at least an image for each MIS available in all regions is provided, in order to show the usability and the user-friendliness through its graphical aspect.

An initial concept is necessary: the **territorial dimension** and the **geographical scale** are two important aspects that need to be taken into account. Connect2CE analyses different contexts, varying from the national scale (e.g. the whole Slovenia as country, which counts more than 2 million inhabitants) to the local one (e.g. the Autonomous province of South Tyrol, with about 525,000 inhabitants). These differences, together with the different availability of transport modes and the management of the systems (typically, private vs public) cause also differences in terms of complexity of the systems. The transnational approach adopted for this deliverable keeps these differences into account, by defining common aspects and differences, also highlighting the diversified contexts.

Friuli-Venezia Giulia (IT)

MANAGEMENT. This region is characterized by a **high number** of MISs. This is mainly due to the subdivision of the PT service in the region, which is managed by several stakeholders at different levels and for different transport modes. More specifically, Friuli-Venezia Giulia (FVG) presents eight main MISs:

- 4 MISs working mainly at local and regional level as APT (municipality of Gorizia), ATAP (municipality of Pordenone), SAF (municipality of Udine), TT (municipality of Trieste). APT and SAF provide also some cross-border connections.
- 2 MISs working at local, partially regional, national and transnational level as VIAGGIATRENO (provided by the national rail operator Trenitalia) and FUC (provided by the regional rail operator Ferrovie Udine – Cividale).
- 2 MISs working at trans-regional and transnational level, which provide only some services in FVG as ÖBB-SCOTTY (developed by the Austrian rail operator ÖBB), and ATVO (bus operator of the bordering region Veneto, with some services provided in the province of Pordenone and at (trans)national level).

MULTIMODALITY. The high number of operators and MISs currently available in FVG makes it difficult a multimodal IMIS (Integrated Mobility Information System) that provides a comprehensive overview of all available services. This condition becomes even more challenging at the cross-border level. Indeed, 1 MIS out of 8 (TT) offers several transport modes (bus, tram, walking and private vehicle), 2 MISs out of 8 (FUC

and ÖBB) include both rail and bus services, while other 5 MISs cover one or maximum two transport modes among bus, train and boat. Thus, the multimodality of these MISs is still a main open issue.

SPECIFICATIONS. All eight MISs described provide pre-trip information, while only a part of them on-trip information (VIAGGIATRENO, SCOTTY-ÖBB, ATAP, SAF, TT and APT). Regarding the scale, only APT, SAF and VIAGGIATRENO cover the local, regional and transnational levels. The languages mainly adopted are Italian (all of them, except for ÖBB-SCOTTY) and English (for ATAP, TT, VIAGGIATRENO, ÖBB-SCOTTY and ATVO). Further languages are adopted by TT (Slovenian), ÖBB-SCOTTY (German), ATVO (German, Spanish and French) and VIAGGIATRENO (German, French, Spanish, Romanian, Japanese, Chines and Russian).

Figure 1: TT (Municipality of Trieste). Home page. Source: http://www.triestetrasporti.it/

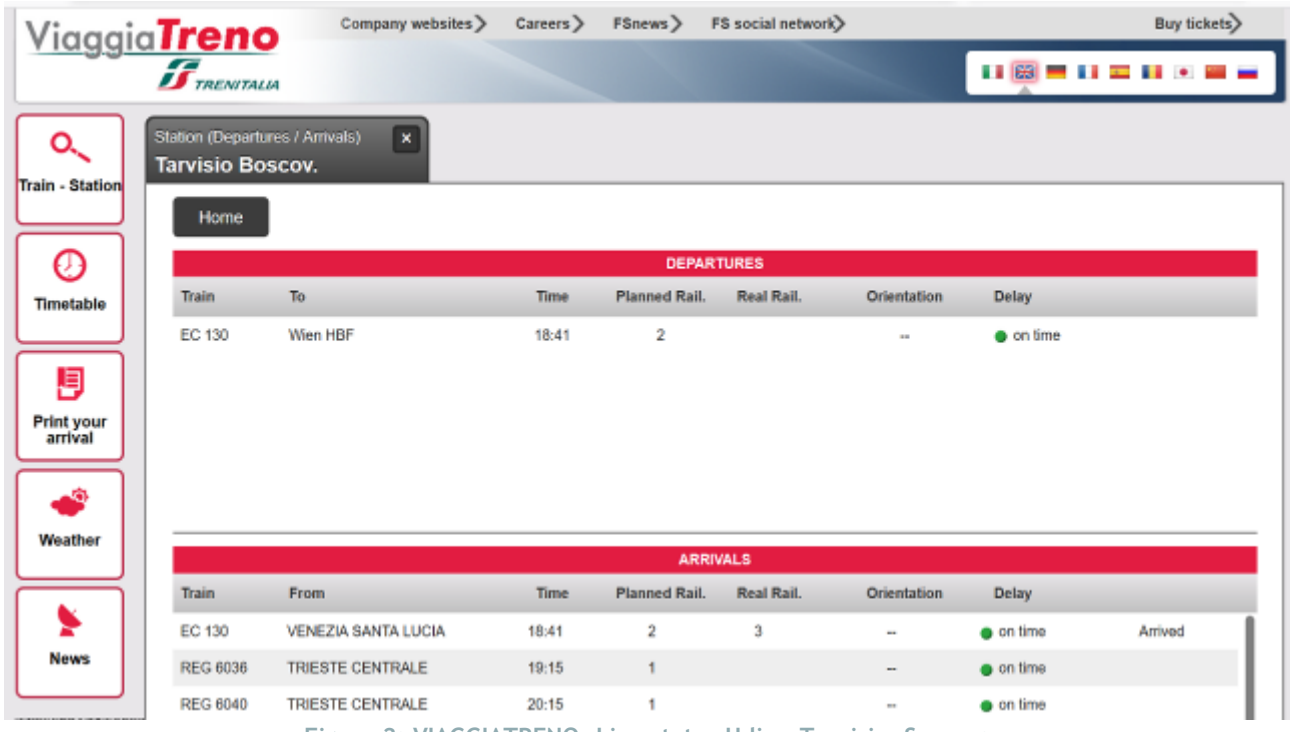

Figure 2: VIAGGIATRENO. Line status Udine-Tarvisio. Source: http://www.viaggiatreno.it/viaggiatrenonew/index.jsp

Veneto region (IT)

MANAGEMENT. The region is characterised by the presence of various MISs given also the fragmented context given by the presence of a high number of public transport operators in Veneto region with particular reference to bus services. In general each operator developed its own travel planner making it available on its own website; moreover almost all of them developed or adopted also dedicated apps endowed with user-friendly-user interfaces. Focusing on the systems offered by the main road operators in each provincial area as well as the two rail operators (Trenitalia and Sistemi Territoriali), the available solutions can be clustered as follows:

- 7 MISs working mainly at local and regional level, provided at the respective website, by ACTV/AVM (Venice area), ATV (Verona province), BUSITALIA VENETO (Padova and Rovigo provinces), Dolomiti bus (province of Belluno), MOM (province of Treviso) and SVT (province of Vicenza) and SISTEMI TERRITORIALI (with particular reference to the lines Adria-Mestre, Rovigo Chioggia and Rovigo-Verona).
- 1 MIS working at local, partially regional, national and transnational level as VIAGGIATRENO (provided by the national rail operator Trenitalia) .
- 1 MIS working at trans-regional and transnational level, which provide also some services in FVG ATVO (bus operator mainly operating in the Eastern part of the Metropolitan City of Venice, with some services running in the province of Pordenone.
- On the other hand, the increasing supply of mobile phone apps includes also tools providing information related to various operators thus providing a more comprehensive vision, which could be considered as "IMIS" (i.e. a system that merges information coming from more providers, operators, sources). In this purpose, it is to mycicero represents also the reference mobile app for BUSITALIA and SVT. Furthermore, as a recent development, it is to mention the DaAaB app (introduced in January 2018). It is managed by a consortium grouping together various operators (ATVO, AVM, ATV, FAP, ALILAGUNA and MOM). Since the tool is based on the Google transit platform, it can profit from the wide availability of information related services in other geographical contexts and with reference to the different means of transport.

MULTIMODALITY. In spite of the fragmented picture given by the high number of operators, each one of them is covering mainly one transport mode. Nonetheless, as reported above, the provision of apps integrating the services of different operators implies also integrating in the same infomobility tool different modes of transport. For instance, MyCicero is integrating rail and bus. Furthermore, operators performing along with bus services waterborne transport and/or tram services (e.g. AVM and ATV) are already integrating different modes of transport in their own app (and , at least partly even Trenitalia services).

SPECIFICATIONS. All the aforementioned tools provide pre-trip information, up to a certain extent. Regarding the scale, a part from the IMIS, only VIAGGIATRENO cover the local, regional and transnational levels. The languages mainly adopted are Italian and English and, in some cases, German (e,g. ATV). Further options are provided, in particular, by DaAaB (English, Chinese) and VIAGGIATRENO (German, French, Spanish, Romanian, Japanese, Chinese and Russian).

Figure 3:AVM Venezia Official app (source: http://actv.avmspa.it/it/content/avm-venezia-official-app)

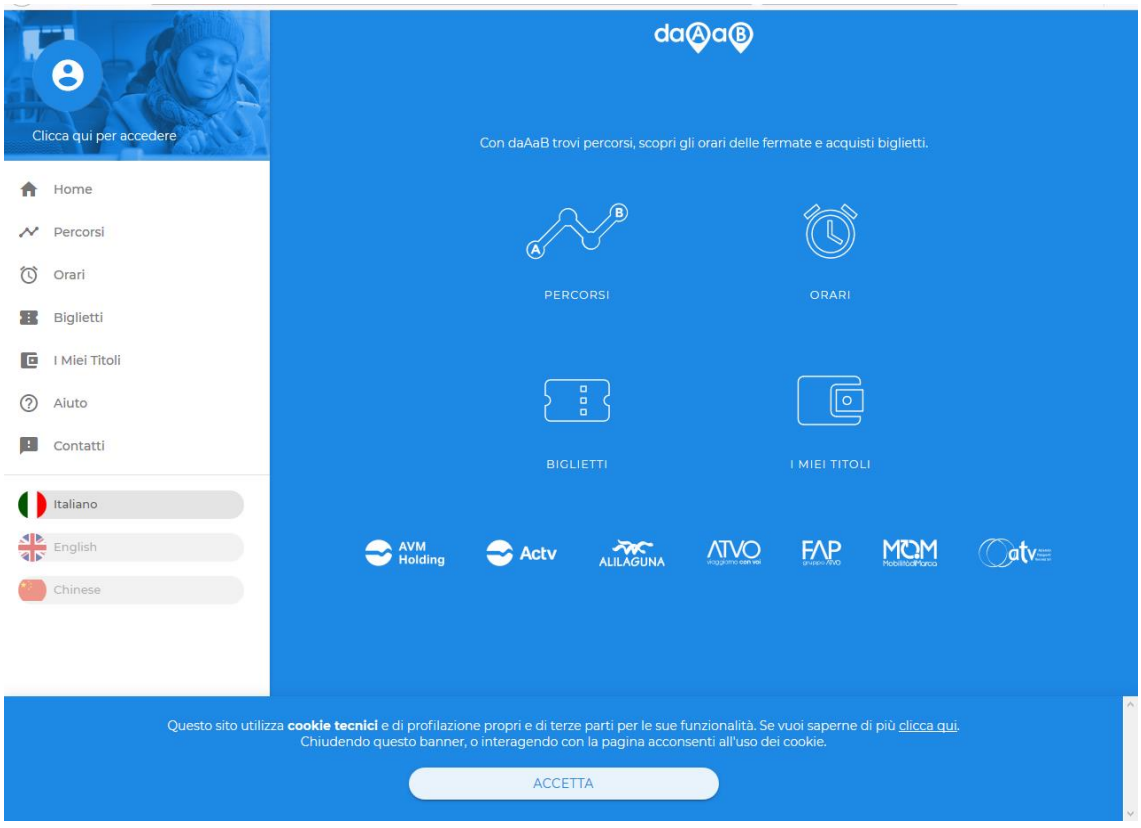

Figure 4: DaAaB homepage (source: https://app.daaab.it/daaab)

South Tyrol (IT)

MANAGEMENT. In South Tyrol, there are currently two MIS providers (STA – Strutture trasporto Alto Adige SpA and SAD Trasporto Locale SpA). This last is responsible for such service only during a temporary transition phase, while the former has replaced the Mobility Agency of Bolzano. This change has improved (and is expected to improve further) the quality of the information, developing a **straightforward structure**, where only one provider manages the comprehensive IMIS called South Tyrol Mobility, which covers all main transport modes of the region, and the main cross-border transport services.

- 1 IMIS works both at local, regional, and (partially) cross-border and trans-regional level, managed by STA. STA collaborates with the Transport office of the Autonomous Province of Bolzano that is responsible for passenger mobility in the whole province. It collects under its IMIS data concerning 4 PT operators of South Tyrol: SAD Trasporto Locale SpA (local transport), SASA (local urban and suburban transport), LiBUS (mainly local bus transport), and Trenitalia Direzione Provinciale Bolzano (regional rail transport).

MULTIMODALITY. South Tyrol Mobility provides information concerning all the PTs currently available on the territory (bus, train, cable car, and funicular), proposing the combination of these modes with pedestrian paths for the last-mile, in order to cover the complete door-to-door journey. Furthermore, car and bike connections are under development, with the aim of proposing them as further options to be included in the IMIS in the next future.

SPECIFICATIONS. On-trip information is currently not available. This is one of the priorities of the IMIS provider in next two years. The project BINGO (https://www.idm-suedtirol.com/en/eu-projects/business-incubator/13-broad-information-goes-online-bingo.html) tries to address this and other issues, in order to increase the user-friendliness of the system. South Tyrol Mobility is quite effective also with reference to journey planning in the Province, door-to-door journey planning, and availability of electronic pass covering all PTs of the region. In addition, the territorial coverage includes several cross-border and cross-regional connections. The current system involves about 5,900 stop points located in South Tyrol, in the neighbouring Autonomous Province of Trento, in the Province of Belluno, plus the main railway stations of Italy, Tirol and East Tirol, as well as the bus stops in the Grisons (Swiss). It is foreseen an important improvement of the system, that will include also part of the FVG region and a larger part of Austria. Regarding the languages, all those officially spoken in South Tyrol are included (Italian, German and Ladin); moreover, the system is available also in English.

Figure 5: Mobilità Alto Adige. Home page. https://www.sii.bz.it/en

Slovenia (SI)

MANAGEMENT. In Slovenia, different MISs create an **articulated managerial structure**. This is due to the presence of more than 30 bus and one rail operators. The biggest operators are at the same time providers of their own MIS. Information about other operators are gathered in other MISs. The result of this plurality of service is the coexistence of 6 main MISs, of which:

- 1 IMISs regarding the rail transport in Slovenia (Slovenian railways). This provides local, regional and national information through its own search engine.
- 4 main MISs regarding the main bus and urban operators. Alpetour and Avrigo provide only static timetables for passengers, and offer local, regional, national and some cross-border information; Integral Brebus Brezice offers local information, but no cross-border connections; LPP (the IMIS of Ljubljana) covers both bus and rail service information at urban and regional levels.
- 1 comprehensive IMIS. Ijpp, developed by the Ministry of Infrastructure – Manager of Integrated Public Passenger Transport, merges different operators of the country, providing local, national, and some cross-border information, and is meant as the reference for Slovenian MISs.

MULTIMODALITY. Among the MISs described above, Ijpp and LPP are considered as the flagships of the pilot area. Furthermore, together with Slovenian Railways, they are the only 3 out of 6 that currently provide multimodal information (local/regional bus, train and multimodal combination of PTs + walking). However, the multimodality of these systems is still an ongoing issue, because walking (partially), cycling and private vehicles are not yet included. This weakness is one of the priority for the region, which forecasts to develop these MISs by including more transport modes.

SPECIFICATIONS. The lack of on-trip information for 4 out of 6 MISs is a weak point, since often only simple static timetables are available. Only two of the main MISs of the region (LPP and Slovenian railways) can cover this dynamic information. Concerning the territorial coverage, only Slovenian railways and partially Ijpp cover the transnational scale. As for languages, all MISs except AVRIGO provides information in Slovenian and English, while AVRIGO can be sought in Slovenian and Italian.

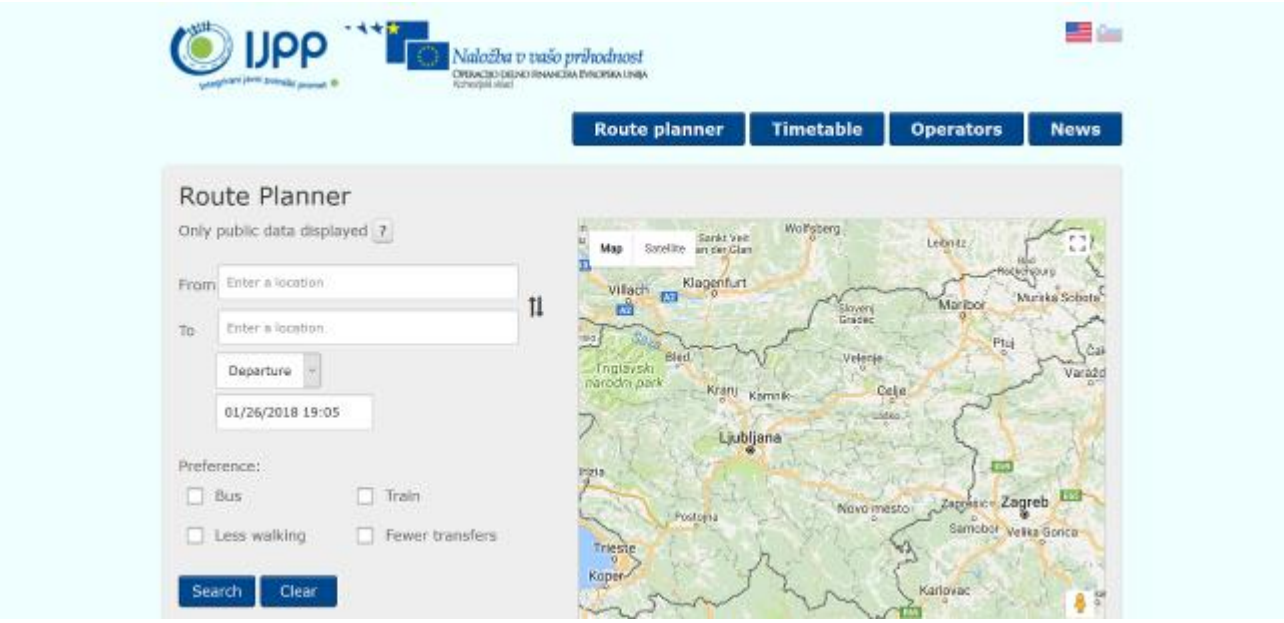

Figure 6: Ijpp. Home page. Source: http://www.jpp.si/en-us/

Zagreb County (HR)

MANAGEMENT. In Zagreb Country there is **a comprehensive MIS**, which is called "ZET", as the company that operates urban and suburban transport in the area of Zagreb ("ZET" in the acronym of Zagreb Electric Tram). Furthermore, **a second MIS** (regarding rail transport) is available: HŽ PP. This is provided by the Croatian railways-HŽ Passenger transport and it deals with the rail service provided at the national level. Moreover, also the relationship between these MISs providers and the PT operators is crucial, in order to understand the management structure of the system.

