ITS projects in Italy developed by the **National Operative Programme** for **Transports** 2000 - 2006

INDEX

1. Introduction

Intelligent Transport Systems (ITS) are an essential tool for managing mobility, road safety and the development of a sustainable mobility model. They derive from the application to transport systems of Information and Communications Technologies, better known as ICT, for the supply of advanced services suitable for increasing the efficiency of infrastructures, the effectiveness of the transport network as well as users' safety.

ITS collect, treat, manage and deliver data regarding vehicles, infrastructure conditions and users, integrating them in an "intelligent" way. The integration of infrastructure, vehicle, supply and demand of mobility allows to face problems linked to mobility in an organic and joint way, increasing safety, efficiency and effectiveness of transport, while reducing the environmental impact and improving users' quality of life so as to realize that "system approach" in which information, management and control work synergically, optimizing the use of infrastructures, vehicles and logistic resources from a multimodal point of view oriented to efficiency and environmental sustainability. Actually, Intelligent Transportation Systems allow the transformation of transports into an "integrated system" in which traffic flows are distributed in a balanced way among the various modalities, for a higher efficiency, productivity and, above all, transport safety.

The various projects of telematics applied to transport implemented in Italy and throughout the world during the last years allowed to tangibly assess the benefits provided by ITS. European Commission data show that, in different applications carried out across Europe, transfer times have decreased by 20%, network capacity has increased by 5-10% and safety has improved by 10-15% through coordinated information and control strategies made possible by the adoption of telematic technologies in transports.

These positive results show the benefits that ITS systems can provide in terms of sustainable development, environment protection and efficiency improvement, to citizens' safety and competitiveness, and also confirm that ITS are by now an essential tool to implement the mobility objectives of the Country.

Apart from that, ITS systems also represent a chance for development for companies operating in a sector with a high technology content, strongly embedded in the national industrial fabric. The promotion and development of useful solutions for the management of transport systems at every level are therefore not to be considered only as actions to solve mobility problems, but also as incentives to the country growth.

Against this backdrop, the Ministry of Infrastructures and Transport (MITT) launched long ago a series of initiatives aiming to the promotion of telematic technologies for transports. Such actions find a good incentive first in the General Plan of Transports and Logistics of 2001 (PGTL), whole section of which regards the role of telematics in the development of a national transport system, and continue nowadays in the objectives of the Guidelines of the General Mobility Plan for 2007. PGTL identifies as a priority action the creation of favourable condi-

tions for the harmonious development of telematic technologies, so as to generate positivities both in mobility and industrial services.

In the light of the above, the Ministry of Infrastructures and Transport promoted in 2001 the implementation of a tool that could make the different ITS applications compatible, integrable and interoperable among themselves. This tool is ARTIST (Architettura telematica italiana per il sistema di trasporto), the Italian Telematic Architecture for Transports System, published in 2003.

ARTIST forms part of the FRAME-NET European project, defining the reference framework for the development of telematic architectures and systems in Europe. The publication of ARTIST allows the producers of telematic systems to make products recognizable in the European market and supports decision-makers about strategic choices regarding the identification of telematic services that could increase efficiency and effectiveness of transport systems implemented, by adopting a shared and open formalism recognized in Europe.

MITT started several actions for the promotion of ITS and ARTIST both nationally, by drawing up memoranda of understanding with universities and local governments, organizing courses and seminars and promoting thematic Master courses about ITS, and internationally, by publishing different scientific reports for international conventions and by participating in various EU working groups.

Last but not least is the contribution to the implementation of pilot projects about telematic infrastructures on a wide scale. Following the mid-term review of the National Operative Programme, Transport sector, for 2000 - 2006, and consistently with the intervention strategy defined in Priority VI "Service Nodes and Networks " of the Community Support Framework as well as in PGTL, the Ministry of Infrastructures and Transport established a financing line, called Measure III.4 - ITS (Intelligent Transport Systems), that could develop and rationalize the transport system in Southern Italy by implementing telematic infrastructures for transports.

One objective of the Measure III.4 - ITS, at present pursued by the Ministry of Transport after the division of the Ministry of Infrastructures and Transport into two different entities, consists in developing the network system of the main link lines of Southern Italy in order to:

- ensure the necessary connections for moving quickly and safely in the territory of southern Italy and from the latter to other areas;
- direct the demand for mobility towards the economically, socially and environmentally most efficient modes in the different contexts, relieving the pressure placed on the road network by long-haul freight transport;
- improve the quality of transport services offered, safety standards and management techniques;
- ensure flowing traffic and accessibility of the territory taking advantage of the possible applications deriving from information technologies;
- contribute to the reduction of environmental impacts due to transport infrastructures as well as emissions (air, noise).

In the framework of PON Trasporti 2000 - 2006, through Measure III.4, it financed the following seven projects, all regarding the two intervention areas of advanced logistics and freight transport - as well as local public transport - for a total amount of 20,612,000.00 €:

- integrated charging system for mobility, in the Regione Basilicata, for an amount of about 3,500,000.00 €;
- Ulisse project (hazardous goods) in the Regione Campania, for an amount of about 5,000,000.00 €;
- development of ITS systems in national nodes of the port system in the Regione Puglia, for an amount of about 4,500,000.00 €;
- SINTAS project: development and testing of integrated charging systems in the local public transport in Sardinia, of the Regione Sardegna, for an amount of about 3,500,000.00 €;
- integrated telematic platform for tracking and tracing the urban distribution of goods; first lot for the town of Palermo, in the Regione Sicilia, for an amount of about 1,400,000.00 €;
- Trinacria Sicura project: "Integrated multi-access telematic platform for monitoring and controlling hazardous goods and waste circulating within the Sicilian territory", of the Regione Sicilia, for an amount of about 1,800,000.00 €;
- integrated system for embarking telereservation on the marine highways: Nettuno pilot project of the Regione Sicilia, for an amount of about 900,000.00 €.

This document is an abstract of an issue of the "Quaderni del PON Trasporti" (Booklet of PON Trasporti), dedicated to the ITS projects developed within the National Operative Programme for Transports sector 2000 - 2006 and titled "Le nuove tecnologie per i Sistemi di Trasporto Intelligenti nell'ambito del Pon Trasporti 2000 - 2006". According to the philosophy that pervades the whole series of booklets, it responds to the objective of disseminating information and methodological tools, so as to be considered as a useful support and reference for operators involved in the management of European Structural Funds, also in view of the start of the next programming period 2007 - 2013.

This abstract, as well as the Quaderno from which it derives, consists of two sections. The first section includes a description of the reference context that drove the actions of PON Trasporti 2000-2006 and led to the identification of the operative methodology used to implement actions and interventions.

The second part of the publication, showing an operative profile, describes experiences about Projects of the Measure III.4 of PON Trasporti 2000 - 2006.

For further analysis, reference can be made to the Italian version of the Quaderno or to the bibliography listed in the last part of this publication.

2. Italian actions for the development of ITS

The role of new technologies supporting the transport system is an essential element of the transport policy in the country. Actually, considering the economic situation and a global efficiency logic, updating and improvement of the transport system - conditions necessary to obtain a better quality of transport services - are also achieved through an efficient use of technical innovation and, above all, of ITS.

During the last few years, Italy developed a set of activities directly connected to the action lines identified at European level, and adapted to the national reference context, to support the ITS sector. Such actions are being developed with the definition of guidelines and the creation of implementing conditions respecting the two main strategic objectives:

-    the development of services for sustainable mobility and safety;
-    the support to the development of a "European market" for national companies operating in the field of IC transport technologies.

Such objectives were pursued through the following action lines:

-    support to the diffusion of transport telematic technologies, implemented mainly through the ITS Measure III.4 of PON Trasporti 2000 - 2006, financing strategically important telematic projects;
-    promotion of a strong coordination action useful for the development of advanced telematic services that could be integrated both at national and European level, realized mainly through the development and promotion of a reference national telematic architecture for transports (ARTIST) for the development of services supporting mobility, integrated in the European FRAME.

