

D3.4C – IMPLEMENTATION PLAN



POLICY LEARNING IN INFORMATION TECHNOLOGIES
FOR PUBLIC TRANSPORT ENHANCEMENT

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1. Introduction

The implementation plan is a planning policy instrument used by local administrations to decide the pattern and financial tools towards the transformation. POLITE has been contributing to this since the phase of the research of the good and best practices till the identification of implementation plan's steps.

POLITE Implementation plan identifies key actors in territorial programs/policies to offer them information support, recommendations, harmonization on ICT/ITS technologies in different contexts. These plan is a guide for the stakeholders to reach a consensus and establish how to transfer the POLITE good practice.

POLITE implementation plan intervenes to provide recommendations on how to change ICT policies for all sides, technical, organizational, economic, social and legislative and revise interests. At the same time the solutions have to be usable and transferable among the European countries.

Procurement specifications have to be analyzed, the responsibilities of actors have to be defined building a integration and regulatory structures in public transport.

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2. Methodology

The implementation plan has two faces, first theoretical and second basically rely on the case study of 5T (Turin, Italy).

First part policies, projects and transport planning importance in our territory are analyzed, and second part consists in a depth analysis on how to transfer the G.P. 5T, using all the points summarized previously.

The straightforward sequence of activities within the framework the implementation plan consisted of:

- Phase 1: desk research
 - ✓ Policies and projects analysis at Regional Level
 - ✓ Transport Planning Tools Analysis at Regional, Provincial and Municipal level
 - ✓ In depth analysis of policies and projects under development at Regional, Provincial and Municipal level
- Phase 2: case study
 - ✓ Selection and analysis of Good Practice to embrace and transfer
- Phase 3: analysis, conclusions and recommendations
 - ✓ How to implement the Good Practice in Province of Ferrara
 - ✓ System Standard definition
 - ✓ System Requirements definition
 - ✓ Design of ITS solutions according to the standard and requirements
 - ✓ System Monitoring and Maintenance

Following the above three phases, the Province of Ferrara has planned some tasks in order to realize its Implementation Plan.

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In the following pages the main steps are described in order to reach the integration of the existing ITS solution in our area.

3. Transport Planning Tools Analysis at Regional, Provincial and Municipal level

According to the Integrated Regional Transport Plan (PRIT: Piano Regionale Integrato dei Trasporti) planning activities are regulated at three administrative levels: regional, provincial and municipal.

PRIT is the main regional planning document providing mobility scopes and actions to be implemented. General dispositions are then locally acknowledged. In fact on the basis of the strategies reported in the PRIT, Provinces develop their Urban Plans (the so called PTCP: Piani Territoriali di Coordinamento Provinciale) and accordingly the municipalities develop local Urban Plans specifically linked to mobility issues, in particular: the Urban Mobility Plan (PUM: Piano Urbano della Mobilità) and the General Urban traffic Plan (PGTU: Piano generale del traffico) to implement the contents and planning tools set up in the previous documents.

In the following pages we will describe how each administrative level for transport planning approach ITS matter.

The Integrated Regional Transport Plan (PRIT)

The Emilia-Romagna Regional Law n. 30 of 1998 (General regulation of regional and local public transport) identifies the Prit (Piano Regionale Integrato sui Trasporti, Integrated Regional Transport Plan) as main planning tool with which the Region establishes guidelines and directives for regional policies on mobility and fixes the main interventions and priority actions to be pursued in the various areas of intervention.

In 2010 ended the PRIT 98-2010 time horizon, approved by Regional Council decree n. 1322 of 22nd December 1999. Closer to the expiration date, Emilia-Romagna Region, starting with an assessment of results achieved with the previous plan, started a process for the preparation of a new PRIT (named PRIT 2020), which currently is following the process required by LR 30/1998 for approval.

PRIT 2020 addresses the issue of ITS in urban mobility management identifying two macro categories of actions supported in the Emilia Romagna region:

- a. objectives related to environment, traffic flow and safety,

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- b. objectives and actions related to monitoring, territorial coordination and ITS systems integration.

PRIT 2020 states that all the actors providing mobility services (freight and passenger services, road, rail, maritime and air services) should share their information and databases.

ITS implementation for road and transport safety is strongly recommended (i.e. centralized systems for the monitoring of weather conditions, real time information on road surface condition etc). Particular attention must be reserved to the link between Vehicles to Infrastructure communication (V2I technology): dedicated pilot test in this way should be considered systems which allow drivers to have information onboard of the vehicle directly from road infrastructures through. In this evolving framework PRIT 2020 has a proactive role in the definition and implementation of specific actions concerning ITS development

Provincial Plans for Territorial Coordination (PTCP)

The plans highlight the importance of Intelligent Transport Systems (ITS) in order to manage transport and mobility problems in a smart way. These systems are useful to policy makers and citizens to increase the quality of transport services making these more appealing to users (also increasing the commercial speed).

Accordingly a series of actions related to ITS for mobility management have been undertaken at local level for different transport services.

Some actions enhancing transport services regarding urban private transport have been introduced in the Municipality of Ferrara:

- Variable Message signs (VMS) dedicated to parking information on main urban parking lots
- Installation of a system (M.U.S.A.: Monitoraggio Urbano Sistema di Accesso) to monitor vehicles access in the limited traffic zone in 2011 .
- In 2013 a system counting up bicycles in order to analyze cycling flow has been introduced.

Currently, in the Province of Ferrara there are 18 bike-counting systems: 11 installed on the most important extra-urban bike lanes and 7 on bike lanes within the municipality of Ferrara along the most important places in the city.

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Results from the cycling flow analysis are forwarded via wireless on the dedicated website (ContaBici portal) and accordingly published.

Some actions in extra-urban areas have been applied: new “Tutor” system has been installed since August 2011 in order to monitor traffic flows and detect violations (the system detects the average speed of a single vehicle in a road section).