- The MIS that covers the entire region (ZET) is managed by ZET (Zagreb Electric Tram, the PT operator of the city of Zagreb). This MIS covers all the PTs provided in the metropolitan area of Zagreb, namely: tram (143 of which are low-floor trams), inner bus lines, school busses, funicular and the most of suburban bus lines. It even provides touristic services as trams, sightseeing busses and mini-trains and specific vehicles for disabled people. It does not cover the urban and suburban rail service (service provided by the national rail operator).
- The MIS that cover the national rail service (HŽ PP) is provided by the national rail operator Croatian Railways-HŽ Passenger transport. This is a system focused on rail service, developed as online website and mobile App.
- A ticketing MIS called ISPRO, which is provided by HŽ PP, is also available. ISPRO covers several services concerning ticket purchasing (for both tickets and passes) and it is available as internet web page and as a mobile App for smartphone.

MULTIMODALITY. The MIS of the Zagreb County (ZET) covers two PT services provided by the transport operator ZET: bus and tram. The connection with the national train service is currently missing, since this service is separately managed by HŽ PP. Walking and cycling are currently available only through a link in the ZET website to Google Maps.

SPECIFICATIONS. ZET provides both pre-trip and on-trip information; currently no official mobile App is available, even though it is one of the priorities of the service provider for the next two years. The geographical coverage of this MIS includes the local, regional (wide region of City of Zagreb) and national scale. Currently, no cross-border information is available. The languages available until now are Croatian and English.

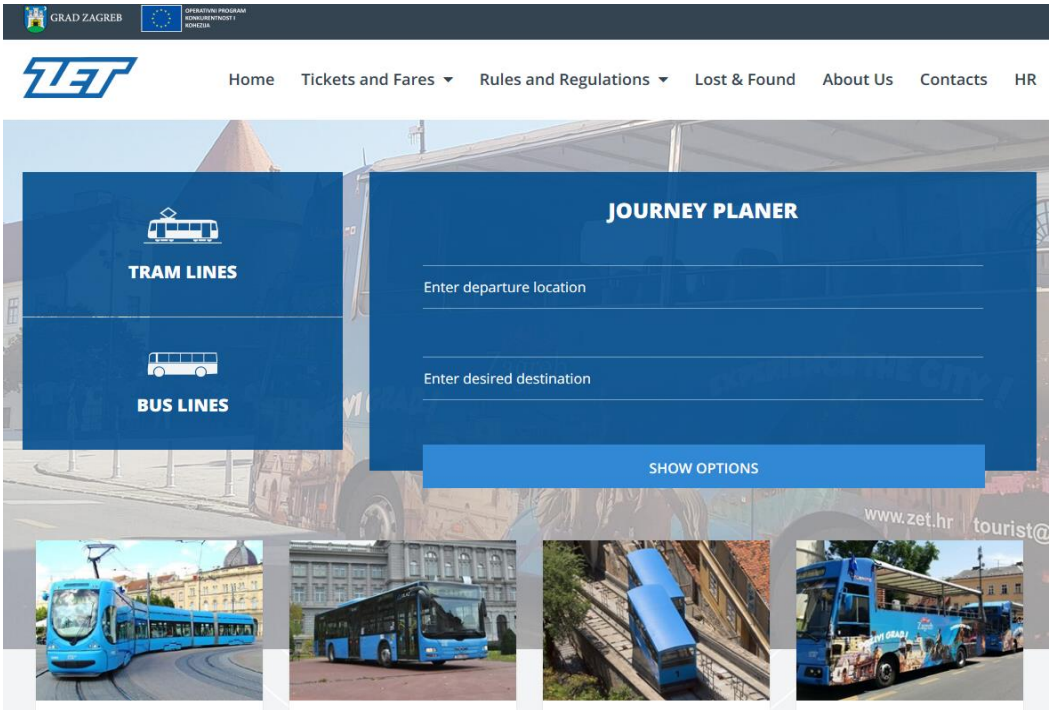

Figure 7: ZET. Home page. Source: http://www.zet.hr/home/581

Western-Hungary + Győr-Moson-Sopron (HU)

MANAGEMENT. Information concerning Western Hungary region and Győr-Moson-Sopron region are jointly presented in this section since only one questionnaire and one TNA have been provided. In the Hungarian regions analysed, **several specific MISs** are available, which deal with the urban PT services as city busses, trams, metros, etc.; and some tools that merge information belonging to different providers, mainly dealing with long distance busses and rail services. More specifically, in this pilot area there are:

- 3 different MISs referred to 3 different transport operators. Two of them cover rail transport: GYSEV and ELVIRA. The former is the MIS provided by the rail operator GYSEV Zrt. It covers regional rail service also in collaborations with Austrian rail service, and inter-urban busses. The latter is the MIS developed by MÁV-START, a company that provides rail service at regional level, especially passenger fast trains. The third MIS is called ÉNYKK: it provides information about buses, by merging information concerning services of the region (providing also some transnational information).
- 1 on-board MIS. It is called FEDUR and is an on-board system conceived to provide information to passengers, developed by GYSEV Zrt. and available in the intercity coaches.
- 1 comprehensive IMIS that collects data from the main operators of the county/region/country. This IMIS, called "Menetrendek" was established in 2016 and it manages the entire Hungarian regional and national timetable database of bus and trains, covering more than 3,150 settlements of Hungary.

MULTIMODALITY. Menetrendek provides info about both busses and trains, including urban and long-distance services. This IMIS provides walking as mode to cover entire routes, or connections between different stops. In the next year, a multimodal ticket service is planned to be integrated in the system. This improvement has deeply changed the use of PT service by the customers, contributing to achieve a number of users that is three times higher than the number registered in the year 2015. Moreover, even GYSEV provides a multimodal service composed by trains and inter-urban busses.

SPECIFICATIONS. As far as the kind of information provided is concerned, the MIS by GYSEV offers both national and international connections. These last ones include only the cross-border connections with departure from Hungary, and not vice versa. About the territorial and linguistic coverages, GYSEV provides information about local, regional and (trans)national connections in Hungarian and German (however, an extension to English is foreseen for the next years), also thanks to the CONNECT2CE project.

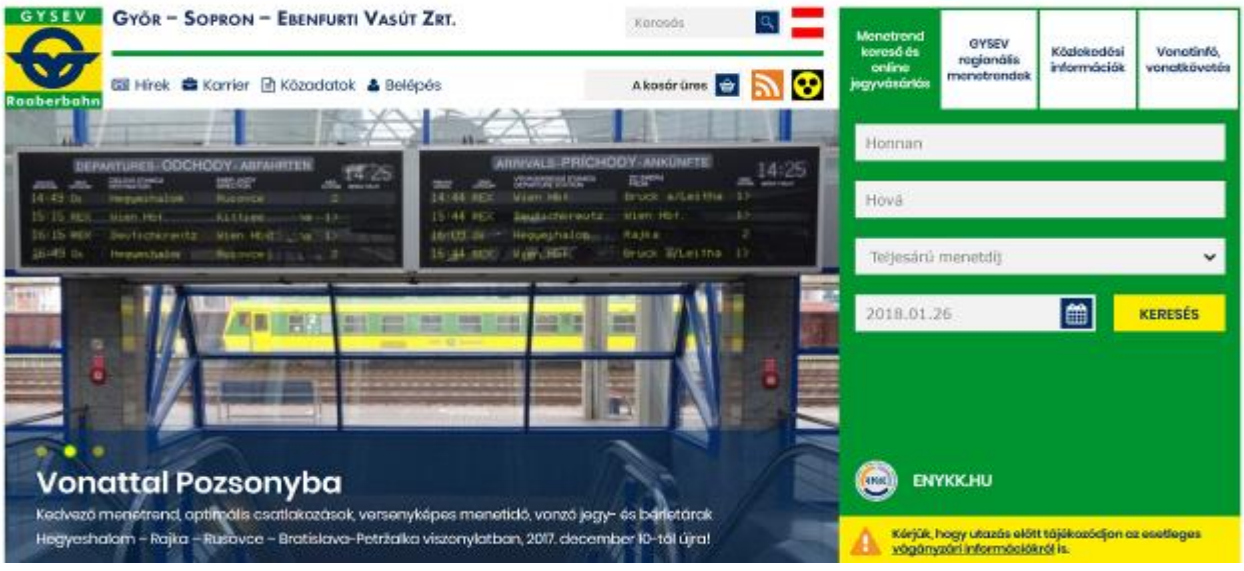

Figure 8: GYSEV. Home page. Source: https://www2.gysev.hu/

Pilsen Region (CZ)

MANAGEMENT. In the region of Pilsen, each transport operator has its **own MIS.** To address this heterogeneous framework, **one IMIS**, which operates at (trans)national level, has been developed. Therefore, current condition includes two main types of MISs in the region:

- Several MISs at regional level referred to single PT operators in the region of Pilsen. Each one provides information concerning the service to which it is connected.
- 1 comprehensive IMIS at national level, covering also the Pilsen region. This IMIS includes information belonging to all the different local/regional providers. It is called IDOS and it has been developed by a private company: CHAPS spol. sr.o. and financed with public and private funds. IDOS merges data coming from public authorities and operators in all regions, cities and towns, covering all the transport modes available in Czech Republic.

MULTIMODALITY. IDOS provides multimodal information at the national scale. This IMIS includes information about trains, trams, urban and suburban busses (the PT transport services available in the Pilsen region), as well as the transport modes available at national level. This IMIS gives also information about multimodal connections between PTs and walking commutes to connect nearby stops. The multimodal service offers many details that the customer can use to customize his/her trip planning, as the maximum acceptable number of changes, the service provider of each mode, the availability of services for disabled passengers, etc.

SPECIFICATIONS. IDOS offers several cross-border connections, mostly performed by train. The on-trip information is more reliable. This is because only some PT operators share their data with IDOS and, hence, the coverage of on-trip data can be only partial. The territory covered by IDOS is very extensive (whole Czech Republic) and very detailed as well (all the PT services in little towns and villages are included). Czech, German and English are the three languages currently available.

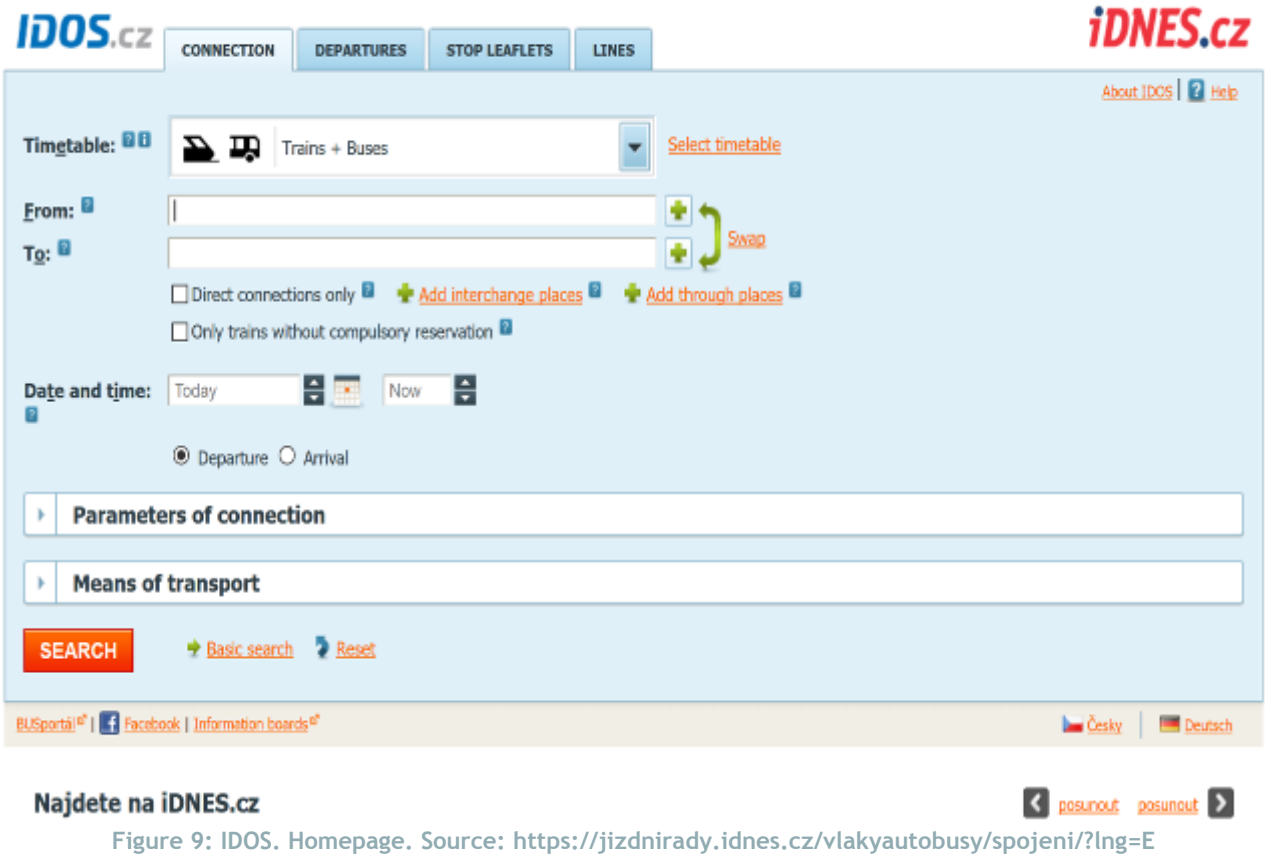

Figure 9: IDOS. Homepage. Source: https://jizdnirady.idnes.cz/vlakyautobusy/spojeni/?lng=E

Burgenland (AT)

MANAGEMENT. In Burgenland, the managerial structure of MISs works both at the national and at the regional levels. Austria has a **national IMIS** (Verkehrsauskunft Österreich - VAO), which collects a large amount of data. Authorities or associations e.g. rail operators or automotive clubs often use this platform, in order to establish different tools with specific focuses. In the **region of Burgenland** there are **two MISs** developed on this base, namely: AnachB and SCOTTY. The region is represented by:

- 1 overall IMIS at national level. VAO collects data for the entire Austrian territory and transport supply.
- 2 main MISs very diffused in the Burgenland region: AnachB, developed by the provider VOR (Public transport Association for Vienna, Lower Austria and Burgenland) and SCOTTY, belonging to the national rail operator ÖBB.
- 1 up-coming IMIS that merges all Austrian transport associations. This tool, called "Wegfinder", is developed by iMobility Gmbh, which is owned by the national rail company ÖBB.

MULTIMODALITY. Both VAO and AnachB offer a wide multimodal range of information. The first one includes all main PTs, combinations of them and private vehicles (as passenger car routing, public routing, bicycle routing, bike & ride, park & ride, bicycles, car sharing, etc.). AnachB proposes a wide range of transport modes, as well: not only PT, but also private car, bicycle and walking. These two options are adopted to cover the last mile and the connections between PT stops.

SPECIFICATIONS. The two regional MISs provide pre-trip information (e.g. best route available between two places, alternative routes, time schedules, etc.) and on-trip information (e.g. incidents, exact location of a departing or arrival PT, delays, etc.). SCOTTY offers also handily ticket purchase service, while AnachB has not a similar system, even if its development is in the provider´s agenda. Currently, this last IMIS cover mainly Austria. Nevertheless, an extension to specific parts of Western-Hungary is foreseen in the next two years. Concerning the languages, German and English are available.

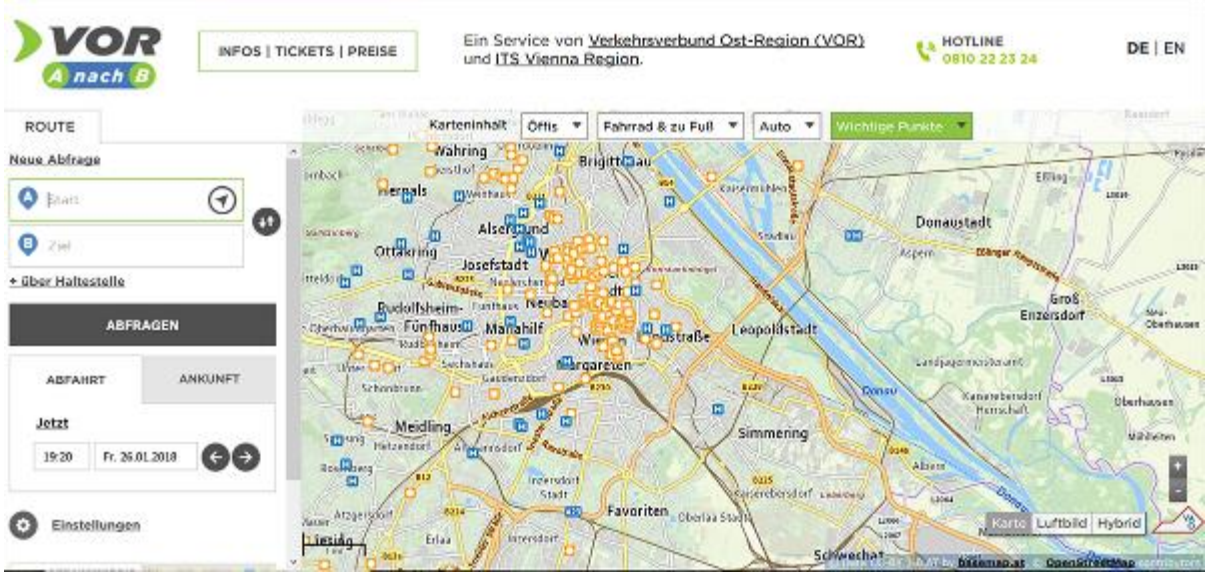

Figure 10: AnachB. Home page. Source: https://anachb.vor.at/bin/query.exe/dn?L=vs_voranachb

Berlin-Brandenburg (DE)

MANAGEMENT. In this region, **one large IMIS** (VBB-Travel Planner) provides information at a broad scale, collecting data from different PT operators and service providers. Thus, in Berlin-Brandenburg region:

- 1 overall IMIS collects data from every transport provider and stakeholder working in the region: VBB-Travel Planner, provided by Verkehrsverbund. It receives information from service providers and authorities, providing multimodal information and the possibility of planning door-to-door routes.
- 1 overall MIS deals with ticketing operations in the whole pilot area. This MIS is provided by "Handyticket Deutschland", a company specialized in ticketing service for mobile devices. With this tool, customers can search a route via the VBB-Travel planner previously described, and finalising the purchase.

