D.3.2.3   Mobility needs and gaps in Emilia-Romagna

WP3 Understanding mobility needs and trends

A.3.2 Mobility needs and gaps in ICARUS region

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1 Introduction

The present deliverable D.3.2.3 aims to identify the mobility needs and gaps in Emilia-Romagna Region (RER) with a focus on the areas included in the Programme Interreg Italy-Croatia.

RER carries out extensive work on monitoring mobility and transport in its territory. Since 1992 reports have been produced, aiming to put together a comprehensive overview of the status of mobility in the Region, as well as collecting specific indicators concerning the services dedicated to mobility. In 2009 RER has decided to extend the content of its monitoring to all transport and mobility sectors, including logistics, road safety, train and freight.

This document on "Mobility needs and gaps of Emilia-Romagna Region" collates the results coming from the work that RER has carried out in the past years, including 2019 surveys, data collection and analysis. Several elements were added in order to complement available information, for example with this report, RER aimed to further analyse the status of intermodal passenger transport and how to develop it further, therefore the information coming from monitoring was integrated with the results coming from the experts' interviews carried out within the ICARUS framework.

2 Current transportation status in Emilia-Romagna Region

2.1 Demographics

To understand mobility patterns in Emilia-Romagna, it is important to analyse the demographic context.

People registered as "residents" in Emilia-Romagna Region in January 2020 were 4 474 292. The population grew by 0.06% compared to January 2019, a countertrend compared to the national one. Over half of the population (51.3%) is made of women, and the percentage is higher (62%) if we only consider the population over 80 years of age. The increase in residents in 2019 concerned the male population, while a decrease was observed for the female population. The population of young adults (30-44 years) is the one with the greatest numerical suffering, indeed, the number of residents between the ages of 30 and 44 is lower than the number of residents of the other age groups: in Emilia-Romagna there is an aging population, as it can be clearly observed in the following figures. In line with the national data, people over 45 years of age are the most numerous. (Regione Emilia-Romagna, 2020)

The population's growth recorded at regional level is not homogeneous across the territory. In the provinces of Ravenna and Ferrara the population decreased by many units. On the contrary, residents in the Metropolitan City of Bologna (capital city of Emilia-Romagna Region) and in the province of Parma are increasing. There is a slight decrease in residents in the provinces of Reggio Emilia and Forlì-Cesena, while residents in the provinces of Rimini, Piacenza and Modena are slightly increasing. There is a decrease in population in municipalities that have up to 5000 residents, but the Metropolitan City of Bologna is the only area where the population is growing even for small municipalities. (Regione Emilia-Romagna, 2020)
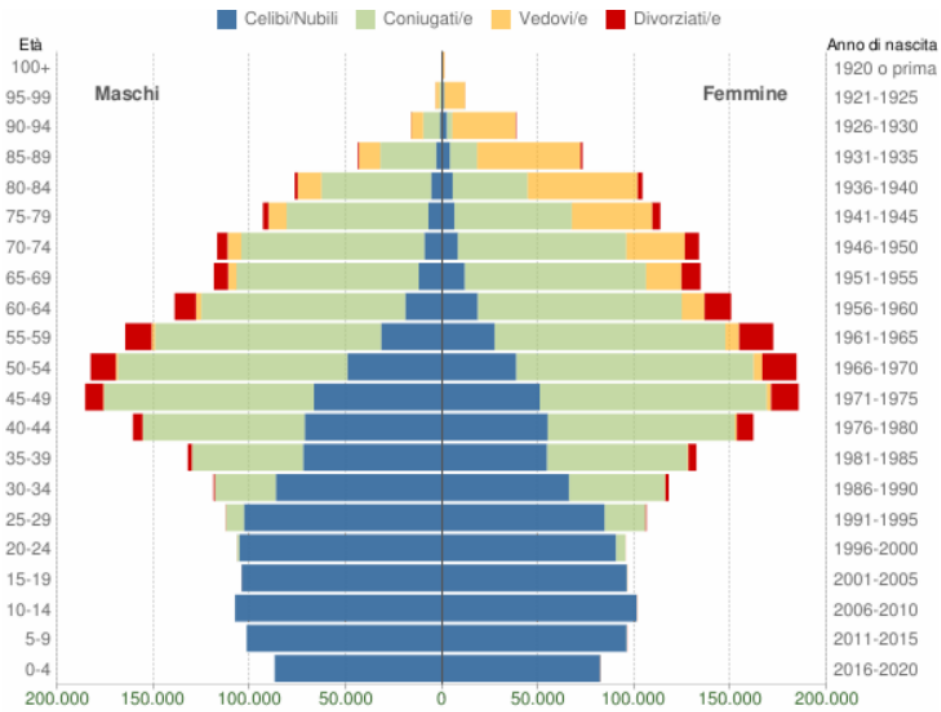
Figure 1 Population pyramids in 2020 by age, sex and marital status (Statistiche demografiche - Emilia-Romagna, s.d.)
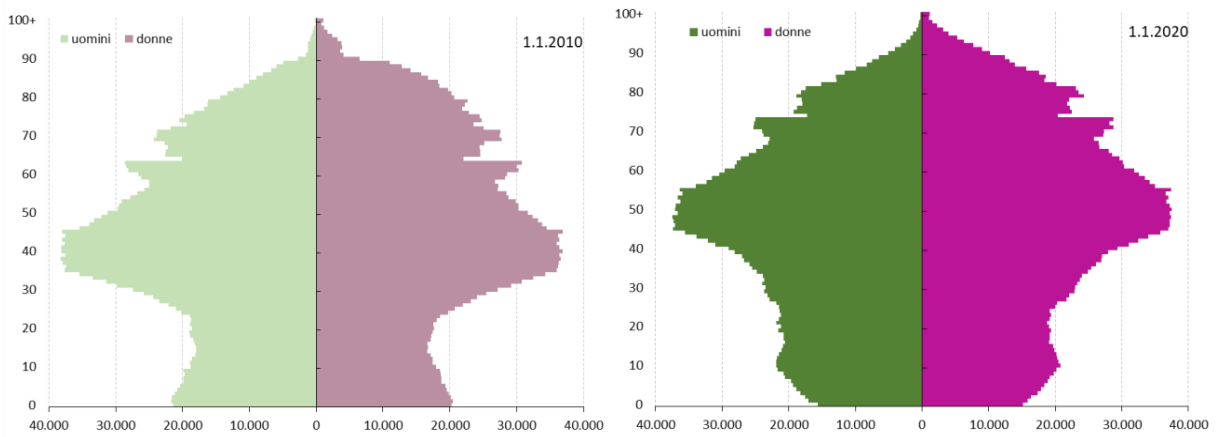