In the early 2000 a road traffic monitoring system (MTS: Monitoraggio Traffico Stradale) has been implemented. MTS system detects vehicles flows and provide real time via web access. The system includes variable messages signs and cameras in some specific areas. Data can be controlled by the Emilia-Romagna Region and local Administrations.

Other ITS application have been implemented in order to improving local public transport services: “Intelligent” bus stops displays showing waiting time for bus arrival have been installed. The bus lines are regularly monitored by GPS through the AVM (Automatic Vehicle Monitoring) system which, according to the GIM project (see the next chapter), will also be extended to all the buses lines. “intelligent” bus stops will be installed along the most important bus lines.

Two free apps for bus services have been developed respectively in Ferrara and Bologna:

- FerraraMobile which provides various information on parking lots, road access, construction sites, bike sharing, cycling map etc.
- Tbus which allows to display information in real time on bus schedules, bus stops, delays, tariffs, possibility to plan intermodal trips by public transport etc. The service is expected to be extended to the whole province of Ferrara by 2013.

It must be highlighted that PRIT states the necessity to enhance interoperability of the above listed solutions in order to set up and integrate systems at local, regional and national level. Accordingly the development and integration of the technological systems already existing in the territory is a fundamental precondition.

It is recommended also an integration of the two apps already set up with the development of further functionalities such as the provision of information on urban and interregional buses, trains, taxis, road traffic data, carpooling,

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information on points of interests like gas station, workshops, driving schools etc.

Urban Mobility Plan

The Urban Mobility Plan is the planning instrument concerning mobility and transport introduced by the Act n.340 of 21/11/2000. This aims at forecasting scenarios, defining measures oriented at improving the efficacy of the infrastructural system and manage mobility demand through urban and territorial planning, developing a project based on strategies and objectives for the medium-long term.

The main aim of the PUM is to reduce or at least stabilize the need of citizens to travel thus reducing travel distances and encouraging citizens to walk, use non motorized vehicles and public transport means.

The actions foreseen in the PUM regard public transport infrastructures, local road infrastructures with focus on modal interchange and viability, parking system mainly concerning interchange, technologies applied to mobility, transport demand management, regulatory and monitoring traffic systems, information schemes, urban logistics and related technologies.

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4. In depth analysis of policies and projects under developed at Regional, Provincial and Municipal level

The city of Ferrara has always shown a strong bent for environmental-friendly lifestyles, and it is confirmed by the mobility style of its citizens: it is in the very first places among the Italian cities for the bike use: approximately 32% of total daily trips are made by bikes, thanks also to the extensive cycle paths network (more than 150 km) developed by the City of Ferrara. Lots of urban projects are planned in order to facilitate the use of bicycles on urban roads. Traffic calming interventions are planned just to improve the safety for pedestrian and cyclists, both along the street and the other public spaces.

A widespread bike-sharing system, together with a new car sharing service, has been developed in order to mitigate the use of private cars within the municipal area.

During the last years a new Limited Traffic Zone, monitored electronically, preserves the city centre of Ferrara by the use of private cars, while a new system of parking guidance can provide real-time information on the availability of parking spaces in the main parking areas just outside the city center. Information to drivers are provided by variable message signs located along the main roads leading to the city.

Despite all these efforts in order to increase sustainable urban mobility in Ferrara, there are still a lot of rooms for improvement as the use of local public transport, both urban and suburban, is still quite low, reaching only the 10% of total trips.

A lot of efforts in this way have been taken from Emilia-Romagna Region which approved the Integrated Transport Regional Plan (PRIT) and the Local Public Transportation Plan. These two plans aim at optimizing the services offered to citizens in order to reach a wider uptake and use of public transport services.

Emilia-Romagna Region is also involved in the Stimer Project that is a new integrated charging system for the regional public transport. Stimer allows Emilia-Romagna citizens to use different modes of transport throughout the region (urban and suburban buses, regional and local trains), using the same ticket and paying depending on the route traveled and not the mode of transport used.

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The Province of Ferrara, within the POLITE Project, intends to investigate the feasibility of a system of mobility supervisor, as presented in the Good Practice about the case of 5T in the Municipality of Turin.

The final objective of the Implementation Plan is to analyze all the necessary steps (both administrative and technical) that are needed in order to set up a traffic control system to optimize the public transport services, offering at the same time, a Real-Time Information Service to the users, in order to attract a larger share of passengers who currently use the private car for their journeys.

The Emilia Romagna Region has taken steps toward the implementation of ITS systems in the mobility sector. Here below there are some of the on-going actions/projects:

GIM “Gestione Informata della Mobilità” (ITS applied to Public Transport) project is geared toward those areas of the Emilia Romagna region which are not endowed with electronic monitoring systems for bus tracks with the scope of integrating an infomobility system for the public transport in the whole territory together with the implementation of regional plans i.e. the Travel planner and STIMER. The aims of the project are the enhancement of the overall public transport system through the monitoring of public transport fleets, the real time sharing of information concerning public transport, the integration of information concerning private transport etc.

Information on public transport and the travel planner. It is an operating system which has been operating since 2002, it is also supported by companies' information systems thus it can provide all possible options for trips by buses and trains in the region. It is based on a data bank with all information on public transport supply within the Emilia Romagna region.

Efforts toward an enhancement of the travel planner shall be undertaken through the promotion of new projects. In particular operations regarding route searching shall be supported also real time functions.

Another important information that should be integrated regards the travel price of the selected trip together with the calculus system per area in particular for rail services on RFI.

The system should be enhanced and completed with the possibility to buy the ticket selected. Accordingly all the systems providing the integrated ticketing at regional level should be connected together with the possibility to

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provide a unique section in which all the operations could be carried out: information search, selection of the trips option, purchase tickets.

There should also be major focus for integration with other collective transport systems such as air transport and international bus transport service.

