DELIVERABLE D.T1.2.2

Territorial needs assessment for South Tyrol

Version 1.0
102017

1. Overview of the selected region

1.1. Delimitation and basic geographical description of the pilot area

The **Autonomous Province of Bolzano/Südtirol** (NUTS3 code ITD10; Figure 1) is part of the Italian region Trentino-Südtirol/Alto Adige. It is located in Northern Italy, bordering the Italian Regions of Lombardy, Veneto and the Autonomous Province of Trento (South), Austria (North) and Switzerland (West). At transnational level, it is part of the Euroregion Tyrol-South Tyrol-Trentino, formed in 1996 between the Austrian State of Tyrol and the Italian provinces of South Tyrol and Trentino.

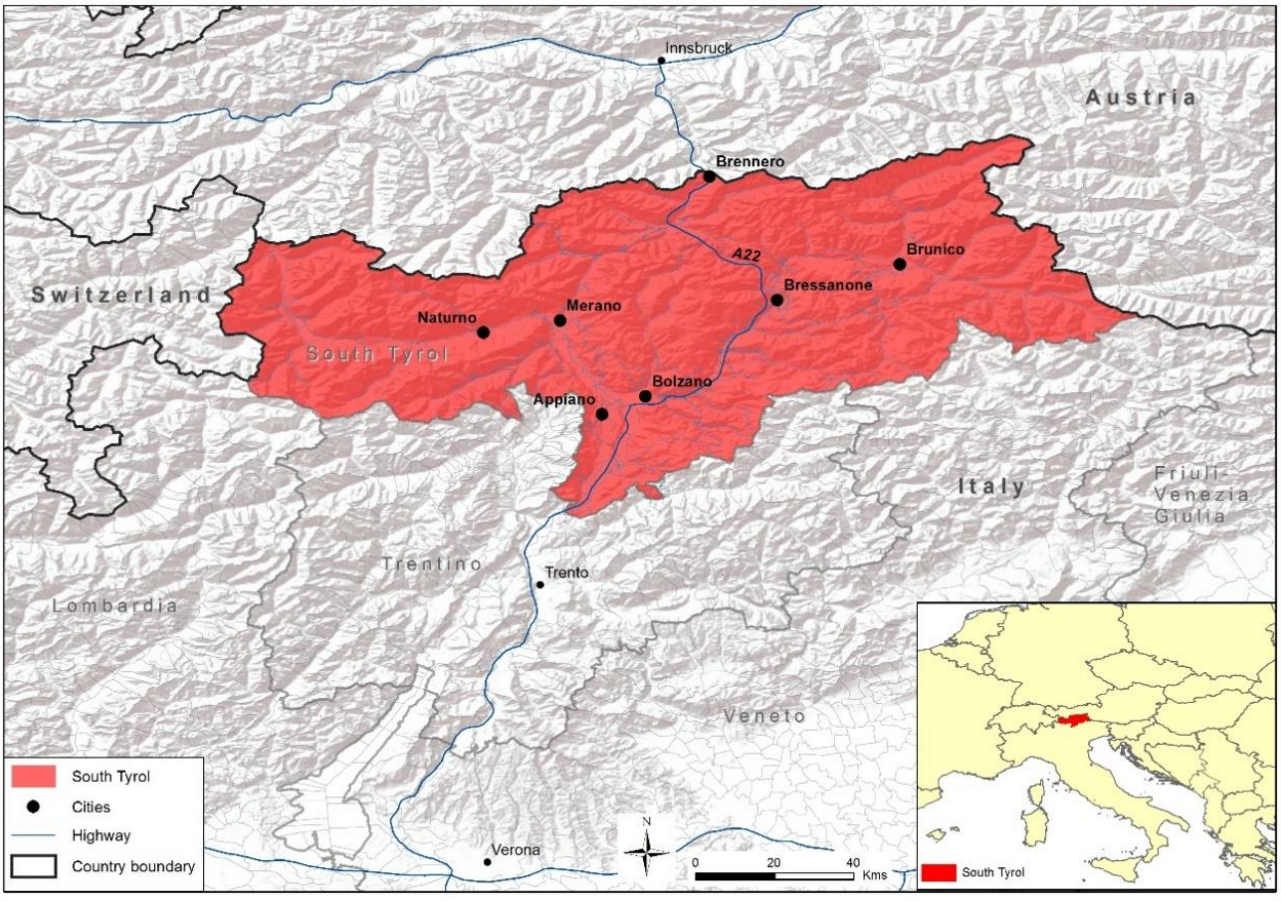

Figure 1: South Tyrol and its territorial context

South Tyrol covers an area of about 7,400 km^2 (80% of which is classified as mountainous and only 6% lies at altitudes and in terrain suitable for human habitation). About 45% of its area is covered by forest, but this figure is in continual expansion. The Province has a high number of natural reserves, including seven nature parks and one national park[1]. The main rivers that run across the Region are the Adige/Etsch (153 km), Isarco/Eisack (95.5 km) and Rienza/Rienz (80.9 km).

South Tyrol (about 525,000 inhabitants) has an autonomous status with wide-ranging powers devolved to the Provincial Government over areas, which would otherwise be regulated by the state (road building, the health and social services, etc.). The province is divided into eight districts (Figure 2): Bozen/Bolzano, Burggrafenamt/Burgraviato, Pustertal/Val Pusteria, Überetsch-Unterland/Oltradige-Bassa Atesina, Eisacktal/Valle Isarco, Salten-Schlern/Salto-Sciliar, Vinschgau/Val Venosta, Wipptal/Alta Valle Isarco. Each of them is headed by a president, the district committee and the district council. The capital is Bolzano/Bozen, which is also the largest town with almost 100,000 inhabitants. Other towns are: Merano/Meran (approx. 36,000 inhabitants), Bressanone/Brixen (approx.17,000), Brunico/Bruneck (approx.14,000), Chiusa/Klausen (approx. 5,000), Vipiteno/Sterzing (approx. 6,000) and Laives/Leifers (approx. 15,000 inhabitants).

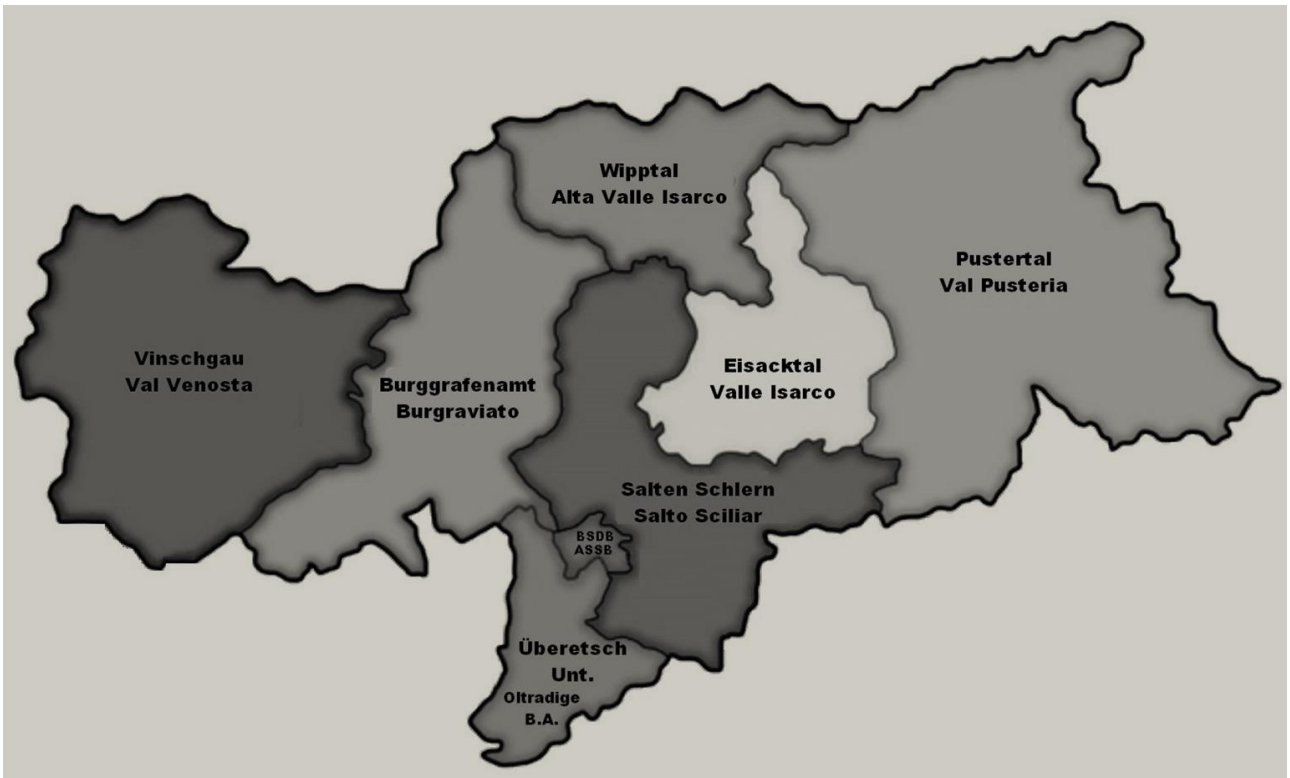

Figure 2: The eight districts of South Tyrol

South Tyrol is an appreciated **tourist region** (Figure 3). It is known for its **nature** and landscape, which is Alpine and Mediterranean at the same time. The vast, warm valleys, characterised by apples, wine and even palm trees, apricots and strawberries, are Mediterranean. However, South Tyrol also has a wilder side: 350 peaks of over 3,000 metres are spread throughout the entire province. The Ortler peak (3,905 m) towers above all other mountains in the eastern Alps. The UNESCO World Heritage Site of the **Dolomites** constitutes a main tourist attraction, both in summer and in winter: about a third of them lies in South Tyrol. Among them, we can recall here the Tre Cime di Lavaredo/Drei Zinnen Dolomite towers with its

[1] The Stelvio/Stilfser Joch National Park, the Gruppo di reserve,the Sciliar Tessa/Texelgruppe nature -Catinaccio/Schlern-Rosengarten Nature Reserve, the Puez-Odle/Puez-Geisler Nature Reserve, the Fanes-Senes-Braies/Fanes-Sennes-Prags Nature Reserve, the Monte Corno/Truder Horn Nature Reserve, the Tre Cime/Drei Zinnen Nature Reserve and the Vedrette di Ries-Aurina/Rieserferner-Ahrn Nature Reserve.

three peaks, the Latemar massif, the Sella-Massif, the Odle/Geisler Dolomite massif and the Alpe di Siusi/Seiser Alm. In between, there are high-Alpine pastures, deep valleys, earth pyramids, lakes and waterfalls. This is an ideal context for sportsmen that can go skiing, hiking, walking, hiking, and cycling. In addition, the cultural aspect constitute another important sector of local economy, as witnessed by attractions such as Ötzi the Iceman in the Museum of Archaeology in Bolzano or the five Messner Mountain Museums, which are also an interesting combination of new and ancient architectures. Furthermore, the region features a large number of castles and churches. The South Tyrol can also benefit of the combination of Italian and South Tyrolean cuisine, as well as typical Törggelen (a seasonal meal featuring young wine). Many visitors every year explore the South Tyrolean Wine Road, with its tradition of more than 3000 years of wine making: it meanders from the Etschtal valley via Bolzano to the Überetsch region and past Kalterer See lake to the Unterland region. Sixteen wine-growing communities border the panoramic road. Other two highlights are the sailing on the Resia lake in Val Venosta, whose main event of the year is the race of the bell tower of Resia Lake and the Sellaronda ski circuit around the Sella Dolomite massif. During the winter season, the Christmas markets in Bolzano, Merano, Bressanone, Vipiteno, Glorenza and Brunico are one of the main attractions (but also a challenge for the management of urban road traffic).