MULTIMODALITY. The VBB-Travel planner is a multimodal information system covering all modes of public transport available in the region (inter/urban bus, tram, subway, train, ferry) at both local and regional scales, as well as private vehicles, cycling and walking. Car sharing, bike sharing and taxi are foreseen to be added soon, while the inclusion of long-distance coaches is still under discussion.

SPECIFICATIONS. The issue of cross-border connections is quite challenging for the IMIS of this area. The Berlin-Brandenburg region is working on this aspect in order to create transnational collaborations and exchange of data to grant a cross-border quality to their regional IMIS. However, this is currently not performed. The IMIS provides also on-trip information, as alternative routes in case of delay or real time advice of changing route. All their data belongs to the "VBB-Sternpunkt" system, which manages the flow data provided by all operators. Finally, the systems provides information either in German or in English.

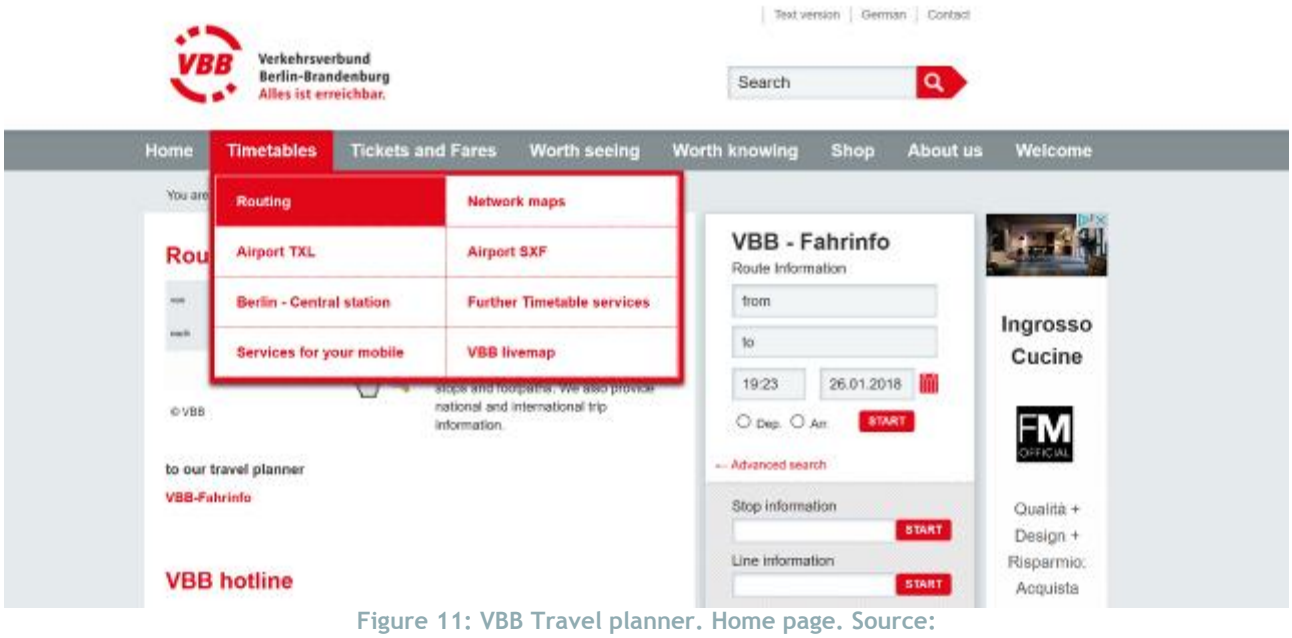

Figure 11: VBB Travel planner. Home page. Source: https://www.vbb.de/en/article/timetables/routing/routing/7593.html

1.1.3. Pre-trip component

This chapter focusses on the available **pre-trip information**. First, the specific characteristics of the MISs are presented including multimodality, travel time, number of changes, costs, alternative routes, filters chosen by customer, etc. This analysis of the pre-trip features is based on the results of the TNAs and of the "section II-b" of the questionnaire filled out by project partners, whose main aspects are:

1. Types of information that users can search for;
2. Types of information provided by the MIS;
3. Types of transport modes (and combinations of them) covered by the MIS;
4. Types of specification/customization that users can adopt in route calculation.

These four aspects are presented under the label FEATURES, which provides all relevant information concerning **types of information** provided, **multimodality** and **customization**. Subsequently, the main issues raised form the description are listed. Finally, a couple of relevant images for each MIS are proposed. They present the layout of each tool, in order to show the usability of the route planning service.

Friuli-Venezia Giulia (IT)

FEATURES. In Friuli-Venezia Giulia, the eight MISs available (APT, ATAP, SAF and TT working mainly at local and regional level; VIAGGIATRENO and FUC working at local, partially regional and (trans)national level; ÖBB-SCOTTY and ATVO working at partially regional and (trans)national level) provide pre-trip information. Focusing on the **types of information** provided by the first four MISs: travel times and schedules are covered by all of them. Stops and fares are covered by three MISs (all except for APT), changes are included by two MISs (SAF and TT), while route and POIs are offered by two MISs (ATAP+TT and SAF+TT). Linked static timetables and Linked timetables on stop level are covered only by APT. Finally, some types of information as last mile information, long term/forecasted warning, and users' reviews are not proposed. Concerning the other four MISs: all they cover schedules, travel time and fares; changes and stops are included by three of them (VIAGGIATRENO, ÖBB-SCOTTY and ATVO), linked static timetables and linked timetables on stop level are provided only by FUC. Even for these MISs, some types of data are missing: long term/forecasted warning, POIs and users' reviews.

The current condition of **multimodality** is very heterogeneous: TT covers six transport modes (bus, boat, cable car, private vehicles, walking and the combination of walking + PT). SAF includes three transport modes (bus, boat and the combination of walking + PT). 3 MISs (APT, FUC and ÖBB-SCOTTY) include two transport modes in different combinations (bus + train by FUC; train + walking by ÖBB-SCOTTY; bus + boat by APT). Finally, the remaining 3 MISs (ATAP, ATVO and VIAGGIATRENO) offer only one transport mode: either train or bus.

Whit these MISs users can **customize** their search, looking for address and stop in the most of cases (only FUC is excluded) and for POIs in some cases (SAF and TT). They can apply always two filters for the route calculation: origin and destination, and only in some cases even the travel time (VIAGGIATRENO, ÖBB and TT). Other filters (via-points, restrictions about transport modes and mobility) are not available.

MAIN ISSUES.

- The strong diversification of information among the eight MISs (with limited overlapped data) makes it hard for users to identify a main MIS that covers properly all the region.
- Multimodality is a point that requires an improvement. Currently walking, cycling and private vehicles are missing in most of the cases, as well as the combinations of cycling + PT and private vehicle + PT.

- Even some filters for route customization by users are still not available (via-points, restrictions about transport modes and mobility).

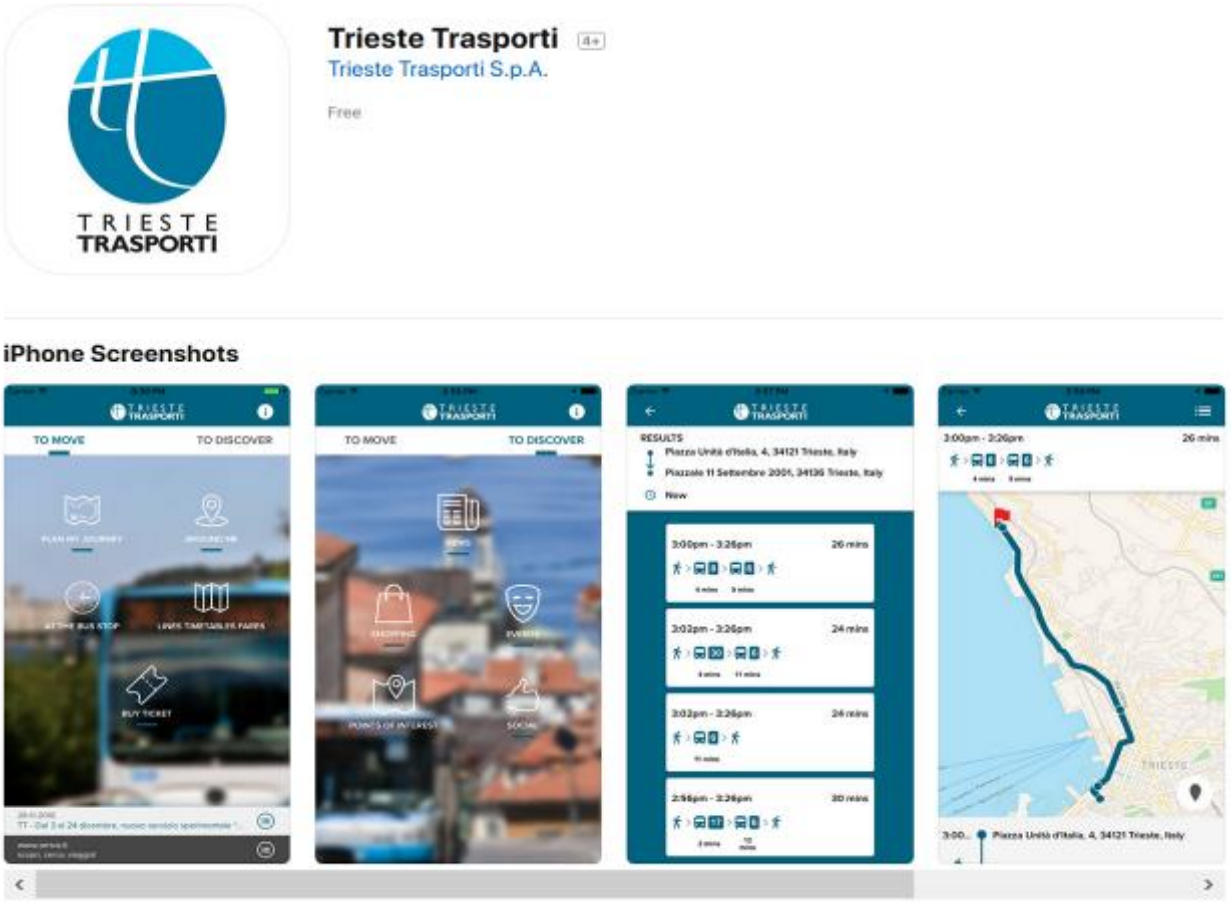

Figure 12: TT (Municipality of Trieste). Mobile App functions. Source: https://itunes.apple.com/us/app/trieste-trasporti/id1124371231?ls=1&mt=8

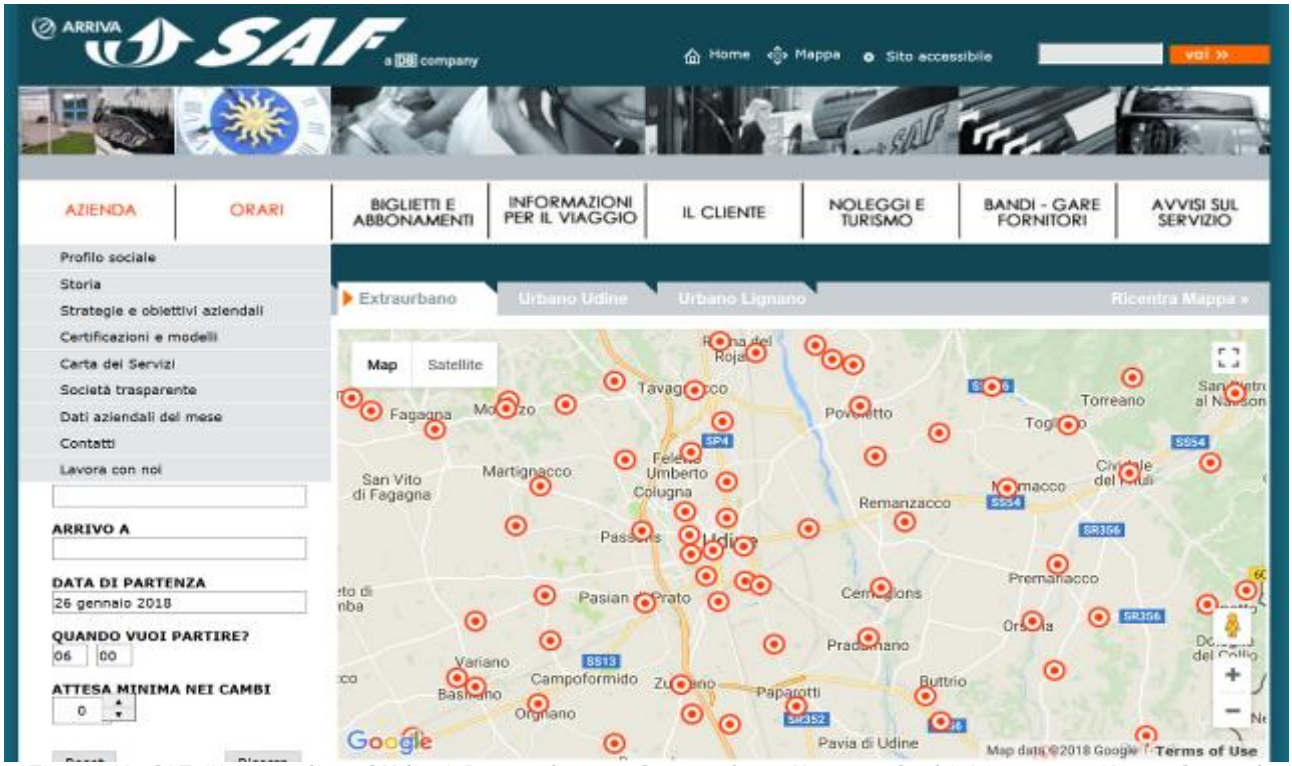

Figure 13: SAF (Municipality of Udine) Route planner. Source: http://www.saf.ud.it/ricercaorari2.aspx?area=*

Veneto region (IT)

FEATURES. In Veneto, the main 9 MISs available are mainly focused on the services of a specific bus operator at provincial level (AVM/ACTV,ATV, ATVO, BUSITALIA VENETO, DOLOMITIBUS) or a rail operator (TRENITALIA and SISTEMI TERRITORIALI). Focusing on the types of information, travel times, schedules and fares are covered by all of them. Stops are covered by al MISs except for Dolomiti bus, while changes are provided by every MISs with the sole exception of SISTEMI TERRITORIALI. Routes are made available by all bus operators with the exception of Dolomiti bus. Furthermore, while POIs are generally lacking, linked static timetables and Linked timetables on stop level are made available. Finally, some types of information as long term/forecasted warning and users' reviews are not proposed.

The IMIS represented by the apps such as DaAaB, instead, are providing a wider informative content with particular reference to the integration of information related to different services in wider geographical scope.

This is particularly relevant with reference to multimodality since it allows to cope with the lack of an overall vision of the multimodal system that can be experience when using a single MIS (even though they are evolving by including a wider informative content, such as rail services in the Venezia Official App by AVM). In this purpose it is to recall that operators are basically limited to a single mode of transport. Only few exceptions in this purpose are related to waterborne transport in Venice and tram services in Venice and Padua, which are operated by the local bus service operator (AVM and ATV).

Whit these MISs users can customize their search, looking for address and stop and only in some cases even the travel time (VIAGGIATRENO, ÖBB). Other filters (via-points, restrictions about transport modes and mobility) are not available.

MAIN ISSUES.

- The presence of various system is providing a quite fragmented overall picture.

  Improvements with reference to full provision of multimodal opportunities (also including intermodal solution encompassing combinations with cycling and car are missing).

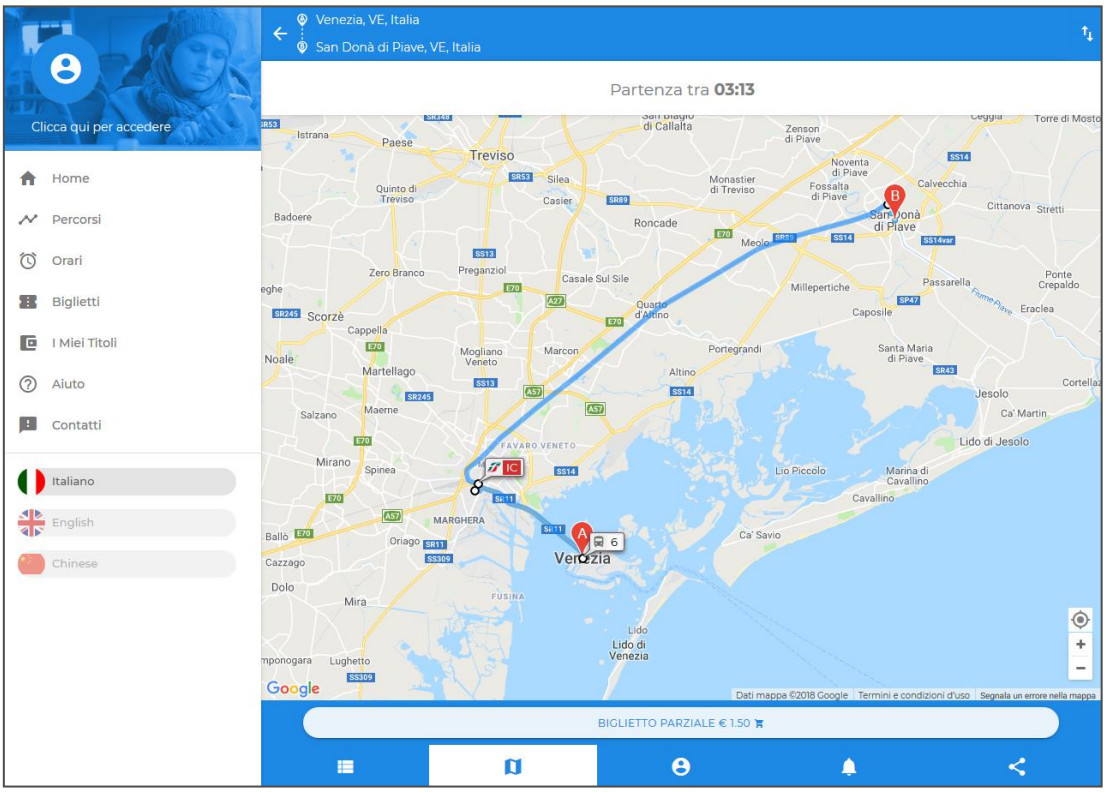

Figure 14: DaAaB path search. Source: https://app.daaab.it

South Tyrol (IT)

FEATURES. As regards the **types of information** offered, South Tyrol Mobility has an extensive coverage. Through the journey planner, almost all the types of info proposed in the questionnaire are included: schedules, routes, travel time, changes, stops, last mile information, fares, long term/forecasted warnings, POIs and linked static timetables. In addition to the web page and the mobile App - a call-center service deals with most of this information, as well.