Particularly, implemented coordination actions are leading to overcoming the fragmentation of services regionally and nationally improving the continuity of services, with obvious advantages for ITS system users as well as competitiveness of companies developing such solutions. The objective leading the actions developed by the Ministry of Transport is supporting the creation of a shared culture about the usage of telematic technologies to promote the mobility system and the territory for the delivery of advanced services to users. Such an action, mainly addressed to users, both public and private, as well as to companies, is implemented through a set of activities carried out according to priorities defined nationally in programming documents such as the General Mobility Plan, whose Guidelines have just been published, and the General Plan of Transports and Logistics of 2001. The latter, one of the first in Europe, allows the transport sector to be seen in a new light as a service to the community whose value may be measured according to its capacity to meet the citizens' needs in a context of environmental and social sustainability, assessable both in terms of

environmental and energetic efficiency and of safety. This criterion is the same identified to assess the efficiency of telematic systems for transports supporting the mobility system in the country.

In programming documents, technological innovation in the transport sector, particularly in ITS, is therefore meant and assessed according to its ability to support better services, developed in a situation of open and competitive market: it becomes one of the essential tools for achieving strategic objectives in the country in terms of mobility, operating on the quality of the transport services delivered, as well as on the inexpensiveness and efficiency of transport system management.

The Ministry of Transport, focusing its attention on transport services, sustainability and safety, suggests an approach based on a system logic, where modal subdivisions loose partly their importance whereas infrastructures, organizations and regulations become tools for optimizing transport globally. Against this backdrop, telematic technologies represent the tool that could allow the sharing of information among all mobility parties (operators and users) on the real situation, modifying and improving their behaviours as well as contributing to achieve objectives of global efficiency, safety, environmental impact and users' comfort. Furthermore, the Ministry recognizes to ITS systems an additional role as key element for controlling the services delivered both in quantitative and qualitative terms, supporting also the monitoring activities carried out by the Ministry itself in application of the policy lines of the General Mobility Plan.

Last but not least is the role played by ITS systems in the development of the national production system as well as services, recognized by all the institutional stakeholders: actually, ITS are identified not only as elements capable of generating a multiplicative effect on investments in road infrastructure and, in many cases, a substitutive effect for new constructions, but also an element capable of generating significant effects on the market, both for systems and ITS services.

Against this backdrop, it is therefore natural to think about a significant introduction on the market of mature systems and services, of demonstrators and prototypes as ultimate results of an applied research developed jointly by research centres, universities and companies, that in the short-medium term could generate new opportunities for companies and for the country and a plurality of new services for users such as:

- individual real time information services (for users) on the state of the traffic network and the situation of the multimodal transport network, accessible through a plurality of high technological content information channels (GPRS, UMTS, Wi-Max, Internet etc.) and useful for a more efficient trip planning;
- individual services for logistics and freight transport, that could support operators in the choice of the best transport solutions for logistic flows;
- collective information systems for road safety and emergency management, that could prevent traffic congestion and reduce incidents;
- optimized management systems of transport fleets (public and private, freight and passengers) that could improve transport global efficiency, also in case of low or flexible demand;

- systems of integrated electronic payment both for local public transport and other mobility services (road pricing, congestion pricing, access control, car pooling, car sharing etc.);
- driver assistance systems, integrated by information about road conditions, collision avoidance systems, speed adaptation and automatic braking controls, that could limit driving in dangerous conditions (excessive speed or not suitable for road/vehicle conditions, tiredness etc.) greatly reducing the risk of incidents;
- integrated systems for service payment and booking of transport services for intermodal use, that could operate in an environment including many competing operators.

Indentified priorities regard first of all road safety, referring both to driving support and to traffic improvement, as well as prevention/repression of wrong behaviours and, secondly, they concern multimodal integration of the transport system, with particular reference to services that allow a better intermodal use of the transport network. On the users' side, this means that services allowing the access to information useful for planning and managing individually trips - both for passengers and freights - will be preferred.

From the operative point of view, since civil engineering works in transport infrastructures are by far the most important component of public expenditure for investment in the field of transports, it could be suggested to make choices able to significantly increase the efficiency of structures. This may be achieved by making the structures converge towards the so-called "integrated systems", i.e. road infrastructures equipped with telematic management plants and structures, such as access payment and control, traffic monitoring, detection systems for traffic violations, infomobility systems for collective information or vehicle tracking systems.

From the technological/architectural point of view, the support to development and diffusion of distributed and open technologies is highlighted, as they promote the adoption of cooperation models instead of centralized, expensive, less flexible and efficient models. Particularly, the Ministry of Infrastructures and Transport in the General Plan of Transports and Logistics identified as priority actions to support ITS those regarding the definition and development of solutions that could offer implementing structures (models of shared data, architectures, standards, cooperation or exchange agreements) relying, for their implementation, on the intervention of market-oriented suppliers of private services. Such an indication led the Ministry to realize ARTIST, the Italian telematic architecture for transports system, compatible with the European FRAME architecture. The central role of ARTIST is confirmed also by the recent Guidelines of the General Mobility Plan, whose drafting was considered necessary by the Financial Act 2007.

2.1 Italian Telematic Architecture for the ARTIST Transport Service

The need to create a unitary reference framework, highlighting the opportunities of transports telematics, the relationship among various systems and services, the requirements in terms of organization, rules and technical regulations, the possible developments, that means hav-

ing a national reference architecture for transport telematics is underlined for the first time in the General Plan of Transports and Logistics of 2001.

The definition of architecture aims to provide local authorities, legislative bodies, dealerships and private companies with general guidelines in the development of their own decisions as well as activities and transport telematics systems, so as to promote and accelerate market development, pursuing efficiency results, with special reference to interoperability among transport modes and telematic services, at national and European level.

In particular, the architecture allows to coordinate, nationally and in line with European standards, the development of transport telematics in the country.

To do so, the Ministry of Infrastructures and Transport has since 2001 launched a series of activities involving all main Italian players interested in transport telematics, transport operators, trade associations, national technical standardization bodies, associations and experts dealing with transport telematics to define the basic characteristics of national architecture. At the end of the process, by means of a public selection, the Ministry established a technical task force to prepare a national ITS architecture.

In spring 2003, the task force published the first version of ARTIST, Architettura Telematica Italiana per il Sistema di Trasporto (Italian Telematic Architecture for Transports System).

ARTIST development is based on strategic priorities aimed at guaranteeing the full consistency of ARTIST with the international situation as well as with the individual needs of the Italian transport system. These include:

-   ensuring the compatibility of the Italian architecture with the European one;
-   promoting the intermodal aspects of transport, both of passengers and goods, with particular attention to road - rail - cabotage transport;
-   analyzing some specific aspects of the Italian transport system, such as the organizational ones, not yet dealt at European level.

The ARTIST project produced the following outputs:

-   a state-of-the-art;
-   the Italian architecture ARTIST, consisting of:
    -   User needs;
    -   Logical architecture;
    -   Physical architecture;
    -   Organizational architecture;
-   SETA (SElection TOOL of ARTIST) selection Tool;
-   a web site;
-   a glossary.

Figure 1 - ARTIST Components

The state-of-the-art is the first fundamental step leading to the drawing of ARTIST: it consists of a wide - national and international - overview describing the present situation about systems, services and standards already in use and their developments in the field of transport telematics, whereas the glossary collects terms usually adopted in ITS.

ARTIST allows the definition of services and physical sites connecting them to users' needs, promoting quality and competitiveness inside the transport system. In this way, ARTIST promotes the integration of ITS systems and services, allowing final users to obtain in any moment reliable and updated information about the conditions of the mobility system, helping them in the choice of the transport solutions better suited to their needs and promoting solutions with a lower environmental impact.

Furthermore, ARTIST is a European reference element, supporting ITS systems and technologies producers in competition on European markets thanks to the definition of a language shared with the main national architecture and with FRAME.

Anyway, ARTIST's most important success can be seen in the large number of (pilot or not) implementations realized in Italy in line with the architecture guidelines, that today make ARTIST the European architecture boating the largest number of implemented pilot projects.

2.2 ARTIST Features

ARTIST is developed coherently with the FRAME guidelines and present strong analogies with the French national architecture ACTIF. Nevertheless, the Italian architecture was developed addressing aspects and priorities typical of the national transport system. These include:

-    multimodality and intermodality, by developing appropriate functions to support the

transfer of road flows to other modes (maritime and rail transport) in order to encourage the process of modal equalization for goods as well as for passengers;

- organizational aspects, by defining responsibility centres for the different services provided by the ITS system and the correct relationship among different people responsible; this feature, introduced for the first time in FRAME architectures in compliance with ARTIST, offers a useful tool to overcome one of the main issues (the one regarding the management and the allocation of responsibility), in charge of the ITS good operation;

- usability, by providing telematic tools, a web site and an open source programme (SETA) supporting the architecture users.

