CIVITAS
Cleaner and better transport in cities

CIVITAS Program - CATALIST Project

Palazzo Rinaldi - Treviso

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CITY OF TREVISO: INFO-MOBILITY SOLUTIONS, URBAN PASSENGERS TRANSPORT AND ITS MASTERPLAN

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INTRODUCTION

From January 2010 ACTT Treviso is participating to the European initiative CIVITAS, which aims at developing a European network of cities working for sustainable urban mobility strategies. Basing on feasibility studies and on the exchange of best practices, CIVITAS promotes policies and projects developing clean and efficient urban transports.

In the framework of CIVITAS and in collaboration with other European cities, ACTT Treviso set the objective of developing an infomobility system aiming at improving both public transport service for users and the overall accessibility to mobily services offer.

In order to achieve a more sustainable mobility, from the environmental, social and economic point of view, a specific set of actions, integrating urban and extraurban mobility, is needed. In particular, real time information, allowing users transport needs and requirements to be met, are a key element.

This project is the starting point of the process that will lead to the goal of supporting and fostering collective mobility systems by using information technologies. In order to obtain concrete advantages from ICT for transports, all the involved actors need to be adequately trained and made more aware of their choices. Below the synthesis of the study carried out by ACTT is provided.

INTRODUZIONE

Da gennaio 2010 ACTT Treviso partecipa all'iniziativa Europea CIVITAS, una rete europea di città impegnate nella realizzazione di strategie di mobilità urbana sostenibile. Attraverso lo scambio di *best practice* e la realizzazione di studi, CIVITAS promuove progetti e politiche per sviluppare trasporti urbani efficienti e puliti.

ACTT Treviso nell'ambito dell'iniziativa CIVITAS, in collaborazione con altre città europee, si è posta l'obiettivo di sviluppare un sistema di info-mobilità rivolto a migliorare il servizio di trasporto pubblico per i cittadini e la complessiva accessibilità ai servizi di mobilità.

Perseguire l'obiettivo di una mobilità più sostenibile, da un punto di vista ambientale, sociale ed economico, richiede una serie di interventi per integrare i sistemi di mobilità urbana ed extraurbana per i quali di fondamentale importanza risulta essere la fornitura ai cittadini dell'informazioni in tempo reale che permettano di incontrare le loro esigenze di spostamento.

Questo progetto rappresenta il punto di partenza verso il traguardo di favorire l'uso dei sistemi di mobilità collettiva attraverso l'utilizzo di sistemi e tecnologie di informazione. I vantaggi derivanti dall'uso delle risorse telematiche per i trasporti richiedono di informare in modo adeguato tutti gli attori e renderli più consapevoli delle proprie scelte. Di seguito quindi si riporta una sintesi dello studio effettuato.

Il direttore Generale ACTT
Giacomo Colladon

PREFACE

The aim of the report summary of the study prepared by ACTT in the context of the CIVITAS - CATALIST project, it is to provide a general overview of the main aspects of Infomobility solutions and UPT (Urban Passengers Transport), in order to support the improvement and the innovation processes of Public Transport services planned or currently operated in Treviso.
Moreover it is described the programmed scenario of ITS and infomobility systems supporting the management and the operation of urban transport and mobility services for the City of Treviso.

1. ITS SYSTEMS IN URBAN CONTEXT

1.1 EUROPEAN SITUATION AND TRENDS

The control and management of urban mobility is a major concern of Local Authorities in virtually all main European cities and the main adopted strategies are characterised by an integrated approach, based on different measures and schemes mainly aimed at achieving a relevant shift of mobility demand from private car to Urban Public Transport and alternative transport modes that are "light and echo-compatible".
The same lines are also shown in the various actions and initiatives promoted and partly-financed by the European Commission (Action Plan for Energy Efficiency (2006), Energy Services Directive (2006), Freight Logistics Action Plan (2007), ITS Action Plan (2008), Action Plan of Urban Mobility (2009), Clean Vehicles Directive (2009), EC Communication (2009) A Sustainable Future for Transport, White Paper on Transport (2001) Time to Decide).
This approach is also underlined in the last European Union "Green Book" and its latest updates by the Directorate General Transport & Environment (DG TREN).
Overall, EU approach is mainly based on two main level of intervention:

- the use of "echo-compatible" vehicles and fleets - public and/or private - that are able to ensure environmental and energy efficiency (Euro5, CNG, electrical, etc.) and require specific technological infrastructures and systems (refuelling stations, re-charge points, etc.);
- the implementation of policies, measures and systems that are able to act on both the demand and supply of transport and mobility services (parking, Urban Public Transport, user information, etc.).

