TRANSFERABILITY REPORT PASSENGER PILOT PROJECT

D.T2.3.4 - Transnational pilot:

Milan Airports - Passenger low-carbon mobility with IT tool application

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1. Introduction

This report includes the results of SEA Milan Airports' LAirA pilot project on passengers' low-carbon mobility. The pilot focuses on enhancing Milan Airports' web site and App with surface access functionalities (travel planner). The pilot project aims at helping passengers to plan their journey to the Airports by public transport and generally by transport solutions which are more environmentally sustainable than driving.

The pilot was part of the wider surface access strategy that SEA is developing, and it includes both activities funded by the LAirA project and activities paid with SEA's budget, as described in the following parts of this report. Thanks to this integration SEA delivered the pilot in a live environment: the pilot is not only a mock-up as originally planned and the travel planning services are currently used by passengers.

This report describes the pilot activities, products and results and it aims at:

- documenting the pilot implementation;
- fostering transnational exchange of experience with partners on steps and challenges in developing the travel planner;
- supporting the pilot results transferability to the other LAirA airports and more generally to airports in Central Europe.

The report is structured as it follows:

- Chapter 2 provides an overall presentation of the pilot context in terms of baseline and overview of the travel planner;
- Chapter 3 presents the travel planner features;
- Chapter 4 describes in detail the travel planner environment and functioning;
- Chapter 5 focuses on its use during the pilot project and on users' feedback;
- Chapter 6 describes pilot project development and challenges;
- Chapter 7 includes the conclusions.

2. Pilot baseline and overview

SEA Milan Airports' App and website were providing passengers:

- static information about transport services to Milan Linate and Malpensa Airports;
- the possibility to buy airport services (e.g. Parking, Fast track, VIP lounge);
- real time information on flights; and
- more generally information on terminals, facilities and services, including shops.

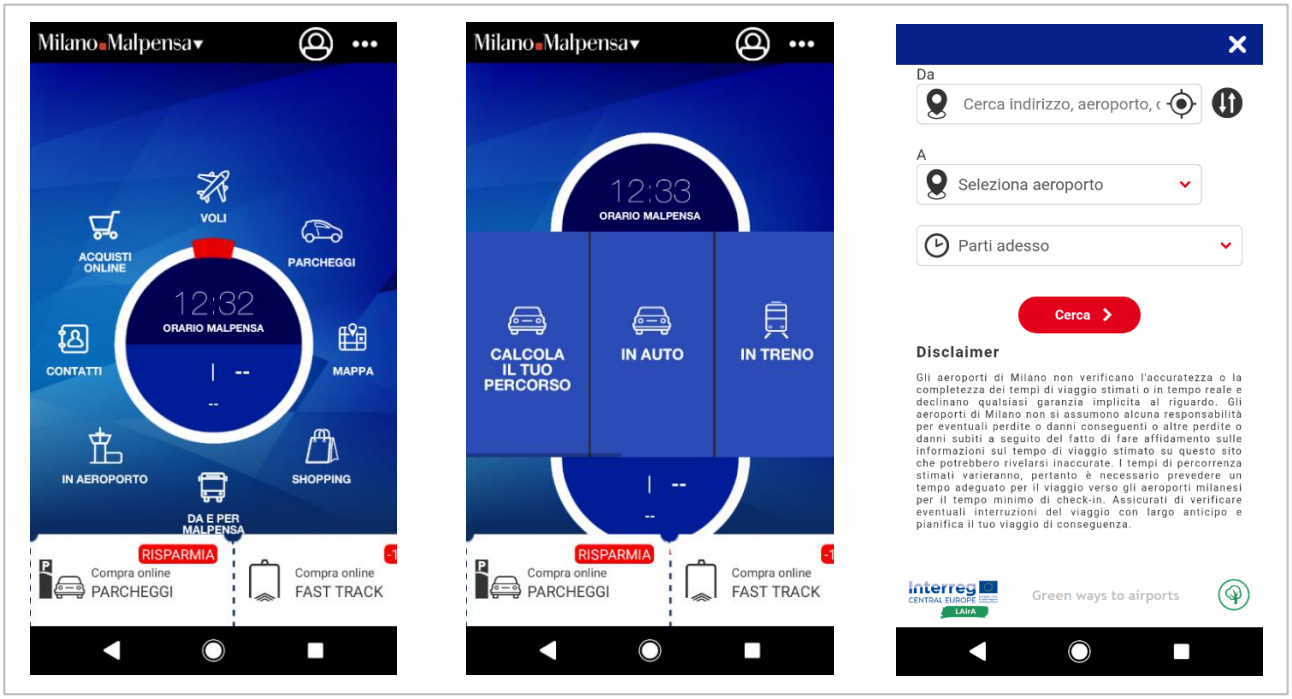
The LAirA pilot scope was enhancing SEA App and website information by a multimodal travel planner that passengers can use when travelling to the Airports. This was a complex project which encompassed two core dimensions, as described in the following parts of this report, and in particular:

- stakeholder engagement, in terms of cooperation with all the main transport providers in Milan Airports' catchment areas;
- technology, with reference to the travel planner functionalities deployment and to ensuring these provide added value to passengers.

The following Figure shows the App interface and in particular:

- the landing page (on the left), which includes all the App functionalities;
- the page on surface access (in the centre), which includes the travel planner ("*CALCOLA IL TUO PERCORSO*"), as well as information on road accessibility and parking, and rail service information;
- the travel planner (on the right)[1].

Figure 1: App user interface



Source: Milan Airports App

[1] The website includes the English version of the travel planner; the Italian App version is currently being translated. Moreover, the website version includes a chatbot to assist passengers.

2.1. Stakeholder engagement

Stakeholder cooperation was a critical success factor in the pilot development. The project encompassed cooperation with two key types of stakeholders:

- transport providers (public and private), which agreed cooperating in the pilot project and provided the transport schedules feeding the travel planner;
- technology providers, which cooperated with SEA in the App technological deployment.

The following Tables summarise the involved stakeholders.

Table 1: Main transport providers

Stakeholder	Type of services	Main geographic scope
ATM AZIENDA TRASPORTI MILANESI S.p.A.	Road public transport	Milan metropolitan area
Air Pullman SPA TRASPORTO PUBBLICO LOCALE		Milan Functional Urban Area (mainly North-West); Milan Central Railway Station - Linate/Malpensa
Autoguidovie Guidati da te.		Lombardy region specific provinces, Milan Functional Urban Area (South-East, Monza and Brianza), Milan Linate
S.A.C.O.		Malpensa - neighbouring municipalities (Gallarate)
STN SOCIETA' TRASPORTI NOVARESI srl		Novara - Malpensa
TRENORD	Rail	Milan sub-urban area, Lombardy region, cross-border services to Switzerland, Milan Malpensa Express rail service
TRENITALIA GRUPPO FERROVIE DELLO STATO ITALIANE		National
	Coach	Air Shuttle Nord Brescia - Linate/Malpensa
arriva sadem a DB company		Torino - Malpensa
arriva savda a DB company		Aosta - Malpensa
autoservizi ab botti		National, including airports (Linate)
Autoservizi COMAZZI S.R.L.		Domodossola – Malpensa
Autostradale		National, including airports (Linate, Malpensa)
GIOSY TOURS		Switzerland - Malpensa
JETBUS		Lugano (CH) - Malpensa
LUGANO SERVICES		Switzerland - Malpensa

Stakeholder	Type of services	Main geographic scope
S.A.F.		Lago Maggiore - Malpensa
autoservizi Silvestri LIVIGNO		Switzerland - Malpensa/Linate
STARfly		Milan Central Railway station - Milan Linate
TERRAVISION		International, *focus* on airports (Linate, Malpensa)
Volpi		Genova - Malpensa

Source: SEA Milan Airports

Table 2: Pilot project technology providers

Provider	Activities
piksel	User experience design and interface, CO_2 calculator
PLUSERVICE.NET	Back-end and algorithm
airport.ai	Chatbot
Great Pixel	User test

Source: SEA Milan Airports

We note that the travel planner includes several private operators, in particular in the coach sector, and this allows a wider range of services compared to Google Maps.