The Integrated Mobility fare system “Mi Muovo” has been introduced since 2008: citizens can travel by train and bus with the same ticketing system through smart cards with microchips which are validated by electronic systems in different means of transport. The scheme is still in the implementation process with several upgrades, in provision it will be integrated with the bike sharing service, car sharing, electric vehicles recharge and parking fees.

Automatic Vehicle Monitoring system constantly monitors buses transit.

The traffic flow monitoring system (MTS) collects data and provide information on transits: number of transits, vehicle classification, speed. Since 2011 the system is also available through infomobility web applications on the mobility portal of the region. Real time functions and integration with other informative systems should be explored.

Tutor system for detecting vehicles infringements. Since August 2011 a new “Tutor” system has been installed. The Tutor devices are used both to monitor traffic and to detect infringements through the calculus of the average speed of vehicles in transit. Proceeds from fines are mainly used for road safety and maintenance operations.

Limited Traffic Zones (M.U.S.A.: Monitoraggio Urbano Sistema di Accesso) in Ferrara. Since 2011 the access to the city centre of Ferrara is managed by a system called MUSA. This system controls all the vehicle accessing the LTZ, checking each plate number and matching them with the authorized vehicles.

Bike-counting system. In February 2013 a system counting up bicycles have been introduced in order to analyze cycling flow. **Parking management and info in Ferrara.** All the parking area in Ferrara are provided with real-time info on the availability of free parking spaces. All these data are provided to city-users via mobile app to all Apple and Android devices.

Bike Sharing system: Emilia Romagna Region funded (€ 2 million) a bike sharing project called "Mi Muovo in bici". 12 municipalities (Piacenza, Parma,

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Ferrara, San Lazzaro di Savena, San Giovanni in Persiceto, Forlì, Cesena, Rimini) joined the initiative and installed the bike sharing stations at the railway stations and near the most important point of interest of each city centre.

Infomobility for users: the Emilia Romagna region intends to promote projects and initiatives, involving relevant stakeholders, for the enhancement of the “integrated fare system” and “integrated information” to support and improve intermodal mobility.

The aim is to manage the integration of information simplifying the information access to users. Accordingly a series of actions should be undertaken i.e. set up a unique website gathering all information from the different existing databases, avoid repeated information, guarantee updated information, access to information through different technologies such as computer, smart phones and variable message signs.

Regional Travel Planner. The system allows to calculate routes and plan trips by public transport system in the Emilia Romagna region through the web, check for bus stops and railway stations.

Ferraramobile is the free app for mobile phones developed by the city of Ferrara providing various information on parking lots, road access, construction sites, bike sharing, cycling map etc.

Tbus is a free app currently operating in Bologna but that will likely be extended to the whole province of Ferrara. The app allows to provide information in real time on bus schedules, bus stops, delays, tariffs etc.

The River Information Services (RIS) concern with the technologies used to optimise traffic and transport processes in the inland navigation sector. These enable quick electronic data transfers between water and land through beforehand and real time information exchange. The RIS intends to optimise information exchange among inland navigation operators and users.

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5. Selection and analysis of Good Practice to follow and implement

According to the main aim of POLITE project, Province of Ferrara aims to increase the public transport attractiveness, both in local and in regional scale, through the development of its Implementation Plan, pursuing the objectives of improving the quality, the efficiency and the safety of the Transport System, both public and private. To reach these objectives the Province of Ferrara wants to capitalize the Good Practice concerning the implementation in Turin (and its surroundings) by 5T.

One of the main objective of 5T was the increasing the PT mode share by increasing the efficiency and improving the services.

The public transport system developed by 5T has the objective of monitoring the PT system in Turin, giving valuable passenger information. Nowadays a public transport integrated ticketing system for the regional area is under development.

The Urban Traffic Control (UTC) improves the traffic fluidity in the urban area of Turin and reduces congestion for all the vehicles and, having a full view of the PT fleet status at any time and the control of 330 controlled intersection with dynamic regulation of traffic light cycles, can manage the PT priority at traffic signals in order to increase the efficiency of PT making it more attractive due to faster travel times and improved service regularity.

5T history

The city of Turin started in 1992 a large-scale project in mobility telematics named 5T (Telematics Technologies for Transports and Traffic in Turin), which embodies the conceptual framework and the results of the QUARTET Project financed by the EU and of the “Environment and Traffic project” financed by the Italian Environment Ministry.

The aims of the 5T Project were the following:

- Development of a strategic supervisory system for all Transport Telematics sub-systems
- Extension of the existing Urban Traffic Control and bus priority facilities over a wider area of the urban network
- Extension of the functions of the Public Transport Management System to include user information and passenger counting

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- Development of a system for keeping citizens better informed about mobility services
- Functional integration of traffic and transport control systems with the environmental monitoring and forecasting system.

At the beginning 5T Consortium counted seven partners. The main partner was a public partner, ATM the Turin public transport company (now GTT), that had a share of 66,6%. The city of Turin conferred 1.5 billion Lire (about 0.8 million Euros) to support ATM effort.

Others important partners were FIAT, the Italian automobile manufacturer based in Turin; Mizar (Today Swarko-Mizar) a company also based in Turin, specialized in the design, development and implementation of advanced telematics systems; Italtel, an Italian communication company; Tecnost, an information company owned by Olivetti and others.

Turin has focused on a comprehensive evaluation of the IRTE (Integrated Road Transport Environment) system. The 5T project was tested during a two-year experimental phase which ended in 1997.

The 5T System has been maintained in 1998-99 at the functional levels reached during experimentation. In the same period the process of the transformation of the 5T Consortium – which has generated 5T – into a new company in charge of all developments of transport telematics in Turin has been accomplished.

In 2000 started the 5T with the following partners: ATM, AEM, FIAT, CSST, Mizar.

In 2006 5T managed the Traffic Operation Centre of the Winter Olympic Games in Torino 2006 (TOC).

In 2008 5T becomes a private company owned by local public institutions,(GTT 35%, Città di Torino 30%, Regione Piemonte 30%, Provincia di Torino 5%) whose focus is on ITS (Intelligent Transport Systems) design, development and management, at the service of individual and collective mobility, both at urban and at regional level.