The second area includes the ICT infrastructures and the ITS systems and services - from traffic signal coordination, to access control, user information and infomobility services, integrated payment systems, etc. - required to support traffic control, public transport planning and service operation and the coordinated management of the overall mobility. Such systems and services provide the fundamental platform to comply with the ever growing needs of coordination and integration of the different mobility management strategies and to improve citizens accessibility to urban and metropolitan areas.

As stated by EU Commission in the recent "ITS Action Plan", the use of ICT tools and systems has been identified as the one of the key elements contributing to the efficient and sustainable management of the overall governance of city mobility. On the other hand the wider and wider use of ICT tools is one of the weak points hampering the real achievement of a full-integrated interoperability in the co-modality chain (see for details: White Paper "European Transport Policy for 2010: time to decide").

1.2 SYSTEMS FOR URBAN MOBILITY AND TRANSPORT

The Intelligent Transport Systems (ITS) market is offering, nowadays, a broad spectrum of enabling technologies, systems and solutions allowing the effective and efficient management of the various processes related to mobility, traffic and collective public transport services. Available for all operators and actors involved in the sector - being these public or private organisations, planners or managers, value added service providers or users - this offer includes a number of design and implementation options addressing virtually all areas of mobility, including:

- systems for vehicle traffic management: traffic and demand simulation and modelling, traffic data acquisition, traffic light control, access control, parking management, integrated systems and centres for mobility supervision and control, etc.;
- systems for travellers and users information: traffic and route information (via i.e. RDS-TMC, SMS, GPRS-WAP connection, etc.), parking information and guidance, pre-trip information by web/internet, integrated information and service centres, etc.;
- collective public transport management: automated vehicle location, fleet monitoring, passenger information, ticketing and automated payment, depot automation, demand responsive service, etc.;
- inter-modal systems and logistics platforms: Park & Ride systems, freight transport, city distribution, mixed passenger/freight services, etc.

The rationale behind the strong boost to implementation and deployment of such systems, technologies and services in the last years is based on the growing evidence of the constraints and barriers that land planning and public budgets impose to the process of road infrastructures renovation and expansion, in relation to a continuously growing (both in terms of space and time) demand of mobility and traffic.
Indeed the network spatial resources is of course limited and a strong enforcement of the actual resources (new roads, lanes, parking areas) can't be imagined at the moment due to the expense constrictions suffered by EU countries to cut their budget and the territorial constraints (large diffusion of close and narrow historical centres in the cities, etc.). This is particularly true for the Italian reference context. If it is commonly agreed that the network resources are limited and they can be poorly improved in the short and mid term period, stakeholders (but also citizens) are not so aware that the network and, generally speaking the territory, is a "public resources" and, being public, this resource must be exploited in a wise and balanced way. Stakeholders and citizens are hardly aware that it is not possible to provide all the actors with effective "public" solutions to traffic and mobility "private" problems.
These issues are even more evident when considering, particularly, the European urban areas and historical centres, where a number of constraints related to historical and architectural assets, to the environment and the desired quality of life make technological measures and technical systems enabling a rational, flexible and coordinated use of road and transport infrastructures actually the only possible solution to meet the varied and changing demand of mobility.

What one can see, today, is an expanding market with a growing offer in terms of quality and number of ITS products and solutions and an increasing capability of influencing the choices and interventions of Local Authorities. In the remainder of this chapter, we briefly overview the main ICT systems and services that, in broad terms, can be regarded as providing the technological backbone for an integrated and coordinated management of urban mobility and for the integration of UPT systems.