Regarding **multimodality**, the IMIS of South Tyrol deals with several transport modes, covering almost all the PT services supplied in the region: busses, trains, cable cars, walking (especially for the first and last mile) **and** funicular. Only cycling, private vehicles and their combination with PT are not available. However, the region is working in order to include also these modes in the next years, so to provide a complete multimodal coverage.

As for the **customization of the system**, South Tyrol Mobility provides an extensive framework of filters and alternatives: users can search for a specific address, insert a specific stop, or looking for the closest POIs. About the information reachable by users, the IMIS allows a search according to origin and destination, travel time and restrictions about the transport modes (which is available only online). Currently, the restrictions about the mobility (e.g. for disabled people) are not available. Furthermore, also other filters are included as: restrictions of the transport modes with stops within xx minutes by feet, travel options with less changes and travel options with the shortest travel time.

MAIN ISSUES.

- To have a real multimodal IMIS, currently some transport modes are still missing (cycling, private vehicles and multimodal combination between them and PT). However, this is a point expected to be developed in the next years.
- The user-friendliness of the system is a main aspect to be addressed. Even if most of the information is available, the visualization is not very intuitive.

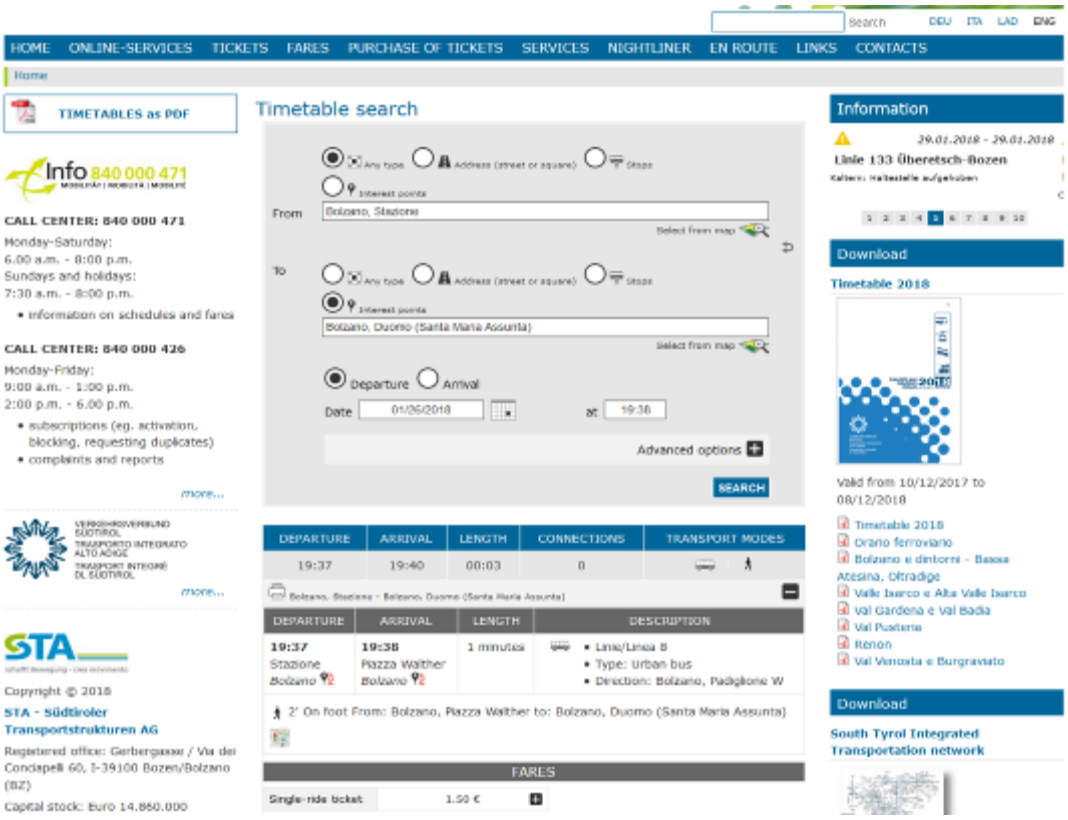

Figure 15: Mobilità Alto Adige. Timetable search. Source: http://www.mobilitaaltoadige.info/en/siitimetablesquery

Slovenia (SI)

FEATURES. In this region, the MISs regarding bus operators as Alpetour, Avrigo and Inegral Brebus Brezice provide only some **types of information**. More in detail: all of them cover schedules and travel time. Routes are provided by Avrigo and Inegral Brebus Brezice. Stops are included by Alpetour and Inegral Brebus Brezice. While fares, linked static timetables and linked timetables on stop level are proposed by Alpetour and Avrigo. Only Alpetour covers changes. Finally, last mile information, long term/forecasted warnings, POIs and users' reviews are not included. The coverage of Slovenia railways, the IMIS of the rail transport operator of Slovenia, is different. It includes most of types of info: schedules, routes, travel times, changes, stops, fares, long term/forecasted warnings and linked static timetables. In future, it is planned to include POIs and users' reviews. It does not provide (and neither it is expected to do in next years) linked timetables on stop level and last mile information. LPP is another important IMIS of the region that provides all the types mentioned, excluding only POIs. Therefore, it can be considered as the most complete IMIS. Finally, Ijpp (that works both at local, national, and partially (trans)national level) provides an extensive range of information: schedules, routes, travel times, changes, stops, long term/forecasted warnings and linked static timetables, linked timetables on stop level and last mile information. It leaves aside only POIs, users' reviews and fares.

The **multimodality** attitude of these MISs is quite heterogeneous. The three biggest IMISs (Slovenia railways, Ijpp and LPP) propose a multimodal approach. Ijpp includes five transport modes: busses, trains, walking, multimodal walking + PT and multimodal car + PT. LPP covers four transport modes: busses, trains, walking and cycling. Slovenia railway deals with two transport modes: busses and trains. However, for all of them, future improvement are foreseen. As far as the other local MISs are concerned, they currently provide information about only one transport mode.

Consistently with multimodality and the types of info provided, Slovenia railways, Ijpp and LPP offer more possibilities for **customization** to the users. All three propose origin, destination and via-points. Ijpp and LPP include travel time, as well. Finally, only Ijpp deals with restrictions about the transport modes.

MAIN ISSUES.

- The presence of many different MISs (with some types of information and some transport modes overlapping) makes it difficult to identify a hierarchical order.
- Multimodality is a weak point for the most of the MISs presented. Currently, only one of them includes private vehicles, and only two IMISs deal with cycling and walking. As regards the filters for users, only one IMIS proposes restrictions concerning transport modes.
- Alpetour, Avrigo and Inegral Brebus Brezice are private owned and financed.

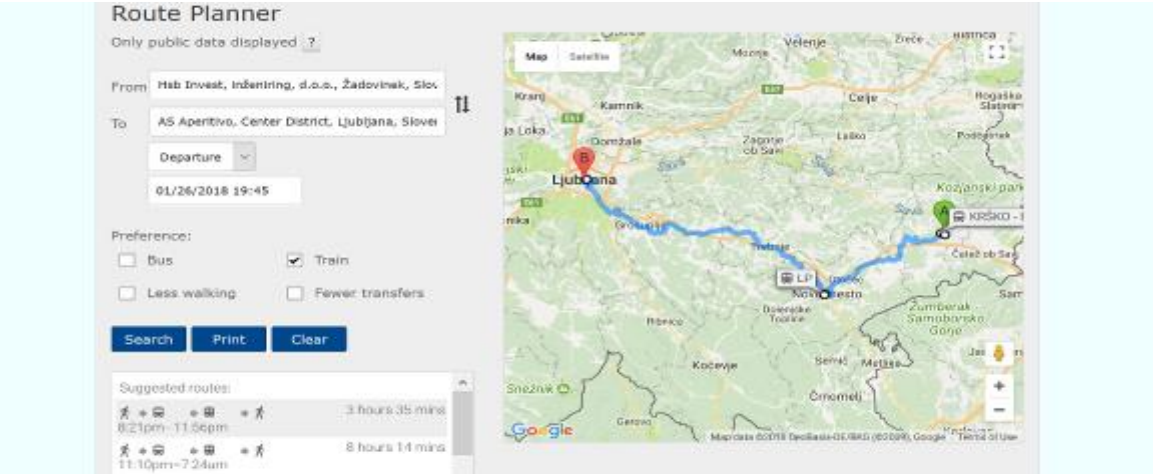

Figure 16: Ijpp. Route planner. Source: http://www.jpp.si/en-us/

Zagreb County (HR)

FEATURES. In the Zagreb County, ZET (working at local, regional and national level) provides all **types of pre-trip information** as schedules, routes, travel time, changes, stops, fares and linked timetables on stop level. On the other hand, last mile information, long term/forecasted warnings, users' reviews and linked static timetables are not included.

As far as **multimodality** is concerned, ZET includes only busses, funicular and trams for both citizens and tourists (that are the systems provided by the namesake PT operator). Therefore, all the other modes (trains, walking, cycling, private vehicles and multimodal combinations of walking + PT, cycling + PT, private vehicle + PT) are not proposed and no plan to include them in future is currently available. To obtain information regarding rail service, users need to check the specific MIS HŽ PP, provided by the national company Croatian Railways (HŽ Passenger transport) that runs urban and suburban rail service in the metropolitan area of Zagreb.

With ZET, users can search for a specific address, a stop of PT services or a POI. In addition, users can also **customize** their search of a route through four filters: origin, destination, via-points and travel time. Nevertheless, some other filters as restrictions about the transport modes and about the mobility (e.g. for disabled people) are not available.

MAIN ISSUES.

- A few multimodal pre-trip information is available by ZET: only two modes of transport are included. On the other hand, HŽ PP provides information only about trains. Currently, the two MISs are separated, with a low degree of integration.
- Some types of information and filters useful for multimodality are missing (last mile information and long term/forecasted warnings; filters regarding restrictions about the transport modes).

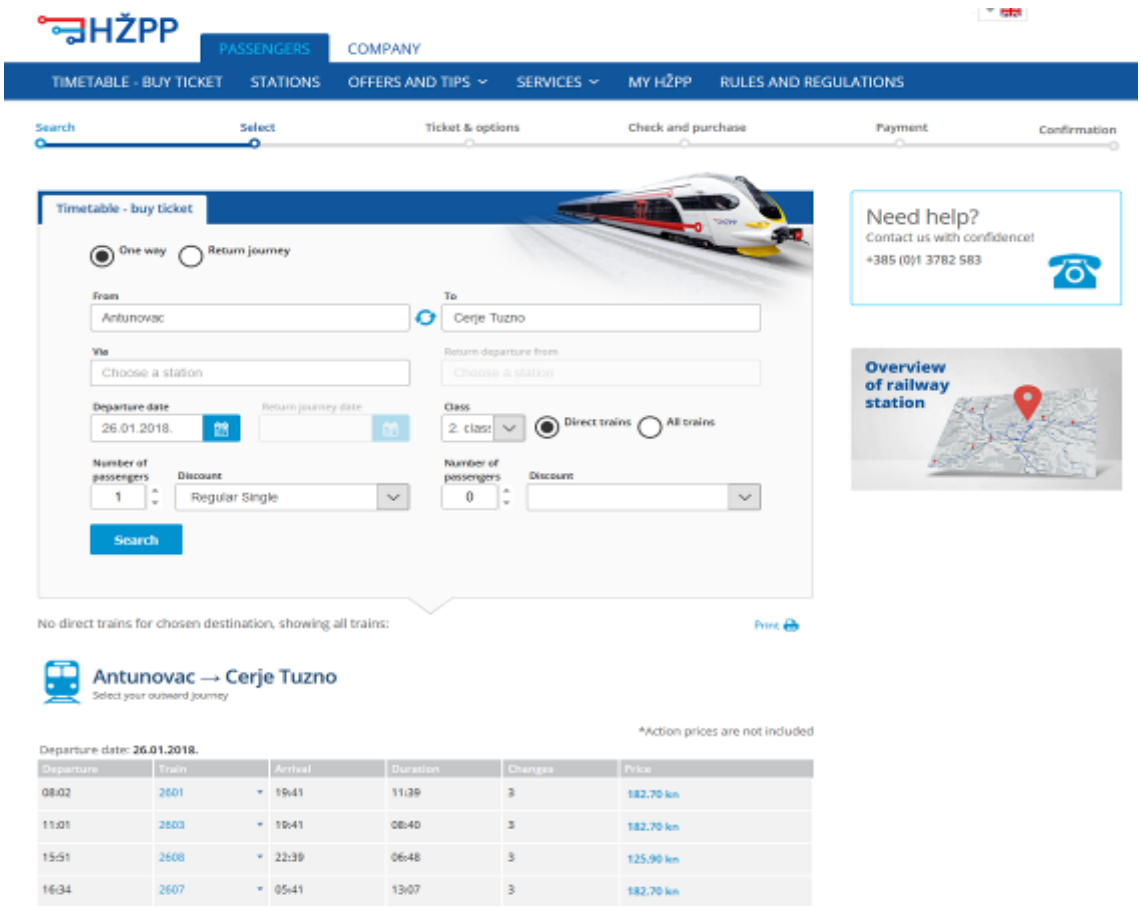

Figure 17: HŽ PP. Time table - travel planner. Source: http://www.hzpp.hr/en

Western-Hungary + Győr-Moson-Sopron (HU)

FEATURES. In the region of Western Hungary, five MISs are available. Four of them offer pre-trip information (GYSEV, ELVIRA, ENYKK and Menetrendek), while the last one is an on-board MIS (FEDUR). As concerning the **types of information** covered, different levels of detail have been submitted for the different MISs. GYSEV and ELVIRA provide schedules, routes, travel times, changes, stops, last mile information, long term/forecasted warnings, fares, linked static timetables and linked timetables on stop level. Furthermore, even detailed information concerning first class coaches, bicycle transport facilities, dinning car and possible discounts are included. POIs and users' reviews are expected to be added in the next two years. Menetrendek covers detailed timetables, stops, map location for each transport mode, walking directions and distances between stops. For ENYKK no information is given.

In Hungary, a centralized system (working at national level) covers all the timetables regarding regional, national and long-distance routes (by bus and train). This national database is a reference for all MISs of Hungary. On the other hand, information concerning local/urban transport (by city busses, trams and metros) are available only on the platforms of each provider (usually dealing with the PT services of a single city). The MISs of the region have different performances in terms of **multimodality**: ENYKK (working at county and regional levels) unifies the transport supply by bus of different local operators. GYSEV and ELVIRA (working at regional and partially (trans)national level) provide information concerning rail transport and the possible PT connections between railway stations. Finally, Menetrendek (collecting data at county, regional and national level) includes train, bus and is expected to offer the multimodal combination of walking and public transport in the next period.

As for the **customization** parameters available for users, these are related to GYSEV. Currently users can search for a stop of PT, but in the future also POIs can be selected. The filters available are origin, destination, via-points and restrictions about the transport modes. Travel time and restrictions about the mobility (e.g. for disabled people) are not available.

MAIN ISSUES.

- The overlap between ELVIRA and GYSEV might create confusion for users.
- Currently none of the MISs available covers a wide multimodal information. None includes private vehicles, cycling and their combination with PTs. Furthermore, none of them provides walking as option of a multimodal route planning, excluding the on-going development of Menetrendek.

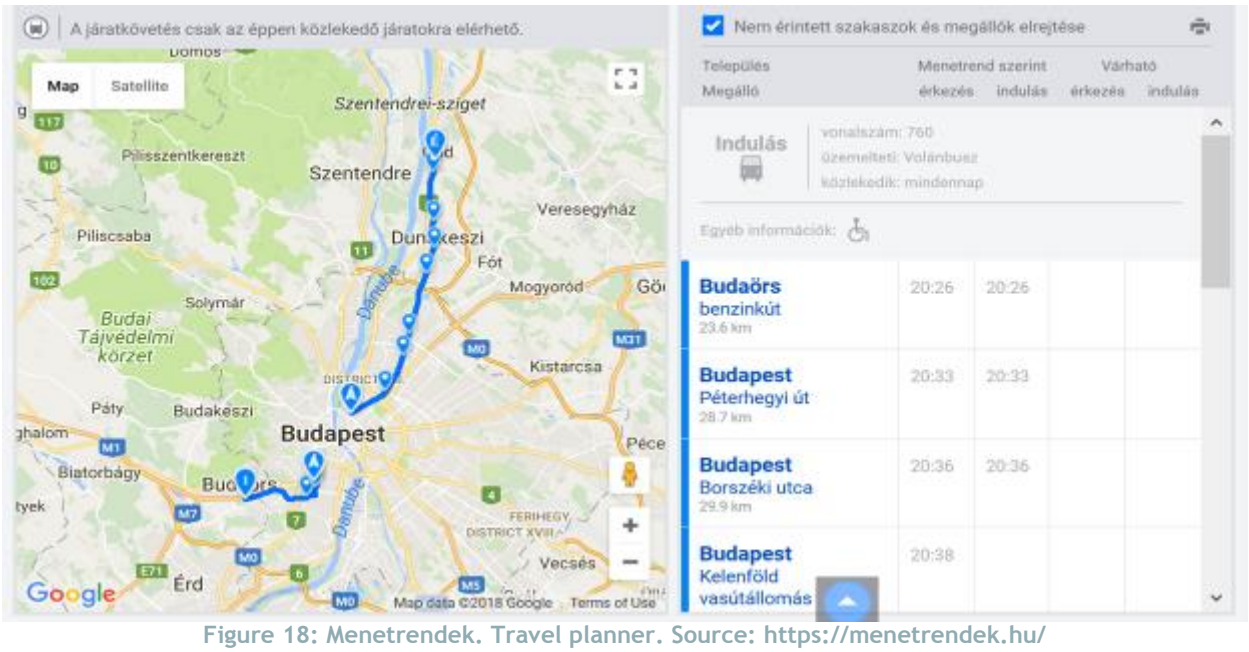

Figure 18: Menetrendek. Travel planner. Source: https://menetrendek.hu/

Pilsen Region (CZ)

FEATURES. In the region of Pilsen, one comprehensive IMIS (IDOS) collects data from a wide range of PT operators at national scale and connections at (trans)national level. This system deals with most of the **information** analyzed in the questionnaire (schedules, routes, travel times, changes, stops, long term/forecasted warnings, fares, linked static timetables and linked timetables on stop level). On the other hand, last mile information, POIs and users' reviews are currently missing, and they are not included in the plan of future development.