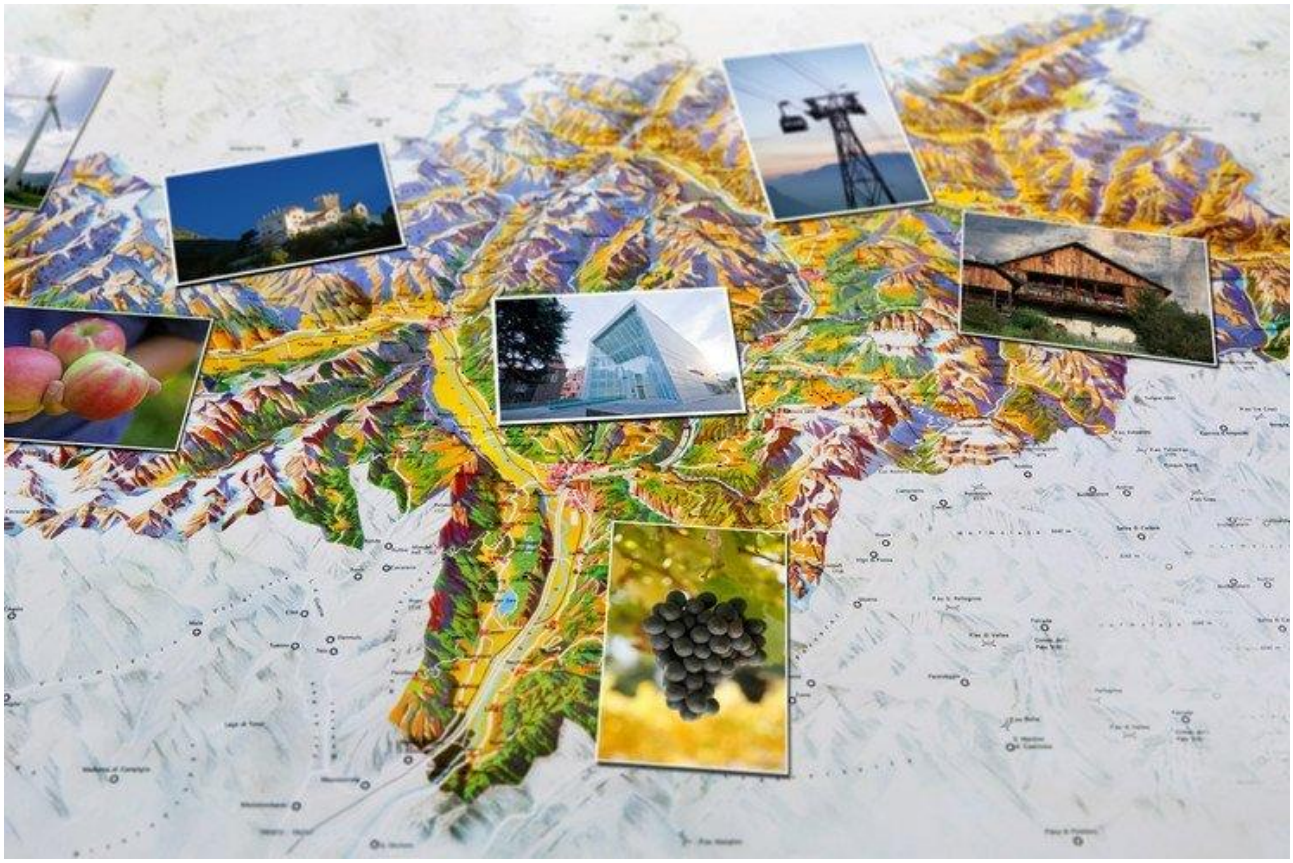

Figure 3: South Tyrol in a nutshell. Source: https://www.suedtirol.info/en/information/important-information/facts-and-figures

1.2. Recent population and demographic trends

In 2016, the resident population was equal to 524,256 inhabitants. It increased by over three thousand units compared to the previous year. The result can be partly explained by the natural balance: births were 5,447 and deaths 4,249 (+1,200). The **increase** is also due to the immigration from other municipalities: almost 12.8 thousand individuals had further increased the resident population, against the 11.6 thousands migrating to other municipalities. The attractiveness of South Tyrol can be mostly explained in economic terms: indeed, South Tyrol is the Italian province/region with the **highest average GDP** per inhabitant (in 2015, €41.141 against a national value of €27.045).

Looking at the demographic trend and considering a broader temporal horizon, a constant increase of the population is visible. Compared to the year 2001 (Figure 4), values registered in 2010 are positive in almost every municipality (red-scale colours), except for some peripheral mountain areas near Merano, in Venosta valley (blue-scale colours). If we extend this analysis over the last century and fix an index equal to 100 for the year 1869 (Figure 5), a constant increase of the population can be detected (grey line). This increase is particularly visible for the main cities: Bolzano and Merano (respectively, red and pink lines) have grown by 7 and 5 times compared to the reference year. However, especially in Bolzano, the growth of the last years is determined only by the immigration, being the number of deaths higher than the births.

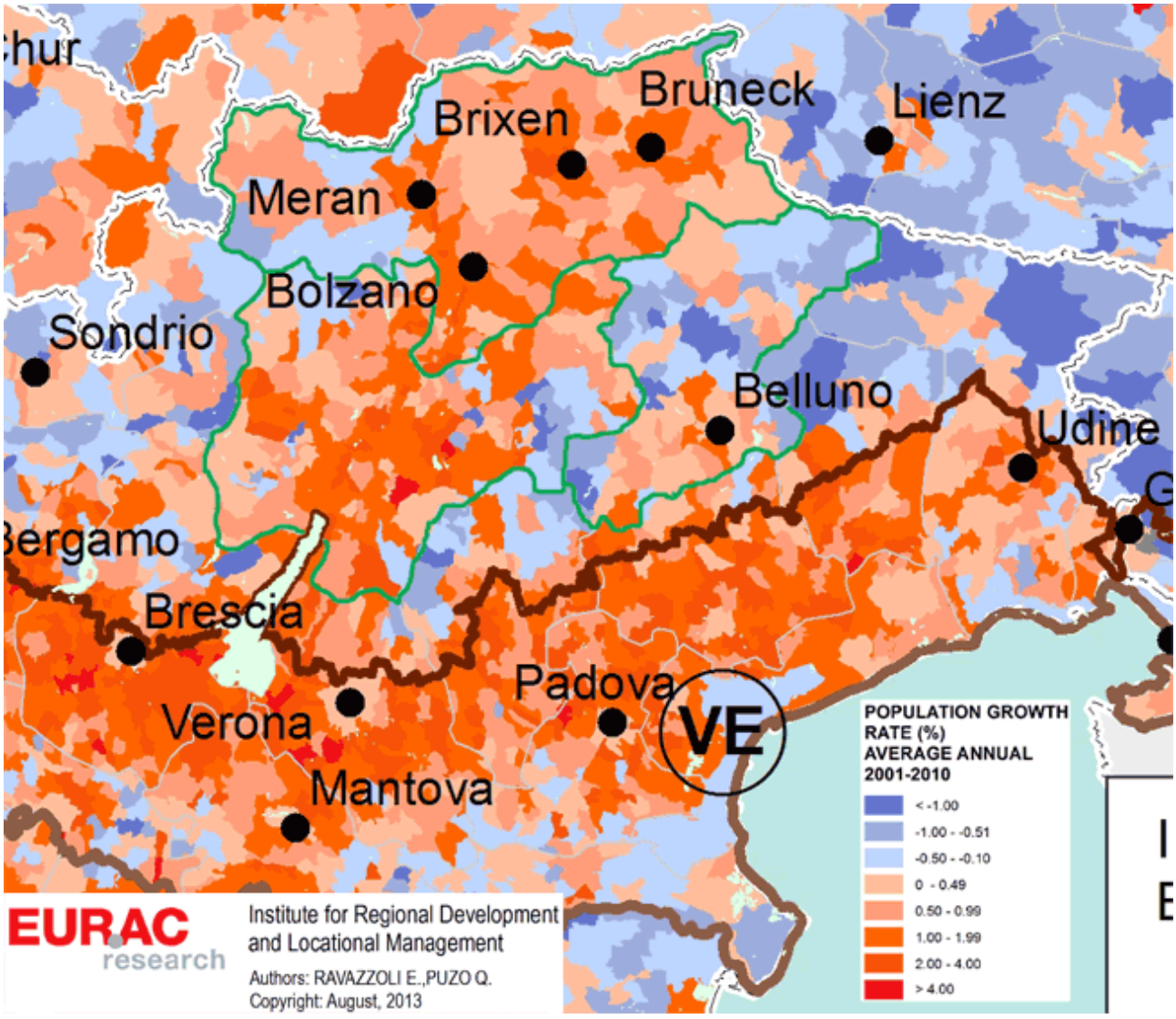

Figure 4: Population growth rate in South Tyrol (variation 2001-2010)