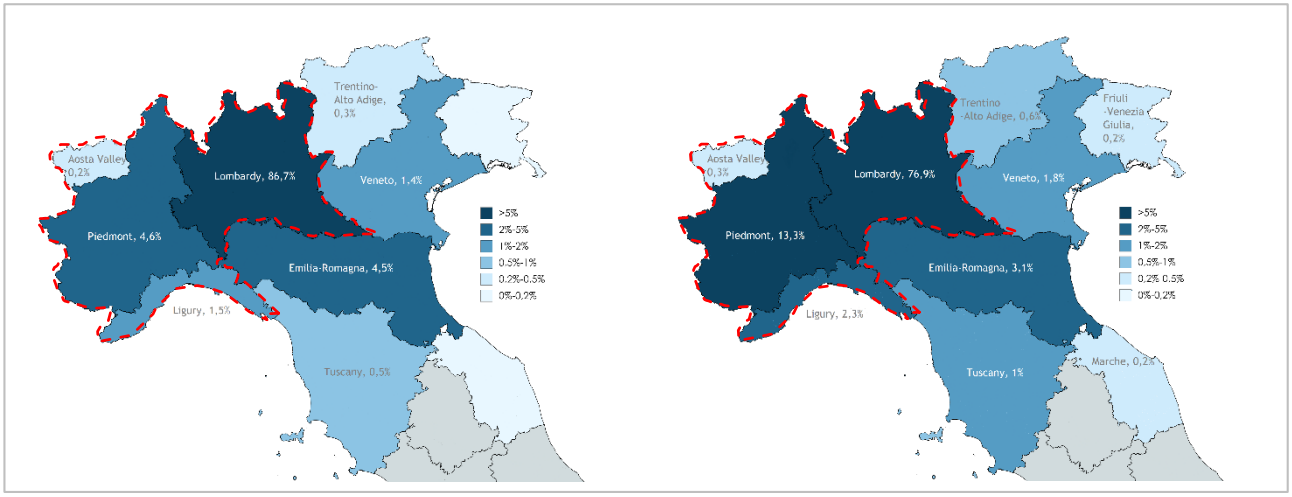
2.2. The travel planner algorithm

The travel planner algorithm calculates and provides passengers information on travel options from their departure points to Milan Malpensa (Terminal 1 or 2) or Milan Linate. The travel planner relies on transport providers' timetables which are imported into the travel planning system. Therefore, the capillarity of the travel planning (as well as the number options) is strictly linked to the transport providers engaged in the project.

SEA focused on providers operating in the Airports' catchment areas, and in particular in those sub-areas which are more important in terms of number of passengers. The following maps show Milano Linate (left) and Malpensa (right) passengers' distribution by originating region; the red areas indicate the geographic scope on which SEA focused the engagement of providers.

Moreover, the engagement of Trenitalia (the national passenger railway undertaking) allows passengers to plan travel from all Italian railway stations.

Figure 2: Milano Linate and Milano Malpensa passenger origins by Italian region



Source: SEA Milan Airports

3. Travel planner features

The following Table provides an overview of the main travel planner features, in terms of accessibility, usability, type of information and functionalities, and services available[2].

Table 3: Travel planner features

Features	Services	Availability
Accessibility	Accessible via web	✓
	Accessible via mobile phone App	✓
	Accessible without login	✓
	Multilingual / at least EN version	✓
	Off-line accessibility of information/routes	✗
	Download/Login free of charge	✓
	Usage free of charge	✓
Type of information	Information on public transport network and lines	✓
	Information on shared mobility offers	✗
	Information on (current) road traffic (on route)	✓
	Information on soft mobility offers	✗
	Information on taxi services (cabs, uber)	✗
	Information on parking offers	✗[3]
	Electric charging points (information, booking, payment)	✗
	Information about travel time (from A to B)	✓
	Real-time information e.g. on delays and disruptions	✗
	Information on CO_2 emission (for chosen route/modes)	✓
	Information about ticket fares (without the possibility to book)	✗
Functionalities	Route searching & planning (from A to B with various modes)	✓
	Station searching and information about supply including departures/arrivals	✗
	Multimodal route searching & planning	✓
	Integrated booking on multimodal level	✗
	Single-mode booking	✗
	User feedback	✗
	Social media add-in (for multidirectional communication)	✓

Source: SEA Milan Airports

[2] Please note the table does not include "usability" as this is further presented in chapter 5.