Concerning the **transport modes** covered by this IMIS, it is worth mentioning a second tool that provides a complementary support to IDOS: mapy.cz. As individual IMIS, IDOS covers five transport modes: busses, trains, boats, walking transfer between stops and partially cable car. Mapy.cz plays the role of complementary tool in order to allow IDOS to include walking as transport mode, and the multimodal combination of walking + PT. Nevertheless, even with this integration, some options are still missing, as cycling, private vehicle and combinations of them with public transport.

The users of IDOS can search for addresses with the external support of mapy.cz. As regard the possibilities of **customizing** the route planning, the parameters covered by IDOS are: origin, destination, via-points, travel time, restrictions of the transport modes included in the route (with some pre-planned options), restrictions concerning mobility (e.g. for disabled people) and walking transfer limits between stops. All options proposed in the questionnaire are included in the possibilities of IDOS.

MAIN ISSUES.

- For several points concerning transport modes and search indicators, the external tool Mapy.cz is needed. This could be a weakness if the system became less user-friendly. Otherwise, it would be a positive example of integration.
- Even if Mapy.cz offers a significant integrative support, some transport modes are still missing.
- The system is private (developed by CHAPS and operated by the company MAFRA) and the difficulties of private operators in dealing with such issues (especially for the real-time component) is known. Nevertheless, the partially public support and a public cooperation for the timetables publication already exists.

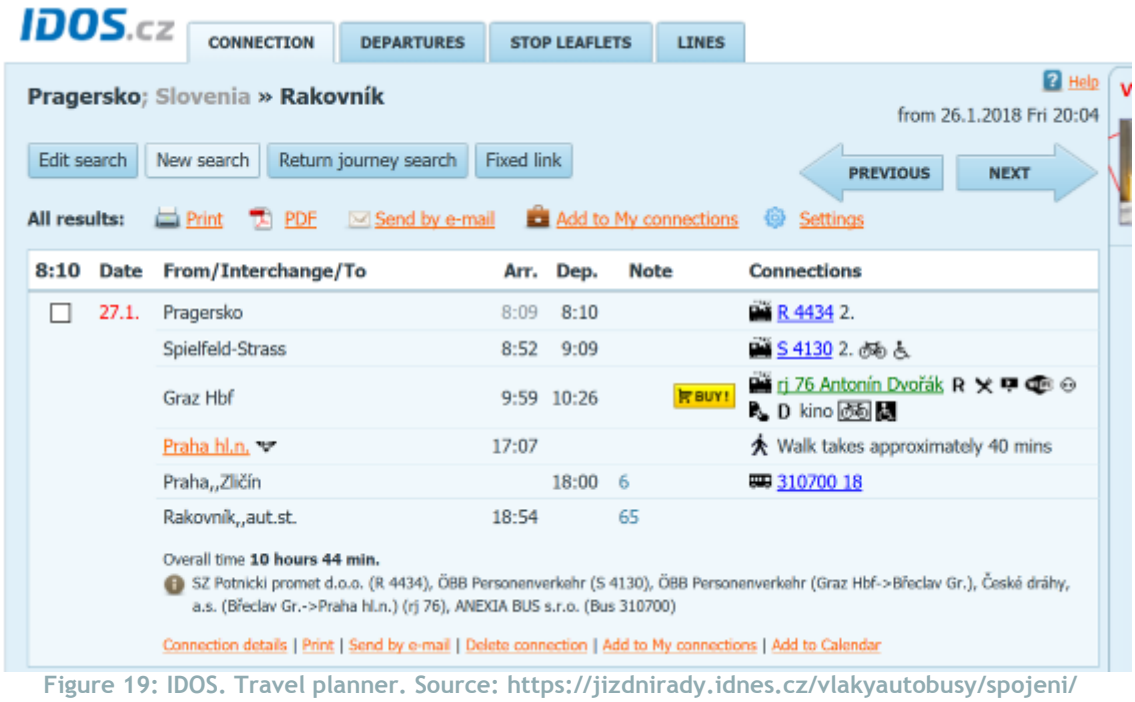

Figure 19: IDOS. Travel planner. Source: https://jizdnirady.idnes.cz/vlakyautobusy/spojeni/

Burgenland (AT)

FEATURES. In the Burgenland region, AnachB is the main IMIS, together with SCOTTY-ÖBB. AnachB covers all the main PT services present in the region, and provides an extensive range of **types of pre-trip information** including schedules, routes (on a base map), travel times, changes, stops, long term/forecasted warnings, fares, linked static timetables, linked timetables on stop level, last mile information and some POIs; leaving aside only users' reviews. Further POIs are expected to be included for the next period, in order to make the system more detailled.

As regards **multimodality**, AnachB provides a very extensive coverage, including all the PTs of the region and a routing tool for private vehicles. More specifically, it covers busses, trains, walking, cycling, private vehicles, and the multimodal combinations of walking + PT, cycling + PT, private vehicles + PT. All transport modes (either public or private) are included in the IMIS, making it as one of the most complete analysed so far. Moreover, the micro transport services (which constitute an important part of the local transport service and it is organized by small associations and municipalities) should be included in the system soon. In order to enhance the provided services, AnachB offers also a customized widget; this gives to users the possibility of checking which transport services can be used to reach the place/restaurant/hotel they are browsing on the internet.

AnachB grants several possibilities of **customization** for the users. It is possible to search for both address, stops and POIs, to apply several filters to the route calculation as origin, destination, via-points, travel time, restrictions of transport modes included in the route calculation and restrictions concerning mobility (e.g. for disabled people or walking speed). This wide range of filter supports the multimodality of the IMIS effectively.

MAIN ISSUES.

- There are not significant issues concerning this region: thanks to the national management of the information, comprehensiveness and reliability is guaranteed. Only some points might be implemented, as the possibility of introducing more POIs as parameters for route calculation, rather than the inclusion of Users' reviews among the types of pre-trip information provided.
- Information about transboundary connections can be also an open issue, which needs to be further developed.

Figure 20: AnachB. Route planner. Source: https://anachb.vor.at/bin/query.exe/en?L=vs_voranachb&

Berlin-Brandenburg (DE)

FEATURES. VBB-Travel planner is the main IMIS of the Berlin-Brandenburg region. It covers many **types of information** concerning pre-trip as schedules, routes, travel times, changes, stops, long term/forecasted warnings, fares, last mile information and some POIs. Users' reviews, linked static timetables and linked timetables on stop level are not currently provided.

Multimodality is a theme under development in this region. Currently, VBB-Travel planner offers several transport modes (busses, trains, trams, subway, ferries and taxis for the places where other PT services are not available). In the next period this number is expected to more than double, including also walking, cycling, private vehicles, multimodal combinations of walking + PT, cycling + PT, private vehicle + PT, car sharing and bike sharing. With this large implementation, VBB-travel planner wants to offer a complete door-to-door coverage to its users. On the other hand, the exchange of such information with the cross-border Polish authorities is the main issue for the region, since it requires a coordination and harmonization of information that is currently hard to obtain. Within the national project "DELFI" and the international project "EU-Spirit" VBB set up the basis to exchange data with other travel planning systems in Germany and Europe. So VBB set up a basis for data exchange with its Polish partners. Due to the fact that on the Polish side no travel planners are in operation so far, no exchange can be organized.

The possibilities of customization given to users are an important characteristic of the IMIS. Currently, users can search for addresses, stops or POIs and can apply all the filters proposed in the questionnaire: origin, destination, via-Points, travel time, restrictions of transport modes included in the route calculation and restrictions concerning mobility (e.g. for disabled people).

MAIN ISSUES.

- Some types of information and transport modes are currently not available, which prevent from the adoption of a real door-to-door journey planner.
- The coordination with Polish authorities to obtain information on transboundary timetables is a challenging point. Currently it limits the potentiality of VBB-travel planner as transnational IMIS. Nevertheless VBB set up the technical requirements for such an exchange within the project "EU-Spirit".

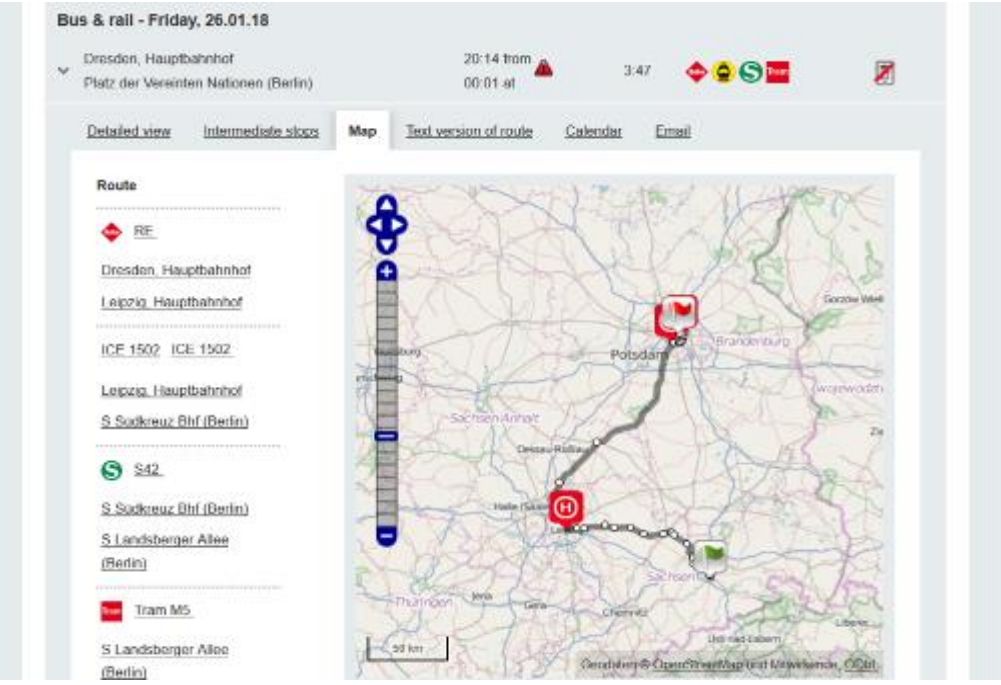

Figure 21: VBB - Travel planner. Route planner. Source: http://fahrinfo.vbb.de/bin/query.exe/en?OK#connection_C0-0

1.1.4. On-trip component

In this sub-chapter, the main features related to **on-trip information** are presented for each of the eight regions. The elements object of the analysis are:

1. Kind of information provided by on-trip MIS;
2. Frequency of on-trip data updating;
3. Technologies used in the real-time data collecting process;
4. Data system architecture, standard and exchange;
5. Availability (and subsequent diffusion) of offline on-trip data.

Considering these five points, the main aim of this part of the Transnational Analysis is to point out the **FEATURES** and **RELIABILITY** of on-trip component for each MIS, and subsequently finding and listing the **MAIN ISSUES** that need to be addressed.

Friuli-Venezia Giulia (IT)

FEATURES AND RELIABILITY. In this region, on-trip information is covered (partially) by 6 MISs out of 8 (VIAGGIATRENO, SCOTTY-ÖBB, ATAP, SAF, TT and APT). Among the seven kinds of on-trip information included in the questionnaire (travel time updates, route updates, real-time warnings, closest POI, measured delays, accidents and deviations), only 2 MISs cover the most of them. Therefore, the difficulty in providing complete on-trip information, in several cases is quite clear considering this overall condition. In this framework, the MISs that cover the highest number of on-trip categories are those dealing with railway transport (i.e., VIAGGIATRENO and ÖBB-SCOTTY), which both provide travel time updates, real-time warnings and measured delays. Moreover, VIAGGIATRENO covers also an interactive map service that is very effective, in order to have an overview of the status at national and regional level. ATAP and SAF (mainly local scale MISs) provide only closest POIs and further information regarding strikes. TT offers a mobile App through which users can obtain information concerning their current location. Finally, APT provides a newsletter service to update users regard special issues as deviations or strikes. No information is available about technologies used in the real-time data collecting process, data system architecture, standard and exchange and availability of offline on-trip data are concerned, almost no information is available.

MAIN ISSUES.

- The FVG region is characterized by the absence or the scarcity of on-trip information in most of the MISs analysed (especially for those covering a local scale);
- The large number of missing information regarding system architecture, frequency of updates, availability of offline on-trip information, etc. is a consequence of this condition.

Veneto region (IT)

FEATURES AND RELIABILITY.

In Veneto region it is to register a partial provision of on-trip information even though a basic level is guaranteed also thanks to the growing spread of mobile apps. Still in this context, the MISs that cover the highest number of on-trip categories are those dealing with railway transport. In particular it is to mention the VIAGGIATRENO tool by Trenitalia described above. Furthermore, updated information in real time about the SISTEMI TERRITORIALI rail services are provided by the app PUNTUALTRENO, giving precise and updated information about the position of each rail service operating in the lines. With reference to the systems mainly related to bus service a certain deal of real time information Is provided in terms of warning and updates, especially in case of relevant criticalities rather than with a detailed tracking of

the bus route. Furthermore, the apps with wider coverage can profit from updates on traffic situation in general as those provided by Google services.

MAIN ISSUES.

- Some on-trip information, such as deviations in PT services, are currently missing, such as deviations. The intention to fill this gap in the next future has been not expressed.

South Tyrol (IT)

FEATURES AND RELIABILITY. In South Tyrol currently, on-trip information is not available for the IMIS South Tyrol Mobility. However, the intention is to develop an efficient system covering real-time data by the next 2 years. For this system, it is expected to adopt a wireless communication technology, but also to include loop detection, Bluetooth, and floating vehicle data technologies. Furthermore, also for off-line information tools an important improvement is forecasted with fixed panels at the main stops.

MAIN ISSUES.

- The current absence of on-trip information is a weak point of the IMIS, but it is also a top-agenda priority for the future development of the system.
- The percentage of stops currently covered by offline information tools (bus stop points and bus stop panels) and the reliability of the data are quite low. Currently there are 500 devices out of 5,900 bus stops in South Tyrol included in the IMIS. Anyway, even in this field a significant enhancement is foreseen.

Slovenia (SI)

FEATURES AND RELIABILITY. In the case of Slovenia, the distinction between different MISs is essential, especially considering the large scale considered. Among the several MISs analyzed, currently LPP (covering the metropolitan area of Ljubljana), Slovenian Railway (covering the (trans)national scale) and the urban-scale MIS of Maribor propose several kind of on-trip information as traffic disruption and delays, real-time warnings, accidents, deviations and suggestion of other transport modes in case of disruptions. Furthermore, LPP offers travel time updates and route updates, and most of this information is available on bus and train stops. Technologies available to support this on-trip information are mainly wireless communication technologies, floating vehicle data and floating cellular data. As concerns the reliability of the service, currently the updating frequency is about 10 min for Slovenian Railways, and about 30 seconds for LPP.

MAIN ISSUES.

- For Slovenian railways, some important kinds of on-trip information are currently missing, as travel time updates, route updates and closest POIs. However, they are expected to be included by the next two years.
- For Slovenia railways, the absence of on-trip informative tools at the stops is an important lack. Even this aspect is part of the improvement plan of providers.

Zagreb County (HR)

FEATURES AND RELIABILITY. In this region, ZET (Zagreb electric tram) manages the available on-trip information of the MIS. Thus, this description focuses on the services offered by this specific provider working at both local (city of Zagreb) and regional (Zagreb County) scales. About the kind of on-trip information provided, this MIS covers real-time warnings, measured delays, accidents and deviations. The technology used to support this service is TETRA radio, which collects information from onboard

computers, sends them to vehicle displays, and to displays set at the main stops of PTs. Moreover, this information is partially available on the ZET webpage, and partially provided through a link to sada.zgh.hr (Zagreb now). As concerns the reliability of the system, it is updated on daily frequency.

MAIN ISSUES.

- Some important kinds of on-trip information are currently missing, as travel time updates, route updates and closest POIs.
- On-trip information is not available online in an intuitive way: the webpage of ZET is not very clear, none mobile App is provided, and the information is not tailored on the real time users´ needs.

Western-Hungary + Győr-Moson-Sopron (HU)

FEATURES AND RELIABILITY. The Hungarian context includes several on-trip MISs. GYSEV, which is provided by the regional rail operator that has the same name, offers on-trip information regarding travel time updates, route updates, real-time warnings, measured delays and accidents. Moreover, there is another national service (connected with GYSEV) called "Vonatinfó" (Train Info) that provides - through a Google-map interface – the exact location of each passenger train running in Hungary. As far as on-board information is concerned, this is covered by another service called FEDUR, which is developed by the same provider of GYSEV and it offers on-trip information for InterCity trains. Technologies adopted are wireless communications and floating vehicle data.

MAIN ISSUES.

- Some kinds of on-trip information are currently missing, as closest POIs and deviations. The intention to fill this gap in the next future has been not expressed.
- The off-line information at the stops are neither available, nor expected to be added in the next future.

Pilsen Region (CZ)

FEATURES AND RELIABILITY. In the Pilsen region, the overall IMIS called IDOS offers some on-trip information at national level. If pre-trip information of IDOS is detailed, for on-trip components this condition is not the same, because of the only partial cooperation of transport operators in this field. IDOS offers some kind of on-trip information as expected departure updates, route updates, some real time warnings and measures of delays. As far as technologies is concerned, computational technologies (GPS module) and physical detector along infrastructures are the systems involved. Finally, information panels are available in railway stations as off-line on-trip tools, and similar off-line devices are available by 14 bus stops (the total amount is not known).

MAIN ISSUES.

- The core issue of this on-trip IMIS is the lack of collaboration with PT operators. This condition has important consequences on the reliability and extension of the service provided.
- Some kinds of on-trip information are currently missing, as closest POIs and accidents.
- Off-line information is available on a limited number of bus stops.