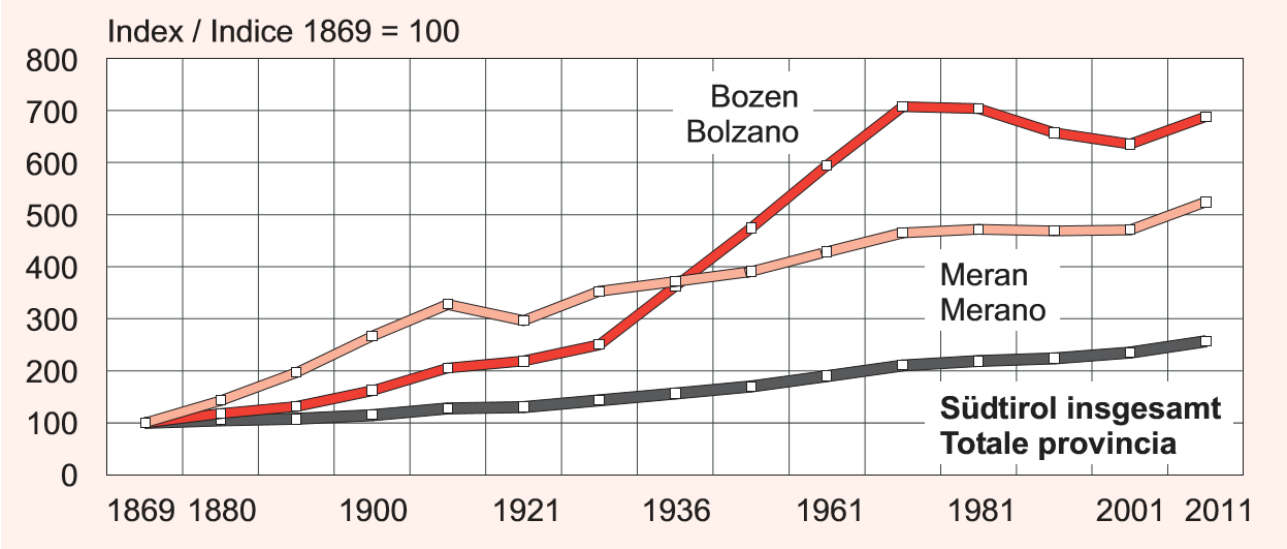

Figure 5: South Tyrol and its demographic growth index. Source: Astat, 2016

The **average age** of South Tyrolean population is 42.4 years, 4 years higher than the values registered 20 years ago. The old-age index (65 years and over) is 121.5 every 100 kids and teenager under 15 years old. It increases dramatically in the main cities: in Bolzano it is 164.1 and in Merano 153.7.

The average number of **people per household** has been significantly reduced in last 40 years, passing from 3.6 in 1971 to 2.4 in 2016. Recently, an inversion of the trend is visible: the average **number of children** per woman of childbearing age has recovered in the last ten years: in 2016, it is equal to 1.75 children, recording the highest national value.

South Tyrol hosts an increasing number of **foreign citizens**: in 2016, 47,325 citizens coming from all around the world are registered in the provincial registry office (about 9% of total population).

1.3. Transport network and accessibility conditions

In terms of **transnational and national accessibility**, South Tyrol is served by the multimodal corridor Munich-Verona, central part of the TEN-T corridor n°1 Helsinki-La Valletta. The main infrastructures that compose this corridor are the Brenner railway line and the A22 Brenner highway. These infrastructures will be flanked by the high speed/high capacity railway line, which is currently under construction in its most complex part: the Brenner Base Tunnel between Innsbruck and Fortezza. Works are expected to finish by the end of 2026. Despite the presence of the Brenner railway, the connection of South Tyrol by public transport with main cities and metropolitan areas is rather weak. This is due to the limited daily number of long-distance trains circulating. Trenitalia, the Italian railway company, grants only five connections to Bologna, Florence and Rome (with the current timetable, the last one departs at 17.16). The Österreichische Bundesbahnen (ÖBB), Austrian national railway company, in collaboration with Trenord and the German national railway company Deutsche Bahn, grants five daily connections from Munich to Verona; one of them continues to Venice and one to Bologna (in the previous years, also a connection with Milan was guaranteed, but now a change in Verona is required). As a result, most of the visitors and tourists (about 90%) come to South Tyrol by car, which is the most adopted transport mode for medium and long journeys.

The provincial **infrastructural system** consists of roads, railways, a civil airport and a limited river and lake network (used for recreational purposes). The extension of the **road network** is 5,016 km, corresponding to 677.8 km each 1,000 km^2. It is constituted by the Modena-Brennero highway (A22, 116 km) and a widespread network of state roads (815 km, whose 31 for the freeway Bolzano-Merano),

provincial roads (1,321 km), municipal roads (2,823 km), and forest roads (1,988 km). The **railway network** covers an overall length of about 290 km, equal to 38.8 km each 1,000 km^2. It is composed by four standard-gauge railway lines: Brenner (Brenner-Salorno, 120 km), Bolzano-Merano (32 km), Val Venosta (Merano-Malles, 60 km) and Val Pusteria (Fortezza-San Candido, 65 km); and one narrow-gauge line (Renon, about 12 km). The network is partially managed at the national level (Brennero, Bolzano-Merano, Val Pusteria) by Rete Ferroviaria Italiana (RFI, the national railway infrastructure manager) and partially at the provincial level (Val Venosta and Renon) by STA - Strutture Trasporto Alto Adige. Finally, "Bolzano – Dolomiti" (code BZO) is a regional **airport** located close to the city of Bolzano. Currently, no scheduled flights are available, but only charter flights in summertime (may-august), with connections to Sicily and Sardinia. International airports are in Innsbruck (120 km to the north) and Verona (150 km to the south), which are reachable also by shuttle transfers of the company Südtirol-Alto Adige bus.

Figures 6 and 7 represent the provincial infrastructural network, with a focus on public transport services. Main **transnational connections** by public transport include the Austrian cities of Innsbruck and Lienz (14 connections per direction per day, respectively along the Brenner and the Val Pusteria railway lines) and the Swiss localities of Martina (13 connections by bus per day from Malles) and Zernez (through the Tubre pass; service guaranteed by the Swiss company AutoPostale). A fourth seasonal connection (only in summertime) is with the Austrian locality of Obergurgl, by bus. According to the National office of statistics, the number of transboundary commuters in the year 2011 between South Tyrol and Switzerland was 649; between South Tyrol and Austria was 216; between South Tyrol and Germany was 6. Almost 75% of them used car to reach the destination (66% as driver, 8% as passenger), while public transport is limited to 25% of total journeys.