[3] Information on parking offer is not in the travel planner but it is available in Milan Airports App and website.

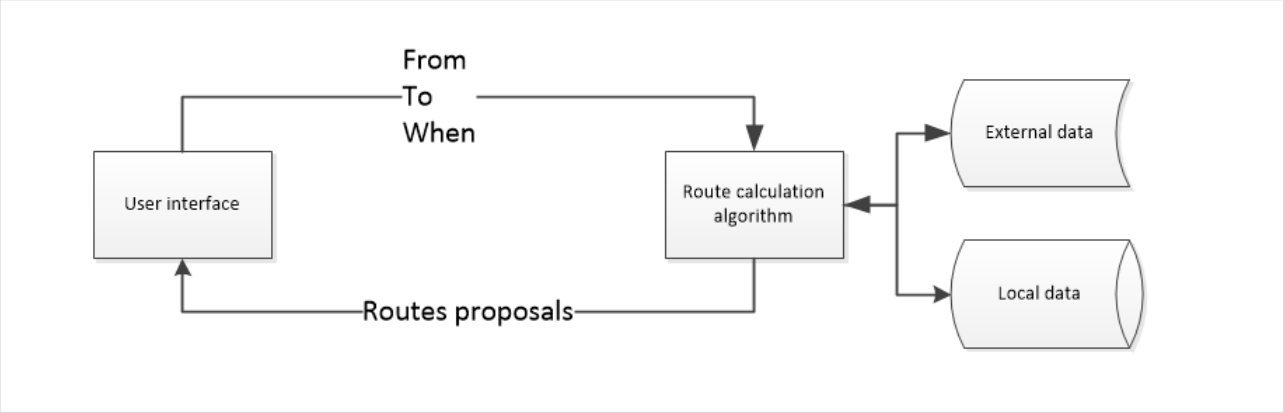
Some services not available at the moment, especially those related to transport offer, will be integrated in the platform in the future: the tool is “open” and will evolve with more functionalities.

4. Travel planner environment and functioning

The system is made of 3 main components:

- a user interface, in which passengers specify the origin, destination, departure time or arrival time;
- an algorithm calculating routing;
- several internal or external sources from which the algorithm retrieves data on transport service offer.

Figure 3: Travel planner structure



Source: SEA Milan Airports

Concerning the hardware interface, the entire system is hosted on premise in SEA data centre. The pilot project is a part of the “milanairports.com” project that is deployed over a cluster 6 of VM’s.

- Container type: Vmware VM
- CPU (Central Processing Unit): GenuineIntel - x86_64
- Capped CPU: 4
- Capped RAM: 32Gb

Concerning the software interface, the system is composed of different types of web technologies. The user interface is an HTML/JS (JavaScript) based interface published by a dedicated cluster of frontend webservers. The backend is composed by a cluster of microservices developed in SpringBoot that retrieves data from internal databases and external data sources. The environment is:

- Server version: Apache Tomcat/7.0.62
- Server built: 7 May 2015, 17:14:55 UTC
- Server number: 7.0.62.0
- JVM (Java Virtual Machine) Version: 1.7.0_65-mockbuild_2014_07_14_06_19-b00
- JVM (Java Virtual Machine) Vendor: Oracle Corporation

Concerning the communication interface, all the external communication interfaces are made of a cluster of microservices that retrieve data from external webservice via HTTPS/REST (Representational state

transfer). There are more than 4 external sources; every search triggers a set of external and internal calls to retrieve all necessary data to create the list of routers.