This lead to a significant review both of user needs and functions, as well as to an architectural modification linked to the presence of a new organizational level developed within the architecture.

As already stated, tools and additional services such as the web site and the selection tool - not less important in terms of usability and consequently of ARTIST diffusion - shall be added to those architectural structural elements.

2.2.1 Multimodality

The characteristic feature of ARTIST is its focus on multimodal aspects. Multimodality and modal equalization, especially in the field of freight transport, represent a European, but above all a national priority. The Guidelines of the General Mobility Plan of 2007 of the Ministry of Transport reaffirm the need of developing actions supporting a higher transport sustainability re-launching and enhancing maritime and rail transports. The Plan itself gives ITS a significant role in supporting such a policy.

ARTIST follows this policy enhancing significantly the multi/intermodal area, in line with the FRAME definition and, above all in ACTIF, offering solutions and services that could promote the adoption of other transport modes (rail, cabotage etc.) in transferring freights and passengers in alternative to road transport, with environment and safety benefits.

2.2.2 Organizational Architecture

Another feature of ARTIST is its Organizational Architecture. It aims to underline organizational and business aspects ensuring an effective provision of the services functionally defined by the Logical Architecture. Actually, often well designed and delivered services do not find an actual application or don't survive in the market since the organizational models adopted were not measured carefully enough or were just briefly outlined.

The Organizational Architecture, as well as suggesting a methodology for the organizational model design of a system, provides some application instances of the proposed method.

2.2.3 Selection TOOL

To help ARTIST users, an IT tool was developed to support the ITS system design based on the national telematic architecture called SETA - SElection Tool of ARTIST.

Figure 2 - SETA, ARTIST SElection Tool
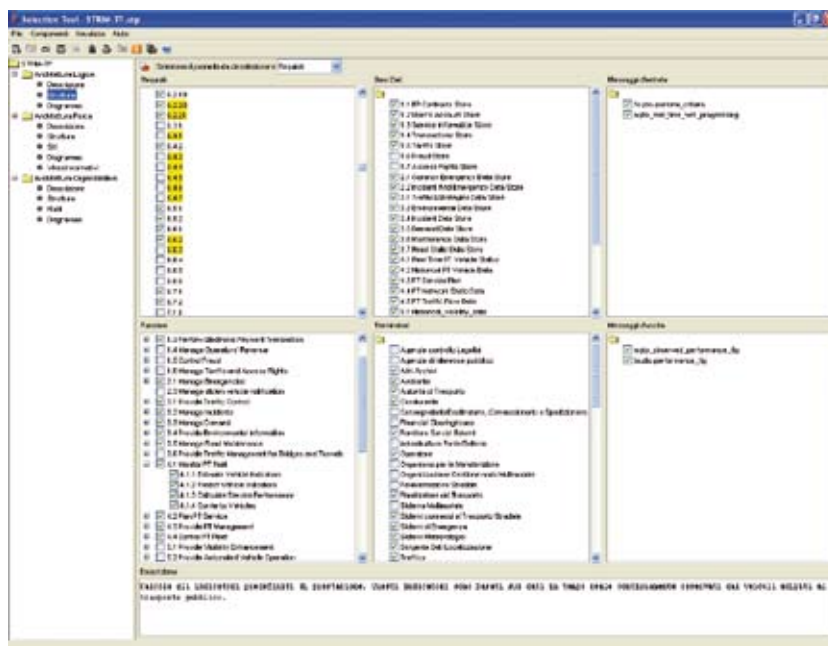
SETA, that can be downloaded free of charge from the ARTIST web site, supports designers in developing new ITS projects as well as users in the analysis of existing projects.

SETA is based on an open source approach using the Java™ technology; to ensure its maximum portability, it was developed with multi-platform approach that makes it compatible with Windows™ XP and Vista, Linux and Mac OS. All functions and menus are available in three languages: Italian, French and English. This feature allows a wide usage also in international projects in which Italy is strongly involved. Moreover, in this way combined analysis with foreign similar tools can be performed, so that it can be enhanced and updated.

The approach adopted for the design and implementation of SETA provides an open and free national platform, which allows the development, sharing and comparison of ITS projects.

2.2.4 Web Site

To make the usage of ARTIST available to the widest number of users possible, an interactive tool to navigate within the architecture was created. This tool allows the generic user to:

-    navigate ARTIST site, according to custom perspectives, in an easy and rapid way;

- download documents regarding parts of partial views of the architecture;
- have a global view about the state-of-the-art of ARTIST projects realized in Italy and of ongoing activities concerning the national telematic architecture;
- access to sample tender documents, developed according to ARTIST guidelines.

Also this tool is available in three languages: Italian, French and English. The interface, extremely light and user-friendly, allows a rapid navigation of the site, which is highly accessible. Furthermore, the navigation tool, developed in CASE technology, is conceived as a support tool for designers, maintenance operators and ITS implementation managers and as a navigation tool designed to suit final users needs during navigation.

3. National Operative programme for Transports 2000 - 2006

Following to the Mid-term review in 2005, Measure III.4 ITS - Intelligent Transport Systems was introduced in PON Trasporti 2000 - 2006. The measure was financed with 20,645,768.00 € from 4% and 6% allocations of premiality and reserve funds upon a decision of the European Commission (n. 5190, 15 December.2004), providing for 50% of the financing from ERDF and 50% from the National Rotation Fund. The action was focused on a strategic pathway undertaken in 2001 by the Italian Ministry of Infrastructures and Transports alongside PGTL, and further encouraged in 2003 with the publication of ARTIST for the development and promotion of IT-based Intelligent Transport Systems offering services aimed at increasing the efficiency and effectiveness of transport systems.

Measure III.4 was added to PON Trasporti 2000 - 2006 as a self-standing measure so as to highlight the key role played by telematics technologies in supporting sustainable mobility models within the activities described in the National Operative Program for Transports, where innovation and technology are in the spotlight.

Measure III.4 supports technological innovation in the fields of logistics and public transports in compliance with national and community strategic lines by creating qualifying conditions to the modal rebalancing and better efficiency of the logistic sector, in order to make goods and people transport safer, more flowing, and more environmentally sustainable.

Measure III.4 ITS of PON Trasporti 2000 - 2006 selected the following 7 project for a total amount of 20,612,000.00 €:

- Regione Basilicata (note n. 3380, 15 November 2005) - Integrated charging system for mobility (3,500,000.00 €);
- Regione Campania (note n. 3541, 29 November 2005) - Ulisse project (dangerous goods) (5,000,000.00 €);
- Regione Puglia (note n. 3379, 15 November 2005) - development of ITS systems at national nodal points within the regional port system (4,500,000.00 €);
- Regione Sardegna (nota n. 3381 del 15.11.2005) - SINTAS project: development and testing of Integrated charging systems in the local public transport in Sardinia (3,500,000.00 €).
- Regione Sicilia (nota n. 3378 del 15.11.2005):
  - integrated telematics platform for tracking and tracing the urban distribution of goods. First lot for the town of Palermo, (1,400,000.00 €);
  - "Trinacria Sicura" project: "Integrated multi-access telematics platform for monitoring and controlling dangerous goods and waste circulating within the Sicilian territory", (1,800,000.00 €);
  - "Nettuno pilot project", Integrated system for embarking remote reservation on the marine highways, (900,000.00 €).

These projects refer to two fields of intervention:

1) advanced logistics and goods transportation;
2) passenger transport, with particular reference to local public transports.

These areas, with the research and the ITS, has been highlight as strategic in the new General Mobility Plan, in compliance with the intervention lines prioritized in the General Plan for Transports and Logistics.

As regards goods transportation, interventions are focused on improving management and increasing safety through projects aimed at developing intermodality and monitoring dangerous goods.

