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The path towards Mobility-as-a-Service: a case study from South Tyrol, Italy

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Abstract

The paper presents the process of transformation towards "mobility-as-a-service" which is taking place in South Tyrol in Italy. This process has been launched in the ERDF project "The Green Mobility of the Future", in which the potential of advanced ITS applied to shared and flexible transport systems has been assessed in order to promote the regional economic development. As part of the project demonstration, in 2016 the pilot web application "bus.meran.eu", which currently shows the real-time positions of the urban buses in the touristic town of Merano, is going to evolve to an one-stop-shop multi-modal platform presenting on a real-time basis information on car/bike/ride sharing services as well as on e-charging stations availability. The integration of all this fragmented information coupled with the current migration from the actual integrated public transport system to a "public transportation-as-a-service" scheme is opening the doors for a rapid deployment of "mobility-as-a-service" in the region.

Keywords: mobility-as-a-service, sharing mobility, open data

The international movement towards Mobility-as-a-Service (MaaS)

"Mobility-as-a-Service" (MaaS) is a new concept developed on top of the new enabling cooperative and autonomous technologies which promises to revolutionise the transportation market in the next decade. The main innovation associated to MaaS is the introduction in the mobility ecosystem of a new player, the "mobility operator", which can take care to all complex and dynamic needs of the travellers through a customized, flexible and on-demand mobility package. In this new scenario, the traditional transport operators will no more offer services directly to travellers, but to mobility operators in a B2B mechanism. In this way, transport modes will no more grow as vertical and isolated silos, but will finally become part of a truly integrated ecosystem without boundaries. This future vision can however be built only through a change of business models, a diversification of the public and private financing, and a renaissance of civil participation [1].

In the last few years the "Mobility-as-a-Service (MaaS)" concept has become one of the key trends in

the ITS sector. This movement was mainly launched by ITS Finland during the 10th ITS European Congress, which took place in Helsinki in 2014. Finland has probably been the European State in which the first concrete steps for MaaS deployment have been carried out, in particular through the definition of a proposal of action and a roadmap for transforming the mobility ecosystem in Helsinki [2]. In 2015, during the ITS World Congress in Bordeaux the European Mobility-as-a-Service Alliance was formed, with the purpose to define a common approach for developing MaaS in all Europe and therefore to put the basis for the growth of an economy of scale which is needed in order to make MaaS financially viable and truly attractive for the private sector.

Challenges and opportunities for a deployment of MaaS in South Tyrol

South Tyrol is a typical alpine environment placed in the North-East of Italy with strong tourist vocation, with small or medium towns mainly located in natural hollows and several villages at higher altitudes. South Tyrol plays also a key role in the international transportation network, since it is crossed by the Scandinavian-Mediterranean Corridor, one of the Core Net Corridors which connects Scandinavia and the major urban economic centres of Germany to Italy. What makes this area particular and unique is the presence of different linguistic groups (with German-speaking people being the majority of the population) and to its strong autonomy, which allows the local government to develop their own policies independently from the Italian State in different domains, including mobility and transportation. In the last years, South Tyrol is known to has become the "Green Region of Italy", due not only for being avant-garde in the use of renewable energies, but also for the green awareness of his inhabitants which permeates all sectors. This increasing awareness is only one of the reasons why the modal split in the main towns of the Province is in line with the most virtuous European cities in terms of sustainable mobility: this current situation has been developed through a comprehensive mobility offer which incentives the use of transport modes alternative to private cars.

The cycling infrastructure

Cycling is one of the most widespread travel mode in South Tyrol, in particular in the most populated areas. The use of bicycles has been promoted not only by means of several awareness-raising campaigns, but in particular through the continuous development of a connected cycling road infrastructure, not only at urban level: all main transit routes of South Tyrol are in fact covered by dedicated cycle paths.

Local inhabitants have therefore at disposal a very competitive alternative to move quickly from one point to another for short-distances trips, while foreign tourists can have an interesting option for enjoying a green holiday in the local natural environment. The increasing diffusion of e-bicycles encourages cyclists to organize even longer trips, not only for leisure but also for home-work or even business trips.

The integrated public transport system and the Alto Adige Pass

Public transport in South Tyrol is organized in a unique integrated transportation system. The integration, to be intended both in terms of harmonized timetables as well as pricing, covers different public transportation means, i.e. urban and inter-urban buses, regional trains and cableways.