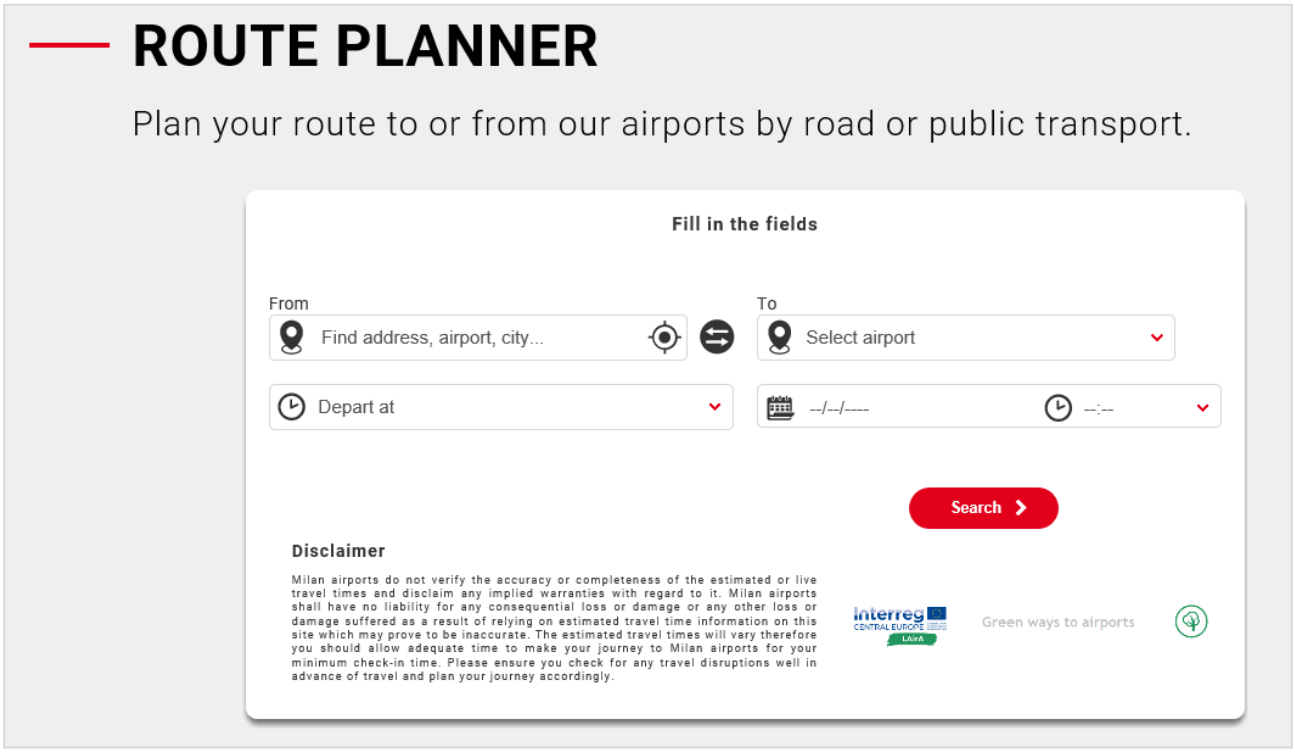
Finally, these are the details of the operating system platform:

- Red Hat Enterprise Linux Server
- Version: release 6.6 (Santiago)- 2.6.32-504.el6.x86_64

4.1. User interface

The user interface is an intuitive web-based interface in a dedicated section of the Milan Airports website (*"How to reach the airports"*). The same interface is optimized for mobile devices, as well as available on Milan Airports App (please see Figure 1). The following Figure shows the website interface.

Figure 4: Travel (route) planner interface



Source: https://www.milanairports.com/en/our-airports/how-to-reach-the-airports

The information required are origin, destination (Malpensa Airport Terminal 1 or 2, or Linate Airport) and the departure/arrival time. Additionally, the user can provide the departure GPS coordinates instead of typing the departure point.

The travel planner calculates and shows the routes including transport services, departure and arrival time, and travel duration. Moreover, it provides details on transport legs and timing, and eventual walking directions, for each route. The most environmentally friendly route (the one with lowest CO_2 generation) is highlighted by a green box including the phrase *"Be a hero!*".

The following Figure shows an App simulation for the journey Milan Centrale – Milan Malpensa Terminal 1.

Figure 5: Travel planner simulation results

Source: SEA Milan Airports

When the passenger chooses the transport option this is shown in detail, including the journey map, as reported in the following Figure.