The interventions on passenger transports target the removal of barriers to the local public transports by introducing electronic and telematics technologies for ticketing, so as to spread integrated charging systems over vast areas. Further goals are pursued concerning the rationalization and streamlining of Local Public Transports and, in general, of Transport services targeting disadvantaged social categories.

In particular, the operations refer mainly to the following fields:

-   Logistics, with further reference to co-modality;
-   Logistics, with reference to dangerous goods monitoring;
-   Logistics, with reference to integrated service offers for second-level port nodes;
-   Goods distribution in urban areas;
-   Local Public Transport enforcement with special attention to their connections to nodal infrastructures;
-   Streamlining transports services having social goals (students, handicapped people, elderly people);
-   Increasing safety levels on the major suburban thoroughfares as well as on motorways.

Measure projects are developed by the Regions in mutual collaboration, with a view to reducing the fragmentation of services on a regional scale, while favoring uninterrupted services, which not only brings obvious advantages to the users of ITS systems, but also encourages the competitiveness of the companies developing those solutions.

3.1 The Integrated charging system for regional LPT in Basilicata

The Integrated charging system adopted by the Regione Basilicata is financed through Measure III.4 ITS of PON Trasporti 2000 - 2006. It is the technological tool supporting the Integrated charging system of that region. As a matter of fact, integrated charging and the ticketing system are just equally essential to achieve the top efficiency and effectiveness of LPT system in Basilicata.

The project aims to ease access to road and rail LPT in order to decrease the use of private cars by easing access modalities to LPT, while visibly increasing the quality of the service of-

fered. The project is to provide the head of the regional mobility system with tools serving as deterrents to the use of private cars in favor of public transports. Thanks to the possibilities offered by technologies, it is possible to launch "loyalty" campaigns for users based on discounts on tickets/subscriptions related to the real use of the service. Such policies may have a major impact on commuters, who, on one side, are the main responsible for continual and remarkable traffic flows but, on the other, will have the chance to profit from the high value services provided by telematics technologies.

Developed according to ARTIST guidelines, the system provides for:
-    data collection on transport offer;
-    access to public transports having integrated charging;
-    clearing policies among companies according to the met demand;
-    diminution of evasion and avoidance;
-    development of a reference telematics infrastructure on a regional scale, able to support advanced mobility services.

In this aim, the project defines a series of objectives to be realized connected to the implementation of a single technological platform over the whole regional territory, with a view to offering LPT users the access to a multimodal integrated transport network.

The objectives are:
-    acquiring technological and computer infrastructures to support advanced charging services and quality monitoring for the transport service delivered;
-    providing a real perception of multimodal integrated public transport on a regional scale accessible with a single ticket by conveying the idea of "transport network", rather than of a system offering point-to-point transportation;
-    minimizing the inconveniences created by the need of many tickets through a telematics "pay per trip" system;
-    providing certain information in real time on the availability of LPT;
-    having analytical data available on the service delivered so that the service planning reflects the needs of the users and territory concerned more closely.

Figure 3 - Charge integration: zoning the territory of Basilicata
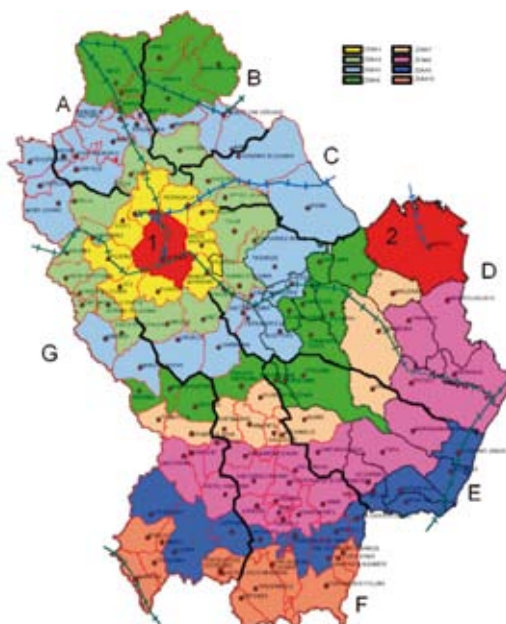
From a physical point of view, the system architecture consists of three levels - a core level, defining charging policies and distributing incomes; a peripheral level, including business concentrators; and a field level, including control, confirmation, emission, and ticket valida- tion systems.

The above architecture allows to insert each level into fully functional groups apt to provide services and information concerning local actors/users of the systems.

Because the system implementation will allow an improvement of the service quality per- ceived by the users while increasing the number of citizens resorting to LPT, it will contribute to a better sustainability of the regional mobility system.

Smart tickets will reveal to be a precious support, due to the exact knowledge they provide about sales and transport use, which are crucial to the Management companies and Planner to calculate passenger flows and transport demand non-stop. As a result, the decisions on service planning will be more effective.

Further expected results include a range of new offers and charging plans closer to the citizens' demands, as well as a diminution of evasion, avoidance, and fraud, that is to say a higher safety level.

Finally, the use of Integrated charging systems and smart tickets based on proximity micro- chip technologies allows to plan and implement new integrated mobility services (access to parking areas and limited traffic zones), just as services related to other fields (access to

museums and PA services, electronic payment etc.) which may be launched in a second phase of the project.

3.2 ULISSE project: Unified Logistic Infrastructure for Safety and SEcurity - an Integrated Telematics System for dangerous goods in Campania

ULISSE (Unified Logistic Infrastructure for Safety and SEcurity in Campania) is an integrated telematics system financed by PON Trasporti 2000 - 2006 within Measure III.4 ITS - Intelligent Transport Systems, aimed at monitoring all dangerous goods circulating over the territory of Campania.

It is part of the European/national range of activities based on the use of ICT technologies applied to transport systems, focused on a higher level of safety for dangerous goods transport through the coordination of the different actors involved.

In particular, ULISSE is aimed at developing a technological solution for a hybrid monitoring of carriers specialized in dangerous goods transportation over the regional territory. On one side, specific monitoring will be required for dangerous goods transportation on vehicles connected to national road freight transport associations active on the regional territory, while overall monitoring will be needed both at motorway entrances along the regional borders and at regional first-level logistic nodes. Said system relies on the availability of historical data as a support to decision-makers throughout the planning phase for a more efficient planning action, and the management phase for higher safety levels. ULISSE will actually be the central core of future services aimed at relieving traffic congestion from road infrastructures, thereby reducing its environmental impact in compliance with the strategic lines of intervention defined at a community and national level.

The project complies with the guidelines set forth in ARTIST promoted by the Ministry of Transport pursuant to FRAME, the ITS European architecture. ULISSE features are such that they could even be extended to the monitoring of vehicles travelling in and out of logistic nodes or motorway networks, which will encourage coordination and cooperation actions over vast areas with a view to creating an integrated logistic system for the territory. To conclude, ULISSE is offered as a reference platform for testing technological solutions and telematics services supporting the monitoring of dangerous goods over vast geographical areas, whose results may facilitate the identification of field intervention lines as well as the allocation of further consistent community and national investments.

ULISSE project involves the main actors operating in the field of logistics and, in particular, in dangerous goods management:

- road and motorway operators:
    - Società Autostrade per l'Italia SpA;
    - Società Autostrade Meridionali SpA;
    - Tangenziale di Napoli SpA;
    - ANAS SpA;

- Provincial authorities and municipalities.
- first-level logistic node operators:
    - Naples port authorities;
    - Salerno port authorities;
    - Campania logistic centre;
    - South-European logistic centre;
    - Salerno logistic centre:
    - Mercato San Severino logistic centre.
- road haulier associations;
- local bodies and authorities in charge of road infrastructure and territorial intervention planning:
    - Municipalities;
    - Provincial authorities;
    - Bodies and organisations involved in the implementation of safety actions and co-ordination of intervention in case of accidents or natural disasters;
    - Fire department;
    - Civil protection agency;
    - Police headquarters.

Other actors are called to carry out and implement ULISSE project, including University Research Centers, whose analyses on the data provided are to support the creation of traffic models highlighting any criticalities in the transport system.

The Ente Autonomo Volturno is entrusted with the leadership and coordination of the project, in addition to the definition of strategic lines. The Regional Agencies for Logistics and Road Safety are called to support its work.