Figure 2 Population pyramids in Emilia-Romagna in 1.1.2010 e 1.1.2020 (Regione Emilia-Romagna, 2020)

Provincia / città metropolitana	fino a 5.000	5.001 - 10.000	10.001 - 20.000	20.001 - 50.000	Oltre 50.000	Totale
Piacenza	75.496	66.412	41.398		104.485	287.791
Parma	43.009	92.606	93.203	27.237	198.341	454.396
Reggio-Emilia	40.749	123.822	144.427	51.239	172.570	532.807
Modena	47.439	72.313	170.415	158.797	259.382	708.346
Bologna	49.527	131.251	226.624	150.347	462.126	1.019.875
Ferrara	17.203	63.424	53.379	79.049	132.448	345.503
Ravenna	12.374	47.922	51.371	61.168	217.145	389.980
Forlì-Cesena	37.108	41.644	75.145	26.012	215.208	395.117
Rimini	18.730	41.348	71.088	57.741	151.570	340.477
Totale	341.635	680.742	927.050	611.590	1.913.275	4.474.292
variazioni assolute sull'anno precedente						
Provincia / città metropolitana	fino a 5.000	5.001 - 10.000	10.001 - 20.000	20.001 - 50.000	Oltre 50.000	Totale
Piacenza	-212	-7	17		336	134
Parma	-288	428	289	129	1.823	2.381
Reggio Emilia	-329	0	-163	-104	245	-351
Modena	-180	112	142	360	-287	147
Bologna	112	338	911	400	1.322	3.083
Ferrara	-162	-397	-299	-157	-45	-1.060
Ravenna	-3	-217	-245	-88	-652	-1.205
Forlì-Cesena	-203	-65	164	-5	-304	-413
Rimini	-132	-122	23	-48	370	91
Totale	-1.397	70	839	487	2.808	2.807

Figure 3 Resident population by province/metropolitan city and class of demographic size of the municipalities. Absolute values 1.1.2020 and absolute changes compared to 1.1.2019 (Regione Emilia-Romagna, 2020)

2.2 Mobility patterns in Emilia-Romagna during the covid19 crisis

The Covid-19 pandemic and the events related to its global coverage made 2020 a peculiar year in terms of mobility. ISFORT developed a report on the mobility patterns of Italians, whose main results we report below (ISFORT, 2019). For 2019 'Audimob' estimates a volume of 105 million daily trips (average working day, population 14-80 years) with a growth of +3% compared to 2018 and +8% compared to 2017. Instead, mobility rate increases slightly.

During the so-called "first (national) lockdown" (12 March - 3 May 2020) there was a vertical drop in demand volumes compared to the pre-Covid 19 regime: 65% daily trips less and 80% passengers*km less. The mobility rate decreased from 85% to 32% in the closing period, but if we also consider the shorter journeys on foot (less than 5 minutes), the reduction was more contained, from 91% to 49%. Mobility rate

recorded a less marked decrease in the North of Italy, compared to the South and the Central territories. In the north-eastern regions the average number of trips decreased from 1,93 to 0,67 with a variation of -65%, while the average length of daily trips decreased from 11,7 km to 6,2 km.

In the weeks following the removal of the travel limitation measures (18 May 2020 - 15 October 2020), the demand for mobility of citizens had a sharp rise. The rate of mobility rose in the first month post restrictions to 75% from 32% in the lockdown period and then remained constant. The number of journeys doubled between the lockdown period and the first post restriction month, with a +144% growth. In the following months there was a further slight increase in day trips. The growth of passengers*km was +352% for the post-confinement period.

During the pandemic[1] there was a tangible impact on the choices of transport modes that led to favouring active modes of transport and motorized vehicles, penalizing all public transport. Active mobility reached 34,9% (modal split) in the first lockdown period and later it became 31,5%; but it has had a considerable increase over 2019 when it was 23,8%. The car's modal split, on the other hand, underwent few changes: it was 61% during the lockdown and then it became 60,6% (it was 64% in 2019). The modal split of collective and intermodal mobility fell to 4,1% in the lockdown period against 12,2% in 2019. After the reopening, there was a recovery in the share of collective mobility which rose to 8% in the first post-confinement phase and then maintained this level also in the following months (ISFORT, 2019).

In 2020, studies analysed the fear of contagion from Covid-19 linked to the various transport modes. The findings confirm that citizens have a widespread fear of contagion associated with collective/public/shared transport means, unlike what happens to cars, walking or using the bike. The graph below shows the perception of security from the Covid-19 contagion from the different transport modes in 2020: the scores are on a scale of 1 to 10 where 10 represents the maximum perceived security.

During the "third (national) lockdown", in the regions in the "red zones" people moved much more compared to March and April 2020, although the restrictive measures were theoretically similar to those of the first lockdown. The commercial activities that were allowed to remain open were more than in the first lockdown and people moved more to work and to engage in physical exercise. After a year from the beginning of the pandemic, fatigue and frustration over the restrictions are evident and this can be seen from the data provided by Google Mobility.