2. KEY ITS SYSTEMS FOR INFOMOBILITY

In order to guarantee an effective infomobility system, it's required to collect various information typologies. These are required to provide an adjusted mobility system that satisfy the users demand and that it's able to adapts itself to the different scenarios of traffic and users demand. In the following list are identified the different systems used for mobility planning and monitoring. The systems in the urban area are the following:

- Traffic data collection and monitoring
- Environmental monitoring
- Urban Traffic Control

Urban Traffic Control (UTC) represents the most used and widespread scheme to implement traffic flows control and management. It is of course a key, strategic component of any scheme of integrated management of urban mobility.

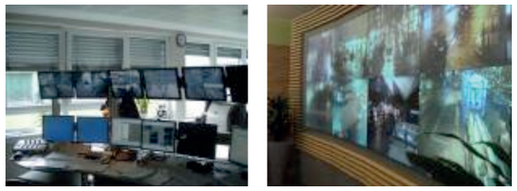

Figure 1: Urban Traffic Control Centre operated in Hamburg.

Figure 2: Traffic Light signals applied for BRT system Traffic light device, Busway in Nantes.

- Variable Message Signals (VMS)

Variable Message Signals (VMS) systems are increasingly implemented in European urban centres (and extra urban areas, mainly on highway and high speed connection road) both to provide information to read user and as tools to achieve flows management. The combination of these two measures allows improving safety and reducing congestion and pollution.

Figure 3: VMS Panel for traffic and PT management (departing platform identification).

- Integrated Parking Management System (PMS)

Parking Management Systems (PMS) are used to distribute "real-time" parking information in an area, facilitating the efficient parking search by the drivers and contributing to a reduction of traffic impacts. In many European cities PMS systems are able to provide information and guidance to the drivers about the current situation of parking facilities in the area.

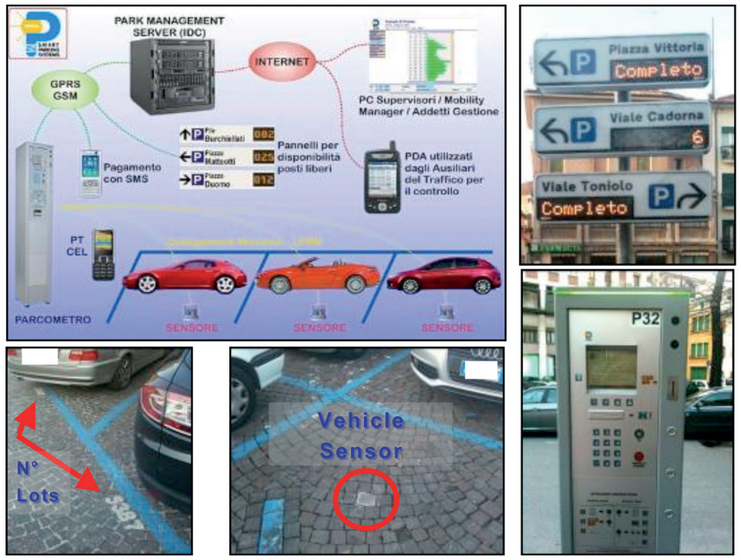

Figure 4: Parking Management System in Treviso.

- Access Control in Limited Traffic Areas (ACS)

Access Control Systems (ACS) are implemented in many European cities to ensure protection of critical areas such as historical centres, pedestrian areas and Limited Traffic Areas. Such systems are fundamental tools to support operation of the city regulations that many Local Administration wish to implement as part of the adopted mobility management policies.

Figure 5: Rising bollards, cameras for access control management and road pricing info.

• City Logistics Services

Freight distribution is becoming more and more important in modern life. Customers expect a wide and growing variety of services in the local area e.g. shopping and leisure facilities and recreational areas. However, most of these functions need some sort of goods distribution in order to provide the necessary services for the customers. This means a steady supply of goods to the commercial operators and thus a growing contribution to the increasing traffic flow and related critical factors (quality of air pollution, noise, vibration, overall congestion).