The project provides for three different actions, each connected to a specific objective to be realised:

- monitoring dangerous goods flows across the territory by assessing/localising carriers, and detecting the kind of goods they carry;
- drawing a risk map of the whole regional territory according to its physical, demographic, and infrastructural features;
- providing the system users with information on the flows, kinds, and presence of dangerous goods over specific areas by localising the vehicles carrying those goods on a digital map with an actual connection to the risk for the territory.

In order to guarantee safe and full interfacing to various tools at the operators' disposal (e.g., motorway network operators), ULISSE supports the development of standard architectural solutions ensuring data interoperability as well as cost-saving industrial solutions.

The technological solutions proposed for the implementation of ULISSE project guarantee interoperability, multimodality, modularity, scalability, and expansibility. In this purpose, technologies for data exchange and data exchanged format are specified through standard refer-

ence solutions known as the state of the art for telematics applications.

The same methodological approach (use of open standards able to guarantee solution interoperability, scalability, and upgradeability) was adopted to select the technologies suitable to each of its functional systems interacting with the different actors involved in the projects. The main services delivered by ULISSE are:

- vehicle localisation: the service provides the system users with information on the flows, kinds and presence of dangerous goods over specific areas by localising the vehicles carrying those goods on a digital map with an actual connection to the risk for the territory;
- vehicle monitoring and operating status assessment: the service allows to assess the position and status of the vehicles monitored by the regional transport companies through alert signals paired to key vehicle operation values. Said alerts are triggered as predetermined thresholds are exceeded, which can be defined by the users as business concentrators;
- goods monitoring: the service allows to assess the status of the dangerous goods carried by the vehicles monitored by the regional transport companies through alert signals paired to key values (e.g., temperature). Said alerts are triggered as predetermined thresholds are exceeded, which can be defined by the users as business concentrators;
- safety: the service allows to signal any dangerous situation, or even accidents involving vehicles carrying dangerous goods, thereby alerting other vehicles of the same fleet, in order to ask for immediate and timely intervention of the authorities in charge;
- management of the regional risk map: the service allows to draw, manage, update, and maintain the risk map for Campania through dynamic data entry concerning the position of dangerous goods from the field;
- routing planning: the service allows the road transport associations involved in the project to plan their carriers' trips according to points of origin, intermediate stops, and destinations, as well as to the distribution or position of other vehicles carrying dangerous goods over the territory, or peculiar events en route, with the possibility to exclude specific areas, thoroughfares, or nodes from the routes proposed;
- data harmonization processing: the service proceeds to a technological and semantic data harmonisation to support integrated services among logistic operators on the territory, with a view to developing a virtual infrastructure sustaining logistics, and notably dangerous goods monitoring;
- historical trip information: the service provides all the data related to historical missions for control purposes or event recreation (route check, accident sites, time and stop rating with parameterization of rated and actual time);
- historical data management: the service allows to record and certify any data exchange thanks to a "data log", from which it is possible to analyse any previous mission;
- notice of estimated arrival time at ports/logistic centres (messaging): the service allows the peripheral systems of logistic node managers (ports and logistic centres)
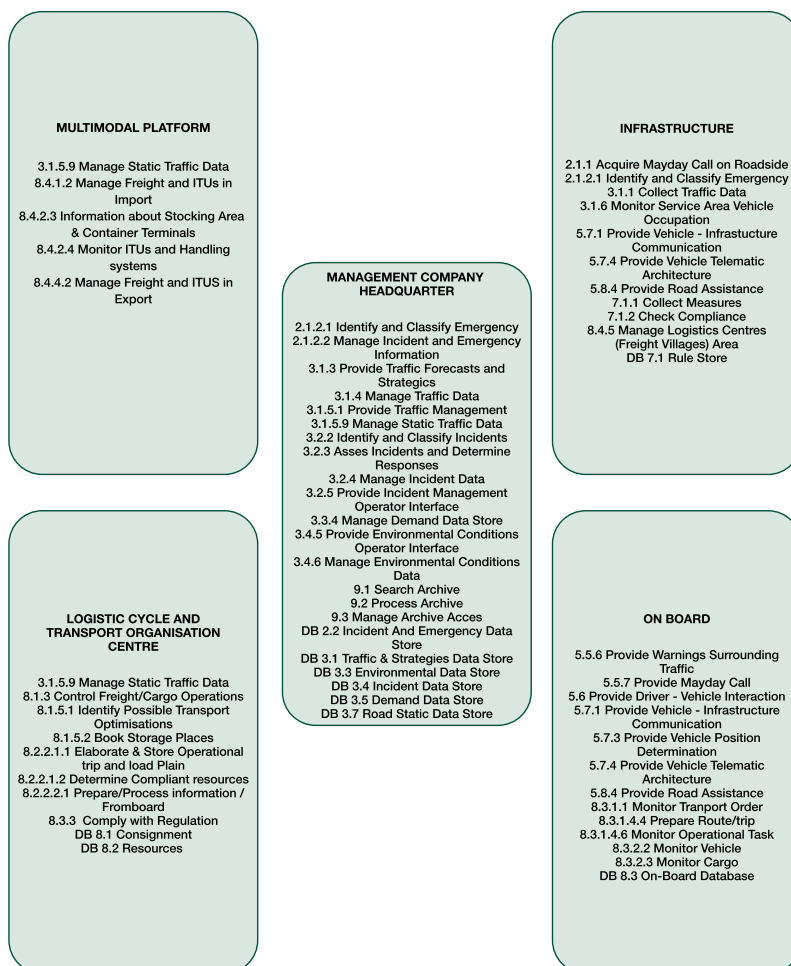
involved in the project to receive early notice of arrival of vehicles carrying dangerous goods having previously declared to be headed to any of the logistic nodes covered by ULISSE.

The architecture on which those services rely was developed in compliance with ARTIST guidelines on different levels, each showing elevated independence and intelligence. The peculiarities of the project, together with technical efficiency and streamlining, suggested to implement various functions upon independent groups of physical areas. This has allowed to enhance the system flexibility, while better adjusting investments and experiences according to the peculiarities of the subsystems considered.

This approach suggested that the architecture should include three levels:
-    management seat (Core level);
-    intermodal logistic node monitoring system (Peripheral level and Field level);
-    monitoring System for vehicles belonging to Road haulier associations (Peripheral level and Field level).

The Core level concerns the Regional Integrated Telematics System for Dangerous Goods Monitoring, while the Peripheral level is connected to the operative functions available at the transport companies, logistic operators, infrastructure operators, and other actors willing to monitor dangerous goods carriers. The Field level concerns the tracking functions for vehicles travelling on the regional road infrastructures, and monitoring systems placed at the entrance/exit gates of those infrastructures (roads, motorways, and logistic nodes).

Figure 4 - Function and database allocation in single physical contexts

MULTIMODAL PLATFORM

3.1.5.9 Manage Static Traffic Data
8.4.1.2 Manage Freight and ITUs in Import
8.4.2.3 Information about Stocking Area & Container Terminals
8.4.2.4 Monitor ITUs and Handling systems
8.4.4.2 Manage Freight and ITUS in Export

INFRASTRUCTURE

2.1.1 Acquire Mayday Call on Roadside
2.1.2.1 Identify and Classify Emergency
3.1.1 Collect Traffic Data
3.1.6 Monitor Service Area Vehicle Occupation
5.7.1 Provide Vehicle - Infrastucture Communication
5.7.4 Provide Vehicle Telematic Architecture
5.8.4 Provide Road Assistance
7.1.1 Collect Measures
7.1.2 Check Compliance
8.4.5 Manage Logistics Centres (Freight Villages) Area
DB 7.1 Rule Store

MANAGEMENT COMPANY HEADQUARTER

2.1.2.1 Identify and Classify Emergency
2.1.2.2 Manage Incident and Emergency Information
3.1.3 Provide Traffic Forecasts and Strategics
3.1.4 Manage Traffic Data
3.1.5.1 Provide Traffic Management
3.1.5.9 Manage Static Traffic Data
3.2.2 Identify and Classify Incidents
3.2.3 Asses Incidents and Determine Responses
3.2.4 Manage Incident Data
3.2.5 Provide Incident Management Operator Interface
3.3.4 Manage Demand Data Store
3.4.5 Provide Environmental Conditions Operator Interface
3.4.6 Manage Environmental Conditions Data
9.1 Search Archive
9.2 Process Archive
9.3 Manage Archive Acces
DB 2.2 Incident And Emergency Data Store
DB 3.1 Traffic & Strategies Data Store
DB 3.3 Environmental Data Store
DB 3.4 Incident Data Store
DB 3.5 Demand Data Store
DB 3.7 Road Static Data Store