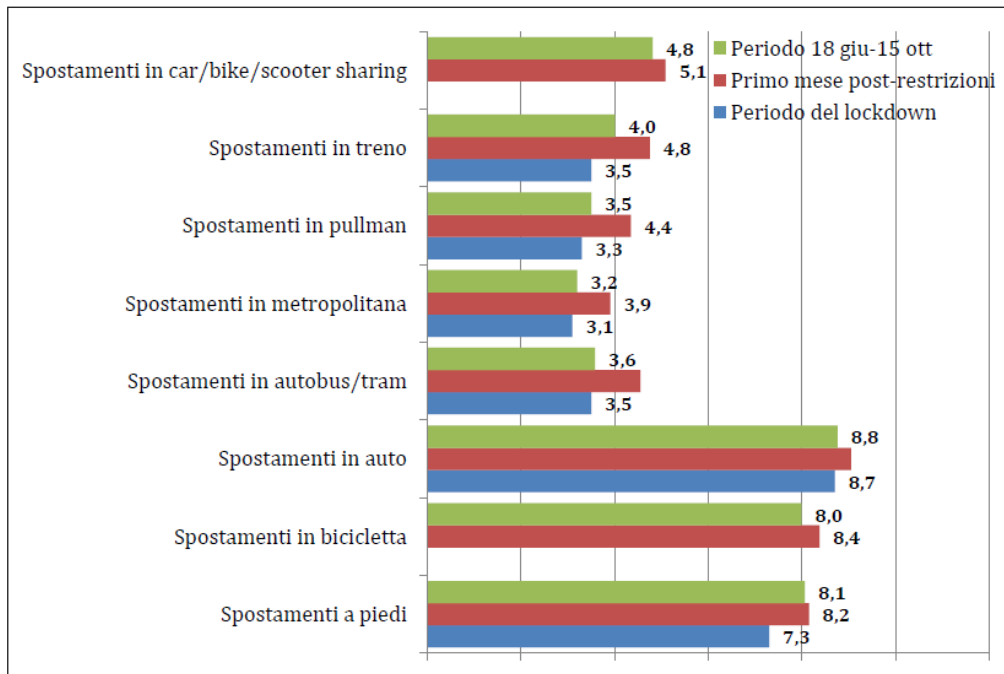[1] ongoing at the time of publication of this report

Figure 4 Perception of security from the Covid-19 contagion for the different modes of transport in 2020 (ISFORT, 2019).

2.3 Current transport network situation

The Emilia-Romagna Region is located between the Po basin and the Apennines. Emilia-Romagna's main municipalities are connected thanks to the via Emilia, based on ancient Roman road, that now is used as main motorway. Bologna is the main rail and highway junction in Italy and has a fast-growing international Airport. After the completion of the new high-speed rail station, the suburban railway network and of the People Mover (monorail line), an elevated monorail connecting the train station to the airport, Bologna future plans include large investments over the next several years to expand the airport terminal, add new tramlines which will cross the city center and incentivize the suburban rail service.

From the map in Figure 5, it is clearly visible (Figure 6) how road traffic tends to concentrate around the main municipalities of the region (from left to right): Piacenza, Parma, Reggio Emilia, Modena, Bologna, Forlì-Cesena and Rimini.

In the Emilia-Romagna Region there are more than 1300 km of railway infrastructures, as displayed in the figure below. Of particular importance is the node of Bologna, which is the link of high-speed train lines from/to Florence and Milan.

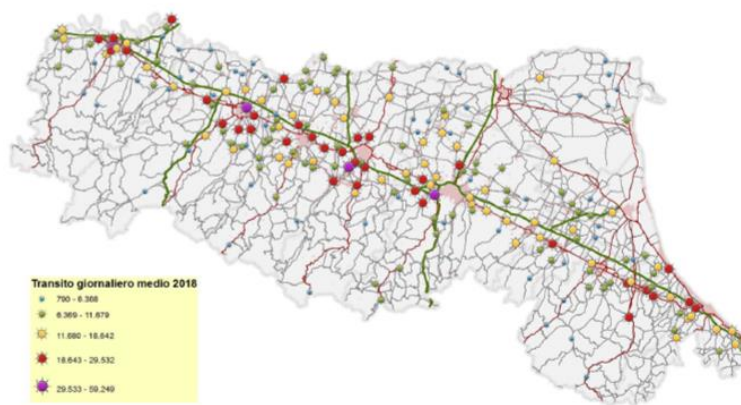*Figure 5 Motorways and highways in Emilia-Romagna Region*

Figure 6 Daily Transit in 2018. Purple locations are the busiest ones, followed by the red, yellow, grey and blue locations
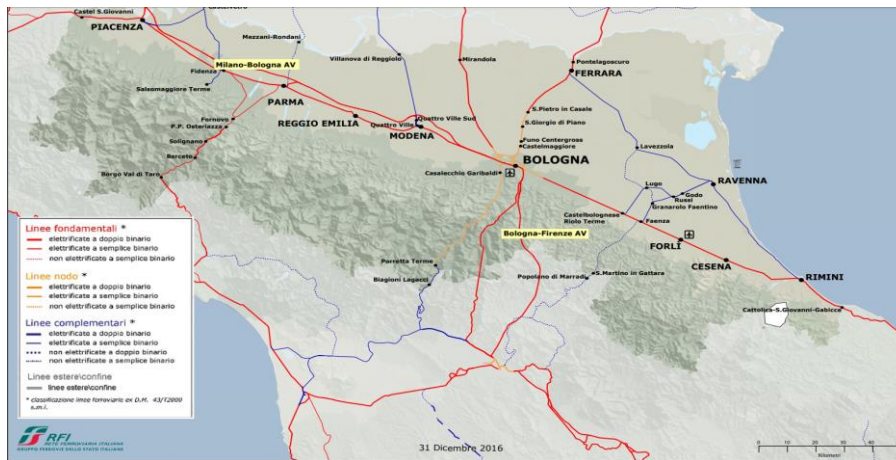
Figure 7 Railway infrastructure in Emilia-Romagna Region

Emilia-Romagna Region is severely affected by air pollution problems, along with the other Italian Regions of north Italy. As an example, ARPAE reports on the days exceeding PM10 concentration rates. Pollution problems have been a strong driver for the Region to promote planning for better air quality in all the cities of the region. Also, Emilia-Romagna Region has joined many environmental initiatives. For example, in cooperation with the cities above 50.000 inhabitants, since 2002 the region is promoting the "Liberiamo l'Aria" (Free the air) slogan to raise restrictions on mobility with private cars. On the other hand, in some particular cases, and especially during high concentration of PM10, some cities allow users to use public transport for 24h by paying the hourly ticket.