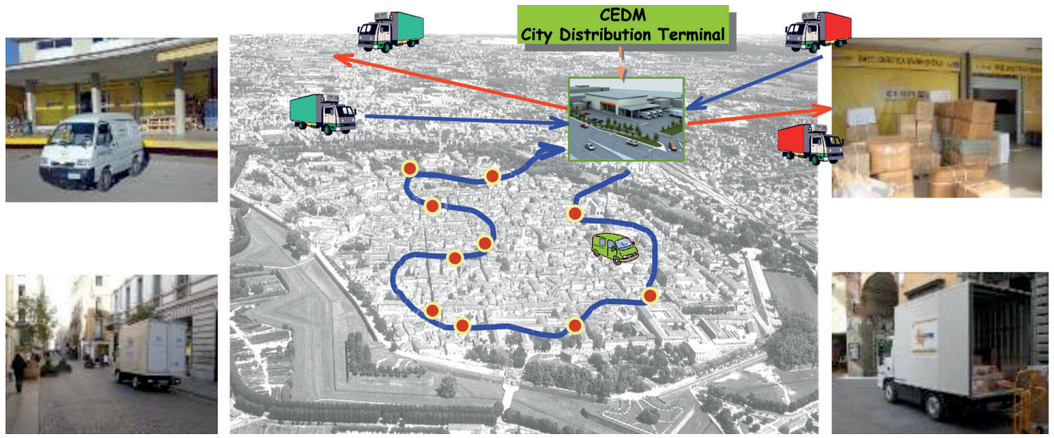

Figure 6: LIFE+ CEDM Project in Lucca (Italy).

3. ITS FOR URBAN PASSENGER TRANSPORT

The following list identifies the IT system for Urban Passenger Transport

- Demand Responsive Transport Services (DRTs); this system provides intermediate collective transport services which can be suitable to provide PT offer into two main scenarios:
  - "low demand" situations, such as:
    - in areas with low density of inhabitants, dispersed travel origins/destinations, high variability of routes;
    - off-peak time periods (e.g. night services, week ends, daily low demand hours, etc.);
  - specific user groups, such as e.g. disabled and elderly people, students, communities, etc.

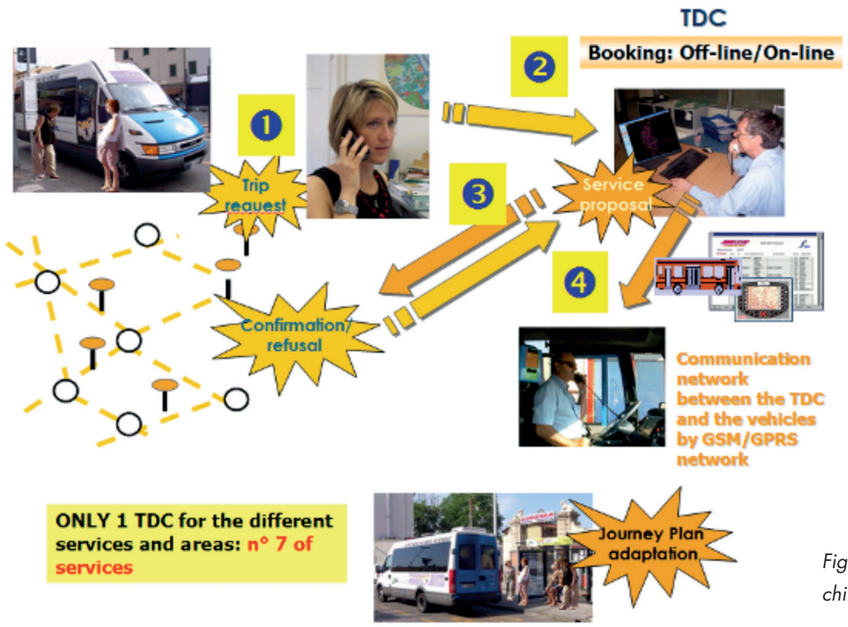

Figure 7: DRT system architecture.

• BRT systems and dedicated corridors

The BRT system (BHLS in Europe context) relies on the advantages of the tramway (speed, regularity, comfort, image) but its overall cost, capacity and flexibility place it somewhere between the "conventional bus" and the tramway.

Figure 8: Dedicated Corridor and Bus Priority System.