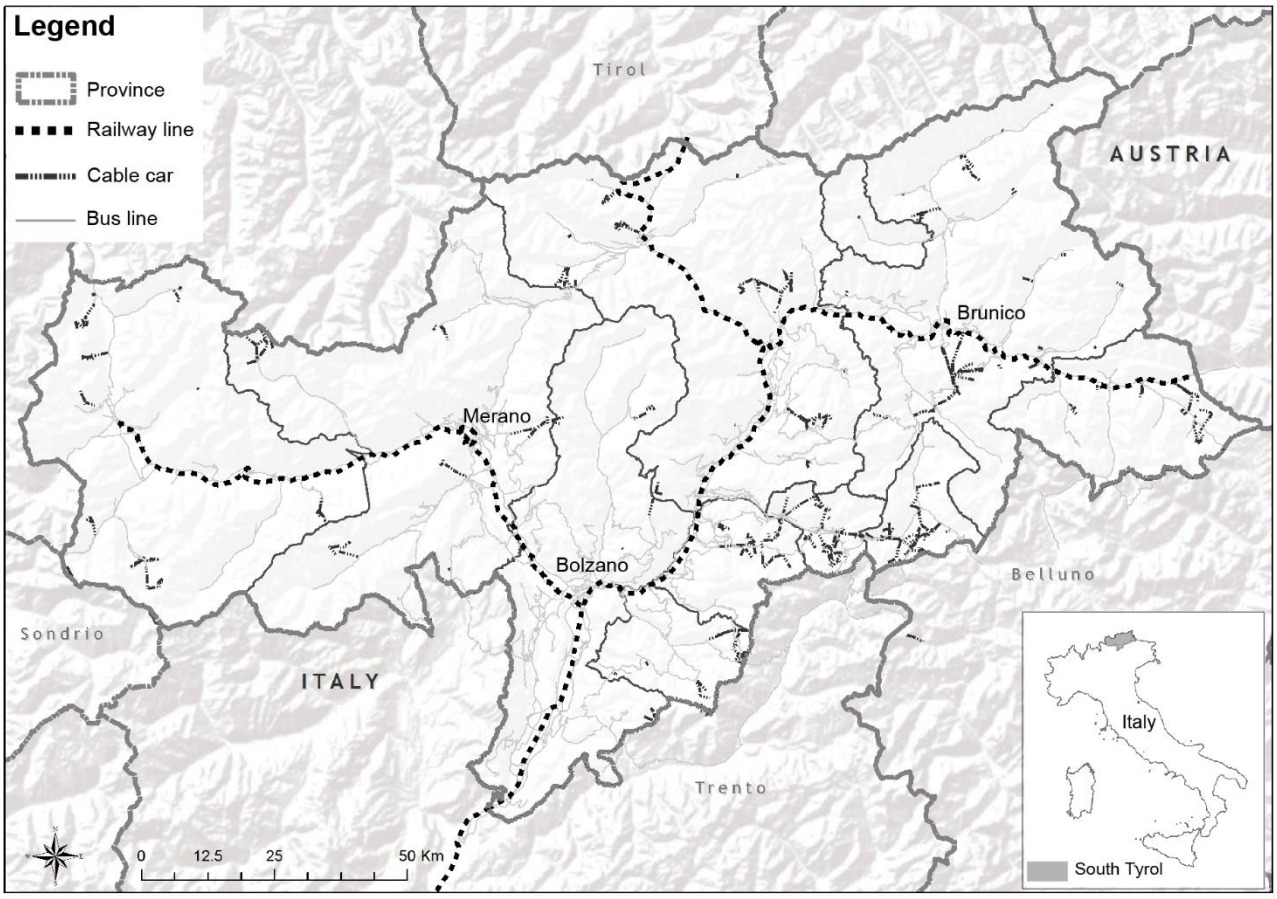

Figure 6: Map of the public transport system in South Tyrol

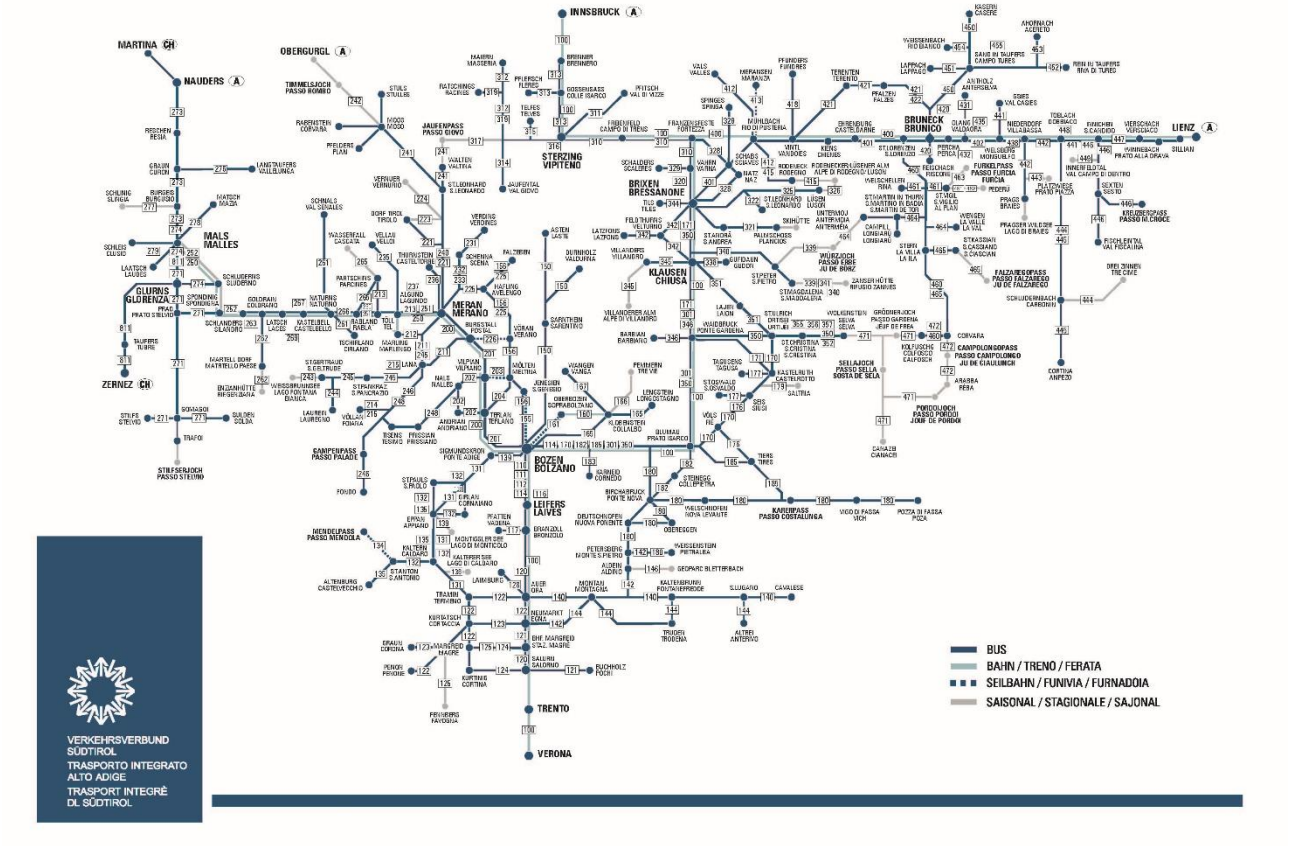

Figure 7: Public transport lines in South Tyrol. Source: https://www.sii.bz.it/sites/default/files/netzplan_a3_3.pdf

In South Tyrol, the **level of motorisation** is high: about 830 vehicles every 1,000 inhabitants (year 2015). These figures make this Province one of the most motorised in Italy (which, in turn, is known to have the highest values among EU countries - Istat, 2013[2]).

As for the **modal split** referred to work and study purposes (Astatinfo, 2017), car is the most adopted transport mean (36%), followed by foot (25%), bike (13.9%), Urban bus (9.7%), Train (6.2%), suburban bus (5.8%) and motorcycle (2.2%). These figures are mostly valid at the urban level; when passing to a broader territorial scale, car (75%) and public transport (19%) are the most adopted transport means (RST, 2012).

The average **commuting distance** is about 20 km. Some specific routes to reach the city of Bolzano from the neighbouring municipalities present the highest daily numbers of working commuters, with the related traffic issues. Particularly, the connection with Laives and with the so-called "Bassa Atesina" (municipalities located southern of the Province, such as Appiano or Caldaro) create daily congestion along the main southern accesses to the city. Furthermore, the connections between main provincial centres (e.g., Merano-Bolzano, Bressanone-Bolzano) are also worthy to be mentioned. The commuters for studying purposes gravitate mostly towards the cities of Bolzano and Innsbruck, including the main localities (e.g., Bressanone, Vipiteno) along the Brenner railway line.

[2] Istat (2013): Indagine multiscopo sulle famiglie "Aspetti della vita quotidiana". Autovetture. Più di 3 autovetture ogni 5 abitanti. Online at: http://noiitalia2011.istat.it/fileadmin/user_upload/allegati/80.pdf [25.06.2013]

1.4. Organisation of transport sector and key stakeholders

Public transport in South Tyrol is characterized by the integration of different transport modes into a single system of fares and schedules. The integrated transport system includes all urban and suburban busses; regional trains for the lines the Province is responsible for and up to Trento (long distance trains, such as Intercity, Eurocity, Euronight, Le Frecce are not included); the Mendola funicular; the Renon line train; the cableways of Renon, San Genesio, Colle, Verano, Meltina and Maranza. In this framework (summarized in Figure 8), every transport system has its own specific role: trains are the backbone of the network and aim at connecting the main cities and villages; buses, cable cars and funiculars should increase the accessibility of more remote areas, while urban busses guarantee the mobility within urban centers.

At the institutional level, the **Transport Office of the Autonomous Province of Bolzano** is the political territorial body responsible for passenger mobility and transport. Currently, it is flanked by the **Agenzia provinciale per la mobilità/Landesmobilitätsagentur**, whose aim is to support the Transport Office in the development and diffusion of timetables to customers, communication and marketing activities, statistics and mobility management. However, in light of its closure (expected by the end of 2017), these activities have been gradually assigned to **STA - Strutture Trasporto Alto Adige Spa**, the in-house society of the Department for Transport Office, who manages infrastructural works (mostly rail) to renew the network of public transport in South Tyrol. This society has been selected also to update the info-mobility and payment systems (see also section 2.2).

At the operative level, there are five main transport operators. **SAD Trasporto Locale Spa** is the main local public transport society in South Tyrol. It is responsible for suburban provincial busses, local railway service (Renon and Val Venosta railway lines), urban transport in cities other than Bolzano and Merano (CityBus service), cableways (Renon and San Genesio), Mendola funicular. **SASA** operates urban and suburban services in the Municipalities of Bolzano, Laives, Merano and Lana. **LiBUS** is a consortium of 19 small and medium companies from South Tyrol, which manages about 350 vehicles (200 of them are used for local public transport). **Trenitalia Direzione Provinciale Bolzano** is responsible for the circulation of trains along the Brenner (Brenner–Trento), Val Pusteria (Fortezza-San Candido) and Bolzano-Merano railway lines. According to the service contract, 130 trains during working days, 100 on Saturdays and 71 on Sundays have to be guaranteed. Finally, **ABD Airport SPA**, owned by the Autonomous Province of Bolzano since 2009, manages the Bolzano airport.

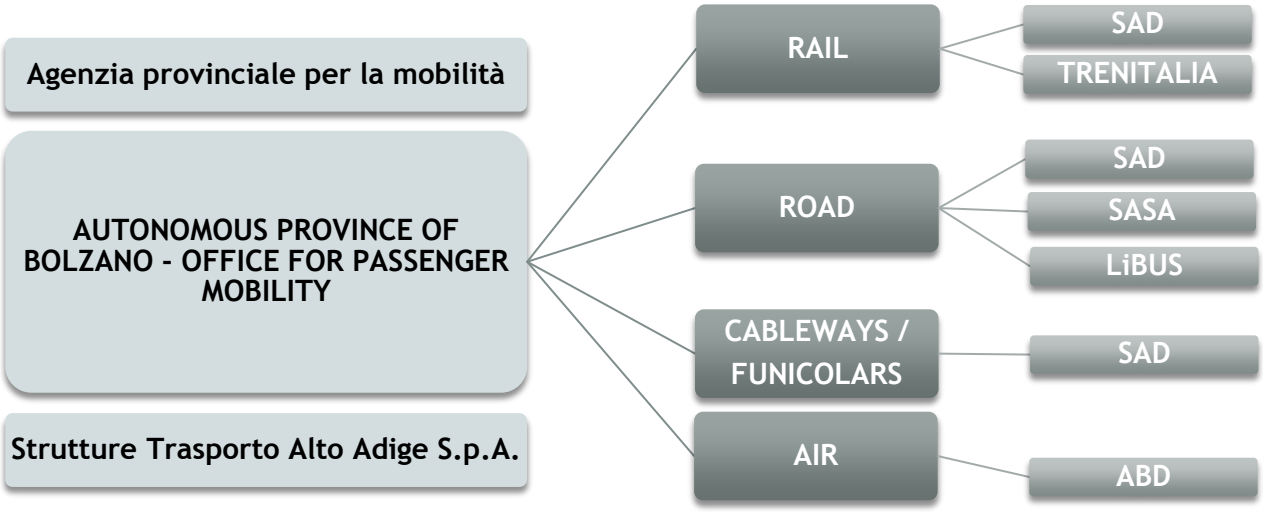

Figure 8: Key transport stakeholders in South Tyrol

2. Territorial needs assessment

2.1. Connectivity

General data regarding supply and demand in South Tyrol derive from a study made by RST (2012[3]) and are reported in table 1. It is interesting to observe that PT **supply** in South Tyrol is significantly higher than in the rest of the country (the ratio is 1.49). On parallel, also PT **demand** is higher, with a ratio equal to 1.44. It could be argued that to satisfy such demand, operative costs have to be higher than the national value. In absolute terms, this is true, since the demand is higher. However, referring to the unitary cost per passengers/Km (€xP/Km), the weighted values deriving from the urban and suburban components reveal an opposite result: unitary Italian costs are equal to 0.24 €xP/Km, while for South Tyrol are equal to 0.22 €xP/Km.