5T Description

5T manages the Traffic Operation Centre (TOC) in the metropolitan area of Torino, integrated with the public transport real-time monitoring system, to get smoother traffic and to improve the performance of public transport ,

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reduce air pollution caused by traffic. 5T is now working on the extent of the TOC to the whole Piemonte regional area, on the base of the experience gained with the Traffic Operation Centre of the Winter Olympic Games in Torino 2006, when 5T managed the traffic in the Olympic Valley.

The 5T System in Turin came out of the integration of pre-existing and on purpose developed subsystems. The System has been designed with an open architecture, to fit with all existing development and to allow further applications extension.

5T designs, develops, implements and manages ITS solutions and infomobility services, aimed to achieve the following goals:

- improve the traffic fluidity in the urban area (regional area) and reduce congestions;
- improve real time information services for the mobility;
- improve quality and performance of monitoring services for the public transport fleets;
- reduce air pollution caused by traffic.

The metropolitan system has integrated has integrated 10 transport telematics sub-systems:

- City Supervisor
- Urban Traffic Control
- Public Transport Management
- Environmental Control
- Parking Control
- Informative Media Control
- Collective Information (VMS)
- Maximum Priority
- Route Guidance
- Automatic Debiting

Urban traffic control

Traffic light system includes 330 intersections out of a total of 600. In order to have that dynamic regulation of traffic light cycles, 5T uses over 3000 inductive loops and 25 above ground sensor, 71 cameras on 23 intersections

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as well as FCD (floating car data). Use of the 5T system has reduced waiting time at traffic-lights, trimming total trip time by 20%.

5T system also offers many advantages to public vehicles: thanks to the busses considerably reduce their travel times with a consequent increase in commercial speed.

Webcams, for real-time transmission of images to the 5T System Control Room and to the Turin Traffic Police operations center, have been installed at 23 intersections in the city, permitting constant monitoring of traffic conditions.

A leading innovation element is the City Mobility Supervisor, a control and management system over the metropolitan and Olimpyc traffic area. Besides providing near real-time traffic information and short and middle term forecast about traffic conditions, defines a general strategy to the other 5T subsystems.

Public transport Management

One of the most important partner of 5T, as well as the majority shareholder, is GTT, with which 5T developed the Public Transport Management subsystem (SIS). The SIS manages the public transport commercial speed and regularity thanks to the position monitoring and traffic lights priority, within the Supervisor strategies. It co-operates to the information to the citizens.

The system for monitoring public transport is based on AVLS systems for the real-time positioning. The Public transport monitoring system is based on 1,400 urban and 300 extra-urban vehicles, for 101 bus lines. There are 8 tram lines with priority at intersection.

Arrival times of public transport vehicles

345 bus stops in Torino have specific monitors providing information on next bus arrivals and possible changes to the service. Those monitors inform users about the exact bus arrival time at the stop, and display also variations on the route or disruptions (strikes, demonstrations, etc.). Among these, 149 are new generation monitors, powered by photovoltaic panels (Figure 5).

Also about the real time information there are 1060 on board displays.

ZTL (restricted traffic area) access control

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On behalf of the City of Torino 5T installed and manages the ZTL control center. 37 electronic gates control the main access points to the restricted traffic zone promoting around 50% reduction in traffic and better public transport regularity. 5T has also developed the online system for handling 8 retractable bollards in order to control vehicular access to the Roman ZTL and to some pedestrian areas in Torino.

VMS - variable message signs

26 VMS panels on the main access routes to the city to direct the flow of traffic, advice drivers on the less congested directions. Another 18 mobile panels moved around the city provide information regarding any changes to the road network and temporary worksites.

There are even 19 panels with variable message, located on the main roads of the Province of Torino (Figure 7). They are used to give information on road and traffic conditions. In particular, thanks to the ALCOTRA project which consisted of giving information on the road network to guarantee road safety, critical situations on the border French roads can be signaled and spread also in Italy

Parcking info VMS

20 parking panels are located on the main streets of Torino in order to suggest the direction for reaching the nearest parking and the number of spaces available for each structure.

Speed control

On behalf of the City of Turin, 5T develops projects intended to reduce speeding, one of the main causes of accidents and deaths on the road.

In cooperation with the Municipal Police, information and control systems are now being installed on the most important routes of the city to improve citizens' awareness of the impact of their behavior on the roads.

Information

The www.5t.torino.it site provides citizens with a wide range of useful services for prior planning of movements round the city.

At the moment, the information covers the metropolitan area of Turin and in the near future will embrace large part of Piedmont region.

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Users can carry out the following operations on the site:

- Calculate the best route to their destination via public transport or by private car;
- Get information regarding free places at city parking lots;
- Check the time of arrival of a public vehicle at a specific stop;
- Verify traffic and road conditions with the aid of maps and warnings;

The site has been a great success, with up to 140,000 route calculation requests from citizens each month.

There's even a sms service which came on stream in 2001, is one of the most popular and most widely-used to check the expected time of arrival of public vehicles at any of the 3000 stops dotted round the city.

The user simply writes a text message (SMS) indicating the number of the stop concerned and sends it to the number 339 9949990.

The reply, received almost immediately, provides all the information required.

The same service can also be used for prior checking of available parking at Turin car-parks, sending a message with the letter "P" to the same phone number. Every month there are 160.000 bus stop arrival information sms.

Since February 2012, 5T manages the real-time regional traffic information service named Muoversi in Piemonte, created by the Regione Piemonte.

Since February 2012, 5T manages the real-time regional traffic information service named Muoversi in Piemonte, created by the Regione Piemonte.

The service offers constant updates regarding the major events those can influence traffic situations on Piemonte roads. For instance, roadblocks, weather conditions, queues, road accidents and emergencies.