LOGISTIC CYCLE AND TRANSPORT ORGANISATION CENTRE

3.1.5.9 Manage Static Traffic Data
8.1.3 Control Freight/Cargo Operations
8.1.5.1 Identify Possible Transport Optimisations
8.1.5.2 Book Storage Places
8.2.2.1.1 Elaborate & Store Operational trip and load Plain
8.2.2.1.2 Determine Compliant resources
8.2.2.2.1 Prepare/Process information / Fromboard
8.3.3 Comply with Regulation
DB 8.1 Consignment
DB 8.2 Resources

ON BOARD

5.5.6 Provide Warnings Surrounding Traffic
5.5.7 Provide Mayday Call
5.6 Provide Driver - Vehicle Interaction
5.7.1 Provide Vehicle - Infrastructure Communication
5.7.3 Provide Vehicle Position Determination
5.7.4 Provide Vehicle Telematic Architecture
5.8.4 Provide Road Assistance
8.3.1.1 Monitor Tranport Order
8.3.1.4.4 Prepare Route/trip
8.3.1.4.6 Monitor Operational Task
8.3.2.2 Monitor Vehicle
8.3.2.3 Monitor Cargo
DB 8.3 On-Board Database

Expected results for ULISSE project at medium-long term:
- detecting the criticalities of the regional territory connected to dangerous goods management (handling, transport, and storage);
- drawing an updated, dynamic risk map of the Campania;
- meeting the safety demands as regards the double aspect of safety and security for the territory;
- setting out guidelines aimed at streamlining dangerous goods transport;
- integrating a modern, functional, economically-sustainable infrastructure into the regional logistic system for dangerous goods monitoring to be developed in accordance to the General Plan for Transports and Logistics and the guidelines set forth in the General

Mobility Plan, compliant to ARTIST Italian telematics architecture;
- developing a modular, open, interoperable, expansible pilot platform serving as a European reference, where the offer for intermodal node and road infrastructure operators (notably motorways) can be integrated with services for logistic operators;
- producing a modular, open, expansible technological solution ensuring complete interoperability with the existing systems;
- delivering a series of high added value services for institutional operators (i.e., police, planners, civil protection agency), business operators (carriers and logistic operators), and infrastructure managers (logistic nodes, such as ports and logistic centres, railways, motorways, road infrastructures, airports);
- issuing guidelines about how to develop a National technological platform.

Although part of the goals may well be attained the moment the system is ready for use (scheduled for autumn 2008), the project will be subject to an intense experience phase consisting of two steps - the evolutionary maintenance step (about 4 years), and the management step, directly involving all the actors who adopted the organisational model proposed.

3.3 Project for the development of ITS systems at national hubs within Puglia port system

The Regione Puglia has carried out a project named S.I.T.I.P. - Sistema Informativo e Telematico Integrato per i Porti di Bari, Brindisi e Taranto (Integrated Telematics and Information System for Bari, Brindisi and Taranto ports) within Measure III.4 - PON Trasporti 2000 - 2006. The project aims to network Puglia ports with a view to increasing the efficiency of the logistic sector through a telematics infrastructure developed on a regional scale and shared by all the actors involved, i.e., logistic operators and the authorities in charge of the various authorisation steps, control, and transport flow monitoring from/to the port nodes. In addition, S.I.T.I.P pursues better safety conditions of intermodal transports and monitoring of dangerous goods travelling through the port hubs.

The system is based on a series of functions able to support logistic and operational management of intermodal chains of transport for all the economical operators involved, both public (Bodies and Authorities in charge of the various authorization steps, control, and transport flow monitoring from and to the port nodes), and private (logistic operators), as well as to improve safety conditions of intermodal transports at port nodes in Puglia.

Figure 5 - S.I.T.I.P architecture.
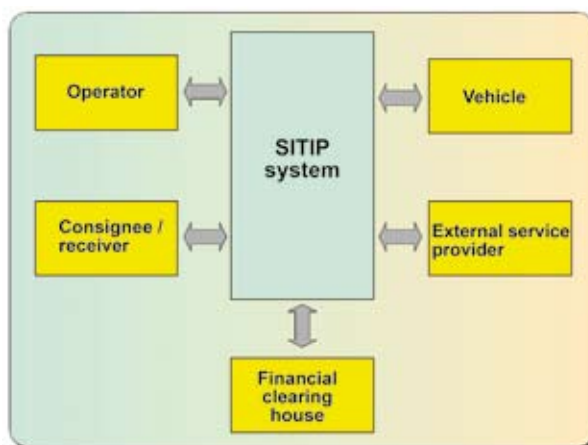
S.I.T.I.P. complies with ARTIST guidelines. It ensures architectural compatibility with similar ITS projects at a national/European level. Its high level of interoperability is further guaranteed by the use of standard technologies and open protocols (data flow coding based on XML, TCP/IP protocol etc.).

The project provides an integrated logistic system aimed at networking the computer systems active in the reference ports of Bari, Brindisi and Taranto, while supporting the services for maritime control, customs, health inspections, and so on, included in the authorization/

regulatory steps carried out by the regional port authorities. Moreover, S.I.T.I.P. telematics platform integrates the information systems of the private operators concerned (agents, shipping agents, freighters, port companies, terminal operators etc.) both at a regional and national or international level.

Figure 6 - S.I.T.I.P. CCS platform
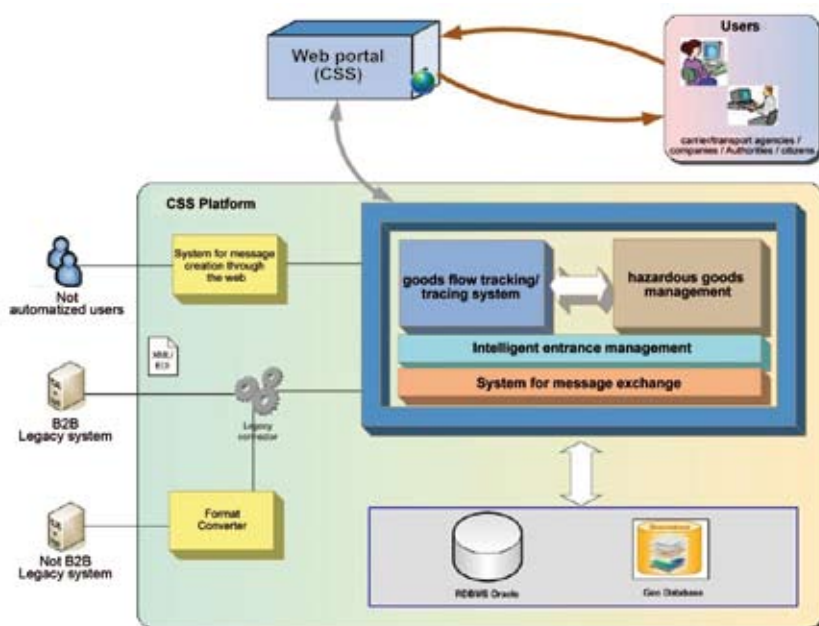
S.I.T.I.P. is composed of the following functional subsystems:
a) Cargo Community System (CCS)-type platform: it is an integrated information system for the logistic cycle and transport of goods, based on a single Service centre allowing automatic data, document, and information exchange among the public and private operators involved in transport/logistic operations within each port area, with particular attention to the handling of any modality changes (ITU and vehicle loading/unloading between roads and ferries, management of the rail-road intermodality, tracking any passage/stop, transshipment operations);
b) Smart Gate subsystem at the ports of Bari, Brindisi and Taranto: all the sensor-based gates in said port areas are equipped with apparatuses for recognition, automatic identification of commercial and service vehicles waiting in or travelling through each port area, and passage recording. The subsystem can transmit all useful data for freight monitoring and control to CCS;
c) "External" goods flow tracking/tracing subsystem: it is the external ("extramural") extension of the functions implemented in the smart gates;

d)   Dangerous goods management subsystem: the system provides a series of added value services relying on CCS-collected data as well as on the tracking & tracing functions suitable to monitor dangerous goods travelling through the three ports and their inner harbour areas. In addition, the subsystem includes Emergency management functions providing the competent authorities with information crucial to a correct management of emergencies in case of accident.