"Liberiamo l'aria" is renewed yearly and it includes restrictions for private vehicles, but also to specific euro standard vehicles. Following this initiative, the Region also promoted the bought of several buses with LNG or CNG and contributed to the bought of several electric locomotives for rail regional transport service as a behavioral change initiative. Emilia-Romagna is also very interested in promoting a "hydrogen valley" along with the well-known motor valley (for the presence of several car and motorbike manufactures). The hydrogen valley is a project aiming to invest in hydrogen technology in several cities of Emilia-Romagna Region (ANSA, 2020).

At international level, the Region is part of several initiatives aiming at reducing the environmental impact of the transport, like as the Under2 Coalition. The Under2 Coalition is a global community of state and regional governments committed to ambitious climate action in line with the Paris Agreement. Emilia-Romagna Region is among the 220 regional and sub-national governments that has joined the community to bring their experiences to protect the environment and to face the challenges of climate change (Regione Emilia-Romagna, 2019).
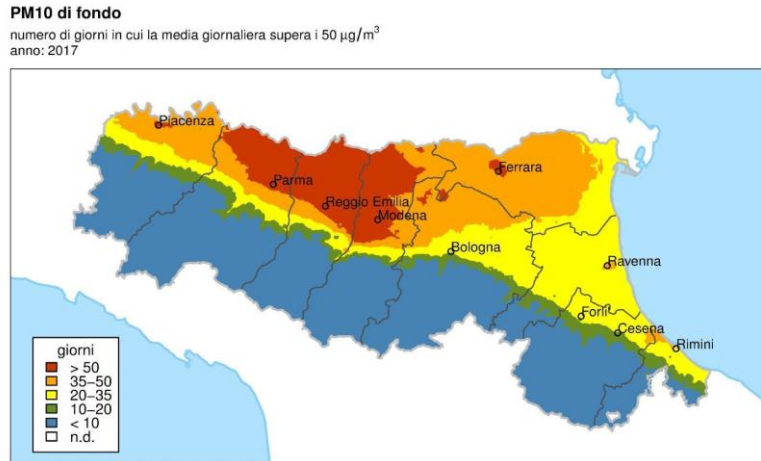
PM10 di fondo
numero di giorni in cui la media giornaliera supera i 50 μg/m³
anno: 2017

giorni
> 50
35–50
20–35
10–20
< 10
n.d.

Figure 8 Number of days exceeding the average mean of 50ug/m3 (2017)

3 Planning and policy documents

Emilia-Romagna Region has a number of functions related to the bus and train sector, as well as urban mobility. Specifically, RER has the following functions: planning, guiding, coordinating and financing public transport, while promoting the organization of mobility and services of public interest. The Region's function is twofold:

- Within its administrative territory, RER operates in economic, environmental and social activities related to mobility;
- As an organization, RER works on the different aspects related to work-home mobility of its employees and collaborators.

RER finances interventions to promote accessibility and synergies between resources. The Region finances the Local Authorities (municipalities and Metropolitan City), the Local Pubilic Transport Companies through the Mobility Agencies according with the Regional Law 30/1998 and subsequent amendments.

The functions of RER on railway transport are those of planning, administrative, and financing. Management of railway lines is regulated by the "Contratto di Servizio" (Contract of service). Since June 2019 the service was awarded to a joint temporary society made by Trenitalia and TPER named "TrenitaliaTPER".

Region Emilia-Romagna has set out a number of plans to guide the Region in its transport matters.

- PAIR - Regional Plan for Air Quality 2020 (Regione Emilia-Romagna, 2017), targeting the main polluting chemicals. It came into force in April 2017 and sets targets to be reached by 2020 on the main polluting chemical, and specifically, with a 2010 baseline, reduction by 47% for PM10, 36% for NOx, 27% for ammonia and VOC, and 7% for sulphur dioxide. This should reduce by 63% the population exposed to the PM10 threshold. PAIR2020 includes 94 measures to improve air quality, including measures on mobility and sustainable management of cities.
- PER- Regional Energy Plan (Regione Emilia-Romagna, 2017), which sets reduction targets for renewable energy, GHG emissions and energy efficiency. It was approved in March 2017 and sets the strategy and the objectives of Emilia-Romagna Region until 2030 regarding themes such as green economy, energy saving and efficiency, transport, renewable energy, research, innovation and training. The main targets are: reduction of GHG emission of 20% by 2020 and 40% by 2030 with a 1990 baseline; increase of 20% by 2020 and 27% by 2030 of renewable energy use for energy consumption; increase of energy efficiency of 20% by 2020 and 27% by 2030. The three sectors targeted by the plan are transport, electricity and thermal energy.
- PRIT (Regione Emilia-Romagna, 2019)- Regional plan of integrated transport. It is the main transport planning instrument of Region Emilia-Romagna, which aims to achieve an integrated mobility system, highlighting the key role of collective transport, sustainable mobility, development of technological innovation, and functionally organized traffic. Currently the PRIT 98 (approved in 1999) is in force, but PRIT2025 is under development. Important preliminary documents of PRIT 2025 were approved. Among the targets set by PRIT2025, 20% of journeys made by bike is for sure one of the most ambitious.

- The Region has financed (since 2015) the guidelines of the SUMPs of the municipalities with a population greater than 50,000 inhabitants and of the metropolitan city of Bologna and coordinates a working table to discuss at a technical level the implementation of SUMPs and their monitoring.