Supply and demand for local public transport – a comparison between Italy and South Tyrol		
	Italy (IT)	**South Tyrol (ST)**
Vectors/km produced per 100 inhabitants	3.0	4.5
Passengers/km per 100 inhabitants	47.7	68.8
Bus/km produced per 100 inhabitants (ST/IT)	1.49	
Passengers/km per 100 inhabitants (ST/IT)	1.44	
Cost per passenger/km (urban)	0.30	0.24
Cost per passenger/km (suburban)	0.19	0.21
Cost per passenger/km (weighted average urban & suburban)	0.23 €	0.22 €

Table 1: Key numbers referred to South Tyrolean and Italian public transport. Source: RST, 2012

The current high standard of connectivity granted by **public transport** in South Tyrol is the result of a process started at least ten years ago, with the decision to enhance local public transport and particularly the rail one. Currently, regional trains cover a yearly distance equal to 5.88 million km (2.52 by SAD and 3.36 by Trenitalia), while public buses (as city, urban and suburban buses) cover 31 million km, for a total of almost 37 million km. In this framework, rail transport is the backbone of the medium or long journeys, while buses grant a widespread connection to final destinations.

Rail transport has shown the highest relative increase in last years. Out of the 53.3 million validations in 2016, 9.8 million have been registered at train stations (they were 6.2 in 2013, with an increase by 58%). Compared to the levels of 2005, the number of passengers along the Val Pusteria railway line has increased by three times, from about 300,000 to more than 1 million. Similarly, an increase in passengers along the Val Venosta railway line has been registered (from 1 million in 2005 to 2.7 million in 2009). This is mainly due to the high infrastructural investments made by the Autonomous Province, such as the renewal of the stations, as well as the vehicular fleet (the average age of the trains is about 12 years, the best performance in Italy). These initiatives are not finished yet: the electrification of the Val Venosta line, as well as the renewal of the infrastructures (rail bypass "Val di Riga" for the Val Pusteria line) are already under development or in an advanced phase of project. Furthermore, the introduction of a harmonized provincial timetable (Figure 9) has contributed to the rapid growth of this transport mode.

[3] Ricerche e servizi per il territorio, 2012. Vincoli e potenzialità del sistema della mobilità nella provincia di Bolzano.

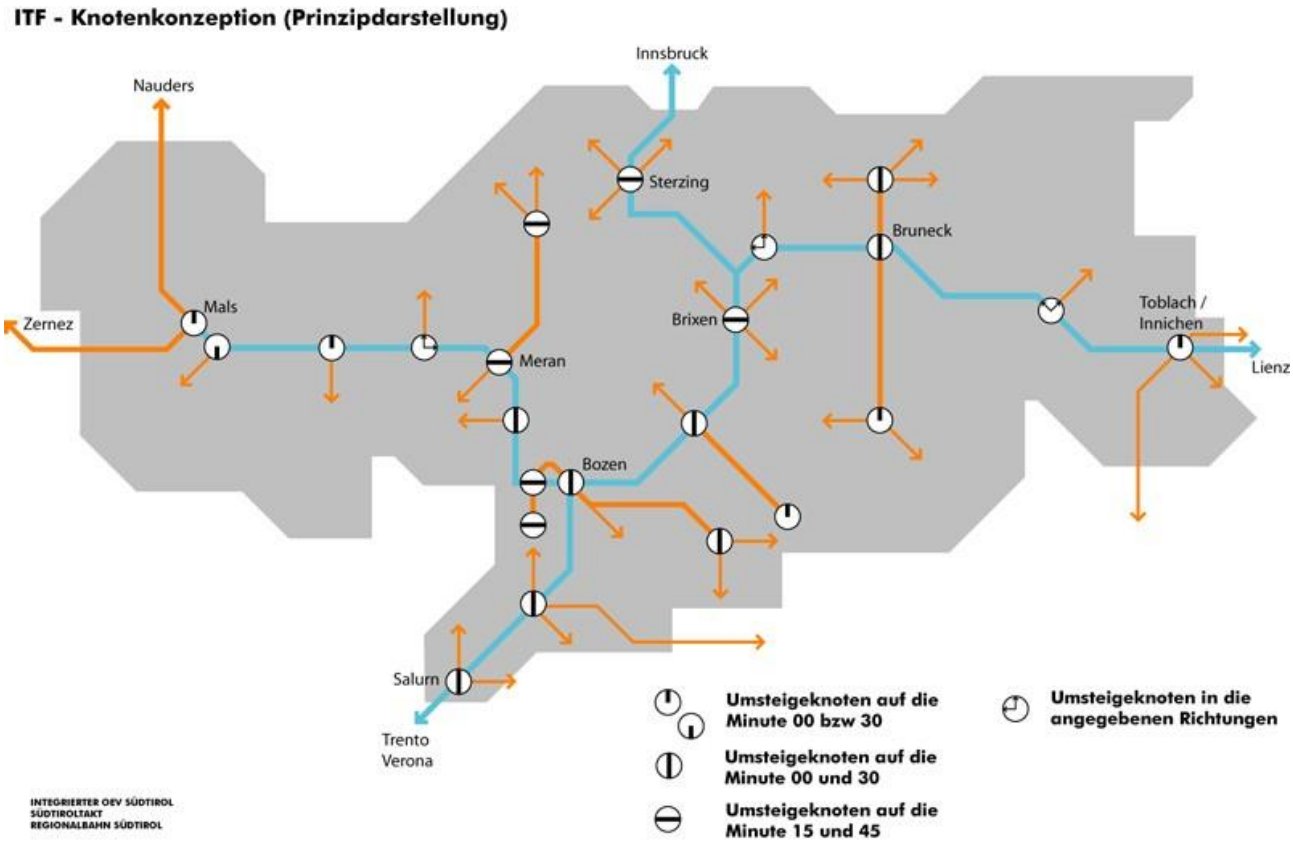

Figure 9: Harmonized timetable in South Tyrolean public transport. Source: http://www.ibv-zuerich.ch/201080-s%C3%BCdtiroltakt.html

Integration is not limited to public transport, but it includes some important **seasonal tourist infrastructures**. The Val Pusteria train, during the wintertime, can be used as privileged transport mean to reach directly the famous ski areas of Kronplatz and Sextner Dolomites (Figure 10). During summertime, trains along Val Venosta and Val Pusteria are also widely integrated with bicycle lanes.

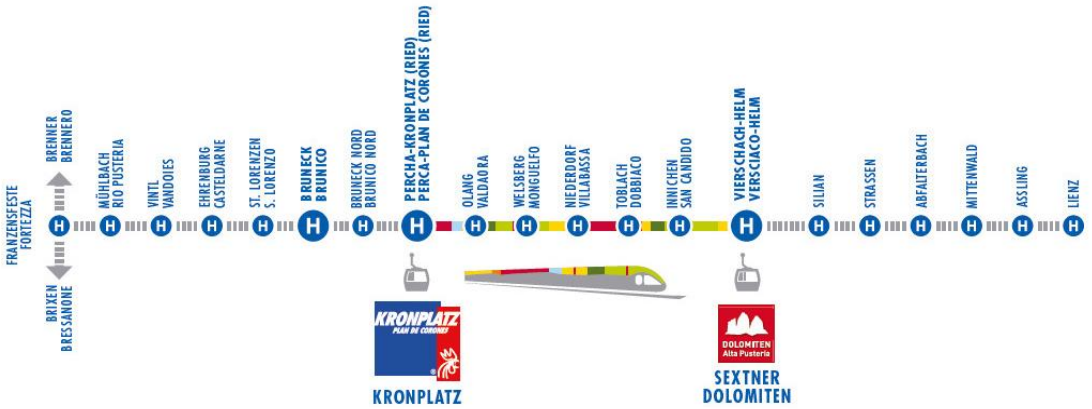

Figure 10: Integration of train and ski areas. Source: http://www.kronplatz.com/en/planning-booking/local-mobility/ski-train

From a legislative perspective, the Provincial law 23 November 2015, n. 15[4] rules all main aspects related to public transport. According to this law, the operation of public transport services has to be regulated by **public service contracts**, which have a validity of less than 10 years for buses and less than 15 years for trains, cableways and funiculars. Worthy to be mentioned, there is currently not any ongoing air Public

[4] http://www.provincia.bz.it/news/it/news.asp?news_action=4&news_article_id=600063

Service Operation. In the previous years (until 2016), the link from Bolzano to Rome Fiumicino via airplane was guaranteed as PSO, but it is currently suspended.

As for the **transport costs**, unitary contracted cost for bus operations are equal to €2.6298/km for suburban buses and €2.8897/km for urban buses. For rail transport, costs are different according to the service providers and the railway line: for Trenitalia, they are €10.99/km; for SAD, they are €12.23/km (RFI network) and €7.86/km (Val Venosta line). Overall, the proportion of total operating costs covered by fares at the provincial level is relatively low (about 24%). This percentage is higher than in 2011 (about 16%), but noticeably lower than the values recommended by the EU (35%). This determines a high provincial subsidy for public transport (€5,500M), equal to about 64% of Public Transport Department's budget and 2.17% of total Provincial budget. This large amount of money used to subsidize public transport has positive results in terms of use of public transport, which is among the highest values per capita in Italy. Also results in terms of public satisfaction are positive: on a scale from 1 to 10, average values are evaluated equal to 7.5. Constant surveys are performed to monitor this indicator, with a focus on specific transport modes and specific types of users (residents or tourists[5]).

Current **cross-border connections** from South Tyrol involve both Austria and Switzerland (see also section 1). Regarding CH-IT connections, the Swiss company AutoPostale guarantees, the regular service between Engadina (Zernez) and Malles (Figure 11). Timetables are harmonized with the railway line Merano-Malles, but the integrated payment is not possible and separate tickets have to be purchased. Indeed, the bus connection from Malles to Nauders and Martina (and vice-versa), guaranteed by the provincial concessionaire SAD, is integrated into the South Tyrolean information and ticketing systems. Regarding AT-IT connections, the train connections to/from Lienz and Innsbruck are performed hourly in both directions, either with a direct train (by SAD or Trenitalia in collaboration with ÖBB) or with a change at the Brenner station (in this case, timetables between Italian and Austrian railways are harmonized). It is possible to pay with the South Tyrolean Mobility pass (see section 2), but tariffs are not harmonized (the Austrian ones are more expensive than those applied in South Tyrol are).
In terms of performances, the **commercial speed** along the Brenner line is quite competitive. For example, the average speed from Innsbruck to Bolzano is 62 km/h (125 km, 2h 00m). Indeed, the connection to Lienz and East Tyrol is less competitive, also due to technical characteristics of the railway line: average speed is 47 km/h (75 km, 1h 39m).