- Bus and Tram Priority systems
- Fleet monitoring and management system (SAE/AVM)

The number of installations as well as the innovation introduced in the sector of AVM system during the last decade show with growing evidence the fundamental role played by such systems not only for Public Transport companies and their operational role, but also in the broader scope of integrated management of urban mobility.

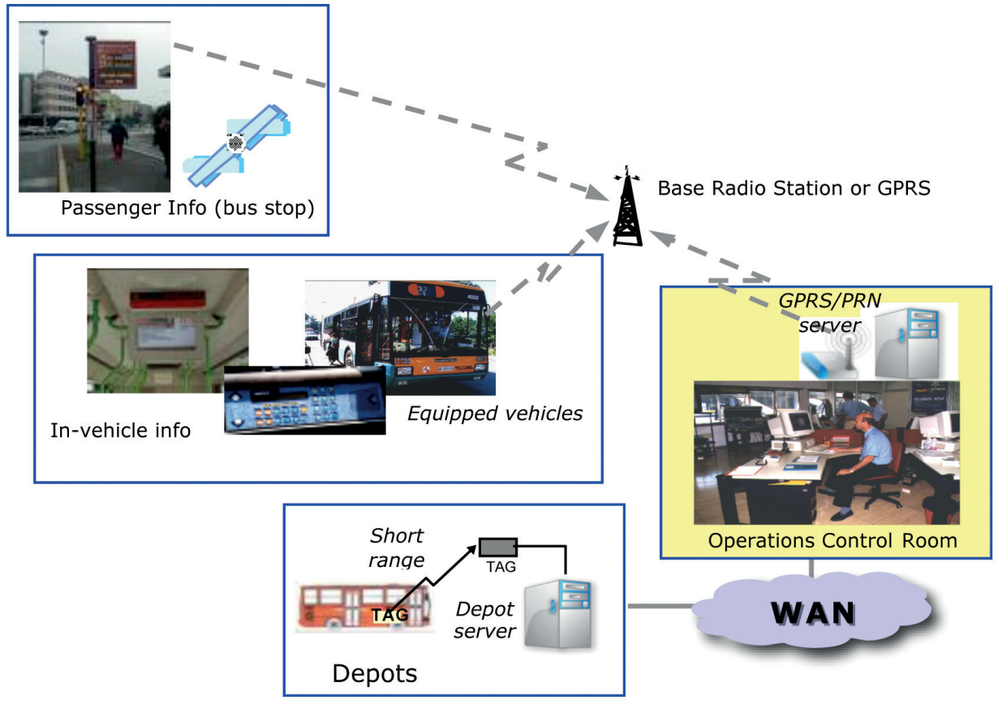

Figure 9: Simplified architecture for AVM system.

- Users Information System

The AVM system is used in order to control and manage the effective operation of the service in real time and in an efficiently way, to gather all the statistical data related to the effective operation of the services (travelled Km on the line, off the line, transit time at main stops, etc.) and to provide dynamic infomobility service to the users over various distribution channel and tools (on board devices, road panels, SMS/e-mail, web, etc.).

Figure 10: On road panels for users information.

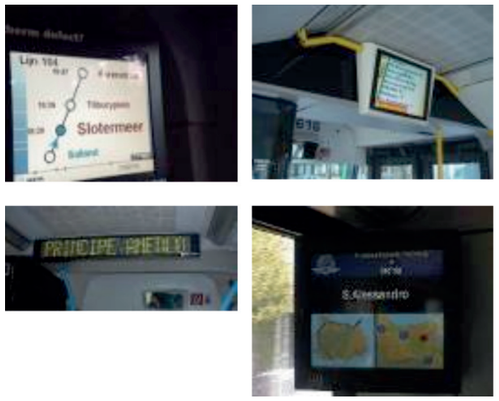

Figure 11: Example of devices (led/graphic) used for on-board information.

- Automatic Fare System (AFS)

The electronic ticket issuing machines which capture data at transaction level has become commonplace in the last decade. This not only improves the in-vehicle fare collection, but the data can also be used to support accounting, planning and service analysis functions.

Figure 12: Examples of ticketing vendor machine, bus validators and smart cards.