Figure 1- A cycling route in Bolzano (left) and a road sign on the extra-urban Bolzano – Merano cycling route (right).

The access to this system was significantly simplified when in 2012 the "Südtirol / Alto Adige Pass", an individual electronic travel document in the form of a personal contactless smart card ,was introduced. The large-scale introduction of the pass was associated to a complete new tariff plan, probably unique at international level, with prices based on the effective length of an overall trip. In order to calculate the exact cost of each public transport service, travellers have to validate their ticket not only when they get on board (*check-in*) but also when they get off (*check-out*).

Figure 2- Buses, trains, cableways and Südtirol / Alto Adige Pass: the integrated public transportation system of South Tyrol.

The mobility packages for tourists

Even if the Südtirol / Alto Adige Pass can be requested by any person living in the European Union or in the Switzerland, it is mainly destined to users who make intensive use of public transport means, i.e. local inhabitants or foreigners that live in South Tyrol for education or business reasons. Alternative and more appropriate mobility packages are at disposal of occasional travellers, in particular tourists:

- **Mobilcard**, which allows to make full use of the integrated public transport network for a limited amount of time (i.e. one, three or seven days);
- **museumobil card**, which is a Mobilcard that offers moreover one admission to each of the over 80 participating museums, collections and exhibitions sites;
- **bikemobil card**, which is a Mobilcard that offers moreover the possibility to rent for one day a bike of the provincial bike rental system.

Differently from the Südtirol / Alto Adige Pass, these cards are still using the traditional magnetic strip card technology, and must be validated by users at the beginning of each journey.

Why MaaS could be a driver for more sustainable mobility and new regional develoment

This overall mobility offer has managed to approach several local travellers to the integrated public transportation system. At present, more than one third of the entire South Tyrolean population has the Südtirol / Alto Adige Pass – and all this without considering students and elderly people, who have received a special pass for free (abo+ and Pass 65+, respectively). Despite this huge success, confirmed also by the exponential increase in the number of ticket-printings, this integrated system is still unable to fully match the highly-varying mobility demand of local users, which is moreover becoming more and more complex because of the changes in the society and in the living styles' habits. The still limited diffusion of sharing services is a strong barrier to efficient and flexible multi-modal habits alternatives to private cars, that can be truly taken in consideration even in case of exceptional conditions such as bad weather. On the other side, the natural constraints which limit the development of the local transportation network represent an intrinsic boundary to the levels of accessibility and therefore of tourist attractiveness of South Tyrol.

The development of MaaS can therefore be a driver for further increasing not only the sustainable mobility habits of local inhabitants and the overall equilibrium of the transportation system, but also the local economy without altering the actual high standards of quality of life. MaaS schemes could in fact even further exploit the unexpressed tourist potential, put the basis for new businesses and consolidate existing ones – and all this compatibly with the increasing environmental challenges, which are particularly crucial for an alpine region such as South Tyrol.

The first step towards MaaS in South Tyrol: the extension of "bus.meran.eu" service in the town of Merano

In 2013, TIS innovation park (now IDM Südtirol / Alto Adige) launched an initiative called "The Green Mobility of the Future", which aimed at investigating the local potential for improving the South Tyrolean transportation system thanks to the novel potential offered by cooperative and autonomous technologies as well as by modern sharing and on-demand schemes. In the scope of this initiative, a pilot action was activated in the town of Merano, the most populated area of South Tyrol after Bolzano. Goal of this action was to promote and demonstrate intelligent and shared mobility schemes among local stakeholders and the local community of travellers, in particular if properly combined together.

Real-time positions of public transport means

The choice of Merano as pilot area for this initiative was mainly due to the launch of the web application "bus.meran.eu", a service available in HTML5 format and jointly developed with the Tourist Agency of Merano and SASA, the public transport operator in the urban areas of Bolzano and Merano. The application, inspired on open data principles [3], displays with a refresh time of a couple of seconds the real-time positions of the public transportation vehicles managed by SASA, an information collected through an AVM system (TEQMonitoring ®). The service was mainly destined to tourists, with the intention to give them a better and more precise overview on how to smartly use the urban buses for their daily excursions. The later inclusion of a layer with all tourist walks in the town has to be therefore intended in terms of further promotion of particular tourist use cases (e.g. tourist walk with return to the hotel by bus), with the goal of further promoting sustainable tourism and of preserving the environmental heritage. The inspiring principle for all activities of the Tourist Agency is to offer services to tourists which can however have a value also for local citizens - it has therefore been not surprising to see the large diffusion of this pilot application even among local citizens, with several hundreds of habitual visitors accessing the web site every week.