Figure 6: Travel planner simulation results - solution detail

Source: SEA Milan Airports

5. User behaviour and information needs

The pilot project included two types of user analysis:

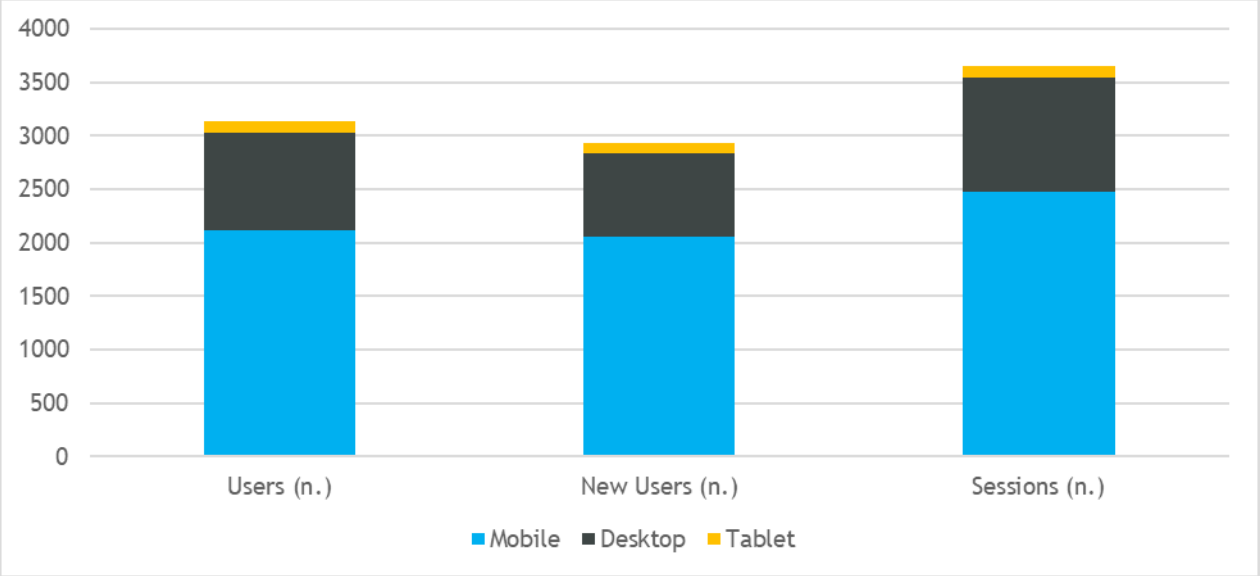
- retrieving and analysing data from Google Analytics concerning how users interact with the travel planner (travel planner use);
- testing the travel planner to identify issues and improvement areas (user experience).

5.1. Travel planner use

The first analysis indicates that in the period from 30 August 2019 to 8 October 2019, 3,130 users visited the travel planner App / Website section. This corresponds to 7.64% of the total number of people visiting SEA digital channels. Most users accessed the travel planner in Italian (88,76%).

The following Figure shows details on number of users, new users (in the concerned period) and sessions by type of devise (mobile, desktop or tablet).