- Security

4. INTEGRATION OF INFOMOBILITY SERVICES AND PROVIDERS

The concept of co-modality is becoming more and more relevant in European mobility. The co-modality has being a concept promoted by European Commission just from the Lisbon Agenda as a way able to guarantee the growth of competitiveness in Europe in a sustainable way. The White Paper "European Transport Policy for 2010: time to decide" states the needs to develop competitive solutions utilising integrated transport's modalities. Generally, information and services can be delivered to the users via a number of different devices and technologies, depending also on the particular travel phase addressed and on the kind of information involved (web portal accessible via desk computers, navigation devices, palm computers, 3G phones, etc.).

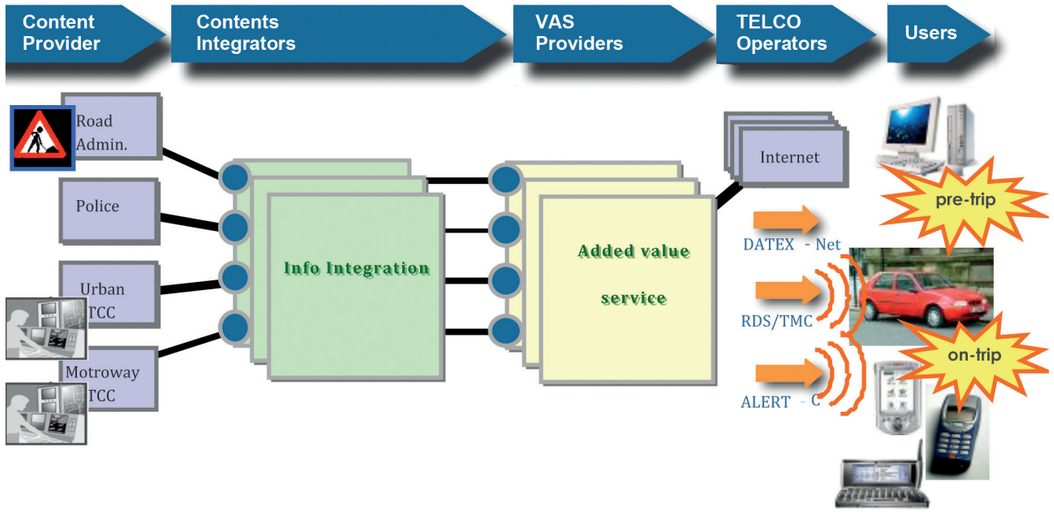

Figure 13: Infomobility service chain based on the integration of different contents.

Real case experiences of the integration of such services begin to be widely diffuse over Europe and not only as result of pilot actions promoted by European initiatives. At Italian level a great interest has been showed by Public Administrations recently and several implementation of TIC (Traffic Information Centre) or multimodal information platform have been tendered even if their implementation is under progress.

5. CITY SUSTAINABLE MOBILITY GOVERNANCE

In the last years the requirements of Public Administrations and Statutory Entities for a full integration of ITS systems/services and related technological solutions under a common umbrella (i.e. a common architecture, an integrated Supervision or Control Centre) has become more and more significant. This requirement arises from the needs for a more effective operation of technological systems for mobility and transport management in order to:

- Provide "added value" services for public transport users, travellers, citizens (i.e.: infomobility services, integrated payment systems, etc.) or stakeholders (monitoring of traffic flows and resources on the network, etc.);
- Improve the coordination capability of Public Administration in terms of monitoring procedure, decisions/planning, "real time" interventions aiming to achieve a definitive city governance;
- Minimize the costs and resources for the management, operation and maintenance of the systems, avoiding the growth of "doubled" costs.