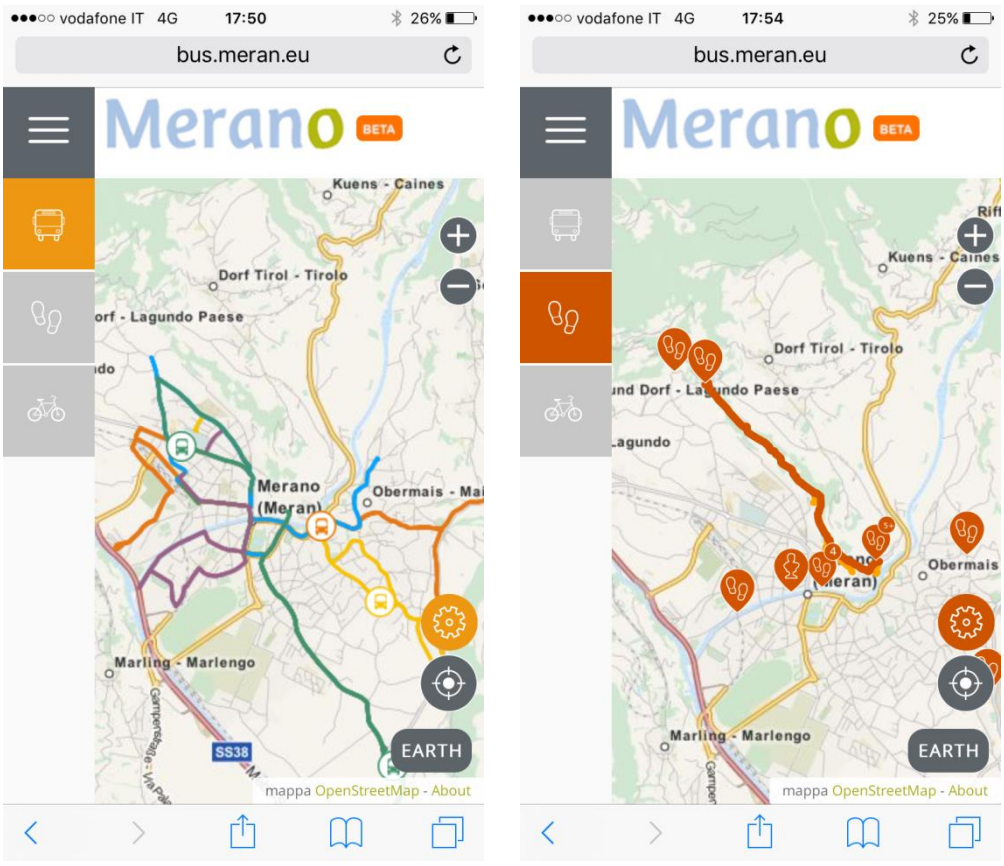

Figure 3- The first version of "bus.meran.eu" application: real-time positions of public transport vehicles and tourist walks.

Integrating real-time information about sharing services

In the scope of the project "The Green Mobility of the Future" an initial assessment study was carried out in order to specifically understand how shared transport services could integrate and extend the

local public transportation offer at disposal of local travellers. As explained in Table 1, shared services can have together the potential to provide an overall robust and viable alternative to private owned cars, even in rural or mountainous areas in which the lower population density makes such mobility offer more challenging to maintain. In order to demonstrate this concept, the web application "bus.meran.eu" is going to be extended in 2016 with real-time information related to sharing mobility services. The integration of real-time availability of car sharing vehicles is going to be carried out in partnership with Car Sharing Alto Adige / Südtirol, a company opened in 2013 also with the support of this initiative providing a car sharing service in the whole South Tyrol. The service is inserted within the Flinkster network of DB Rent, uses VW vehicles and can authenticate local users through their Südtirol / Alto Adige Pass. Since the company is strongly committed in the introduction of e-vehicles, the web application will also integrate an informative layer with the real-time availability of local e-charging stations.

Table 1- Shared transport services potential in the city of Merano.