Figure 7 - S.I.T.I.P. hardware architecture
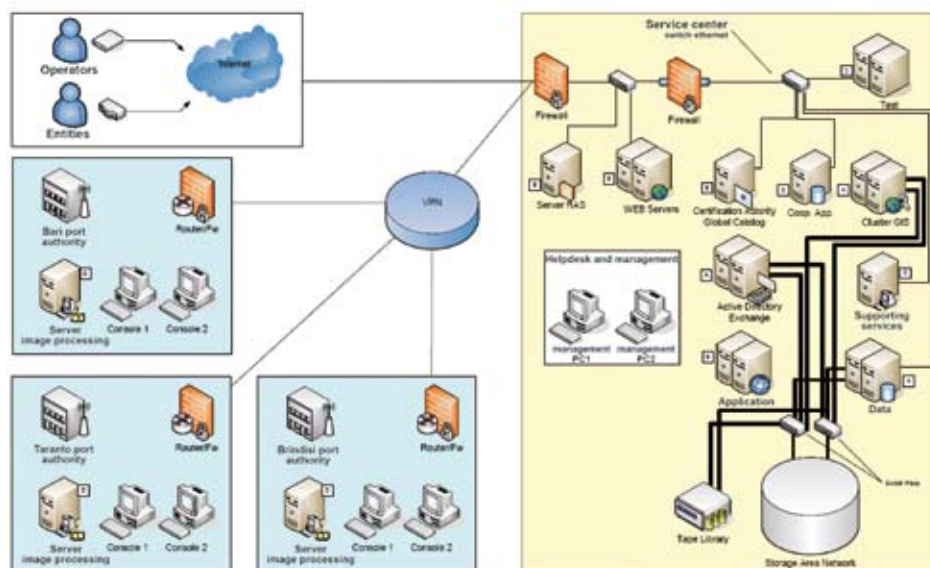
With particular reference to the Smart gate subsystem, two telematics gates connected through a LAN network are provided in each port area. Each gate can:
-   identify incoming vehicles by reading their number plate and serial number;
-   identify the goods carried by reading active/semi-active RF-IDs.

The latter is guaranteed by the installation of 90 active transponders (30 at each port) for vehicle tracking at the Gates in the first experience phase. Node operators will be able to identify RF-ID transponders as well by means of a palmtop equipped with a special software module.
Monitoring functions of any passages through each gate can be processed by the system thanks to the information available from the gates, thereby ensuring data recording for historical-statistical uses, and contributing to the overall port safety even for non-recurrent vehicles through the real-time automatic identification of all the vehicles operating in the area.
The experience phase is bound to last at least two years. These are the major expected results:

- a modular, open, expansible telematics infrastructure guaranteeing full interoperability with existing systems, apt to network the logistic port nodes in Puglia;
- a higher safety level for Puglia ports, in terms of both safety and security;
- a functional modern, economically sustainable infrastructure to be integrated in the regional logistic system for dangerous goods monitoring compliant to the strategic lines of interventions indicated in the General Plan for Transports and Logistics and the guidelines laid down in the general Mobility Plan, pursuant to ARTIST Italian telematics architecture;
- information on the vehicles carrying dangerous goods which interact with the regional port system;
- an offer of high added value services for institutional operators, (i.e., police, planners, civil protection agency), business operators (freighters and logistic operators), and infrastructure managers (logistic nodes such as ports and logistic centres, railways, motorways, road infrastructures, airports);
- a contribution to the development of guidelines for a national technological platform.

3.4 Integrated Charging System for regional LPT in Sardinia

The promotion of sustainable mobility to meet the growing demands for local transports, both on a urban, provincial or regional scale, is indisputably favored by the LPT strengthening and definition of policies to discourage the use of private cars. To support this passage, considered as strategic for people mobility at a national and European level, Measure III.4 - PON Trasporti 2000 - 2006 financed a project of the Regione Sardegna called SINTAS - Sistemi di INtegrazione TAriffaria nel trasporto pubblico locale in Sardegna (Integrated charging systems for regional Local Public Transports in Sardinia).

SINTAS is included in and shares the same strategic goals and objectives of a wider project co-financed through non-PON resources by the Regione Sardegna, with a view to developing a System for Electronic Ticketing, the Acquisition of passenger flows-related data, and Fleet Monitoring for Public Transports Services (SIBEM RAS).

The main, long-run goal of the project is allowing people to travel on the whole rail-road regional network with a single ticket valid for all the public transports means, thereby easing citizens' mobility within the region and making them pay only the exact "quantity" of transport used.

Generically speaking, the project aims at:
- promoting a common public transport system supporting local mobility to be integrated on a modal and territorial level as much as possible, in order to allow fair accessibility to the territory and overcome situations of social exclusion for a higher environmental sustainability and safety and lower energy consumption;
- developing a dynamic local public transport system meeting the customers' needs, whose aspects and steps can be fully planned and shared, from the first steps of study

and conception to the implementation and governance, extended to all competent local bodies and LPTs;

- setting out a single, coordinated charging system promoting a growing use of LPT among users, fostering and valuing the operators' contribution by guaranteeing their fair and balanced participation to the benefits provided;
- gradually introducing articulated and flexible charging mechanisms promoting a more equal balance between offer and demand through prices and solutions apt to satisfy demand models diversified according to the territorial areas and time, as well as customized price ranges according to the actual use of the service;
- introducing payment and ticketing models able to ensure the users fair and free access to the different modes and kinds of services offered across the territory, and to provide efficient tools in the battle against ticket counterfeiting and frauds, for a growing social-economical equality;
- computerizing ticket issuing and access control systems in order to develop an integrated charging system for the transparent and objective management of income distribution;
- systematically acquiring meaningful and reliable data on demand flows so as to ensure greater comfort to users;
- setting forth organisational, managerial, and technological requirements needed to foster the integration of mobility, transports, and fares at a supraregional level up to the regional dimension, for all transport modes.

In this view, the project identifies a series of objectives to be realized, all connected to the creation of a single technological platform for the whole regional territory apt to grant LPT users the access to an integrated transport network.

Figure 8 - Physical architecture of the on-board subsystem
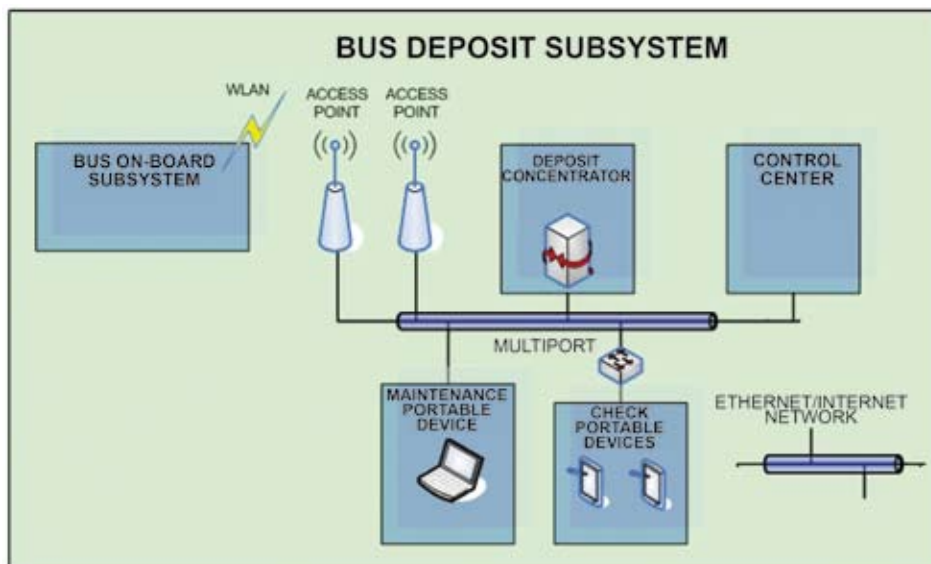
The system complies with ARTIST guidelines. In particular, the preliminary project identifies the users' requirements and the first-level functions defined by the Italian telematics architecture.