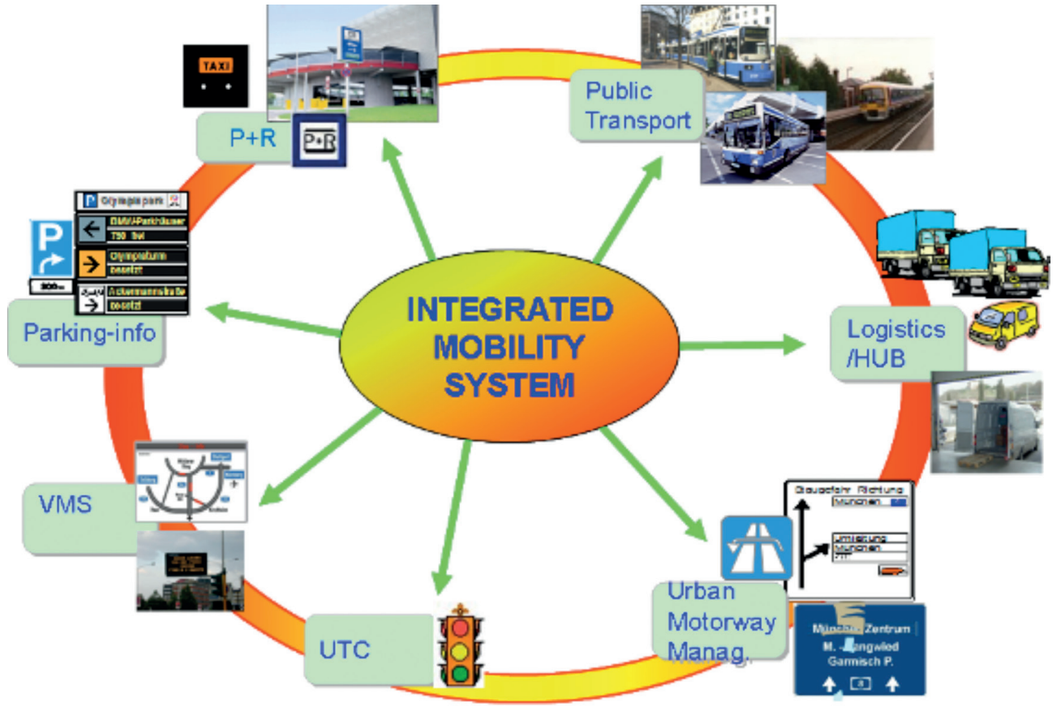

Figure 14: The concept of integrated mobility for urban mobility governance.

In general main functionalities are:

- Network state monitoring and coordination of the interventions based on the integration of the different information which are send by the various system (Parking Management System, Access Control System, UTC, etc.);
- The support to the control actions providing to the operators the integrate information of the Coordination Level, in order to allows effective interventions;
- Distribution of the information to different stakeholders (Police, Public Work, Emergency, etc.);
- "Real time" communication among the stakeholders;
- Generation of statistical report and historic series;
- Coordinated management of damages or operational/functioning alarms transmitted by several systems;
- Interface with external systems.

6. ITS MASTERPLAN FOR THE CITY OF TREVISO

Based on the ICT and ITS systems outlined in previous sections, the implementation of an personalized ITS architecture for the city of Treviso should be driven and controlled by a MasterPlan for ITS Services defining the best options for technology and service deployment in the urban area in order to allow a Sustainable Mobility City Governance.

The definition of this MasterPlan is a fundamental step to ensure the implementation of the selected ITS solutions and services follow the strategic objectives set by the city Administration. Particularly, the MasterPlan for the City of Treviso should be defined taking into account the main city policies including:

- reducing the congestion levels of the network and the environmental impacts;
- improving the quality of PT services by monitoring and controlling the bus fleet;
- monitoring the traffic and parking network situations and implementing the appropriate response measures;
- managing the freight distribution in the inner center;
- providing infomobility services specially for the PT users;
- realizing a Permanent Mobility Observatory.

The MasterPlan should represent the reference plan for the deployment of the most suitable ITS services for the Treviso urban and Province area.

Further evaluations related to the priorities of the different measures and implementations will have to be undertaken together with the definition of the technological and technical framework. Time, financing and institutional restrictions will also have to be taken into account at the same stage.