Shared transport service	Public transport service extension potential
Car sharing	Shared vehicles can represent an alternative for allowing occasional travellers to reach local destinations outside the town, or to let them reach Merano from another place in South Tyrol. This offer could match the needs of those users which cannot be satisfied with public transportation.
Bike sharing	E-bikes can represent an extension in time and space of public transportation service in the town of Merano. With a proper connected cycling network, these means could also be used to travel from Merano to one of the small neighbouring villages, and viceversa.
Car pooling	Car pooling can be considered an extension in time and space of inter-urban public transportation service, in particular as far as the connection with valleys which are not served by rail services is concerned.

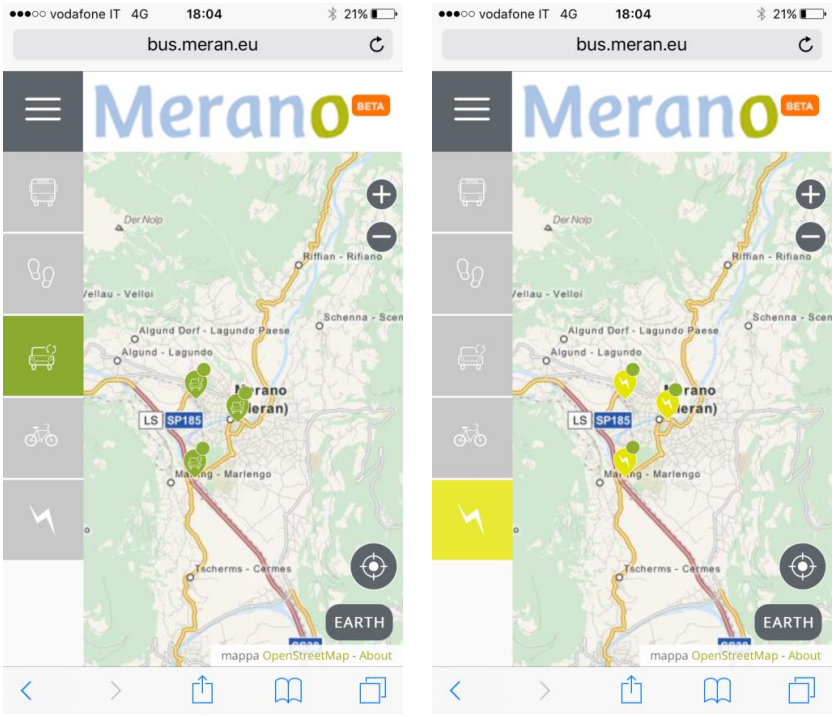

Figure 4- The "bus.meran.eu" application extended with real-time car sharing and e-charing stations information.

As far as the bike sharing layer is concerned, the displayed information is going to present the current availability of bikes put at disposal through the bike rental service offered by the Municipality of Merano. In 2015, a first experiment was already carried out in cooperation with the local company algorab by equipping all bikes with an active tag in continuous communication with a master unit installed at each rental site (Figure 5). From 2016, based also on preliminary feasibility studies, the intention of the Municipality of Merano is to transform the current traditional bike rental service in a modern automatic e-bike sharing service, accessible through the Südtirol / Alto Adige Pass or a similar electronic ticket, that can properly serve both citizens and tourists. In order to further promote cycling, the plan is to integrate into the application also the geo-data of the cycling network infrastructure.