Figure 7: Travel planner users and sessions by type of devise



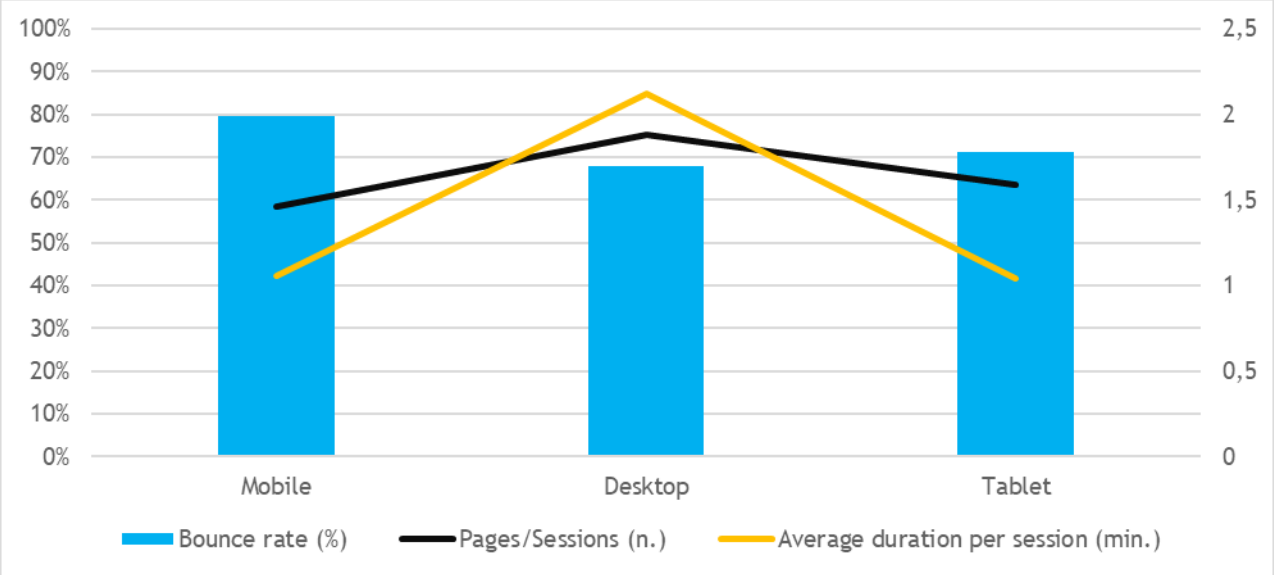
Source: SEA Milan Airports

We note that most users are new (2,930 equal to 93.61% of the total number of users) and that mobile is the most used type of devise.

Moreover, the analysis shows that about 55% of users are in the 25-44 age range. Concerning gender there is an equal distribution in the travel planner use.

The following Figure reports user behaviour by type of devise.

Figure 8: User behaviour by devise - bounce rate, pages per session and average duration per session



Source: SEA Milan Airports

Concerning bounce rate[4], it is higher for mobile and lower for desktop access. The desktop access also has a higher number of pages visited per session and a higher average duration per session. Currently there are not enough elements to understand reasons, and SEA will further monitor these Key Performance Indicators.

Finally concerning users' geographic distribution, most passengers used the travel planner from Milan (29%). The bounce rate from other geographical areas is higher and this may need further analysis to understand if it relates to a better travel planner performance in the Milan area.

5.2. User experience

SEA developed a travel planner user test on the mobile and desktop versions. The following Table highlights issues and possible solutions raised by users. The dots in the last column ranks SEA's assessment on the extent to which the issue is critical (from 1 - minimum to 3 - maximum). Not all issues were identified by all test users and the Table includes all the comments received.

Table 4: Travel planner user test

Issues	Possible solutions	Level of criticality
Difficulty in finding the section *Calculate your route*	Direct link on the website homepage or header.	•••
Difficulty in understanding icons that characterize the travel options (most comfortable or fastest)	The icons could be more intuitive.	•••
Bug message in the GPS geo-location ("the browser doesn't support geolocation")	Need to improve the geolocation feature.	••
Banner "*Be a hero*" though to be an advertisement and not a travel solution	The most sustainable travel option could have a better illustration.	••

[4] The bounce rate is the percentage of single page visits (or web sessions) in which a person leaves without browsing any further.

Issues	Possible solutions	Level of criticality
Raking of travel options unclear	The ranking could depend on the time variable (arrival, departure or travel time).	••
Need to scroll a lot before finding all the solutions (desktop web site)	The web site could have a different page lay-out.	•
Impossibility to modify travel data once the results are shown and need to restart planning	The travel planner could include the "modify travel" option in the same page where it displays results.	•
CO_2 information only available for the greenest option and difficult to evaluate in terms of magnitude	The travel planner could add information on CO_2 information for all solutions and convert it into a figure more understandable to the general public.	•

Source: SEA Milan Airports

Further than assessing issues, users provided the following positive feedback and suggestions for additional functionalities:

- The information needed to plan the travel is clear and easy to use;
- The information on the greenest travel option / CO_2 calculator is appreciated;
- The travel planner could include information on ticket - journey price;
- The functionality "arrive by" is useful and could be integrated with the flight departure time;
- The travel planner could be linked to other websites (e.g. ATM - public transport provider) to provide real time travel information.