In particular, 5T acquires information through different entities and managers of roads and highways of Piemonte, and spreads those information through three major channels:

That system has a radio broadcast service that is available Monday to Friday, 7:00 a.m. to 8:00 p.m. On Saturday, Sunday and during holidays the service is from 8:00 a.m. to 10:00 p.m. Radio reports are broadcasted on 26 local and regional stations.

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There is even a Web Portal with a website www.muoversinpiemonte.it traffic conditions are updated 24-hours a day. In particular, traffic events are updated by the operators from Monday to Friday, 7:00 a.m. to 8:00 p.m. On Saturday, Sunday and during holidays the service is from 8:00 a. m. to 10:00 p.m.

Is also available a toll-free number 800 333 444: The service is available every day from 8:00 a.m. to 10:00 p.m., 365 days a year, and is free from both landline and mobile phone.

BIP (integrated ticket Piemonte)

The goal of this project is to boost the local Public Transport in Piedmont, improving its accessibility, awareness, management and promotion. The project intends to realize:

- a regional electronic ticketing system based on smart-card technology with contactless microchip;
- a public transport monitoring system (AVM);
- a video surveillance system in trams and busses.

The BIP project manages:

- 100 public transport companies
- 3,400 buses
- 15,000 bus stops
- 300 railway stations

The BIP Card provide an integration with (Figure 10) :

- Pyou Card
- University smartcards
- bike-sharing and car-sharing
- Regional museum card

Results achieved

In 1997 at the end of the project, the system was tested. The experimentation has been realized by subsystems observations and evaluations at the centre, by extensive on the field campaigns of time

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measurements and on site interviews, and by a telephone survey on a panel of 500 citizens resident in the area of application of the system.

The measured effect has been a decrease of the trip time by 17% for the traffic and by 13% for the public transport. Reduction of waiting time at traffic lights and greater efficiency in travelling conditions causes a decrease of exhaust emissions and fuel consumption.

The computed effect has been a reduction of 6% in carbon monoxide emissions and 8% in fuel consumption.

The overall effect has been a reduction of the average O/D time by 22% for the use of the car and 20% for the use of public transport.

Concentration in critical links has decreased by 18%.

The average concentration over the full city has decreased by 7.5%.

On the basis of this figure and of the previous reported effects, the general impact of the 5T system can be stated as a decrease of the average O/D trip time by 21%, equivalent to about 7 minutes per trip.

The general impact of 5T at the city level on the environment taking into account also the modal split effect, can be stated as decrease of 10-11% of pollutant emissions.

Within the S.I.MO.NE project (Innovative System for Management of Mobility in Metropolitan Areas), coordinated by City of Turin and 5T, with the collaboration of City of Bologna, City of Geneva, Province of Florence and Province of Cagliari, in 2012 they measured the benefits of 5T system:

- The travel time for private vehicles along an important route of Lecce-Potenza-Siracusa reduced by 12%.
- The PT travel time of the line 4 (one of the most important in Turin) along the route Unione Sovietica-via Sacchi reduced by 11%.

In Turin since 1992 great public transport infrastructural interventions have been made, as the new automatic underground (VAL system). Thanks to that and with the mobility telematics application described above a panel of citizens has perceived the public transport service quality improvement and has judged with particular favour the passenger information subsystem.

In general the results of the 5T learned that integrated transport telematics application can increase the proportion of travelers using public transport,

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improve efficiency of both private and public transport, reduce the likelihood of environmental pollution and improve the quality and quantity of information available to the traveler.

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6. How to implement the Good Practice in Province of Ferrara

One of the main outcomes from the analysis of the Best Practice is that there is a strong link between 5T and the public administrations. In fact, 5T is a private company which belongs to various public institutions. Nowadays 5T is owned by local public institutions: GTT, Città di Torino, Regione Piemonte and Provincia di Torino.

In particular, 5T can be considered an “In House Company”, and it combines all services related to mobility on a single company: in this case the public bodies are present in the dual role of partners and customers.

This experience could be taken as a reference also with regard to the implementation of a similar system in RER, involving similar partner, Provinces, Cities, Region, Public Transport companies.

Of course dealing with a complex systems, like the mobility telematics ones, with different actors it's essential to have the same objectives and motivations. A common understanding is as necessary as the financial resources to generate integrated systems

The market for so-called “alternative mobility services” such as public transport, car-sharing, bicycles, etc. is fragmented (separated information, access and billing) and is still difficult to break up despite all the technical progress, considering for example the often complicated fares and sales systems as well as the lack of intermodal information platforms.

The objective for the near future is to integrate different mobility information, different mobility services and different access and billing systems in order to establish an active intermodal bi-directional communication between customers and the mobility services providers.

With this aim, POLITE Implementation Plan of Province of Ferrara will try to set up a unique-integrated “selling point” for mobility services and information in order to tackle the main challenges of urban mobility, e.g. reduction of emissions, improvement of road safety, revitalization of urban space: an alternative mobility with the use of IT tools to improve the quality of service and supporting the harmonisation at regional level discouraging the use of private cars, promoting a smarter mobility.