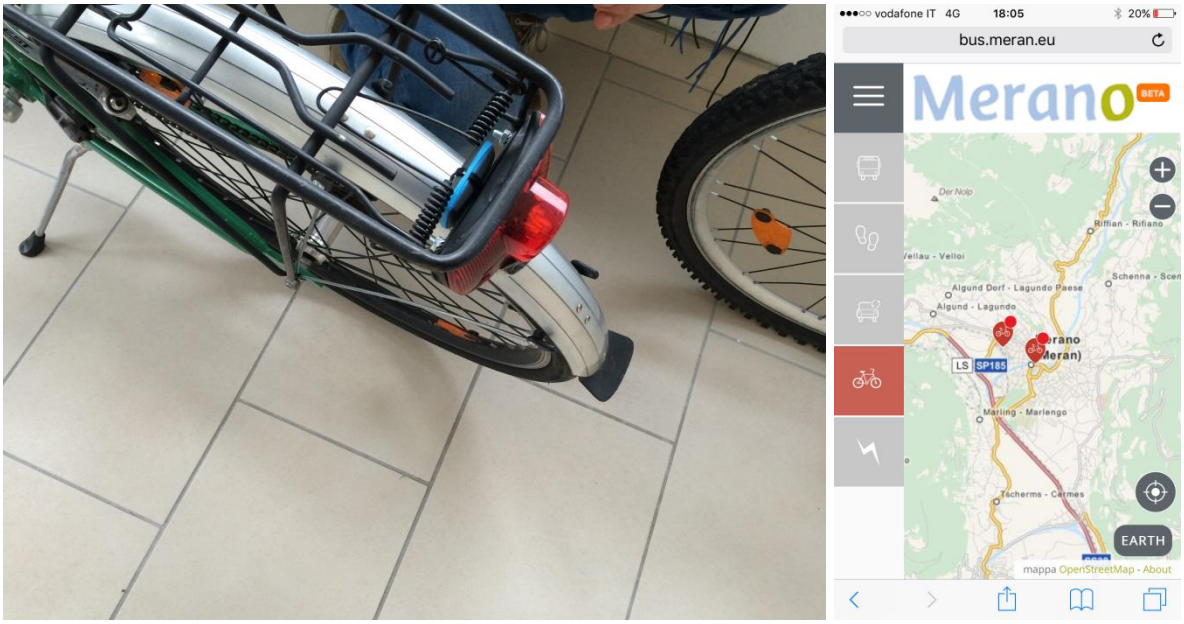

Figure 5- A tag mounted on a bike of the rental service and the "bus.meran.eu" application extended with real-time bike sharing information.

A customized car pooling platform, developed by the local company inno.vìe, will finally allow local users, in particular commuters having similar travel patterns, to enter in direct contact one with each other and share rides to and from Merano. In order to aggregate the mobility demand and reduce as much as possible the barriers to this service during its first launch, a certain number of urban destinations have been identified. The platform will also allow users to share a ride in order to reach temporary city events and/or tourist attractions.

From a server side point of view, all data presented by the web application is going to be centrally collected in a "big data management system" developed and currently controlled by IDM. This ITS system is based on the reference architecture firstly developed in the scope of the EU-funded project "INTEGREEN" [4]-[5]-[6].

The second step towards MaaS in South Tyrol: a new enhanced management of all public transport information

The purpose of this pilot initiative in Merano is on one side to provide a new powerful instrument that local users can start to use in order to step-by-step change their travel habits, and adapt them smartly

as a function of their changing needs. On the other side, the goal is to empirically demonstrate to local key stakeholders the potential of novel sharing services for the local mobility, if properly combined together and designed as an integrated offer to the traveller.