4 Multimodal integrated tariff schemes and tickets

4.1 MiMuovo

In April 2018, Trenitalia (primary rail transportation company and owned by the Italian Government) launched a smartcard, part of the national scheme for interoperability and integration promoted by the Gruppo Ferrovie dello Stato. The idea was to offer a tool to easily access transport services, as the smartcard would also integrate with the tickets from the system MiMuovo. With the respect to this smartcard, many steps are being taken to reach fully accessibility and interoperability between the

different systems in Emilia-Romagna. MiMuovo represents a first step to an integrated ticket, which is a cooperation between Trenitalia and the different transport societies (displayed in Figure 9).

Figure 9 Public Transport companies that have the MiMuovo system

MiMuovo is a single, integrated travel card for regional public transport available to residents of Emilia-Romagna Region, making travel on public transport much easier and more practical. The base of this integrated ticket is the definition of a regional integrated fare (bus plus train) that substitutes the old fare system based on the trip distance to be covered (calculated in kilometres) with a new system based on areas (zones) to be crossed. These integrated fares and ticketing services were launched in late 90's by Emilia-Romagna Region in an European project named STIMER.

In the framework of this project the new integrated Mi Muovo tickets were introduced, making traveling in Emilia-Romagna more comfortable, simple and easy, thanks to the use of one comprehensive chip card. During the years MiMuovo ticket has been further developed allowing the access to different transport and mobility services (from bus and train to bike sharing and car sharing), and to electric recharge points for e–vehicles. The system can be potentially extended to all the mobility services, so to improve the implementation of an integrated transport policy at regional scale.

The MiMuovo system not only makes payment easier and offers a discount to season ticket holders but it allows the city and regional authorities to monitor passenger flows. This information helps to better manage the public transport network according to users' needs.

Following the "Patto per il trasporto pubblico 2018-2020" the Region, the transport companies and the mobility agencies, have started the initiative "MiMuovo anche in città". This initiative offers the opportunity for users with a monthly or yearly train ticket to freely use public buses in the cities where they arrive or depart (over 50 000 inhabitants). The budget that the Region allocated to this activity was over 6M€. In the period September 2018- December 2018 there was an increase of 20% on yearly tickets and 34% for student tickets.

4.2 Other types of tickets

There are two special initiatives of START Romagna that are available in Romagna (provinces of Ravenna, Forlì-Cesena and Rimini). These are specifically designed for tourists.

- Romagna Smart Pass[2]: It is a ticket for 3 or 7 days giving unlimited access to public transport operated by START Romagna. The 3-day pass costs € 11 and the 7-days pass costs €22.
- Rail Smart Pass[3]: It's a Romagna Smart Pass but in addiction the user can use all the regional trains. The 3-day pass costs €25 and the 7-days pass costs €50.

5 ITS, ICT & MaaS solutions

5.1 Interview with LEPIDA

Concerning ITS, ICT and MaaS solutions, within the framework of this project, a specific interview was carried out with LEPIDA's general manager Professor Gianluca Mazzini. LEPIDA is the in-house company of Emilia-Romagna Region. LEPIDA, on behalf of the Emilia-Romagna Region, develops ICT including infrastructures for smart mobility.

Prof. Mazzini is convinced that the collection of data within the context of smart cities is essential for planning and for supporting the political strategy that the Region wants to implement. Data can only be collected thanks to ICT infrastructures, which are already in place in Emilia-Romagna Region but that are

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[2] https://www.startromagna.it/turismo/romagna-smart-pass/
[3] https://www.startromagna.it/turismo/rail-smart-pass/

also constantly upgraded and improved. Data collections constitutes the solid base through which policymakers can inform their decision. According to Prof. Mazzini, it is important to remember that ICT is actually supporting the choices of the policymakers of that Region, rather than being a driver itself.

Connectivity is crucial when it comes to smart cities. There is a direct connection with internet connectivity and GDP; it is hard to say how they influence one another, however they are both extremely important to bring services to the users. Prof. Mazzini also says that access to the digital services (such as the SPID Digital Identity Service) is increasing by empowering citizens and including also disadvantaged categories like the elderly people who thanks to targeted training and support are reducing their digital gap and started to obtain some benefits from technologies.

According to Prof. Mazzini, one big change that was brought about by Covid19 is related to the work from home, the so called Smart Working, and the broadband network has managed to cope with the demand. He was surprised by this positive result and acknowledges that huge broadband capacity was provided in a short time. He observes that providers have managed to make the operators very responsible in this effort, and that users were able to adapt. Workers managed to work from home in a productive and efficient way. So, as a consequence of the pandemic, people have rediscovered proximity. People have changed their vision and mindset, so work from home might become part of the normal way of operating. ICT is the enabler and has the power to transform the society.

Finally, Prof. Mazzini makes reference to the PNRR (Piano Nazionale Ripresa e Resilienza – National Recovery and Resilience Plan) as a challenge for the years ahead. The PNRR highlights digitalisation as a pillar, but his concern is that the availability of funding will not mean that actions would be automatically efficient and ambitious. Prof. Mazzini is concerned that it seems to be a lack of a national vision on the digital future of the country that would support in the years to come, and that bureaucracy might jeopardise the achievement of the expected results, the role of ICT and the digital would be strategic to innovate the industry sector and create the conditions for the development of the smart cities in Europe. Prof. Mazzini thinks that by Christmas 2021 it will become evident if Italy and the its Regions would be able to seize the opportunities of the PNRR.

Prof. Mazzini talked about one of the strengths of the Emilia-Romagna, which is the capacity of creating new partnerships and working together, that has exactly been the situation from which LEPIDA has been created.

5.2 The RogER App

In order to promote Mobility as A Service, RER has developed the RogER App[4]. RogER is a virtual mobility assistant: the user can choose how to get around, integrating the various forms of public transport. RogER proposes all the possible combinations and, after the user has identified the chosen travel solution, RogER also proceeds to purchase the related travel tickets.