Burgenland (AT)

FEATURES AND RELIABILITY. The regional IMIS named AnachB is the system that has been described in the questionnaire concerning on-trip information. This IMIS provides several kinds of on-trip information as

travel time schedule, measured delays, deviations and construction sites in Vienna; moreover, it is developing road sign information. In order to offer these kinds of data, the technologies used are computational technologies, induction loop detection, floating vehicle data and floating cellular data. Finally, the system called basemap.at provides a cartographic update every three months; and also the rail MIS ÖBB-SCOTTY provides on trip-information as well, concerning travel time updates, real-time warnings, measured delays, traffic information and a train radar tool.

MAIN ISSUES.

- Some kinds of on-trip information are currently missing, as route updates, real-time warnings, closest POIs and accidents.

Berlin-Brandenburg (DE)

FEATURES AND RELIABILITY. VBB-Travel Planner offers a wide range of on-trip information for the Berlin-Brandenburg region. Indeed, almost all the typologies proposed in the questionnaire are covered (travel time updates, route updates, real-time warnings, closest POIs, measured delays and deviations); and even all train stations are served by off-line on-trip information. On the other hand, the reliability of this data is not completely clear, due to the absence of indications regarding the updating frequency. The technologies used are three: computational technologies, floating vehicle data and floating cellular data.

MAIN ISSUES.

- As far as the off-line information available on the stops are concerned, there is a strong difference between rail and other urban forms of PT. The coverage in the railway stations is complete (100%) while the coverage of other systems is noticeably lower (about 5%).

1.1.5. Ticketing systems

The aim of this section is not to explain the ticketing system of each region (which is the role of the deliverable D.T1.2.14), but rather to inform about the **availability** and the **characteristics** of **purchasing options** in the MISs that have been presented in the previous subsections. The main thematic aspects described in the section are four:

1. Availability of payment systems;
2. Availability of ticketless systems;
3. Payment methods allowed;
4. Percentage of online sales.

Each geographical area includes these features by dividing them into two parts: MANAGEMENT explains if (and which) MISs provide a ticket purchasing system; FEATURES describe the available payment methods, the types of ticketless systems offered, and percentages of sales.

Friuli-Venezia Giulia (IT)

MANAGEMENT. 6 MISs out of 8 in FVG offer an integrated payment system. Only FUC and APT (municipality of Gorizia) do not offer possibilities of buying tickets. More in detail:

- TRENITALIA (reachable from VIAGGIATRENO with a link) and ÖBB-SCOTTY offer a ticket purchasing system on their own website and via mobile App.
- ATVO offers tickets and subscriptions on its own website. In addition, a mobile App is available for ticketing.

- TT, SAF and ATAP currently provide the possibility of buying tickets via mobile using an App (TT and SAF) and via SMS (TT and ATAP). For TT and SAF subscriptions are available online.

FEATURES. For ATAP, SAF, ATVO, TRENITALIA, TT and ÖBB-SCOTTY ticketless systems are available. In particular, TRENITALIA and ÖBB-SCOTTY offer both digital tickets and tickets based on QR codes; ATVO and TT only digital tickets; SAF only QR code tickets; ATAP mobile tickets via SMS. Furthermore, credit card is the most diffused payment method for all types of tickets and subscriptions, but even mobile payments are partially available. The share of tickets bought with these systems is not known.

Veneto region (IT)

MANAGEMENT. With reference to the MISs already presented, apart from the one related to SISTEMI TERRITORIALI, they all offer an integrated payment system. More in detail:

- TRENITALIA (reachable from VIAGGIATRENO with a link) offer a ticket purchasing system on their own website and via mobile App.
- The main bus service providers at provincial level offers tickets and subscriptions on its own website. In addition, mobile Apps are also available for ticketing.
- The IMIS provided by apps including various operators allow to purchase online ticketing solutions encompassing services of the main operators. In particular, MYCICERO, among others, is allowing to purchase tickets of TRENITALIA, AVM/ACTV, BUSITALIA VENETO, MOM and SVT. DaAaB, instead, is allowing the purchase of the tickets of operators directly involved in the initiative (ATVO, AVM, ATV, FAP, ALILAGUNA and MOM).

FEATURES. TRENITALIA offer both digital tickets and tickets based on QR codes; MyCICERO is based on QR code and allows also notification of purchase via SMS. DaAaB dgital ticket include a validity chack that can be verified through the screen of the user' smartphone. Furthermore, credit card is the most diffused payment method for all types of tickets and subscriptions, but even mobile payments are partially available (e.g. MyCicero).

South Tyrol (IT)

MANAGEMENT. In this region, no online ticket purchasing system for standard or daily tickets is available. Nevertheless, with the IMIS South Tyrol Mobility is possible to buy via website the different types of annual passes proposed in the region of South Tyrol. More in detail:

- South Tyrol Mobility allows only the purchase of the Südtirol/Alto Adige Pass, which gives access to all transport modes in South Tyrol. This card is available in 5 versions: Südtirol/Alto Adige pass (standard), Südtirol/Alto Adige pass abo+ (for students), Südtirol/Alto Adige Pass 65+ (for elder people), Südtirol/Alto Adige Pass "free" (for people with disabilities) and EuregioFamilyPass. Three further cards are available: Bikemobil Card (to combine renting a bike and using all the public transport modes of the region, for a maximum of 7 days), Museumobil card (to have access to museums and all the transport modes of the region, for a maximum of 7 days) and Mobilcard (to use all the transport modes of the region for a limited period of maximum 7 days).

FEATURES. Even if currently no online payment system for tickets is available, all the passes described can be defined as ticketless systems. This card has an initial cost of 20 €, and subsequently it is connected to a bank account or is refundable with direct payment. For this service, different payment methods are available as credit/debit card, money transfer and mobile payment. For the region of South Tyrol, no data concerning sale share via web is available. However, about 140,000 Südtirol /Alto Adige Pass (including standard, family and "free" versions) were active at the beginning of the year 2015, a number

corresponding to about 1/3 of South Tyrolean population (this number excludes the passes for students and elder people).

Slovenia (SI)

MANAGEMENT. In this region, currently 2 main IMISs out of 6 offer an online payment system with some restrictions. More in detail:

- Slovenian Railways offer an online ticket purchasing system for only seasonal tickets.
- LPP proposes payment via mobile App, and via the voice data transfer on mobile called "Moneta" for standard tickets. An online payment is foreseen for the next period.

FEATURES. For Slovenia Railways, currently ticketless systems are not available. Nevertheless, digital tickets and QR code tickets are expected to be included in the next two years. LPP provides both digital tickets and electronic wallet on smart or virtual card called Urbana. About payment methods, credit/debit card and mobile payment are offered. At the moment, LPP offers standard tickets, monthly and annual passes with these methods, while Slovenian Railway provides only monthly and annual passes. Anyway, the intention is to extend these payment possibilities also to ordinary and daily tickets in the next two years. Regarding the coverage, an online sale share of 2% is registered through the Slovenian Railway system, for which the purchase of seasonal tickets is the only option currently available.

Zagreb County (HR)

MANEGEMENT. In Zagreb County, only one of the two MISs analysed in this deliverable provides an online service of ticket purchasing:

- ISPRO (by HŽ Passenger transport) is the main MIS providing ticket purchase. This service is available via web site and mobile App and it offers both ticket reservation and purchase.
- ZET (the main MIS of the region) does not provide services concerning online ticket purchase, but only contact-less tickets and passes.

FEATURES. As regards ZET, with the contact-less tool named "Mifer card" all the transport modes covered by the MIS are available, and it is also possible to buy tickets for other people. Ordinary tickets, daily tickets, monthly passes and annual passes are available, using either credit card or money transfer. ISPRO has been offering since August 2017 a new ticketless tool named "Smart card" that replaces the old system "HŽ PP card". With this system, users can obtain discounts on monthly and yearly subscriptions. Finally, some integrated subscriptions are available, which include both ZET and HŽ PP services (busses and trams + trains). They can be monthly or annual passes and are available at ZET offices.

Western-Hungary + Győr-Moson-Sopron region (HU)

MANEGEMENT. In the region of Western Hungary 1 MIS out of the 5 available provides a ticket purchasing system:

- ELVIRA (provided by the rail operator MÁV-START Zrt.) offers an online ticketing service for domestic and some international routes. It is available on website and with mobile App. Moreover, a new tool called "Vonatinfo" (connected to GYSEV to provide also on-trip information) is under public testing to offer an alternative to ELVIRA with a mobile App.
- GYSEV Zrt. (provided by the namesake rail operator) is connected to ELVIRA, to provide its own ticketing service.

FEATURES. Both the ticket purchase systems adopt a ticketless technology, thanks to digital tickets (even on mobile App for some ticket categories) and QR code tickets. Anyway, even printing at home or at the

railway stations are valid alternatives. The payment methods included in these systems are credit/debit card and mobile payment. Users can buy ordinary tickets, monthly and annual passes. To encourage users to buy with this system, ELVIRA and GYSEV propose discounts from 5 % to 20% on tickets bought with online tools (10 % for any normal tickets online and online only 20 % for selected off-peak long-distance trains) or at automatic vending machines (5 % discounts from any domestic single or return ticket). Concerning the share of the sales, in 2017 about 7% of total tickets sold by ELVIRA have been sold online, reaching 10% in the month of December 2017. This data has been further grown since that date, when higher discounts (instead of the previous 3 % discount currently10-20%) were introduced for e-ticket users.

Pilsen Region (CZ)

MANEGEMENT. In the Pilsen region, IDOS deals also with a ticket purchasing system. More in detail:

- IDOS (working both at regional and (trans)national level) provides a ticketing service that redirects to each specific operator that provides the transport service. Therefore, IDOS can provide this ticketing service only if an online ticketing service for the involved operators is available and connected. Currently no integrated tickets are proposed; anyway, this is a point mentioned in the TNA as future aspect to be addressed.

FEATURES. Since this purchasing system managed by IDOS is under development, no information concerning ticketless technology, payment methods, possible discounts and sale share is available. Anyway, the information provided in the TNA show the possibility of extending the number of PT operators involved in this system, to provide an updated payment system at both urban and regional levels.

Burgenland (AT)

MANEGEMENT. In the Austrian region of Burgenland, both the MISs working at regional scale provide a ticket purchasing system. More in detail:

- ÖBB-SCOTTY, which is provided by the namesake rail operator, offers an easy ticketing service. This tool requires a quick registration before the payment, and after that, the process is quite simple. The service is available on web site and mobile App, and for all the routes covered by ÖBB, including regional, national and some transnational rail connections.
- AnachB (which is provided by VOR – Public Transport Association for Vienna, Lower Austria and Burgenland) includes a ticketing system, as well. Nevertheless, in this case the process seems more complex than the previous one due to a less usability of the system: to buy a ticket users have to enter a specific webpage, where it is necessary to refill departure and destination of the chosen route.

FEATURES. Both these two systems provide digital tickets thanks to the ticketless system. Credit and debit cards and money transfer are the payment methods offered to obtain almost all the types of tickets and passes (ordinary tickets, daily tickets and monthly passes). Only annual passes are not yet available, but their inclusion is expected by the next two years. As regards the sale share of online tickets and passes, currently it counts for 4% of total incomes.

Berlin-Brandenburg (DE)

MANEGEMENT. For the region of Berlin-Brandenburg, there is only one ticket purchasing system:

- Handyticket is the payment tool connected to the MIS VBB-Travel planner. It is a tool available only for mobile devices, and it is designed for ticketing purchase by a German company (Handyticket Deutschland). Thus, the combined use of these two systems ensures pre-trip, on-trip info and a valid ticketing system.

FEATURES. Through this ticket purchasing system, digital tickets and QR code tickets can be provided. As regards payment methods - credit/debit card and money transfer are already offered, and mobile payment is an option under development. With the two payment methods currently available, users can buy every kind of ticket (ordinary and daily) and even extension tickets. Furthermore, VBB is used also as a platform with which operators share their income data, and every three year a survey is organised in order to collect data from customers. The share of the sales is currently about 2% of total incomes, confirming that traditional paper tickets are still the most diffused system.

1.2. SWOT analysis and findings on INFOMOBILITY

This section points out the main findings concerning the MISs of the eight regions, with a particular attention to the transnational issues. To reach this goal, a comprehensive **SWOT analysis** is carried out, focusing both on the **common points** among the regions, and on the **specific elements** that regard some of them. The consequence of this approach is a partial loss of the specificities that characterise each region, in favour of more general aspects. In order to understand the results of the SWOT analysis, two main aspects need to be taken into account:

1. The comparative analysis of the regions presented in section 1.1 assesses the characteristics of **info-mobility inside a region**, and the **cross-border relations** with neighbouring areas. These two aspects are complementary: data exchange at transnational level is possible if all MISs are built following common (or at least, compatible) strategies and standards at local/regional scales; and if a transnational political collaboration is established. Therefore, the harmonisation increases the chances of collaboration among systems, since several difficulties currently visible at transnational scale have their own causes at the national, regional and local level (e.g. absence of standard common technologies, existence of many different managerial structures and high heterogeneity of information covered). The existence of PT connections between different countries does not necessarily imply the existence of integrated MISs.
2. The **different sizes** of the regions are another fundamental aspect to be considered. The analysis highlights that some common points exist among different areas. Several IMISs that merge information from different specific operators to provide a general framework of PT are available for both the smallest and the biggest regions. As an example, AnachB (Burgenland region) covers an area of about 3,900 km^2 (with about 290,000 inhabitants); VBB-Travel planner (region of Berlin and Brandenburg) can be potentially used by about 6,000,000 inhabitants (more than 20 times than Brandenburg region); finally, IMIS Ijpp (national level) covering the entire Slovenia, counts about 2,064,000 inhabitants. This means that **IMISs are flexible tools**, which can be considered for different sizes and levels of complexity. Therefore, for this transnational SWOT analysis, this type of MISs is crucial both for the regional/national level, but also for the cross-border scale. Currently, this dimension is not often covered, even if an effort in this sense has been done by the Alpine Space project AlpInfoNet (Sustainable Mobility Information Network for the Alpine space). The attempt was to merge mobility MISs with tourist MISs at the transnational level, thus allowing tourists to reach Alpine areas by public and alternative forms of transport, rather than by car.

To build a SWOT analysis a **conceptual subdivision** of the main characteristics of the system is required: the subdivision between internal factors (strengths and weaknesses) and external factors (opportunities and threats). This difference divides those aspects that are under the control of the object of the SWOT, from the aspects outside of its control. In this case, the object of this SWOT analysis are all the MISs of the eight regions.

- **"Internal"** are all the aspects concerning the field of info-mobility itself, which can directly enforce or undermine the qualities of the transport service available (e.g. the absence of a multimodal IMIS in a region that provides multimodal and integrated PT services, lack of foreign languages, incomplete timetables and unreliable real-time information).
- **"External"** are all the aspects not directly concerning info-mobility as the qualities of transport services and politic conditions, which influence the effectiveness of transportation in these regions (e.g. the absence of a multimodal PT service in a region, which obviously implies the absence of a multimodal MIS, the absence of the technologies necessary to collect real time data and the lack of cooperation among different transport providers).

In the four boxes of the SWOT analysis (strengths, weaknesses, opportunities and threats) the main themes concerning MISs are addressed (multimodality; types of information: pre-trip, on-trip and

ticketing; door-to-door information; customers' needs and oriented approach; and the transnational scale) considering how they are covered by the eight regions. As regards strengths and weaknesses, a focus on the **technology** is given (e.g. availability of data, transport modes and door-to-door services, reliability of information, tools provided, etc.), while for opportunities and threats a more **general point of view**, which does not include assessments related to information itself, but rather assessments mostly related to the PT service. For instance, they include the level of political collaboration, the technical practicability, the availability of services, the organisation of transport providers, the presence of integrated tariffs, the complexity of the tariff schemes, the specific needs of transboundary commuters, etc. Although not directly manageable by the MISs, these aspects need to be addressed, in order to provide a reliable service and to achieve the main goal of Connect2CE, i.e. the improvement of the transnational connections between CE peripheral areas. These threats and opportunities are in some cases **shared by most of the regions** analysed. Moreover, they have an ex ante role compared to info-mobility that can contribute to the overall quality of the system, making it more accessible, understandable and appealing for users.

Finally, the SWOT analysis includes two columns, where each point is matched with the affected regions. With these columns, the SWOT analysis tries to give both an overview of the **most common points**, and some **specific indications** for each region. Since this tool regards the regions in general (and not the single MISs), the output has been verified with project partners, which have a better knowledge of their territorial context. For this reason, they have been asked to **revise the SWOT analysis**, giving their feedback as concerns the main strengths, weaknesses, opportunities and threats of their own region. In this way, the result may bring some general considerations together with a specific evaluation of each area.

SWOT ANALYSIS

Strengths	Regions	Weaknesses	Regions
S.1. Mono-modal MISs present a high degree of accuracy.	FV; VR; SL;ZC; WH;BU.	W.1. Difficulties to provide a competitive multimodal and door-to-door coverage (compared to private vehicles).	FV; VR; SL;ZC; WH.
S.2. IMISs combine different transport operators and specific MISs, providing an overview of the transport supply in a given region.	ST; VR; SL;WH; PR;BU;BB.	W.2. Pre-trip information of multimodal MISs does not always provide a reliable overview of the available services (e.g., generic route-planning tools not tailored on the area).	FV; VR; SL;WH; PR.
S.3. IMISs can work at different scales (including the transnational one), unifying already existing systems and covering a broader context.	ST; VR; PR;BB.	W.3. If MISs collect data from different PT providers, ticket systems can be a central issue in case of lack of tariff integration.	VR;SL;WH;PR; BU.
S.4. The rail MISs adopt a technology that grants an accurate and reliable on-trip information.	FV;VR; SL;WH; BU.	W.4. Closest POIs and offline information at the stops is often missing.	FV; VR; ST;SL; ZC;WH;PR; BU;BB.
S.5. Mono-modal MISs (especially the ones covering rail) often provide a user-friendly ticketing system.	FV; VR; ZC;WH;BU.	W.5. Real-time information in peripheral areas and at transnational scale is a critical issue, because of the expensive technologies needed to cover widespread territories.	FV;ST;SL; ZC;WH;PR; BU;BB.