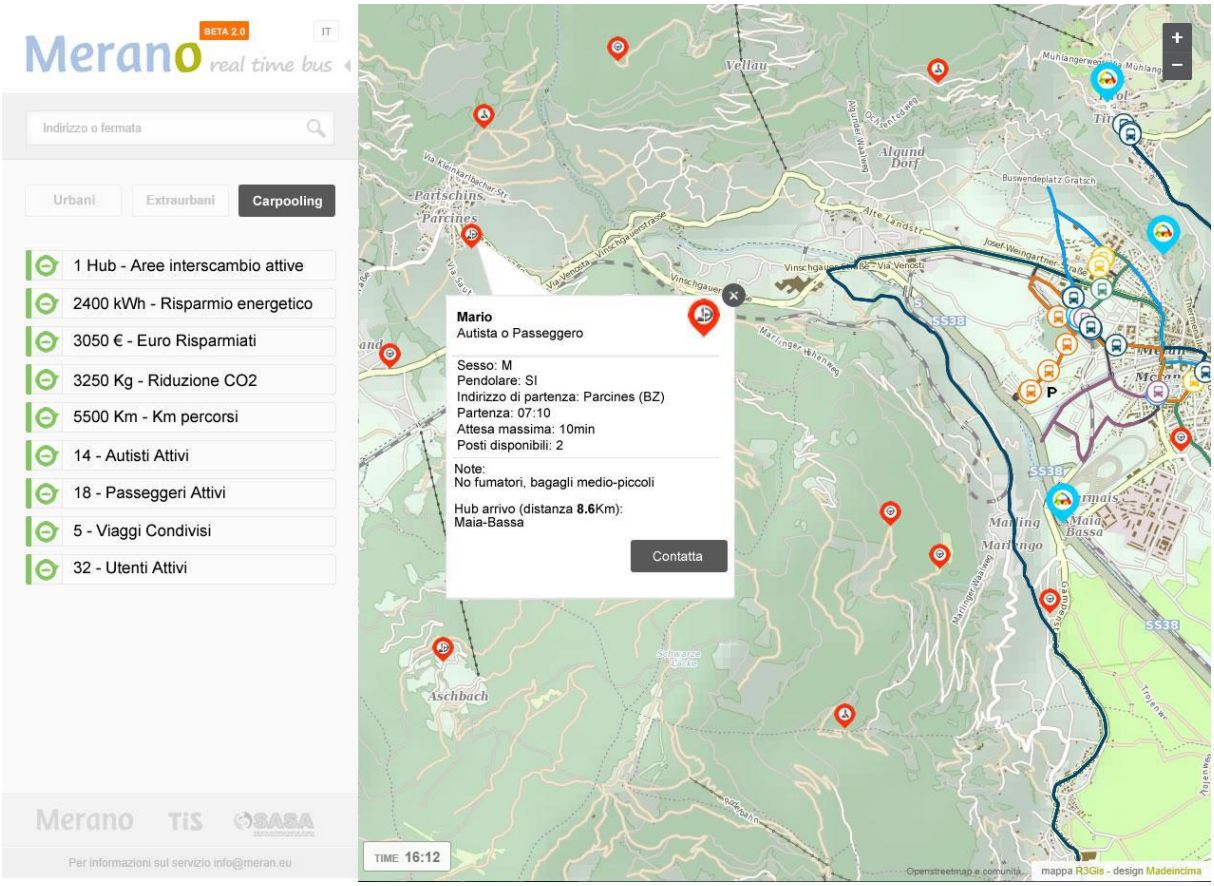

Figure 6- The customized car pooling platform in the "bus.meran.eu" application.

The recent legislative changes in local public transport regulation

In order to fully exploit this potential, it is however fundamental to also re-think the mechanisms and the modalities on how public transportation services are currently conceived and managed. In South Tyrol, the services accessible through the Südtirol / Alto Adige Pass are supplied by different authorities, i.e. the aforementioned SASA, SAD, which manages most of the inter-urban rail, road and cableway transportation services, and LiBUS, which completes the inter-urban transportation service on road. SAD is also responsible to manage all on-board / remote hardware and software components of the integrated ticketing system according to the integrated scheme previously presented.

In 2015, the Autonomous Province of Bolzano has introduced new rules on the ways public transportation services will be managed in the future. The main change is related to the decision to fully separate the responsibilities related to what is related to ticketing and services invoicing, which is going to be technically managed by a company fully owned by the Province (STA) and therefore fully controlled by the main public authorities in South Tyrol, and what is related to the pure transportation service, which is going to be externally entrusted to service suppliers, as happens today. This new concept for the management of the public transportation in South Tyrol opens the door to an

interesting evolution of its architecture, with the gradual evolution of transport operators in "transport-as-a-service" providers.