Figure 10 Homepage of RogER (https://rogerapp.it/)

The current main functions of RogER:

- Calculation of trip/journey;
- Purchase of train/bus tickets;
- Purchase of parking tickers;
- Check the capacity and availability of seats (also in relation to the Covid19 emergency);

RogER is active and used in many municipalities of the Emilia-Romagna region. It is not just an application for the sale of travel tickets, because it also allows for the purchase of different types of travel tickets, seasonal tickets and also acts as technological substitute for the ticket. Furthermore, it can be used to pay

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[4] https://rogerapp.it/

for parking and in the future it is expected that it will be a full dynamic travel planner integrating more functions and more transport modes. The Region considers RogER as a first step towards the MaaS.

RogER works both with Android and Apple; the user can validate the ticket directly using the telephone on board the vehicle.

6 Impact of Covid-19 pandemic in Emilia-Romagna Region

The Covid-19 pandemic has changed mobility patterns of the residents and citizens of Emilia-Romagna bringing about new concerns, needs and habits. The health emergency has imposed many constraints and restrictions on travelling across the national territory. Meanwhile, there has been a reorganization of work and school patterns with the widespread adoption of distance learning, videoconferencing and agile work.

In 2019, almost two million employees and 800 000 students used to regularly move across Emilia-Romagna Region. The number of commuters, among workers, is 44,2% of the resident population and commuter students are 18% of the population. Before the lockdown the most used transport to go to work in Emilia-Romagna were cars and motorbikes, they were used by 78% of the employed, while 5,3% of those go to work by public transport. The percentage of students who took public transport was 29,2% (Regione Emilia-Romagna, 2020).

In 2020, lockdowns had a profoundly impact. In the most critical period of the emergency (Spring 2020), in Emilia-Romagna any movements towards indoor leisure environments (shopping, restaurants, bars, museums,...) and parks disappeared. Movements to places for the purchase of essential goods (foodstuffs, pharmacies,...) decreased between 30% and 40% compared to pre-Covid times. Public transport stations registered between 70% and 80% less activity. Attendance at workplaces decreased by 60/70%, while mobility in the near proximity of homes increased because these were the only movements allowed (Regione Emilia-Romagna, 2020)

Google has made some data available on the use of their services that allow to have a rough idea of how the mobility of people has decreased in recent months in Emilia-Romagna. These estimates are based on data collected on the location history of users of Google services since mid-February 2020. The data shows how visits to places such as food shops and natural or entertainment/shopping parks has changed in Emilia-Romagna. The baseline for the change is a median value that was calculated over the five-week period between January 3 and February 6, 2020 (Google)

6.1 Mobility patterns in 2020

Main results regarding mobility trends and patterns in 2020, specific to Emilia-Romagna, are summarised below.

- Travel trends towards places such as restaurants, bars, shopping, centers, museums, libraries and cinemas show a decline of -43% compared to the reference;

- Travel trends towards places such as supermarkets, agricultural markets, gastronomic shops, drug stores and pharmacies show a decline of -2% compared to the reference;

- Travel trends towards places such as national parks, public beaches, dog areas, squares and public gardens show an increase of +1% compared to the reference;

- Travel trends towards places such as public transportation hubs (stations railway, subway and buses) show a decline of -49% compared to the reference;

- Travel trends towards workplaces show a decline of -27% compared to the reference;

- Travel trends towards residential places show an increase of +14% compared to the reference.

Figure 11 travel trends to places such as restaurants, bars, shopping, centers, museums, libraries and cinemas in Emilia-Romagna (Google)

Figure 12 travel trends to places such as supermarkets, agricultural markets, gastronomic shops, parapharmacies and pharmacies in Emilia-Romagna (Google)

Figure 13 travel trends to places such as national parks, public beaches, dog areas, squares and public garden in Emilia-Romagna (Google)

Figure 14 travel trends to public transportation hubs in Emilia-Romagna (Google)

Figure 15 travel trends to workplaces in Emilia-Romagna (Google)

Figure 16 travel trends to residential places in Emilia-Romagna (Google)

Furthermore, the lockdown had an impact on specific air quality indicators, monitored by ARPAE (ARPAE, s.d.). In particular, had a pronounced effect on the concentrations of nitrogen dioxide (NO_2), a pollutant for which no criticalities were recorded for the first time: for the first time, during the first lockdown (March – May 2020), the annual limit value of 40 µg/m3 was observed at all stations and the hourly limit value was exceeded in none of the stations. However, the impact of Covid-19 was not so relevant for the other indicators.

7   Identification of mobility gaps

7.1 Survey to experts and stakeholders to identify mobility gaps

The Emilia-Romagna Region regularly carries out extensive surveys and monitoring reports on mobility and transport in the territory of its competence. As a result, the work carried out within the ICARUS project

focused on collecting additional information from transport experts to identify and improve passenger transport and mobility.

In addition to the information the Region is already collecting, a survey to experts was made with specific stakeholders in March- April 2021, including the questions indicated in the survey methodology provided by ICARUS.

The involved stakeholders in a first round of interviews were:

- AMR - Mobility Romagna Agency; it is a company owned by local authorities of the provinces of Ravenna, Forlì-Cesena and Rimini. The role of the AMR is to design, develop and coordinate collective mobility services.
- Tempi Agenzia Srl - Mobility and Public Transport Agency of Piacenza; it performs various tasks and services for users of local public transport. The company designs and plans local public transport, takes care of the quality of the service and facilities and manages the competition procedures for the award of services.
- TPER, it manages road transport in Bologna and Ferrara and the Emilia-Romagna regional railway service;
- Municipality of Ravenna;
- Municipality of Forlì-Cesena.

Stakeholders answered questions regarding mobility in their coverage area. From these interviews, it is possible to see that the companies/institutions refer to different sources to acquire data on passenger transport and to identify the major criticalities affecting their areas. Most of them refer to surveys, interviews and the database of students enrolled in institutions located in their territory. In particular, the Municipality of Cesena refers to ISTAT (Italian National Institute of Statistics) to collect local data both on the use of public transport and on accessibility. Instead, with regards to data relating to the accessibility of public transport, both AMR and TPER refer to the number of passengers transported and to the level of filling of the bus. This data is calculated based on the sales of travel tickets reported by the service operators. Mobility Romagna Agency thinks that there could be an improvement, as a result of a greater transparency of the data. These data are often considered to be the property of the managers and therefore these are difficult to access even by local authorities. All organizations that have a geographical area of competence in Romagna refer to the PRIT (Integrated Regional Transport Plan) and the PUMS (Urban Plan of Sustainable Mobility), two planning documents that support and regulate the use of public transport.