Figure 11: Harmonized timetable in South Tyrolean and Swiss public transport

[5] An example of these surveys can be found at: http://www.interregiorail.eu/2012-01-10_REPORT_INTER-Regio-Rail_it-file=136dextQvgkt5.pdf&name=2012-01-10_REPORT_INTER-Regio-Rail_it.pdf.pdf

As far as the **cross border commuting demand** is concerned, the most recent survey[6] has indicated more than 1,500 commuters between Val Venosta and Switzerland (Grisons) and about 50 between Austria and South Tyrol. However, these figures are not realistic, especially for the AT-IT connections. Hence, the official Italian statistics (Istat, 2011) is to be preferred. It reports 649 daily commuters between South Tyrol and Switzerland, 216 between South Tyrol and Austria and 6 between South Tyrol and Germany. By taking into account this last source, it is possible to understand other features of transnational commuting, such as the cross-border modal split, the gender and the purpose of the trip. With almost ¾ of total travels, car is the most adopted transport mean, followed by public transport (25%, whose 15% by train and 10% by bus). The purpose of the trip is primarily related to work (83%) and secondarily to study (17%). As for the gender, 58% and 42% of the journeys are performed, respectively, from male and female.

[6] http://www.ilfoglio.it/economia/2016/09/07/news/dalla-venosta-alla-svizzera-piu-di-mille-transfrontalieri-altoatesini-103715/)

2.2. Infomobility and ticketing systems

a) INFOMOBILITY

Information about mobility is currently provided by the journey planner **"Südtirol Mobil/Mobilità Alto Adige"** (http://www.suedtirolmobil.info/; Figure 12), managed by STA – Strutture Trasporto Alto Adige SpA. This information system, which is also available as app for smartphone (AltoAdige2Go), is completely financed by public funds. It provides reliable and update information about how to move within the entire South Tyrol using the local public transport (including urban, suburban and city buses, trains, cable cars and funiculars), thus allowing users to plan their door-to-door journey.

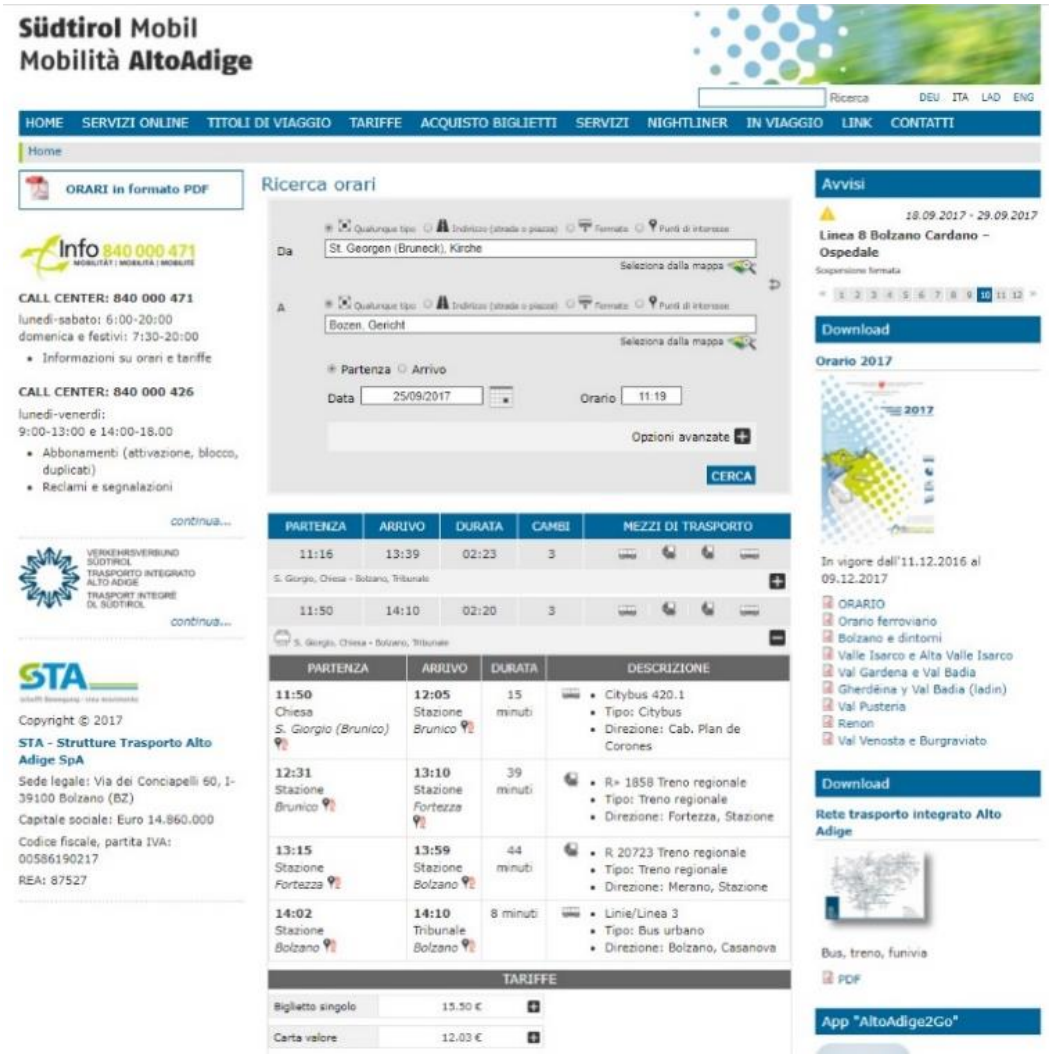

Figure 12: The journey planner "Südtirol Mobil/Mobilità Alto Adige". Source: https://www.sii.bz.it/it/siitimetablesquery

In the past years, the transport provider SAD and the Mobility Agency of Bolzano managed this system. With the recent passage to STA, some improvements have been provided. The **technical backbone** has not changed significantly, being based on EFA for online timetable information system and DIVA version 4 for timetable planning. However, the extension of the **territorial coverage** has been grown. Currently, it includes about 5,900 stop points located in South Tyrol, in the neighboring Autonomous Province of Trento, in the Province of Belluno, plus the railway stations of Tirol and east Tirol and the bus stops in the Grisons. The definition of the territorial context is still ongoing and in the next two years it is expected a further extension, including the Italian Provinces of Pordenone and Udine, as well as the North Tirol. The inclusion of the entire Austrian network is still under discussion. Information is provided in the three official languages of South Tyrol (Italian, German and Ladin) and English. According to the provincial law

about public transport, data is public and it can be gathered through an open xml interface (no VPN-tunnels or passwords are required).

Regarding the available **type of information**, users have several alternatives: they can either search for specific addresses, or insert the name of the stop, or the name of the closest point of interest. The journey planner provides information about schedule, route, travel times, point of interests, changes, stops and fares. Last mile connections are also provided, but only considering walking as possible option; in two years, it is expected the integration of bicycle and car as further alternatives. The user can also insert further specific requests: they deal with restrictions (selecting only specific transport system), the selection of the shortest travel time or the option with less changes, the selection of journeys that require no longer than an amount of minutes selected. Currently, it is not available the option that allows selecting only stops with adequate infrastructures for disabled people.

Another important channel to receive real-time and pre-trip information about public transport is the official **call center** (from Italy: 840 000 471; from abroad: +39 0471 551 155). At national level, the cost of the service is limited to the call setup fee, while for foreign countries tariffs are fixed by the telephone company. It operates from Monday to Saturday from 06.00 to 20.00; on Sunday and bank holidays from 07.30 to 20.00. The call center guarantees information about timetables of the public transport in South Tyrol, railway connections to/from Austria, Italy, Germany and Switzerland. Furthermore, it provides details about tariffs, tickets and sales channels.

On-trip information is currently a critical aspect of the South Tyrolean information system. Today, real-time data for sub-urban buses is not available. Information about urban buses, obtained through GTFS Data Exchange, is shown in selected panels at bus stops; however, results are not completely reliable. Indeed, information is only a "virtual" real time, based on the scheduled timetable, rather than actual position of vehicles. To overcome this issue, some experimental tools have been developed by specific transport providers, which however do not cover the entire territorial context. For example, http://bus.merano.eu/# is valid only for the cities of Bolzano and Merano. The app Viaggiatreno (http://www.viaggiatreno.it/viaggiatrenonew/index.jsp) provides detailed and real-time information about regional trains managed by Trenitalia. In two years, this condition is expected to change significantly. STA, through the FESR project BINGO (Broad INformation Goes Online), is introducing a widespread and technically updated solution to deal with this issue. Based on the SIRI protocol (Service Interface for Real-time Information), information will be available regarding travel time and route updates, real-time warnings, accidents and traffic deviations.

b) TICKETING

Ticketing system in South Tyrol is based on an integrated tariff scheme (see next section). Available ticketing systems are four: Südtirol/Alto Adige pass**,** card, a prepaid ticket or a standard ticket (Figure 13).

Südtirol/Alto Adige pass include standard Südtirol/Alto Adige pass, 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. These passes are electronic, nominal and non-transferable and can be used on all public transport means in South Tyrol. They can be requested on-line (*una tantum* cost: €20) and they can be associated to a bank account or work as a prepaid card (minimum amount rechargeable €20). All journeys and invoices are visible at the website https://www.sii.bz.it/altoadigepass/. This system is mostly used by the inhabitants of South Tyrol: at the beginning of the year 2015, 132,831 AltoAdige Pass were active (88,809 of them standard and 44,022 as EuregioFamilyPass). By including 6,000 Alto Adige Pass „free", about 1/3 of South Tyrolean citizens own this type of ticketing system (this datum does not include passes for students and elder people).

Three different **cards** are available. The **bikemobil Card** is a combined ticket that allows renting a bike and using South Tyrol's Integrated Public Transport network, including the PostBus Switzerland service between Malles and Müstair (CH). It is available for 1, 3 or 7 consecutive days. **Mobilcard** allows the unlimited use of public transport system in South Tyrol for 1, 3 or 7 consecutive days. The

museumobil Card combines museums and all means of public transport in South Tyrol and can be valid 3 or 7 days.

The **prepaid ticket** is a transferable ticket that can be bought at values of 10, 25 or 50 Euros. It can be bought at train stations, ticket vending machines located at stations, or at tobacconists. Those using a prepaid ticket will save one third off the price for every kilometre of inter-city travel and one third off the price of urban travel. Before beginning any journey, the prepaid ticket must be stamped at the blue machines located at the train stations or on the bus itself.

Standard tickets can be bought at the train stations or on the bus, must also be validated at the ticket machines before beginning a journey.