6. Project development

The LAirA pilot project started in early 2019 and most activities were delivered in 6 months, so that the travel planner could be ready before the closing of Milan Linate Airport (from 27 July until 27 October 2019 due to renewal works). Modifications and improvements continued after the summer and are still ongoing.

The following Table reports SEA Milan Airports departments involved in the project.

Table 5: SEA departments involved in the project

Departments	Main task
Information and Communication Technologies	App / website development
Non-aviation sales	App / website development
Real estate and airports accessibility planning	Service planning and stakeholder engagement
Legal affairs	GDPR and legal compliance

Source: SEA Milan Airports

Concerning budget, the pilot project included both LAirA - Central Europe (ERDF) funds and additional SEA Milan Airports funds (in particular for the algorithm development). The total pilot project budget is around €110,000, plus 6 months of a senior Full Time Employee.

The main challenges in the project delivery concerned:

- Engaging transport providers and agreeing cooperation; engaging numerous players was necessary to provide passengers exhaustive travel information;
- Verifying the algorithm travel planning results, in terms of travel combinations and proper functioning;
- Ensuring the travel planner availability before Linate Airport closure (time pressure), so that the service was available to passengers and help Malpensa Airport accessibility;
- Providing travel options which ensure information on all available solutions, and consequently treating equally all transport providers based on service availability;
- Developing the layer for communication with the algorithm software;
- Designing the travel planner to provide users the best experience and added value.

Future challenges concern:

- Ensuring that the travel planner evolves as technology progresses;
- Enhancing the travel planner promotion;
- Adding functionalities which may include:
    - Home-to-gate travel planning;
    - Digital wayfinding features /in-door navigation, with reference to terminal infrastructures and services (e.g. shops, gates, etc.)[5];
    - Automatic import of timetables[6];

[5] This project is currently ongoing and should end within 2019.

[6] These are currently imported weekly and take into account eventual changes.

- Real time information provision, including alerts;
- Step-by-step guidance to passengers in their journey, based on real time monitoring of their journey progress;
- Ticketing functionalities.

7. Conclusions

The LAirA pilot focused on enhancing SEA Milan Airports App and website surface access information by a multimodal travel planner that passengers can use when travelling to the airports. The pilot was a test bed aimed at supporting the LAirA partners, and other Central Europe airports which wish to develop a travel planner, on project phases, critical success factors and challenges.

The pilot needed a strong stakeholder cooperation, in particular with transport providers in Milan Airports' catchment area. The availability of multiple transport services made the project complex and at the same time was a key reason to act. The travel planner is multimodal and includes transport offer of over 20 providers in the road public transport, coach and rail sectors.

Based on the passenger origins and destinations the travel planner calculates and shows the routes including transport services, departure and arrival time, and travel duration. The most environmentally friendly route (the one with lowest CO_2 generation) is highlighted.

The pilot included two types of user tests.

The first test focused on users' interaction with the travel planner. 3,130 users visited the travel planner App / Website section in September 2019 (7.64% of the total number of people visiting SEA digital channels). This allowed understanding among others which devise they mainly used (mobile) and their geographic area (mainly Milan), as well as gender and age.

The second test focused on user experience and encompassed the travel planner test by a panel of users to collect detailed information on issues and improvement areas. In particular main issues were technical and related to how information is provided. Improvement areas mainly concerned a further integration of the travel planner with flight departure times, ticketing integration and real time information. The travel planner information on the greenest travel option (CO_2 calculator) was appreciated by users.

The project development relied on a team including staff from several SEA departments, plus external consultants, which managed technical, Information Technology and legal issues. The project lasted 6 months, but modifications and improvements are still ongoing and are part of SEA efforts to continuously enhance passenger services. The budget was around €110.000, plus staff costs (about 6 months of a senior Full Time Employee).

The main challenges in the project delivery concerned:

- engaging transport providers and agreeing cooperation;
- verifying the algorithm travel planning results, in terms of travel combinations and proper functioning;
- providing travel options which ensure information on all available solutions, and consequently treating equally all transport providers based on service availability;
- designing the travel planner to provide users the best experience and added value.

Future challenges areas concern:

- ensuring that the travel planner evolves as technology progresses;
- enhancing the travel planner promotion;
- adding functionalities which may include Home-to-gate travel planning, real time information and ticketing.