Opportunities	Regions	Threats	Regions
O.1. When the MISs and the PT providers of a region are public operators, the reliability of information should be granted.	FV; VR; ST;SL; ZC;WH;BU; BB.	T.1. Political and technical difficulties in establishing new transnational and cross-border collaborations.	FV;ST;SL; ZC;WH;PR; BU;BB.
O.2. Data collection at a high territorial level (e.g. inter-regional and national level) contributes to have harmonized data.	ST;PR;BU; BB.	T.2. Establishing multimodal MISs requires demanding agreements between transport providers.	FV; VR; ST;SL; ZC;WH;PR; BU;BB.
O.3. Common standards for the MISs, as established by the EU, are expected to improve the exchange of data between providers and countries.	FV; VR; ST;SL; ZC;WH;PR; BU;BB.	T.3. The presence of many transport operators in the same region, need a political handler that manages the information on top level.	FV; VR; WH.
O.4. The presence of several complementary tools (e.g. satellite maps, POI focus maps, etc.) that are connected with MISs can grant a better user-friendliness.	FV; VR; WH;PR.	T.4. A partial or lacking coverage of on-trip information may highly affect the reliability of the system and, as consequence, the users' level of satisfaction.	ST;ZC;PR.
O.5. Existence of transnational bodies (e.g. CECT) that can provide information for those cross-border areas that are recognised officially.	ST;ZC;WH; BU;BB.	T.5. Commuters' needs are both local (origin and destination) and cross bordering. They require challenging transnational door-to-door solutions.	FV;ST;SL; ZC;WH;PR; BU;BB.

Legend: FV: FVG region; VR: Veneto region; ST: South Tyrol; SL: Slovenia; ZC: Zagreb County; WH: Western Hungary+ Győr-Moson-Sopron region; PR: Pilsen Region; BU: Burgenland; BB: Berlin-Brandenburg.

1.3. Best practices about INFOMOBILITY

The **best practices** proposed in this section try to present a **comprehensive vision** of the possibilities granted by a MIS, either in terms of size (from the local to the national and transnational scale), in the type of information provided (pre-trip and on trip information, and ticketing systems), as well as in the transport modes considered. The focus is put on those systems that cover a **transnational information**. All the cases taken into account cover effectively the main themes described in the introduction (multimodality, types of information provided and user-oriented approach), building transversal synergies among these components, in order to provide integrated services. Considering these qualities, they represent effective examples to encourage the development of the regions. More in detail, six cases are presented: AVV - Aachener Verkehrsverbund (avv.de), DB – Deutsche Bahn (bahn.de), TPG – Transports publics genevois (tpg.ch); VIAGGIATRENO, provided by Trenitalia; SBB - Schweizerische Bundesbahnen (sbb.ch) and VTT - Verkehrsverbund Tirol (vvt.at), in the region of East Tyrol, implemented as pilot actions in the EU project AlpInfoNet (alpinfonet.eu), specifically focused on ISs in the Alpine context.

According to the previous sections, these MISs represent good examples regarding the following four parts:

- 1.3.1 General characteristics of the system (AVV);
- 1.3.2 Pre-trip component (DB, TPG and VTT);
- 1.3.3 On-trip component (VIAGGIATRENO);
- 1.3.4 Ticketing system (SBB).

1.3.1. General characteristics of the system

Aachener Verkehrsverbund (AVV)

Aachener Verkehrsverbund AVV (avv.de) is a **cross-border authority** that manages the planning, coordination and information regarding several PT services. It was born from an important transnational cooperation between **Germany, Netherlands and Belgium** in the formation of a European region established in 1976. Thanks to this initiative, this area is officially recognised and served by a unified system of public transport. AVV includes many stakeholders and transport operators belonging to the three countries, and it provides comprehensive information that cover 35 cities and municipalities for a whole area of about 2,280 km^2. Moreover, to enforce the identity and effectiveness of this cross-bordering area, an **integrated ticketing system** is proposed, allowing users to move easily among the regions with different transport modes. Focusing on the IMIS offered by AVV, it provides a comprehensive **multimodal information** for the main PT modes of the region (busses and trains) but even for walking, cycling, private vehicles, car sharing and all their multimodal combinations. A very flexible and complete **route-planning tool** is offered, which allows users to obtain several kind of information as the fares of each route involved, the travel time and the time to change between transport modes at the stops, the number of the lines involved, etc. All this information is available on tailored interactive map, which covers a three-nation cross-border area. This map is also usable to customize the route calculation. Users can freely click on the map itself to introduce the origin and destination; they can select the preferred transport modes, via points and travel time. AVV offers further map tools to provide an overview of the **whole transport system**. This is a static map, in which users can see all the lines of PT available, and search for specific POIs divided in thematic groups (as culture, sport, health, entertainment, museums, etc.). This tool is available both on a classic map and as abstract diagram. As regards languages, only German is available. The strength of the cross-border collaboration, the establishment of integrated and transnational tariffs and the presence of effective tools for the route calculation make this case a best practice.

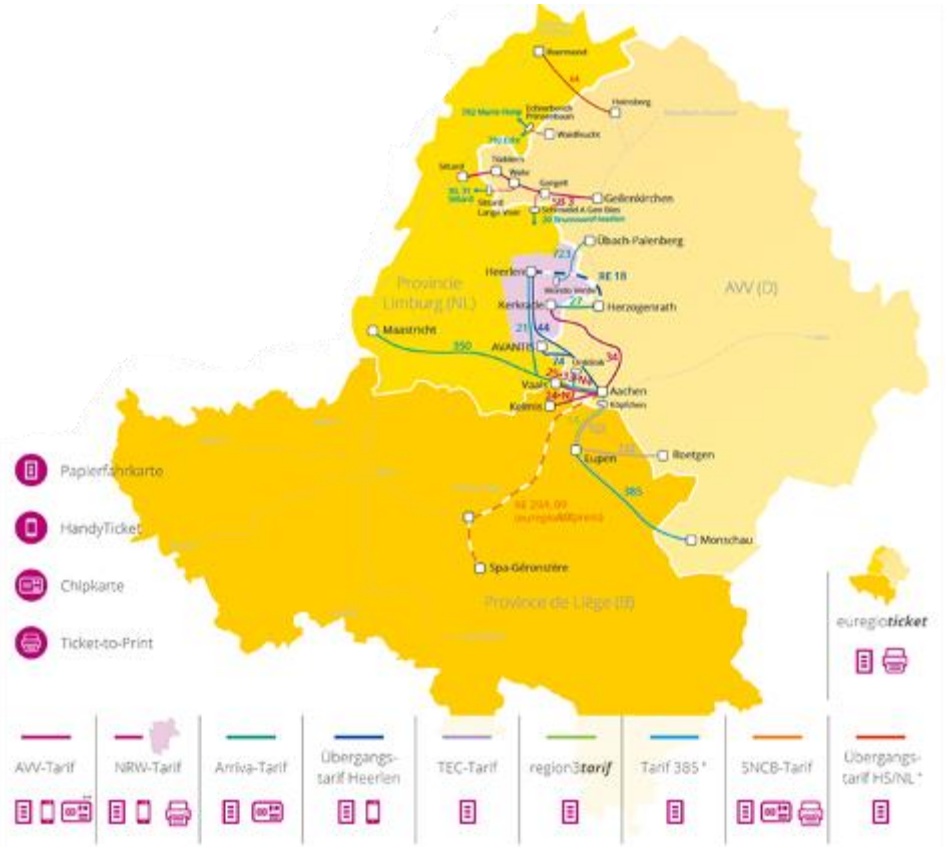

Figure 22: AVV. Euregion and tariff scheme. Source: https://avv.de/de/service/downloads

Figure 23: AVV. Route planner. Source: https://auskunft.avv.de/#!timeSel|depart!S|Walporzheim!Z|ss!start|yes!date|26.01.2018!time|20:27

1.3.2. Pre-trip component

Deutsche Bahn (DB)

This IMIS is offered by the national rail company Deutsche Bahn AG, DB (bahn.de) and covers pre-trip and on-trip information, as well as a ticketing system. The DB transport company provides transport services at **national and transnational level**, with both long-distance and local trains. The transnational coverage of the IMIS in particular is very extensive, involving many countries as Austria, Belgium, Croatia, Denmark, France, Italy, Luxemburg, Netherlands, Poland, Czech Republic, Slovakia, Slovenia, Sweden, Switzerland and the city of London. The IMIS includes all train connections operated by the company, but it is also a **multimodal tool** that includes all the main transport modes available in its area of competence at urban, regional and national level (trains, metros, trams, busses, boats and ferries, subways and taxis). Thanks to the wide range of possibilities and scales covered, users can find door-to-door connections through a very large territory. These transport modes are included inside a **travel planner tool**. Users can find every connection available between origin and destination points that may be stops, stations and POIs (as for example squares or streets). For each connection searched, the IMIS proposes the possible mono-modal routes or multimodal chains, including walking as mode to cover short distances between stops and between the origin/destination and the closest stop available. This information is available either as a written list or as an interactive map, where users can see the whole route or only the starting and destination stations. **Further interactive information** concerning the service available in the stations are considered, as DB info-points, parking spaces for cars and bikes, PT connections, toilettes, lock boxes, taxy stations (where available) and services for disabled people. Customers can use many **filters** as travel time, preference for fast or local connections, presence of a specific intermediate stop, transport modes to be included in the route calculation, maximum duration of the journey, number of passengers, class of travel and connections that allow carriage of bikes. Following this process of route planning, customers get the final ticket purchasing system in a very user-friendly way. The languages covered are German, Czech, Danish, Spanish, French, Italian, Dutch, Polish and English. This IMIS shows that an extensive multimodal service can be provided. In this case the transport provider plays the role of a comprehensive IMS, which merges all the PT services of the region.

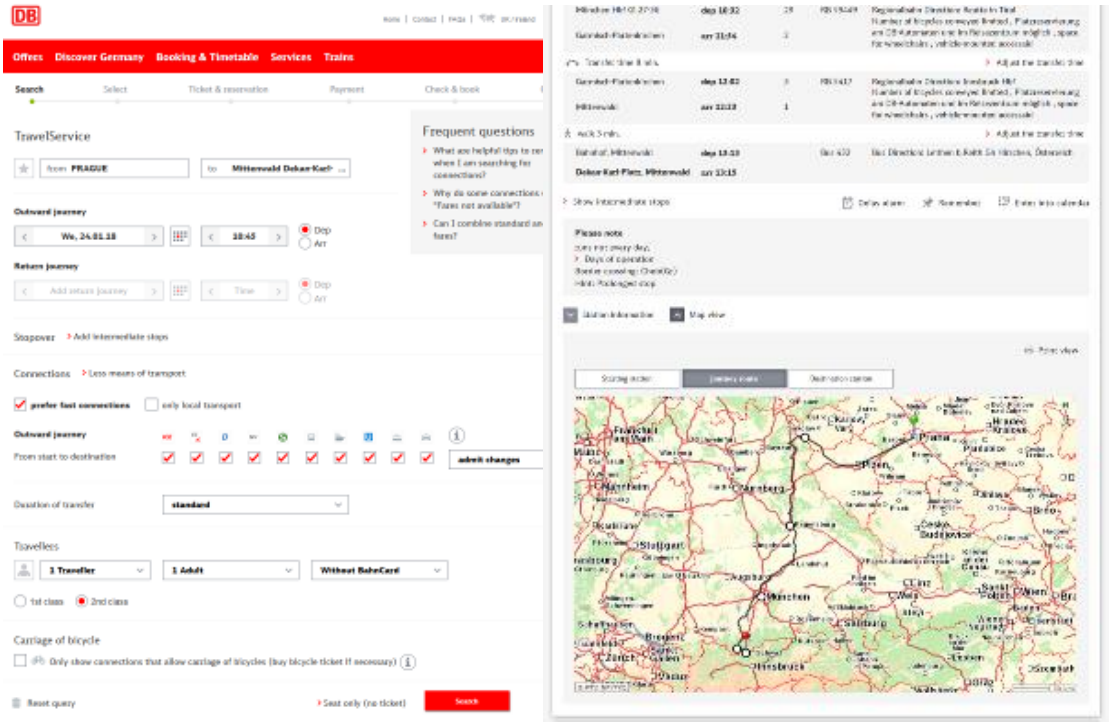

Figure 24: DB. Route planner and filters. Source: https://reiseauskunft.bahn.de/

Transports publics genevois (TPG)

TPG (tpg.ch) is the name of both the transport provider (covering the Geneva city and Canton, and some national and cross-border scale connections in the neighbouring regions of France) and of the IMIS linked to these transport service. TPG transport operator provides PT services by busses, trams and trolleybuses; while local trains and ferries are covered by the Swiss Federal Railways and Mouettes Genevoises Navigation (ferries on the Lemano Lake). The IMIS provides **extensive pre-trip** and **several on-trip** information regarding these services, as well as a ticket purchasing system. As regard ticketing, in Geneva region a very effective tariff system exists. It is called UNIRESO, which is an umbrella organisation for a **common tariff scheme**. Currently several transport operator at different scales participate, as Transports publics genevois (TPG), Swiss Federal Railways (SBB-CFF-FFS), Mouettes genevoises navigation (MGN), Transports publics de la région nyonnaise (TPN), Transports annemassiens collectifs (TAC), and Transport express régional (TER). Even if TPG manages only some transport modes, the IMIS includes a wider multimodal range composed by: busses, trolleybuses, trams, lake boats, trains, cableways and walking. Therefore, this system is managed by a PT operator, but also includes other operator´ services, proposing a comprehensive system for the entire region. The **route planner** is one of the strengths of this system. All the transport modes included and the filters available for customers make it very flexible and powerful. Users can search for addresses, stops and POIs, and the system itself proposes some points of interest with a scroll menu. In addition, the maximum number of changes, the transport modes considered, the total duration of transfer and via points are also potential filters. TPG provides other interesting tools as the **Timetable Booklet**. It is possible to compose a customized timetable, choosing a specific route, a period of the day, week and year, some specific transport modes and even only the ones that allow the carriage of bicycles. Finally, information concerning the accessibility for disabled people, strollers and elder people are covered; as well as static maps of services and lines. The languages available are French or English. The quality of this journey planner lies in its reliability, as well as in the high level of customization, respecting the crucial principle of a customer-oriented approach.

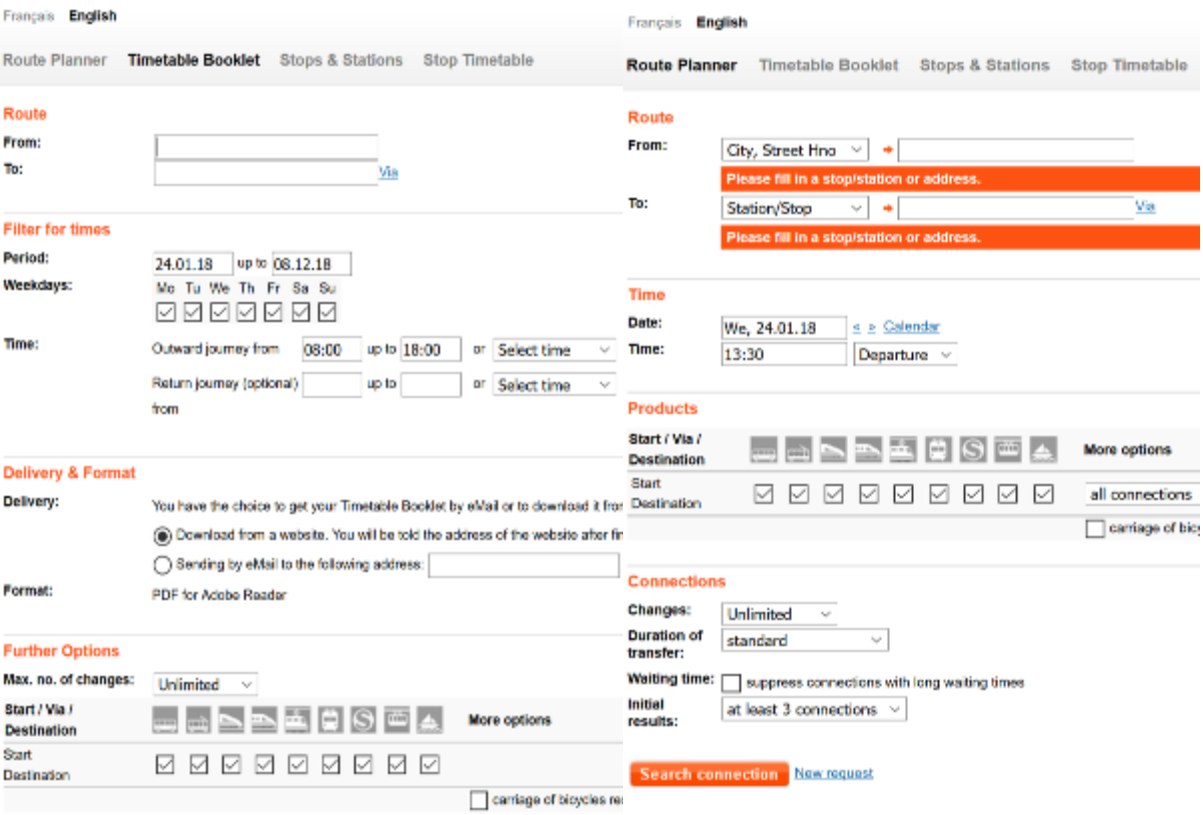

Figure 25: TPG. Route planner and Timetable Booklet. Source: http://www.tpg.ch/en/web/site-international

Verkehrsverbund Tirol (VTT)

East Tyrol is one of the regions involved in the EU project **AlpInfoNet.** In this project, a new IMIS is proposed, which merges the route planner of **Osttirol** (maps.osttirol.com/en/routingplanner) with the Verkehrsverbund Tirol VTT (vvt.at). The former is connected to the site osttirol.com and provides extensive **tourist information** about hotels and accommodations, events, services, vacation packages and mobility. The route planner collaborates with this information, proposing an interactive tourism map, where users can look for POIs concerning summer and winter holidays (e.g. climbing crags, bike tours, winter hikes, Sky areas, etc.), as well as services, restaurants, hotels and accommodations, museums and services for disabled people. Mobility information (as bus stops, railway stations, car parks, taxis, ski-busses, garages, charging stations for e-vehicles) is also covered. For all these POIs, the possible PT and multimodal connection are provided. Osttirol route planner is available in Italian, German and English. **VTT** is a public office that deals with the **planning and management** of public transport development in the region of Tyrol. It covers a role of mediation among the several transport operators of the region. On its website, an effective route planner is available. This tool provides all timetables regarding PT. The IMIS of VTT is based on an **interactive map**, realised with the contribution of OpenStreetMap.com and basemap.at. Users can search for many types of information, as POIs regarding administration, health and addresses. The system covers a wide range of transport modes, including busses, subways, trams, city busses, regional busses, long-distance coaches, cable cars, ships, private vehicles as well as bicycle and walking, proposed in the intermodal connections to cover the first/last mile. For every route calculation, users can check different kinds of multimodal possibilities for covering that route: public transports, bike & ride and park & ride. In addition, bicycle, walking and private vehicles are proposed as alternatives. Even if the tourist component is specifically referred to the region of East Tyrol, the mobility information is available at regional, national and transnational levels, thus granting a complete information about accessibility of the area. For this tool, available languages are German and English. In this case, the interaction of mobility with complementary topics as tourism is an essential point to encourage not only the internal mobility, but also the access to the region by public transport.