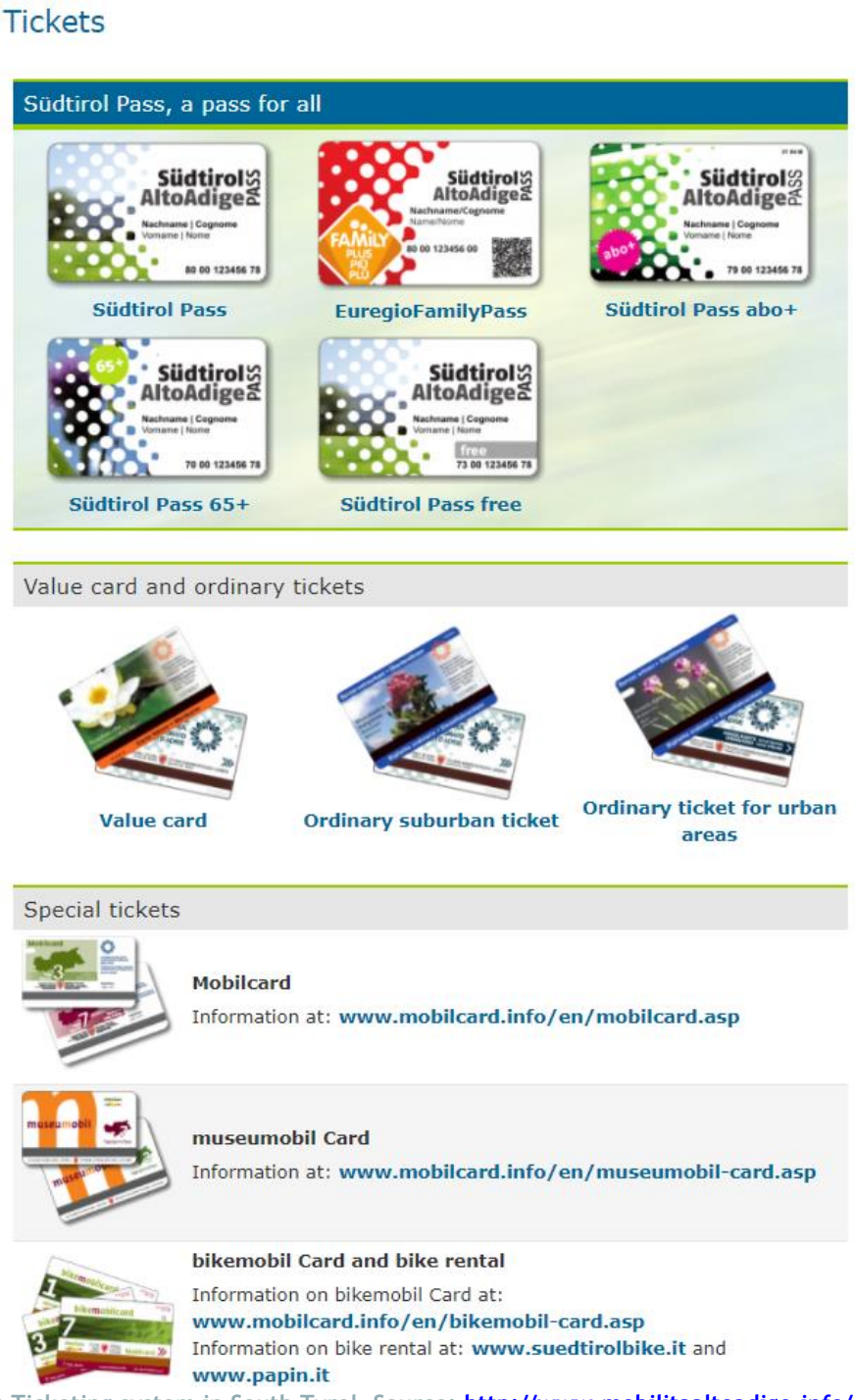

Figure 13: Ticketing system in South Tyrol. Source: http://www.mobilitaaltoadige.info/en/tickets

Finally, it is worthy to be mentioned that some of the aspects described above are going to be further improved. STA, responsible for the infomobility and ticketing system, through the FESR project **BINGO** (Broad INformation Goes Online), is now working on a new integrated system. Its architecture, which is shown in Figure 14, update the current information and ticketing system adopted in South Tyrol. The new version of the model will be presented to Connect2CE PPs in May 2018, during the technical workshop that will be held in Bolzano.

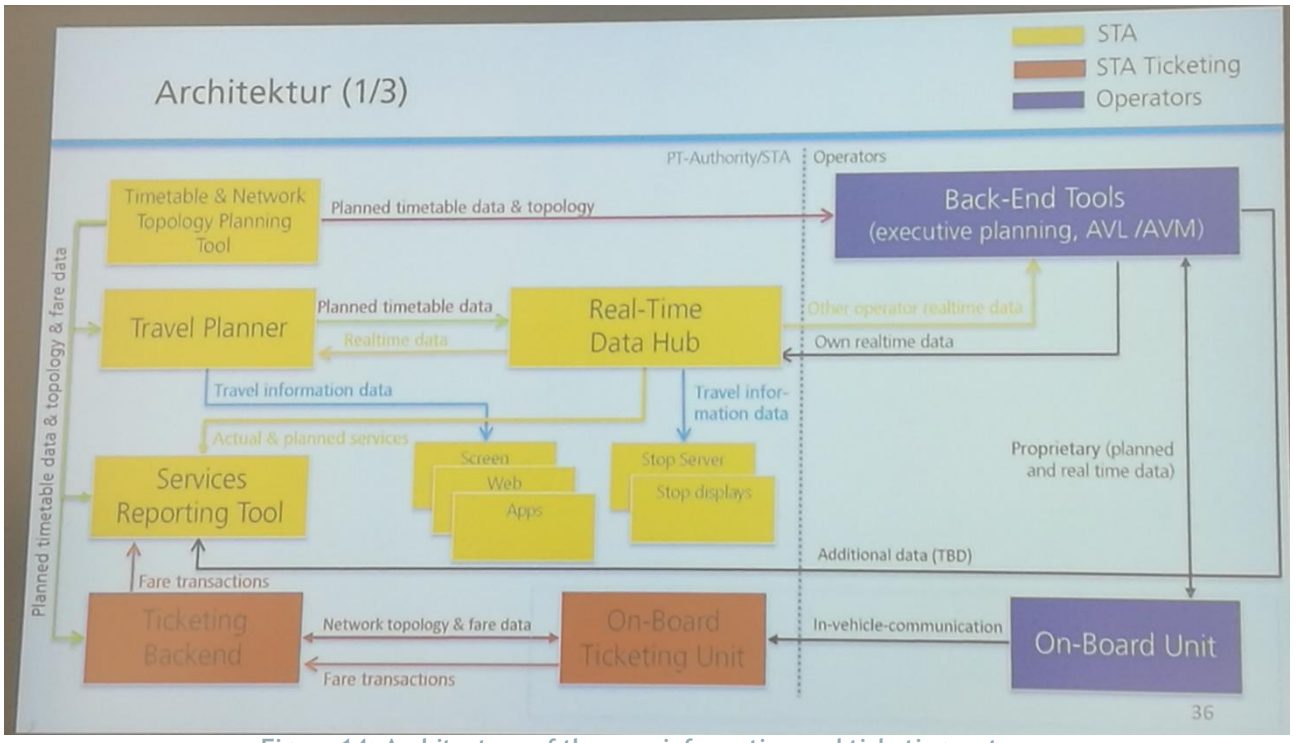

Figure 14: Architecture of the new information and ticketing system

2.3. Integrated ticketing and tariff schemes

a) FINANCING MODEL

Public transport service is currently regulated by **concessions** (for urban and suburban bus operators) and by **public service contracts** (for train operators).

The concession for **urban and suburban bus** operators expires at the end of 2018 and significant changes are expected compared to the current operative framework. After this date, a European tender should determine the new assignments (Provincial law, 23 November 2015, artt. 11-13). The current condition is quite complicated, since the economic interests of local companies are high. It is likely that SASA becomes an in-house company of the Province, which should avoid the tender. SAD, which currently operates its service along 80 lines (with more than 2,000 fares per day and over 15 million km), proposed a public-private contract to renew the concession, but the Autonomous Province of Bolzano has considered this option juridically not feasible.

The condition of **local train transport** is different. According to the EU legislation, railway services at the local level can be assigned directly through a public service contract. The Province has recently confirmed the assignment of the service to Trenitalia (in 2016) and SAD (in 2017), both until 31 December 2024.

Although the law admits different forms of financing (net, gross, mixed), both bus and rail services are currently financed through **gross model**. Costs are reimbursed to the operators by the Transport Office of the Autonomous Province of Bolzano. Unitary costs are equal to €2.63/km for suburban buses and €2.89/km for urban buses, while for rail they are equal to €10.99/km for Trenitalia and €12.23/km and €7.86/km for SAD, respectively for RFI network and Val Venosta line. The contract signed with Trenitalia was innovative at the national level, since it included a rewarding system based on key performance indicators. Reliability and customer satisfaction are two of them and recurring surveys are performed in order to monitor the quality of the system as perceived by users.

b) INTEGRATED TARIFF SCHEMES

The article 36 of the Provincial law 23 November 2015, n. 15 states that the Autonomous Province of Bolzano/Bozen encourages the **integration** in a unique tariff system of all public transport services operating in South Tyrol. This integration, which is valid for all owners of the Südtirol/Alto Adige pass, includes regional trains for routes within the jurisdiction of the Province as well as for those reaching Trento and Innsbruck, urban and long-distance buses, city buses and certain cable car lines and funiculars.

Tariffs are based on the km travelled and the unitary tariffs. Every journey has a minimum length of 10 km. Hence, all urban routes in Bolzano and Merano, even though the distance run is shorter, are considered equal to 10 km. Distances covered by cableways, Renon trains, funiculars and specific tourist bus routes are counted with a separate system. Nightliners, i.e. buses that circulate only on Saturday night, have a special tariff: a ticket for the single ride costs €3.00; a ticket valid for all nightlines costs €5.00. It is also possible to buy a cumulative ticket for 10 rides (cost €30.00).

Unitary tariffs are differentiated according to the type of ticket: 15 €cent/km for ordinary tickets; 12 €cent/km for value cards. The unitary tariffs of passes vary according to the km covered in a year, a following the simple rule “the more you travel by PT, the less you pay”. Five levels are available: they go from 12 to 0 cent/km for Südtirol/AltoAdige Pass and from 10 to 0 cent/km for EuregioFamilyPass (see table 2).