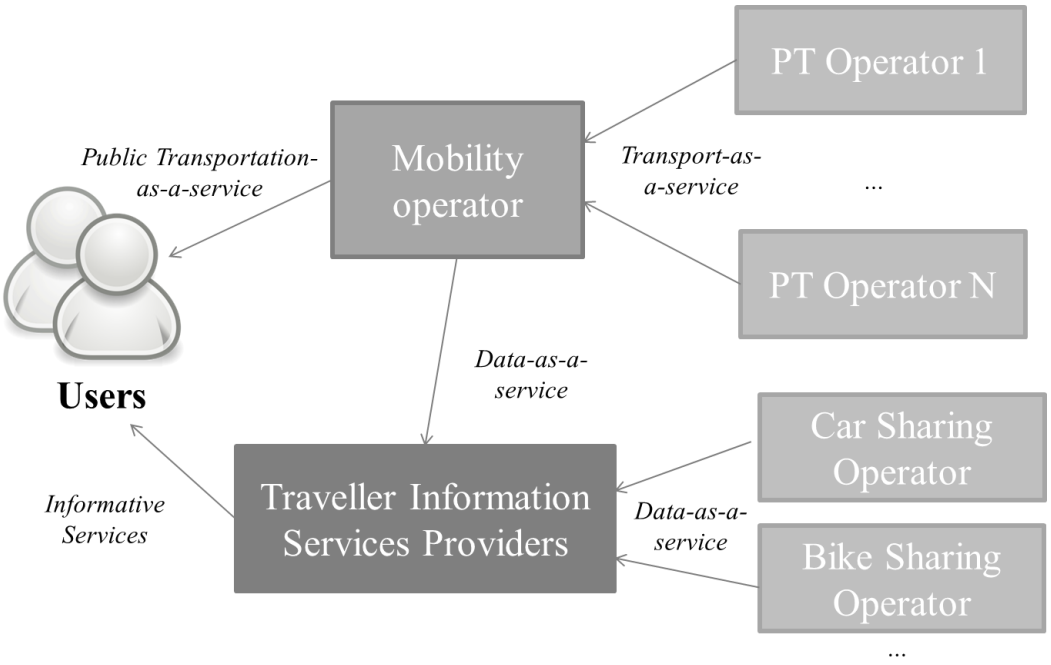

Figure 7- The evolution of public transport system in South Tyrol.

The third step towards MaaS in South Tyrol: transform public transport in a flexible, multi-modal on-demand system

The open data availability of real-time information about all public transportation modes as well as the gradual diffusion of harmonized sharing transport services could become the enabling factor for the deployment of MaaS in South Tyrol. A new mobility operator could take the commitment by the public authorities to jointly offer as a package all the mobility alternatives to the users. The integrated invoicing of all services could take advantage of the central ticketing management system developed together with the introduction of the Südtirol / Alto Adige Pass. The information of pattern travels of users that it would be possible to extract by properly processing the data of the central ticketing management system, eventually combined with personal instruments collecting the real-time mobility demand of travellers, could not only be used by a car pooling engine in order to promote a shared use of private cars (e.g. in multi-modal trips, with first / last mile carried out by car), but also to gradually transform the conventional "fixed" services in on-demand, flexible and dynamic services. Such services could clearly have their full exploitation once autonomous technologies will be ready to fully enter into market. What is still unclear is the identification of the players who will evolve to a mobility operator in the transportation sector, and the steps which are needed in order to ensure that multiple parties can offer such integrated mobility packages in targeted ways, for example in order to meet the specific needs of tourists.

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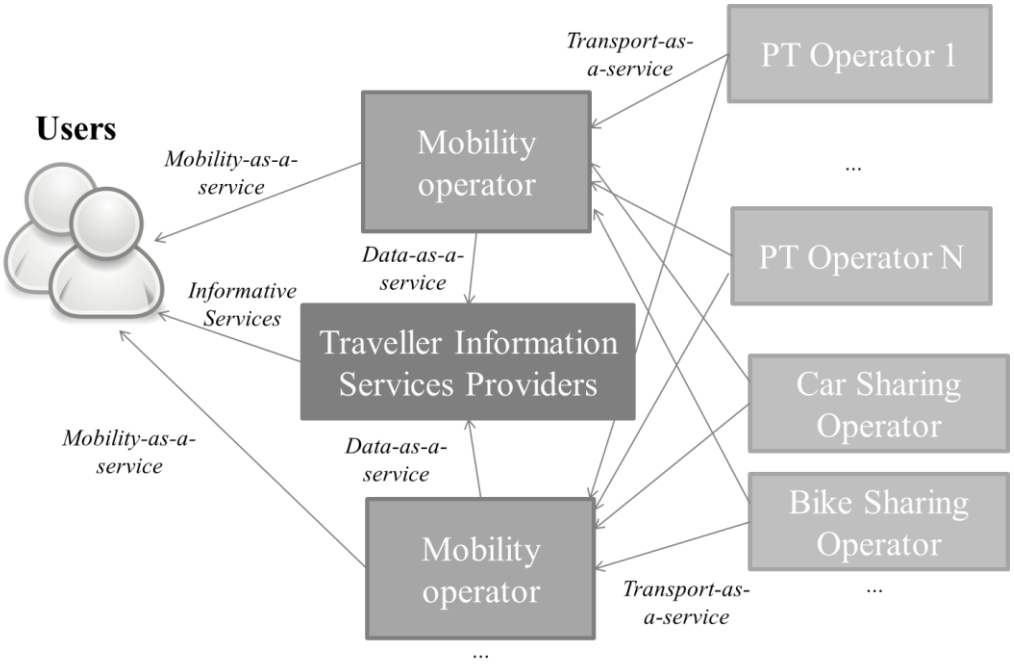

Figure 8- A proposal of MaaS architecture for South Tyrol.

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