Incentive formulas for the use of public transport are being tested throughout the Emilia-Romagna area, some of these are already in use. The MiMuovo regional fare system exists throughout the region and there are subscriptions and fare supplements for students. In particular, in Romagna there is *RomagnaSmartPass* concerning the bus-train intermodality. The car-bus project is active in Piacenza: there are interchange parking lots on the outskirts of the city.

Passengers also travel by other means of transport to the countries bordering Italy, without using the plane or the car. Most of the stakeholders are not aware of transport options, fare schemes or integrated tickets for cross-border travel between different foreign countries and their coverage area. Only AMR is aware of cross-border road services to the Republic of San Marino and seasonal connections between the Romagna coast and the Croatian coast. Furthermore, none of the stakeholders knows public and online travel planners that include regional or national routes and cross-border routes.

The Emilia-Romagna region has invested a lot in ITS (Intelligent Transport Systems) and ITC (Information and Communication Technology) for data collection and management. There are platforms such as MOOVIT, ROGER and MyCICERO for local public transport. Stakeholders rate the state of their area with respect to ITS and ICT quite good. However, the Municipality of Cesena thinks that the integration between the various systems is still difficult. TPER suggests strengthening platforms such as Roger with non-public transport services, like the purchase of tickets for museums or other events.

The competitiveness with the private car is one of the main gaps that foresee the extensive use of public transport pre lockdown according to stakeholders. In particular, TPER says that in its coverage area a main shortcoming is the low public transport offer in certain time slots or in certain geographical areas: the offer should be increased to make the use of public transport easier and more accessible. To encourage the use of public transport, AMR proposes to impose restrictions on private traffic in urban areas. Both TPER and the Municipality of Cesena think that the introduction of on-demand services can make the service more efficient and, therefore, incentivize the use of public transport. Tempi Agenzia of Piacenza thinks that an incentive for public transport could be obtained with infrastructural interventions, with greater modal integration and greater economic resources. Tempi Agenzia believes that the main limitations are the frequency of services, travel comfort and travel time.

The pandemic has had a strong impact on public transport services: users perceive less security and this has led to a significant reduction in demand. Only AMR has the perception that the pandemic has not affected public transport services very much, contrary to what everyone else says.

Finally, all the stakeholders interviewed believe that accessibility from/to their coverage area is quite good.

7.2 Involved public and private bodies and their role

In general, when it comes to public transport the main stakeholders are the following:

- SETA SpA, since 1 January 2012 it has been operating as transport company in provinces of Modena, Reggio Emilia and Piacenza;
- TEP SpA (transport company), that works in the province of Parma;
- TPER SpA (transport company), since 1 February 2012 it has been operating in the Bologna and Ferrara basins;
- START Romagna SpA (transport company), since 1 January 2012 it has been operating in the Ravenna, Forlì-Cesena and Rimini basins;
- LEPIDA (in-house company), looks after the ICT infrastructures of Emilia-Romagna Region, supporting the implementation of smart cities' strategies;
- Ferrovie dello Stato, is an Italian company that operates in the railway transport sector, in the local public transport sector and in the goods train sector.

7.3 Key Performance Indicators

The Emilia Romagna Region has defined several performance indicators (KPIs) that are regularly monitored in the annual mobility and transport monitoring report. (Regione Emilia-Romagna, 2020) The indicators of urban areas are:

- Resident population in urban areas;
- Running Park in urban areas and fuel consumption;
- Number of accidents in urban areas, it refers to serious accidents with at least one person injured;
- Air quality in urban areas;

Urban mobility indicators are:

- Urban cycling tracks;
- Accessibility control of the historic center and ZTL, it considers the limited traffic areas and the pedestrian areas of historic centers;
- Parking and organization of the park;
- Interventions for the moderation of traffic, such as the creation of traffic roundabout intersections in urban center;

Public transport indicators in urban areas are:

- Urban service performed, offered by public transport;
- Fuel consumption of urban local public transport;
- Traffic control system, it considers the average speed of the public transport service, the percentage of km of lanes reserved for public transport compared to total length of the urban public transport network and traffic light intersections;
- Quality of the urban local public transport service, it includes the number and characteristics of public transport stops.

8 Needs

Within the context of mobility and given the administrative competences of the Region, Emilia-Romagna has identified some specific mobility needs, and consequently a number of projects were undertaken in the past years.

- **Improve mobility through intermodality, flexible forms of transport and innovative solutions**. The Region has set up a project to improve mobility in four internal/rural areas (named Montefeltro, Basso Ferrarese, Piacentino, Parmense); these areas are more isolated and the distances to be covered are high. The project includes a form of flexible transport system, as public transport service would be too expensive to run.
- **Improve students' mobility through funding to incentivize the use of public transport.** The GRANDE and GRANDISSIMO projects provide free passes for students up to the age of 14 and 19, respectively, belonging to families with an income (ISEE) of less than 30000 euros. Through these passes, accessibility to local public transport is improved and families obtain financial help.
- **Improve mobility for leisure and vacations**. In the past years, the following projects were initiated/completed:
  - Construction of long cycle paths connecting cities to improve sustainable tourism (in this context there are three cyclepaths that are under construction/already activated: Ciclovia del sole, Ciclovia del vento, Ciclovia Adriatica).
  - Promotion of a smart rail pass, a pass that allows tourists to discover all of Romagna by moving freely using both buses and trains.

9 Identification of future challenges in the area

There are several challenges (and opportunities) that Emilia-Romagna Region is facing, also connected to the identified needs.