	Rate Classes	AltoAdige Pass	EuregioFamilyPass
1	From 1 to 1,000 km	12 €cents/km	10 €cents/km
2	From 1,001 to 2,000 km	8 €cents/km	7 €cents/km
3	From 2,001 to 10,000 km	3 €cents/km	2 €cents/km
4	From 10,001 to 20,000 km	2 €cents/km	2 €cents/km
5	From 20,001 km	0 €cents/km	0 €cents/km
Maximum amount in the single year		**640 €**	**530 €**

Table 2: Unitary tariff schemes of passes

As for the transnational and transregionale connections, the integration is valid also for the following journeys: Malles - Nauders (A)/Martina (CH); San Candido - Sillian (A); San Candido - S. Stefano di Cadore (BL); Dobbiaco - Cortina d'Ampezzo (BL); Dobbiaco - Tre Cime (BL); Corvara - Arabba (BL) - Passo Pordoi (BL/TN); Selva - Canazei (TN); Selva - Passo Pordoi (BL/TN); Bolzano - Pera di Fassa (TN); Ora - Cavalese (TN); Merano - Fondo (TN). As mentioned in section 2.1, for the owners of the Südtirol/Alto Adige pass tariffs to reach Innsbruck and Lienz are integrated, but not harmonized. Currently, Austrian tariffs are due according to the ÖBB scheme, more expensive than that applied in South Tyrol. The ÖBB-Vorteilscard can be registered and associated to a Südtirol/Alto Adige Pass. For the journeys with origin or destination Lienz and Innsbruck, the reduced tariff is automatically calculated. However, with other types of ticket (see 2.2, section b), the integration is not possible and a separate ticket from Brenner to Innsbruck or from Prato alla Drava to Lienz has to be bought in advance, either at the automatic machines at Brenner or in a South Tyrolean station (in this last case validation is required at the boundary station).

Finally, **bicycles** can be brought on board of trains and suburban busses. The daily ticket costs €7.00 (€3.50 for the owners of AltoAdige Pass and EuregioFamilyPass).

c) TICKETING SYSTEM

As described in 2.2., different types of tickets are available. Currently, **bus operators** in South Tyrol accept either magnetic stripe tickets (bikemobil Card, Mobilcard and museumobil card, ordinary suburban and urban tickets) or electronic tickets (Südtirol/AltoAdige Pass and EuregioFamilyPass). They have to be validated on fixed validation machines available on buses. The technology is different: machines for electronic tickets are available close to every door of the bus, while magnetic stripe tickets are normally located only at the front door. In the future, digital tickets and home-printed tickets are going to be introduced, as well. With reference to **rail operators**, a distinction has to be introduced, according to the service provider and the origin/destination of the journey. For journeys with origin and/or destination outside South Tyrol, Trenitalia accept paper tickets (Trenitalia official or printed at home), electronic tickets (Südtirol/AltoAdige Pass and EuregioFamilyPass), magnetic stripe tickets and tickets displayed through smart phone (with VQR and QR codes). However, for internal journey, only magnetic stripe tickets and electronic tickets can be used (this is valid also for SAD trains). Tickets need to be validated at the station through the Trenitalia machines or the public transport blue validation machines (Figure 15). They are available also in the Austrian railway stations of Innsbruck and Lienz). The system is different: in case of Trenitalia validation machine, it is sufficient to stamp the ticket. In case of SAD, a numeric code that identifies the destination has to be pressed.

Purchasing system is diversified, according to the transport mode and the service provider. Ordinary ticket for urban areas and day urban ticket for Bolzano or Merano can be purchased at authorised sales outlets, at the automatic ticket vendors, at the automatic ticket dispensers installed on all SASA buses. Day urban ticket for Bolzano or Merano. Ordinary suburban tickets are available on suburban buses, on authorised sales outlets. Value card can be bought on suburban buses, at authorised sales outlets and at the automatic ticket vendors. Südtirol/AltoAdige Pass and EuregioFamilyPass can be requested only online, at the following address:

https://www.sii.bz.it/richiesta_altoadige_pass/index.php?page=request.controller. Trenitalia tickets can be purchased online, at the Ticket Office or at Self Service machines.

Figure 15: Validation machines in South Tyrol

3. SWOT analysis

Strengths	Weaknesses
• **Integration** of all public transport lines into a unique system, managed by the Province and accessible with a single ticket. • **Connections** by PT not limited to South Tyrol, but integrated with some relevant tourist and working destinations of the neighbouring regions (Trentino, Belluno, Grisons, Tyrol, East Tyrol). • **Technological know-how** about innovative solutions. Bolzano hosts the only centre for hydrogen production, storage and fuelling in Italy, used to fuel some hydrogen urban busses. • **Modal share of PT** higher than in any other Italian region. Also thanks to the good supply, the willingness to choose this form of transport is a good basis for a sustainable growth of local mobility. • Integration of PT with main **tourist opportunities** (e.g., snow train, train&bike).	• The **accessibility** of the Province for tourists and visitors. Currently, only few long-distance trains connect Bolzano with main Italian, Austrian and German cities and car is the most valid option to reach South Tyrol. • **Old vehicular fleet** of some transport companies as an obstacle to improve the environmental performances of PT. • **Real-time information** is currently provided only for limited transport systems and thanks to the efforts of single operators. • **Road congestion** due to commuting traffic along specific road sectors of the Provincial network, with negative impacts on PT service. • Former **lock-in** related to the provincial information system, which was developed by SAD with its own protocol. The passage of these competencies to STA (not completely finalized) should overcome this issue.
Opportunities	**Threats**
• The forthcoming approval of the **Provincial Mobility Plan** as an important step in order to set the priorities for the future development of mobility in South Tyrol. • The possibility to improve the efficiency of PT service thanks to the participation to several **EU-funded projects**. • The **integration** with other forms of **alternative transport** (South Tyrol has the highest km per capita of bike lanes). • The realization of the **new high speed/high capacity Brenner railway line** as driver to increase the regional accessibility. • Presence of **different rail and road operators**. Together with service contracts based on performances, this can generate virtuous mechanisms that increase the quality of PT. • **Mobility-as-a-service** (MaaS) as the future target for provincial mobility, overcoming the traditional distinction between public/private transports.	• **Territorial context and type of settlement**: South Tyrol is mostly a mountain area, characterized by several dispersed villages. To grant a widespread service, unitary costs of transport have to be higher than in other (flat) regions. • **Differences of tariffs and technological solutions** between South Tyrol and neighbouring regions (Tyrol, Trentino) make it difficult a harmonization in light of a unique Euregio system. • For suburban busses, the forthcoming passage from the concession to a European tender, which may generate disinvestments from the transport companies. • Economic prosperity of South Tyrol, which, if not supported by an adequate PT service, may lead to a **modal shift** towards the private vehicle. Still today, South Tyrol is the Province with the highest number of cars every 1,000 inhabitants.

4. Overall conclusion

Thanks to its vast and long-lasting competence on mobility and cross-border connections, the Autonomous Province of Bolzano/Bozen has undertaken a process aimed at increasing the use of **public transport** on its territory. Indeed, PT has been conceived as a fundamental element that guarantees a sustainable territorial development, through the **coherent integration** of different modes. This issue was not simple, also considering the mountain territory, the morphological characteristics and the dispersed settlements of South Tyrol, which are normally labelled under the generic term "low demand area" and constitute a complex problem to handle, due to the high costs that this territorial model generates.

This process started some years ago with a countertrend initiative: after the closure of the Val Venosta railway line by Trenitalia because of its economic inefficiency (beginning of '90s), the provincial council of South Tyrol decided to invest on it, by managing the line directly and by making it the backbone of the valley. Its in-house society STA was designed responsible for the **renewal of the railway line** and the stations, the equipment, as well as the acquisition of new trains. In 2006, after the first year of operation, users were three times higher than expected and they have continued to grow so much, that now works of electrification are necessary, in order to increase the capacity of the line according to the demand. Similar results are visible also along the other local lines (especially Val Pusteria), thus making the rail service of South Tyrol competitive for local journeys. In this scheme, (sub)urban buses can be used mostly for the last mile connections or to reach the more dispersed areas.

Currently, South Tyrol is recognized as a best practice at (inter)national level and the Val Venosta railway line is cited as a virtuous example. However, this report has shown how the **positive results** of public transport in terms of travel demand and supply, which are significantly higher than the Italian average values (see section 2.1), are determined not only by the renewal of the railway line. Indeed, these results are the consequence of a more structured approach, which has included also the integration of all transport modes into a unitary system, characterized by a unique tariff scheme and ticketing system, such as that granted by the AltoAdige/Südtirol pass.

Obviously not all the technical aspects are solved: the SWOT analysis has detected some **deficiencies** of the system, which are related to the accessibility, the necessity to renew the vehicular fleet of urban buses, the lack of real time information and the congestion along specific roads and the integration of tariffs and ticketing systems with neighbouring regions. At least for the Euregio Trentino – Alto Adige/Südtirol – Tyrol, this constitutes a main criticality, which needs to be addressed urgently. Currently, some initiatives are ongoing (e.g., the hypothesis of a card for university students valid for the free circulation in the three regions), but the differences in the tariff schemes make this integration difficult to be achieved.

Furthermore, this report has not discussed about other **environmental issues** such as NO_2 emissions produced by the vehicles that circulate along the Brenner highway, where annual average values exceed the limit imposed at the EU level (Lückge et al., 2017[7]). Even if this issue is mostly associated to road freight transport, also private cars contribute to their emissions. Hence, a shift from private vehicle to public transport can contribute to improve a condition that along the Brenner corridor –and hence in many of the South Tyrolean municipalities- is particularly critical.

To improve the current condition, several initiatives are ongoing. At the **policy level**, the adoption of the new Provincial Mobility Plan constitutes a unique opportunity to face in a structural way some of the issues previously highlighted. At the **operative level**, the participation of relevant stakeholders in several European projects aims at improving specific aspects related to infomobility, ticketing and transnational

[7] Lückge H., Heldstab J., Cavallaro F., Vivier S., Kistler R., Joos-Widmer N., 2017. iMONITRAF! Annual Report 2016. Political support for Toll Plus & agenda setting for a new phase. Online: http://www.imonitraf.org/DesktopModules/ViewDocument.aspx?DocumentID=nb41gbP9A0o=

issues. Finally, at the **technological level**, research centres can contribute to make innovative technology less expensive and more efficient, thus allowing a renovation of the vehicular fleet at a lower cost for the community. Again, only an **integrated approach** that operates at a multilevel scale can guarantee an improvement of the current condition and a further shift towards public transport.