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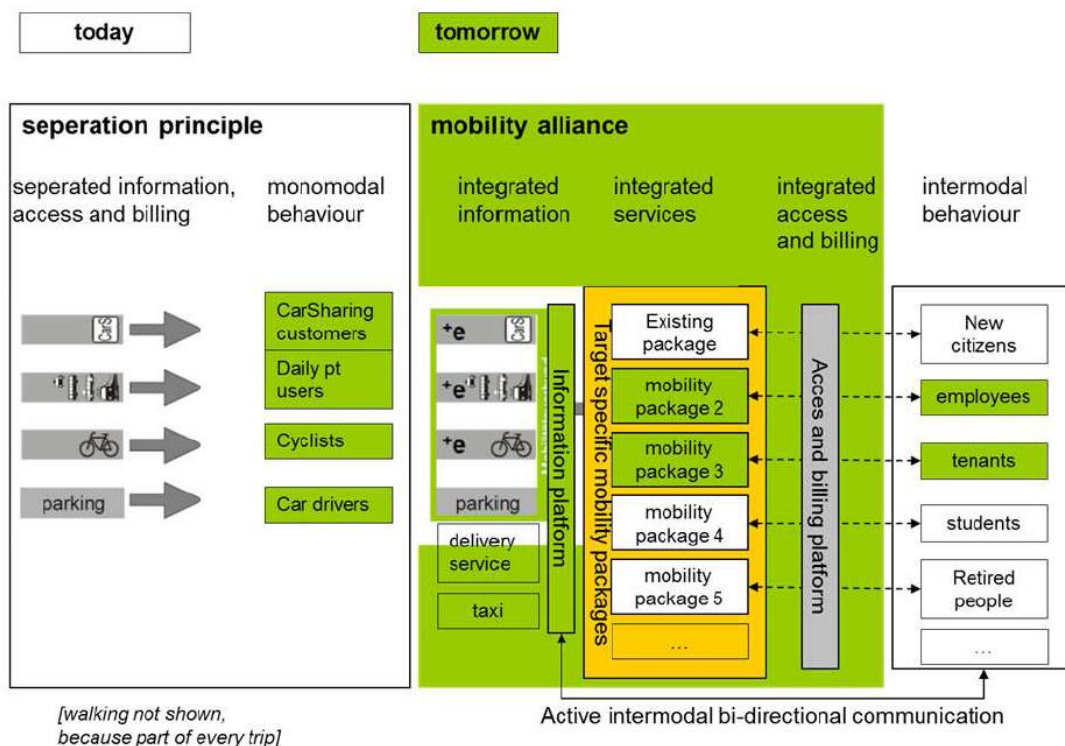
Alternative types of mobility quit their “niche existence” through such new system and will be available at all times for all users (also across national borders) on the basis of simple and uniform information and distribution systems.

The main objectives of this idea are:

- The strengthened cooperation of urban and regional mobility service providers in order to jointly develop comprehensive, easy to use, affordable and attractive transport services for the customers
- The creation of a uniform, intermodal information platform for all mobility service providers in an urban area.
- Integration of new services for the customer (suggestions, questions and complaints). Example: a fully-customizable newsletter system into the information platform.
- The creation of a uniform sales and settlement system for all mobility service providers by means of electronic media (e.g. chip cards, mobile phones).
- Break down existing barriers for customers: no complicated fares, easily understandable settlement of mobility costs, etc.

With this unique-integrated system, the image of public and alternative transport modes will be improved. This will lead to a less car usage resulting in a more use of public transport, reducing emissions.

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The establishment of a uniform information and distribution platform allows citizens to arrange their individual mobility needs in a quick, comfortable and competitive way. Thereby existing offers and structures are picked up, interconnected, and qualitatively developed.

By providing to citizens a user-oriented, internet-based information platform, mobility information will be available for the first time in a single, universally retrievable “area”. At the same time, the client medium is an important basis of a uniform distribution structure and the establishment of new, collective offers in the region is accomplished. Direct user access via mobile phone and internet as well as high-profile mobility services contribute decisively to the positive economic development.

Present situation

Currently, new and alternative mobility offers are developing in the mobility market and sometimes they are not interconnected and about which the general public often doesn't know much (Car2Go, Enjoy, Bike Sharing, ..., etc.): through organizational and technical cooperation and integration into a mobility network these providers are leaving their niche existence and are available for the customer at any time.

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Technological developments are offering various potentials for the modernisation of information channels, sales and marketing.

The prime beneficiary of these technical improvements over the past few years has been the automobile sector. It has in particular become much easier to plan and complete a trip throughout Europe through the proliferation of sat nav systems for passenger cars.

A variety of old and new services is currently present on the mobility market, most of which are not networked and are marketed via their own information platforms. But customers want integrated mobility services with intermodal information based on interoperability.

All mobility service providers in the Province of Ferrara and in Emilia Romagna Region already have (various) electronic information and distribution channels as well as several customer media (paper tickets from ticket machines or printed at home, tickets on mobile phones, chip cards, etc.) that should facilitate customers' access to the systems. In the last years an integration had been launched but not for all the services and the existing information.

However, these channels and media are rarely coordinated. At the moment, mobility services in the Province of Ferrara are offered by:

- Province of Ferrara G.I.M. project (ITS on mobility)
Traffic flow monitoring
- Municipality of Ferrara G.I.M. project (ITS on mobility)
Traffic flow monitoring
Limited Traffic Zones
Bike Sharing
Traffic flow monitoring
- Emilia Romagna Regional Travel Planner
Region Mobility integrated fare system
Traffic flow monitoring
- TPER TPL Automatic Vehicle Monitoring

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- Ferrara TUA Parking management & info

Information and distributional systems run independently from each other to a large extent: the Province of Ferrara aims to cooperate more closely on mobility services.

Activity 1: Planning & preparation

The main requirements of this project is a customer medium that includes a cross-border public transport ticket, a customer card for making reservations for car-sharing and commuter rides or other services.

During the preparation phase the following tasks will be executed:

- Identification of all the actors involved in the project:
 - ✓ This first step is ongoing. The Province of Ferrara has decided to implement the first step of the local action plan in the framework of POLITE project. The Province of Ferrara has had the possibility to discuss and share with the Emilia Romagna Region (Mobility and Transports Dept.) all the information and results achieved in POLITE in order to influence the future regional policies. In the framework of a permanent dialogue with technical stakeholders we are going to involve Emilia-Romagna Region in organizing technical round tables, that will work also beyond the end of POLITE project. The Emilia Romagna Region is going to be involved in the round tables together with the provincials mobility agencies (in Emilia Romagna Region we have 9 agencies who are in charge, at provincial level, to manage the public transport in each reference area), and the main municipalities responsible for managing the private traffic and mobility.
 - ✓ The expectations from the round tables are:
 1. To share the POLITE project goals, transferring to the stakeholders all the documents, results, and ideas that POLITE has produced;
 2. To acquire new information from all the participants who will take part in the round tables.
 3. To support the integration of the POLITE project results in the future Emilia-Romagna regional transport strategies.
 4. To support future policies in Ferrara and Emilia-Romagna territories based on the work done during the 36 months of POLITE project implementation.
 5. To investigate on the existing ICT/ITS tools in Emilia Romagna Region and support their harmonization, taking Ferrara as baseline.