Specifically:

- Emilia-Romagna recognises that **innovation** in the transport sector is very complex but that the means and resources exist to make a big change, especially in the light of the heavy **air pollution** problems affecting the Regions of the Po Basin. The Region has addressed this challenge by funding the renewal of the public transport fleet
- People should drastically change the way they move, so the Region should promote the **change of behaviour** through all possible means, such as improvement of infrastructures, funding. The funding of projects such as GRANDE and GRANDISSIMO (described in the previous chapter) is an example. Through new season tickets for the lower age groups, the Region seeks to encourage the use of public transport.
- Use **ICT, big data and digitalisation** to their full potential to support the growth of the Region.
- Find mobility solutions connecting urban, suburban, periurban areas, but also rural areas. The Region must find solutions that can be sustainable not only from an environmental point of view, but also in economic terms.

10 Definition of priorities in each involved area

To improve and maintain a good quality of life for the citizens is a priority for every administration, particularly Emilia-Romagna recognises that the problems related to mobility (pollution, congestion) must be addressed at all levels. In general, the priority of the region is therefore to abate pollution, contrast climate change and ensure that the health and wellbeing of citizens is preserved.

At the end of 2020, Emilia-Romagna has signed the Pact for Work and Climate (Regione Emilia-Romagna, 2020) together with the local authorities, universities, employers, trade unions and non-profit sector, in order to agree and progress a full employment and green transition.

With this Pact, Emilia-Romagna is determined to share its latest ambitious goals of carbon neutrality by 2050 and a transition to 100% renewable energy by 2035. The regional government believes that for active change to occur, ambitions and ideas. supporting that change must be shared with local institutions and bodies. Only by working together can this change be implemented fully in society.

Some of Emilia-Romagna's plans to improve air quality, develop clean energy, fight climate change and build a green economy include:

- Renewing local bus fleets by replacing at least 600 buses with low impact vehicles.
- Improving sustainable mobility by:

- Injecting over €14 million into bicycle mobility, pedestrianisation and implementing restricted traffic zones.
- Scrapping commercial vehicles which emit pollutants and increasing greener urban areas by 20%.
- Coordinating climate work with other regions of the Po Valley through the "Regional Integrated Air Plan 2020" to improve areas including transport, heating and energy.

Thus, concerning mobility there will be different actions in place such us:
- investing in new sustainable mobility, including by integrating the current investment with particular reference to mountainous and inland areas;
- enhancing the region's production capacity by replacing LPT with more environmentally friendly vehicles;
- providing further forms of subsidised pricing; promoting the use of bicycles by building 1,000 km of new cycle paths; incentivising investment in the development of electric mobility;
- speeding up integration between rail and road and with sustainable mobility methods; enhancing bike and car sharing with a view to reducing private motorised traffic by at least 20% by 2025;
- supporting the spread of private mobility towards 'zero emissions', including through the installation of 2500 recharging points by 2025;
- supporting the transition from thermal vehicles towards electric vehicles; reducing the need to travel by strengthening digital technology (smart city);
- strengthening and qualifying rail transport, both for people and goods, including by completing the electrification of the regional network;
- focusing on the development of intermodal transport, starting with investments in freight villages and intermodal and logistics centres to promote the transfer of freight transport from road to rail.
- Promoting the development of the Port of Ravenna area and activating the special logistics zone linked with it will be of especial importance.

According to Emilia-Romagna Region, within the framework of this document, the priorities are:

- Intermodality: It is clear that public transport alone is not able to provide the flexibility required for leisure and entertainment. A shift in paradigm is necessary, represented by intermodality and Mobility as a Service as next step. This is also strictly connected to an aging population that has specific needs and in the light of the ongoing pandemic, so it is also a priority to improve mobility supporting the healthcare system (e.g. going from/to hospitals)
- Support behavioural change across all segments of users: students, commuters, elderly people, citizens in general.
- Electric mobility: fostering low-carbon transport across all types of transport modes.

- Exploit mobility for tourism. In the past years it has become clear that, given the opportunity, people love to use their bike for tourism and leisure. In general, it is import to recognise that people do not move just to go to work, school and their chores but a large audience could and would use sustainable transport means and options to enjoy leisure time and holidays. This holds great potential, as Emilia-Romagna is a Region rich in natural and cultural attractions. By encouraging mobility, tourism becomes an increasingly growing sector. There is a strong relationship between mobility and tourism: the region seeks to improve and facilitate mobility so that it can increasingly become a popular tourist destination.

Emilia-Romagna intends to respond to these priorities with allocation of funding and start of specific projects.

11 Recommendations

When it comes to mobility, Emilia-Romagna pursues a number of priorities. With the ICARUS project, Emilia-Romagna Region intends to improve intermodality, fully in line with the analysis that was made in this report.

Specifically, Emilia-Romagna wants to encourage the use of dynamic travel planner solutions. This was already partially realised with the RogER App, prior to the start of the ICARUS project. However, much remains to be done, especially in terms of change of behaviour and promotion of sustainable solutions. The Pilot that will be realised by Emilia-Romagna will therefore complement the dynamic travel planner with an ICT solution.

12 Conclusions

The present report has conducted an analysis of the state of the art of mobility in Emilia-Romagna Region, while taking into consideration the pandemic and its consequences on mobility patterns. As the pandemic is still ongoing, it is hard to predict the long-terms effects but it is very interesting to note the patterns found in 2020.

The report includes a series of results coming from the consultation of experts from different key stakeholders of the Emilia-Romagna Region, who have offered their view, also at local level, of the mobility system.

Emilia-Romagna has identified its needs, challenges and priorities on which much resources were invested in the past but need to be carried out and continued in the future too. ICARUS will particularly focus on ICT, behavioural change and intermodality, which are among the priorities of Emilia-Romagna.

Finally, it is important to highlight that the Region has specific competences that are in synergy with those of the Municipalities, who organise their mobility based on the Sustainable Urban Mobility Plans (SUMP). Well-aware of this, Emilia-Romagna has organised specific meetings (WP5 Quality Partnership Meetings) to make sure that the results of ICARUS in terms of intermodality are also taken into consideration in the SUMPs.

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