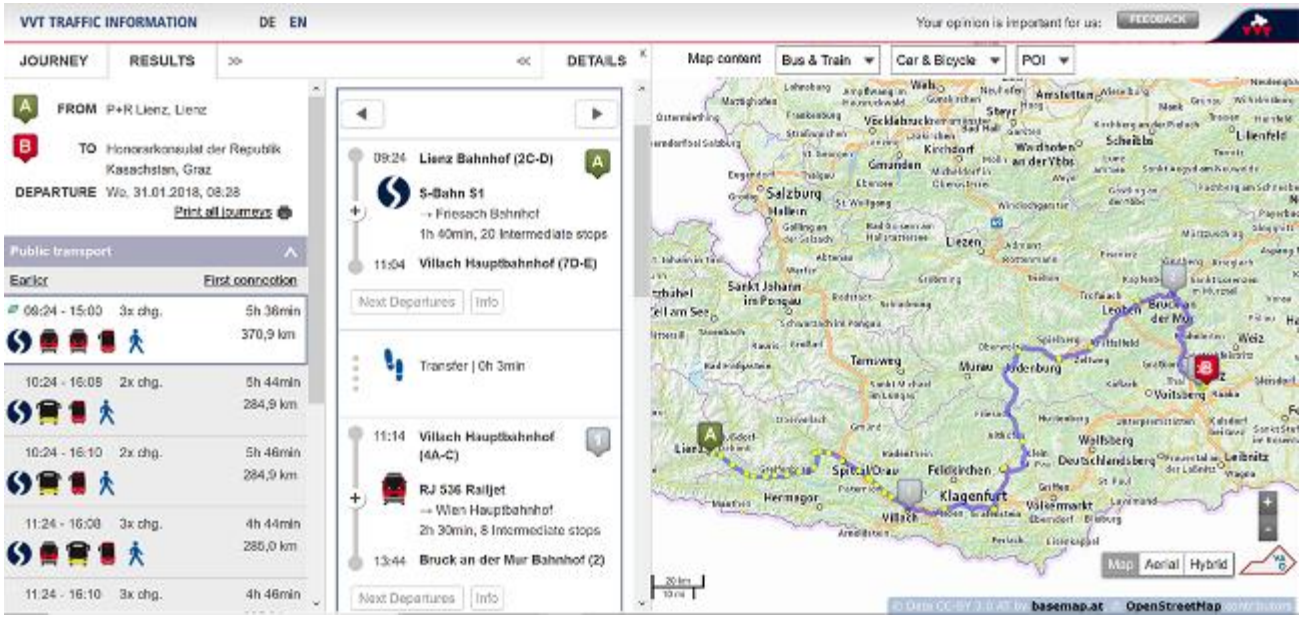

Figure 26: VTT. Route planner. Source: https://fahrplan.vvt.at/bin/query.exe/en?L=vs_vvt

EU-Spirit. European travel information network.

To conclude the section of best practices dedicated to the pre-trip component, a virtuous European initiative is presented. **EU-Spirit Service** is a network coordinated by VBB Verkehrsverbund Berlin-Brandenburg GmbH, and involving currently about fifteen partners, already providing this service to their customers. This initiative can represent well the concept behind the definition of "IMIS" (Integrated Mobility Information Systems). Indeed, the objective of EU-Spirit is to improve the transnational quality of already existing systems at different levels. This improvement is reachable thanks to a **high data exchange** (operation that requires a high effort) and thanks to political and managerial cross-border cooperation. The (on-going) result of this approach is the development of each system currently involved, with several additional information regarding foreign regions. The innovation brought by EU-Spirit are several. Firstly, international door-to-door travel planner information are fed by timetables that are frequently updated, thus guaranteeing a high reliability. Second, the international availability of information confirmed by the **geographical coverage extension** of the systems involved, regardless their scale of interest (which can be local, regional or national). Third, the high usability and user-friendliness of the system. This quality is guaranteed by one main aspect: customers do not need to learn the functioning of a new system or change their habits, they simply find extended information in the system they are used to use. Forth, the involvement of different transport modes, involving the local scale (e.g. busses and subways) and the large one (e.g. ships in the North Sea, airplanes and long-distance trains). Furthermore, even the attention devoted to **real-time data** is significant. In the project, the South Swedish public authority of the Malmö region and the Danish national travel planner were the first that integrated real-time info into EU-Spirit network. The result was an increase of quality in cross-border PT information between the countries, provided by the higher reliability offered. This first test is spreading among the participants for a better diffusion of real-time data. Finally, this European initiative has an open approach to the inclusion of new participants, in order to extent the European attitude desired. Currently, price information and ticketing services, as well as mobile supports and re-routing options in case of delay are some of the on-going development of the initiative.

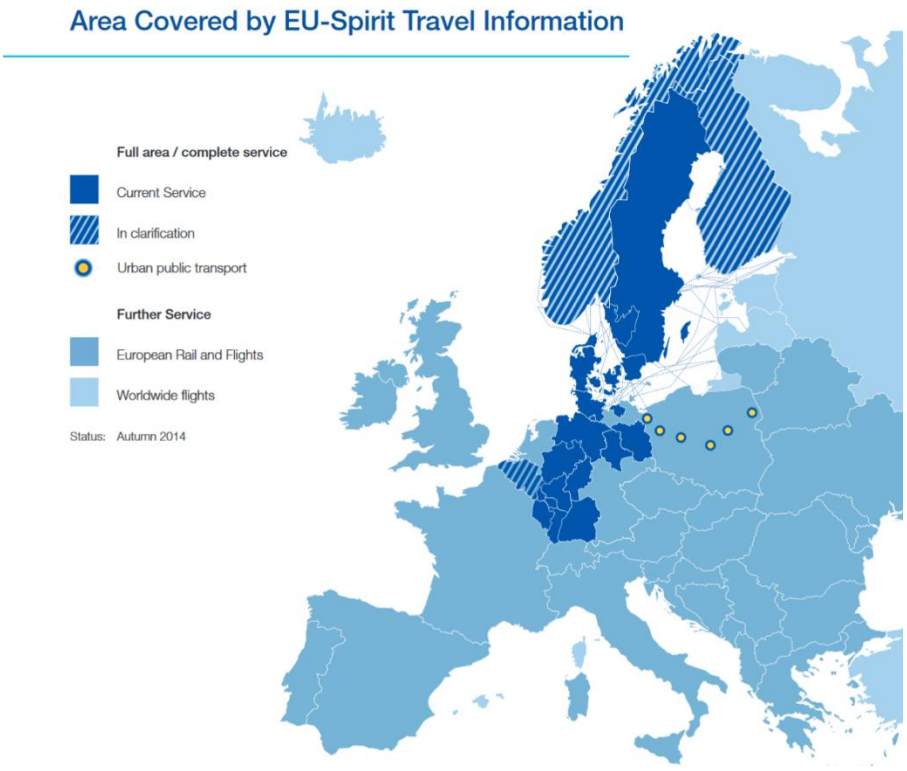

Figure 27: EU-Spirit. Geographical coverage. Source: https://euspirit.files.wordpress.com/2013/02/2015-01-26-eu-spirit_folder_190x260-fc3bcr-webanzeige.pdf

1.3.3. On-trip component

VIAGGIATRENO – Trenitalia

VIAGGIATRENO is one of the MISs provided by to the Italian rail operator Trenitalia. It grants a comprehensive and complete **overview on the real-time situation** of the rail service all over the country. This MIS offers also information regarding the timetable of departures and arrivals in each station and the platforms. VIAGGIATRENO is connected through links to the other services provided by Trenitalia, including the ticket purchasing system. The scale covered by VIAGGATRENO is both **national and regional**, with different levels of detail. It is available both as website and as mobile App (VIAGGATRENO Mobile). The on-trip information is one of the most important features of this MIS. Users can search for the **status of a train** (knowing its number or one of the stations that is served). Starting from this information, the system provides several details: the origin and destination points with their scheduled and actual departure and arrival, real time information about the eventual current delay, the current position of the train with the station already and not yet stopped, the scheduled and real platform for each station and the possible connections to other destinations available in each station. The same information is reachable also following a different way, where users can look for on-trip data using the **national or regional network**. With this tool, users can visualize on the national/regional map either all the types of trains or only some of them (e.g. high-speed trains). Subsequently, with a mouse click on one of the lines, all **trains currently circulating** are listed, with some specific information as the type of train, the code number, the origin and destination, and the current delay (if any). With a further selection of a specific train, users can search for origin and destination with their scheduled and actual departure and arrival, real time information about the eventual current delay, the current position of the train with the station already and not yet stopped, the scheduled and real platform for each station and the possible connections to other destinations available in each station. Finally, wheatear updates of the largest provinces are available thanks to the collaboration with external ISs, and a news service concerning the main and latest updates about rail traffic is offered. VIAGGIATRENO offers information in nine languages: Italian, German, French, Spanish, Romanian, Japanese, Chines, Russian and English. VIAGGIATRENO shows that even the on-trip information can follow a user-oriented approach, providing kind of information and ways of displaying that are intuitive, and focused on the real needs of customers during the journey.

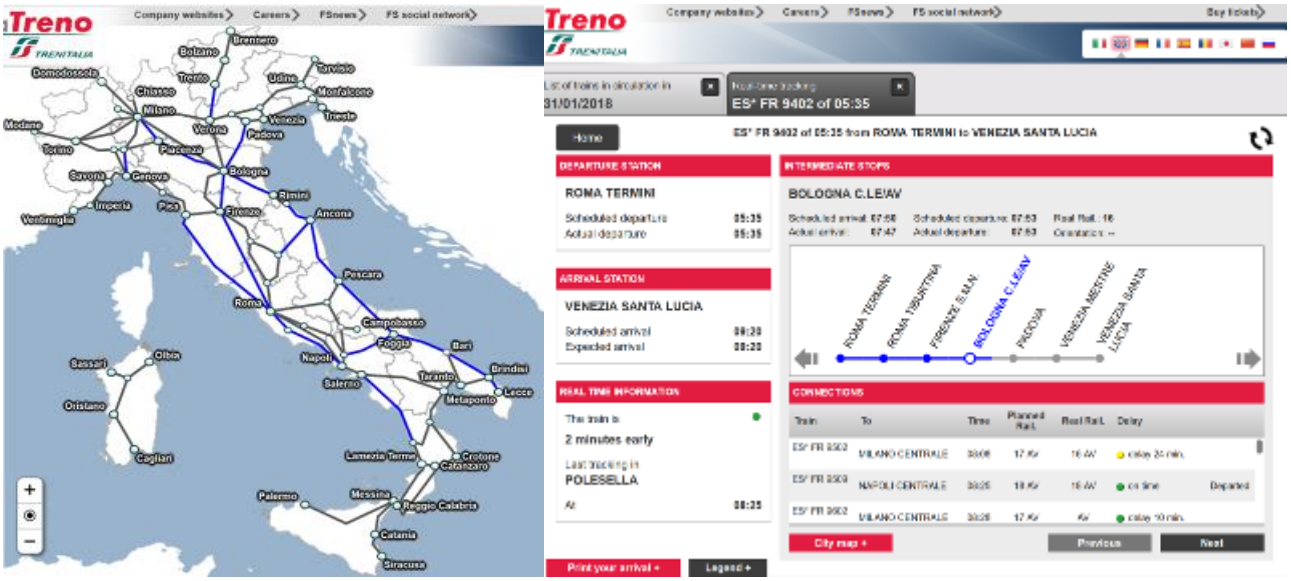

Figure 28: VIAGGIATRENO. Home page. Source: http://www.viaggiatreno.it/viaggiatrenonew/index.jsp

1.3.4. Ticketing system

Schweizerische Bundesbahnen (SBB)

The MIS developed by the **Swiss national rail company SBB** provides information both online and via mobile App (sbb.ch). In particular, the App (SBB Mobile) won the prize Best of Swiss Apps 2016, for its excellent qualities of design and usability, in addition to users experience, functionality and innovation. The **travel planning process** and the ticket **purchasing system** are the two points that are mostly developed by SBB, in order to make the service user-friendly. As regards the first point, SBB Mobile offers the possibility to set a customized "touching time table" where typing the name of origin and destination is not more needed, and where users can set some favorite routes and places regarding their home, place of work and habits, building their own time table, which become their "personal start page". As the filters regarding the route planner tools, even these possibilities of customization may contribute to propose public transport as a door-to-door service, properly tailored on the necessity of customers. Finally, the route calculator tool provides also information concerning the expected level of occupancy of the train, and an "ecocalculator" tool that shows how many liters of gasoline are saved using train. As regards ticketing systems, **SBB Mobile** covers many different typologies (usual tickets for journeys within Switzerland, regional transport tickets, city-city tickets, 9 o'clock travel passes for the half-fare travel card, 1-day travel passes for the half-fare travel card, 1-day travel passes for children, dogs and bikes and the supersaver tickets or the saver day passes). In addition, some complementary services are available (1-day class upgrade, class upgrade for specific routes, class upgrade from 9 a.m., night supplements, special regional network offers, bike reservation and seat reservation). All these types of tickets and integration can be **purchase without passwords** if the cost is less than 40 Swiss francs. To establish this password-free system, SBB is introducing a payment method already adopted in Switzerland in other fields: the **monthly invoicing**. With this tool, customers have just to register their profile for the first time. To propose the monthly invoicing SBB works in collaboration with Byjuno AG, a Swiss company dealing with the field of payment systems for goods and services, which takes care of the entire billing process. SBB provides information in Italian, German, French and English. Considering all the features described, this IMIS shows how much details matter. Proving a user-friendly layout and making the service as much accessible as possible are crucial characteristics of this App, both for the effectiveness of the system and for the perception of users.

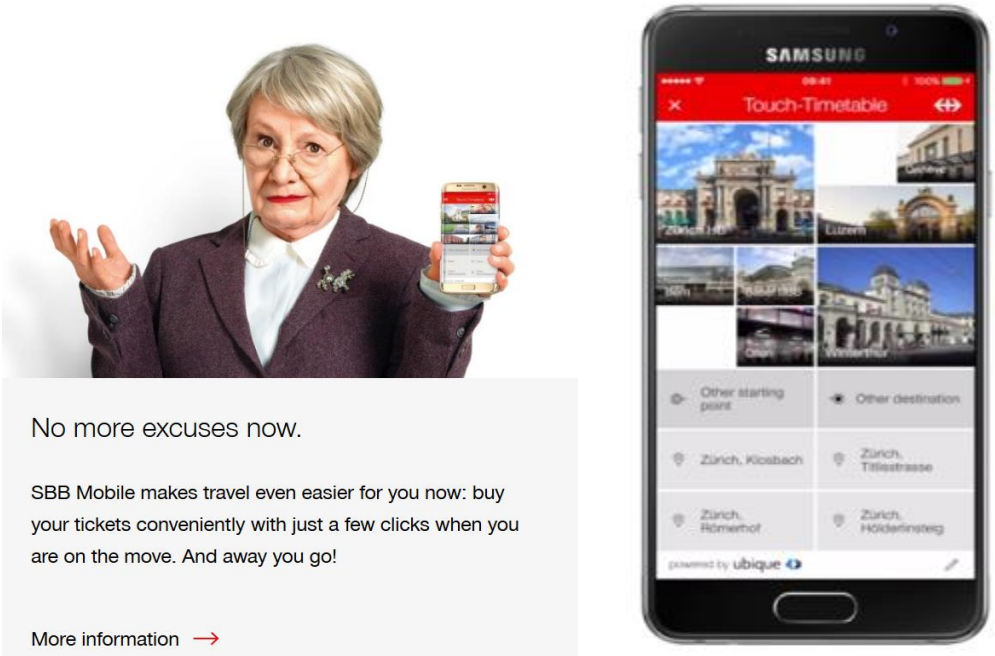

Figure 29: SBB Mobile. Ticket purchasing system. Source: https://www.sbb.ch/en/timetable/mobile-apps/sbb-mobile.html

1.4. Proposed lessons to be told in transnational tools as for INFOMOBILITY

Without the claim of comprehensiveness, the analysis carried out in this deliverable outlines a transnational framework concerning info-mobility in peripheral areas of central European countries. The **SWOT analysis** and the **best practices** contribute to feed this framework, giving an overview of the main opportunities and issues to be addressed in Connect2CE.

The SWOT analysis shows that technical aspects of MISs are important, but not sufficient to provide a good quality of the information. Indeed, MISs are highly influenced by several **external themes**, as the level of political collaboration, the technical feasibility, the availability of services, the organization of transport providers, the presence of integrated tariffs, the complexity of integrative tariff schemes, the specific needs of transboundary commuters, etc. These issues, which are part of the project, contribute to determinate a better quality of the MISs and confirms how the three aspects covered by the project cannot be considered separately. Furthermore, these **specificities** highlight the strong heterogeneity of the areas, and as consequence the need of proposing tailored solution responding to each context in a different ways.

Several aspects contribute to generate these differences, as already mentioned in the deliverable. The **size** of the areas is a crucial one. Indeed, most of the information collected and proposed in the SWOT analysis has a strong link with this aspect. Multimodal MISs are sometimes available at a higher level, but mostly at the local one; on-trip information is a weak point especially in those areas with widespread settlements rather than dense and metropolitan areas. Furthermore, political and managerial difficulties raise in those medium or small-size areas, where all municipalities offer their own systems without a public body that collects them at a higher level. In this framework, also some **trans-regional or transnational** aspects cannot be left aside. IMISs are a clear example: they are able to collect data either from several transport or MIS providers and unify information under a unique tool. This operation can be used at regional, national and potentially even transnational levels. Establishing a political collaboration, and reaching an agreement among transport providers, are essential preconditions, in order to design a clear **geographical and multimodal coverage.**

At the transnational level, these two last features are probably one of the most challenging aspects. A leading role can be played by EGCTs as visible in the Best practices presented in section 1.3. Finally, findings of this deliverable together with TNAs and questionnaires constitute the basis for the construction of a **transnational tool** (D.T.1.3.5), which should allow policy makers understanding which are the most appropriate solutions to be introduced in a specific territory, according to its demographic, economic, geographic and mobility-related characteristics.