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6. The most important aim that the transport system must achieve is a total integration between public & private transports management centers in the Regional Territory, including Ferrara, based on improved policy making.

- Set-up of clear communication and cooperation procedures and responsibilities among the relevant stakeholders, including a clear communication/dissemination strategy plan;
- Taking stock of electronic information and distribution channels in the area;
- The definition of the requirements and/or corresponding customer medium (e.g. chip card, software for mobile phone);
- A market analysis (taking into account systems throughout Europe), and finally
- A draft concept for the “unique services/info provider” for the Province of Ferrara and Emilia Romagna Region.

The concept should explain – against the background of existing structures – how the “unique services/info provider” can be established step-by-step. The focus shall be on the development of an integrated, attractive sales approach (so-called “frontend”) and on software and hardware interfaces between individual mobility service providers (so-called “back office”) in the form of an electronic information and reservations platform.

Activity 2: Implementation & demonstration

Starting from the present situation, the following (technical) improvements are necessary:

- Integration of the data from all mobility service providers (the standard must be discussed);
- Integration of the existing distribution and reservation systems, integration of the mobility products into one customer medium (e.g. chip card/ mobile phone);
- Simplification of customer access to the mobility products by breaking down entry barriers (e.g. lack of information, lack of availability, confusing fares structure)
- Establishment of payment systems that link the customer medium with distribution and reservation systems;

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- Structuring of an intensive personal sales approach aimed at informing the customer – in particular in the case of delays or operational disruption, advising and providing the customer with the objectively most appropriate mobility service;
- Development of novel mobility products through cooperation between several mobility service providers and municipalities as well as public transport operators (e.g. discounts on offers for alternative mobility services for anyone who voluntarily hands in their driving license/resident parking permit);
- Integration of all the mobility partners and mobility services that are offered in Emilia Romagna Region.

Within the scope of this project a pilot test will be launched in a restricted test area within which the effect of the integrated mobility offers on transportation patterns can potentially be proven. At least 3 different mobility service providers (public transport, car-sharing, bike sharing) will be integrated.

The process will be accompanied by intensive cooperation and organisational activities as well as extensive communication in both the public and political arena.

Activity 3: Evaluation

Changes in mobility behavior may be quantified through academic evaluation of the measure and a pilot test.

Indicators measuring the economic, society and transport impacts will be selected on the basis of some core indicators (environment, economy, transport, society and energy).

In accordance with the objectives and innovative aspects named at the beginning, the following indicators can be recorded and measured in a before-after comparison:

- Development of supply and demand for the individual mobility services;
- Visits to the new mobility platform and the old ones (Regional Trip Planner, Ferrara TUA,);
- Survey, census of transportation patterns;
- Type and content of customer generated information.

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Besides the technical networking of the various offers in such a complex measure, many different actors have to work together effectively. The process evaluation examines the used methods and their results in terms of their impacts and solution contributions. For this purpose the workshops and project meetings will be evaluated and interviews will be conducted with key individuals.

Activity 4: Dissemination

The dissemination concerns mainly informing the public about the intention of the mobility service providers to jointly set-up and operate an information platform (and related services) for the benefit of the customer, supplemented at a later stage by the results achieved.

As soon as the service(s) become available and operational (pilot test), a large promotion and marketing campaign must be launched aiming on the one hand to select test users (evaluation) and on the other hand to make the service known as widely as possible. Traditional tools (such as newspapers and district newsletter) will be used as well as the web pages of the partners involved, mainly of the Province of Ferrara. Details about the local dissemination will be set up during the preparation phase.

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7. System Standard definition

In all the various processes of design, the designer begins with some user requirements to be met, normally required by the client, transforms them into functions that the system must fulfill to be developed and then combines the functions to objects, then, in the end, to a physical structure of the system itself.

Dealing with complex ITS systems, comes the need for a unitary framework, which highlights the opportunities of telematics for transport, the relationships between the various systems and services, the needs in terms of organization, rules, standards and technical regulations, possible developments. An ITS architecture¹ could satisfy these needs.

An architecture is a functional representation, or logical, and physical system - hardware, software, or both - which represents the structure and relationships between its components, providing, however, none or very few construction details and much less technological choices.

Architecture is therefore a structure that identifies the functions, characteristics and relationships between all elements involved in the pursuit of telematics intelligent transport systems: systems, services, technology, actors, any standards.

In particular an Intelligent Transport System (ITS) Architecture is a set of high level viewpoints that enable plans to be made for integrating ITS applications and services. It normally covers technical aspects, plus the related organisational, legal and business issues, according to the Direttiva 2010/40/UE, July 2010: "On the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport" and the Italian Law Decree 18th October 2012, n.179 "Ulteriori misure urgenti per la crescita del paese".

¹ Dalla Chiara B., Bifulco G.N., Fusco G., Barabino B., Corona G., Rossi R., Studer L., "ITS nei trasporti stradali - Tecnologie, metodi ed applicazioni", a cura di B. Dalla Chiara, Ed. EGAF, pp. 1-477, Marzo 2013, ISBN 978-88-8482-477-6

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The availability of the architecture has therefore the intention of providing general guidelines to government agencies, standards bodies, the concession companies, private companies in the development of their own decisions, activities and systems related to telematics for transport. The aim is to facilitate the development of the market, pursuing efficiency results, with particular reference to interoperability between modes of transport and telematics services to national and European level; it also allows the fulfilment of the objectives and requirements set.