6.1 MAIN AXIS FOR TREVISO MOBILITY GOVERNANCE

Within the main axis previously described the possible actions to be implemented in Treviso are:

- Realization of an AVM system in order:
  - to support the control and the management of the fleet;
  - to act as "kernel" for the generation of the "real time" information used for infomobility services;
- Development of a web based common platform as technological horizontal infrastructure to support the management of the different ITS systems/services;
- Development of infomobility services:
  - Development of an integrated web based platform collecting all the static and "real time" information on mobility (parking availability) and public transport service (bus, bike sharing) accessible via Web "light navigation" (Public hot spots equipped in infopanels);
  - Provision of "real time" pre-trip information on the arrival time of buses to be carried out on different distribution channel:
    - On-road installation of the infopanels (see section):
    - Web portal;
    - SMS/e-mail notifications to be managed under two operative scenarios:
      - The user logs into the web portal and registers himself as frequent user of some bus lines to receive the information in case of irregular service conditions (i.e.: line diversion, etc.);
      - The user digits a SMS with the code of line/stops and the system returns the "real time" information;
- Development of an Agency for the coordination of flexible transports in Treviso urban area. Starting from the management of Taxi service this coordination Agency can be extended in the future to other intermediate services as car pooling, disabled services, school services, etc. and logistics "last mile" distribution (i.e.: reservation service for parking lots dedicated to freight carriers to be achieved through the integration of functionalities provided by Parking Monitoring System);

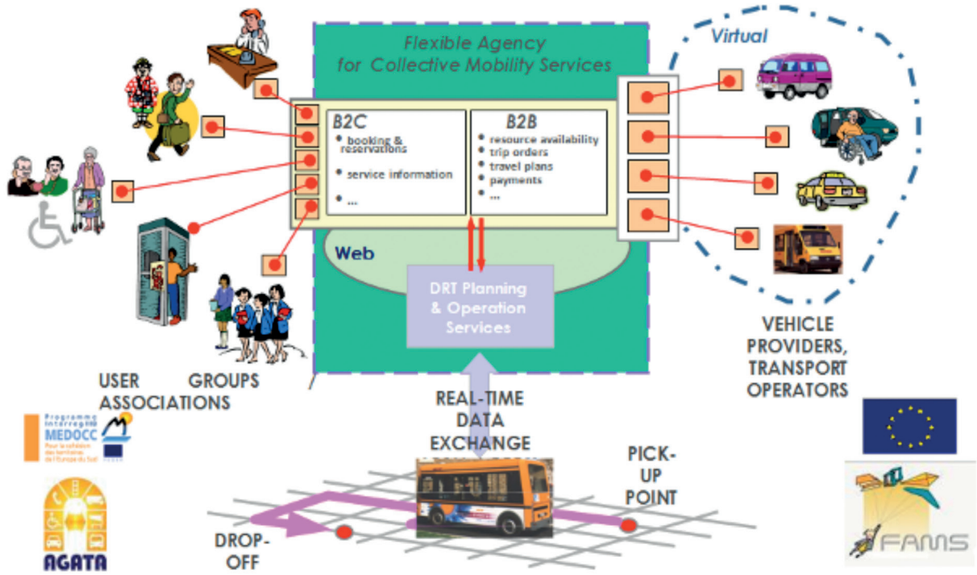

Figure 15: flexible Agency for collective mobility services.

- Implementation of an integrated ticketing system for the payment of public transport services, parking and bike sharing;
- Implementation of a personalised service payment system through the use of SMS messaging;
- Use of the web based common platform as "on-way shop point" for the payment of mobility and transport services.

6.2 DEVELOPING THE ITS MASTER PLAN FOR THE CITY OF TREVISO

In conclusions, the activities for the definition of the MasterPlan of ITS Services for the Treviso urban area should then include the following main steps and activities:

- Reference Architectural Model:
  - Operational and logic scheme;
  - Information flows and enabling technologies;
  - Institutional and management constraints and requirements;

- Identification and preliminary planning of the applications and ITS services:
  - Requirements;
  - Functionalities;
  - Management schemes,
  - Involved technologies;
  - Costs;
- Identification of communications needs among the different technological services;
- Integration issues:
  - Technological and operational features;
  - Competence domains and roles of the individual stakeholders and actors;
  - Interaction with external systems;
  - Organizational levels and management complexity;
- Definition of priorities for implementation and of a preliminary economic plan for the identified ITS applications.

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