The UML (Unified Modeling Language) is a standard language for the design and performance of software systems, approved by the OMG (Object Management Group) in November 1997 (AA. VV., 2004). In summary, UML can be used to capture and analyze the requirements of the system during the entire life cycle of the project. As standard, it is also useful for communicating, and documenting the characteristics of the project among different subjects. Another reason of interest for the UML is related to the complexity of transport systems, which forces them to devote more resources to the definition phase of their architecture, logical and physical, through models, first to define the technical specifications.

In short an ITS Architecture helps to ensure that the resulting ITS deployment:

- satisfies the expectations of the users;
- is planned in a logical manner;
- integrates successfully with other systems;
- meets the desired performance levels;
- has the desired behavior;
- is easy to manage;
- is easy to maintain;
- is easy to extend.

With reference to the case of the Emilia Romagna Region, from the operational point of view, it is desirable that the integration of existing systems could be made on the basis of common standards that allow for the exchange of information between the various actors involved.

Starting from the 5T Good Practice standards, DATEX and DATEX II are used for traffic and travel data exchange between traffic management centers, traffic information centers and service providers

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DATEX II offers a standardized way to exchange data among road operators and between road operators and service providers. Information related to traffic and exchanged with DATEX II systems is shared out into different categories:

- Road and traffic-related events (called in DATEX II “Traffic elements”)
- Operator actions (like network management, road works, sign setting)
- Non-road event information including multimodal information
- Elaborated data (derived/computed data, e.g. travel times, traffic status)
- Measured data (direct measurement data from equipment or outstations, e.g. traffic and current weather measurements)
- Messages displayed on Variable Message Signs (VMS).

Another important standard to follow is Transmodel (formally CEN TC278, Reference Data Model For Public Transport, EN12896): is the CEN European Reference Data Model for Public Transport Information. It provides an abstract model of common public transport concepts and data structures that can be used to build many different kinds of public transport information system, including for timetabling, fares, operational management, real time data, journey planning etc.

Another standard (also used by 5T) is the Network Exchange (NeTEX) that provide an efficient European wide standard for exchanging Public Transport schedules and related data. NeTEX is intended to be a general purpose format capable of exchanging timetables for Rail, Bus, Coach, Ferry, Air or any other mode of public transport.

NeTEX is based on the CEN Transmodel standard which specifies a Conceptual model for Public Transport data, extended with additional concepts for stops and stations from the CEN Technical standard IFOPT (Identification of Fixed Objects in Public Transport).

NeTEX uses a fully articulated model that represents PT concepts as well characterised, layered abstractions; the format is designed for the efficient, updateable exchange of complex transport data between distributed systems. This allows the data to be used in modern web services architectures and to support a wide range of passenger information and operational applications.

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The Service Interface for Real Time Information or SIRI is an XML protocol to allow distributed computers to exchange real time information about public transport services and vehicles.

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8. System Requirements definition

According to the POLITE project it is possible to outline a process for the establishment an information technology system to enhance the TPL performances through the following activities:

- to formalize the idea of the system that the different actors involved want to accomplish, based on the aspirations of stakeholders and regulatory requirements. Of course, being a complex system born from the integration of existing systems with individual requirements, the definition of the requirements of the entire new system will start from the set requirements already expressed by the various actors plus those potentially arising from the integration by the different sub-systems: a; at this stage it is useful to identify and define the problem to be solved and to detect the needs of the stakeholders, in order to provide a specification of the high-level requirements (features, constraints) and a brief description of the result (what the system does, who needs, comparison with similar products);
- manage the system requirements in order to ensure traceability, a concept expressed by adopting the definition ECSS, which is shown below (ECSS, 2004): "Traceability is the ability to identify the relationship between: a) requirements (eg to higher level requirement, an Imposed constraints, applicable standards, or an accepted lower level constraint); b) decision and the affected requirements (eg Within the trade-off loops); c) requirement and its source (eg in the mission statement); d) verification result (eg test result) and the related requirement to be verified. "at this stage, Specific Requirements Management Tools (INCOSE-TDWG, 2005) may facilitate the task of requirements traceability throughout the process;
- analyze the functional requirements using use-case model, in which we highlight the actors, either by the use-case diagrams that express the relationships of the actors using the system, with both the textual part of the model, which describes the flow events; actors may also represent other external systems with which there is an interaction; ARTIST provides support even at this stage because, organizational architecture, and highlights the roles, architecture, physics, identifies systems.

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9. System Monitoring and Maintenance

Each sub-system must foresee a maintenance phase after the realisation and a period in which the manufacturer is called to maintain systems and equipment up to their specified availability and performances levels.

Dealing with a complex ITS system every sub-system will follow a particular monitoring and maintenance schedule, according to some predefined indicators: somebody predefined should emerge as in charge of the maintenance and development of the system. This steps are fundamental, otherwise all the efforts to develop it will be in short time wasted.

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10. Conclusion

Expected Outputs

- Web and mobile Mobility platform with interactive features for users
- Communication with guidelines and practical information to the users
- Training material in order to push the harmonization at regional level and the transfer of experience

Expected outcomes in the short-medium term:

- Agreement with the involved cities of the Emilia-Romagna Region to define a common IT system at regional level
- Definition of a standardised electronic mobility platform containing intermodal transport information and using dynamic real time data
- Payment systems linked to the distribution and reservation systems
- User friendly access to the mobility products by breaking down entry barriers

Expected Outcomes In The Mid-Long Term

- Reduced CO₂ and noise emissions
- Harmonisation at regional level of mobility information
- Young, dynamic and modern image for public transport
- Users behavior change in favour of the Public Transport and against the use of private cars
- Higher satisfaction of the people using alternative means of transport

D3.4a Implementation Plan Scoping Document Template

Time Schedule

Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Planning and preparation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15															
Implementation													1	2	3	4	5	6	7	8	9	10	11	12						
Evaluation/In depth analysis																				1	2	3	4	5	6	7				
Dissemination															1	2	3							4	5	6	7	8	9	10