As for its physical features, it is an ambient intelligence system composed of three levels with peripheral modules providing full services. Its specific features are:

- Core Level (Service centre), to which the income distribution and definition of integrated charging strategies refer;
- Peripheral Level (Corporate control centre), replicated in different companies, where corporate data are gathered;
- Field Level, where on-board systems are identified (electronic ticket-dating machines, localisation systems, on-board communication systems), together with sales and optimization apparatuses and check out apparatuses.

SINTAS relies on the integration of two e-ticketing-based technologies - magnetic and microprocessor technologies. Notably, the system provides for the integration of three different kinds of tickets:

- magnetic tickets;
- rechargeable "chip on paper" contactless ticket;
- contact-less smart card.

This choice stems from the need to cut the costs for periodically used tickets, considering the extremely diverse demand in the areas within the province of Sassari.

As regards first and second-level concentrators, SINTAS presents a web-oriented architecture, while the communication subsystems for deposit concentrators are based on a Wi-Fi infrastructure.

As for on-board systems, GPS is the reference technology for localisation, whereas communications are established via TCP/IP protocol on long range (GPRS/EDGE/UMTS) and short range (Wi-Fi) networks.

Figure 9 - Physical architecture of the on-board subsystem
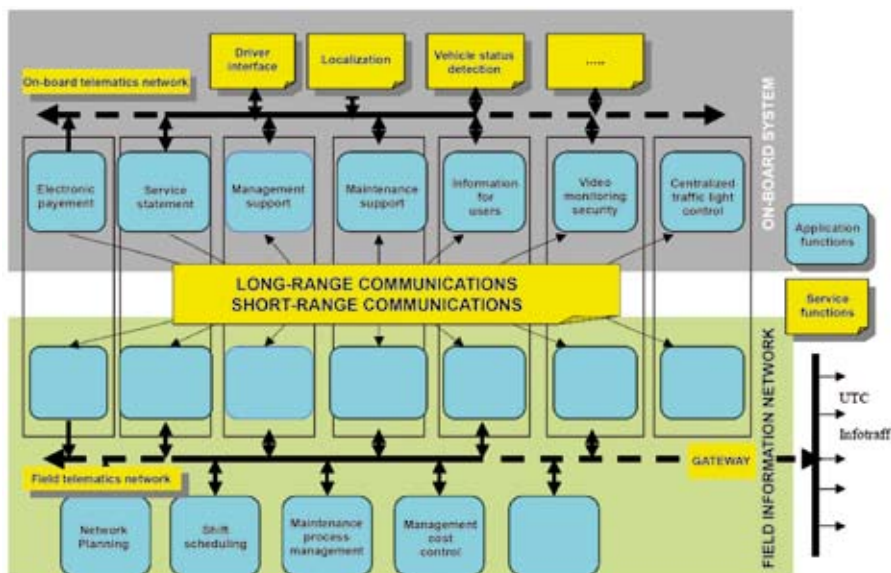
With reference to the software architecture, the project applies a web-based architecture for accessing information about the service, that ensures an high level of integrability at the whole platform.

The following are the main expected results for SIBEM RAS projects, and notably for SINTAS:
- contribute to the evolutionary process of public transport service by creating a data acquisition system and defining the transport offer;
- launch an ongoing monitoring and planning process for the regional transport system;
- provide the citizens-users with a wider range of services aimed at increasing the service quality perceived;
- monitor the service in real time;
- implement regulatory policies to foster a higher service regularity;
- strongly support the decisions on fare policies;
- determine a common charging structure to be shared by all the companies involved in the project;
- introduce the use of a single ticket in the target area so as to satisfy the mobility demand

with a simple access to the public transport network, without distinction of the number of carriers and modes of transport;
- incentivize users to resort to the public means even through a higher use of intermodalities, to attain a proportional releave of traffic congestion from O/D itineraries, with a consequent reduction of journey time.

Last but not least, the redistribution of the expected demand will not only result in an expected reduction of traffic-originated air pollution, even though not immediately quantifiable, but it will also have a positive impact on employment.

3.5 "Nettuno" project (Regione Sicilia)

Financed through Measure III.4 - PON Trasporti 2000 - 2006, the project named Nettuno - Sistema integrato di teleprenotazione dell'imbarco per le Autostrade del Mare (Integrated system for embarking telereservation on the marine highways) by the Regione Sicilia is a telematics system supporting the intra-modality within the logistic sector.
The project is intended to spread knowledge, use and development of intelligent transport-oriented systems aimed at the reduction of block times and idle stops on the quays for vehicles resorting to short sea shipping. A further goal is to monitor and manage the vehicles travelling through and parked at the Sicilian ports in a homogeneous and rational way, with a view to speeding up goods passage at the points of embarkation for the various destinations or, alternatively, to guaranteeing "safe" parking in the special zones (port terminals) while waiting to be embarked.
The project provides for the development of a demo version to be installed at the port of Palermo. The demo is composed of a Call Center and a telematics network supporting the remote reservations for each sea carriers.
In order to calculate the journey time to the port, Nettuno includes a system, integrable in mobility monitoring, control, and management systems, aimed at monitoring the carriers approaching the port of Palermo: this will provide information on scheduled or unscheduled events occurring on the road network (motorways, urban, and suburban roads) in the proximity of the points of embarkation.
With reference to the activities provided by Nettuno, the objectives to be realized are directly linked to the following functions:
- supplying road haulers with information on traffic disturbance, works in progress, and unscheduled events;
- streamlining routes to the points of embarkation;
- offering the possibility to book trips via Internet and cell phone;
- offering the possibility to book parking zones at port terminals;
- reducing embarking times through the introduction of electronic tickets and toll collection systems for marine highways;
- tracking all the vehicles and monitoring their access to the quay.

The project will comply with ARTIST guidelines.

Nettuno is mainly expected to gather information on the criticalities of the access system to port services, notably on operations like embarkation for the marine highways. The results obtained through the experience shall support the decision makers in the definition of the best actions to be taken on a regional scale in the light of a future integration of the Sicilian port network.

3.6 "Trinacria Sicura" project (Regione Sicilia)

Trinacria Sicura is a project financed through Measure III.4 - PON Trasporti for the development of a Multi-access Integrated Telematics Platform for the monitoring and control of dangerous goods and special wastes travelling within the Sicilian territory.

The project aims to ensure proper control over the dangerous goods and special wastes travelling within the region, in order to secure a significantly decisive reduction of major and fraudulent accident risk connected to the concealment of dangerous substances within the Sicilian territory.

The project provides for the development of a non-stop monitoring system for vehicles carrying or shipping dangerous goods based on route monitoring on geo-referenced maps.

Its architecture complies with ARTIST guidelines. It is composed of two levels: core level and field level. The core level refers to the functions of the "Operative centre" for emergency management, while the field level concerns on-board systems for vehicle localisation and information transmission. In particular, the peripheral unit shall present a modular, expansible architecture apt to recognize alert conditions in travelling vehicles on account of a communication launched by the driver/operator to the operative centre. It offers the possibility to exchange vehicle-related data, to receive remote controls, to allow audio monitoring, or hand free telephone communication with drivers while travelling.

The operative centre shall accomplish such tasks as geographical localisation of the vehicles and screen display of their exact positions on a geo-referenced map with geographical coordinates. Furthermore, it shall record the data transmitted by the peripheral units, monitor and remote-program their functions through data transmission for the remote control, and finally allow generic message exchange with the peripheral unit to be displayed by the latter on a special alphanumeric screen.

In accordance to the predetermined goals, the expected results concern a more accurate control of the territory alongside with more efficient capacity of intervention by the civil protection and other authorities in case of accidents or emergencies.

The results shall provide for useful elements to assess how effective the extension of such an experience on a wider scale could actually be.

3.7 "Città Metropolitane" project (Regione Sicilia)

The project called "Città metropolitane" (Regione Sicilia) - Integrated Telematics Platform for tracking and tracing the distribution of goods in urban areas is aimed at developing a telematics infrastructure in support of urban logistics. The project pursues a homogeneous, streamlined distribution of goods within urban areas through accurate controls en route and at stops for goods unloading at small and medium-scale distributors. This will reduce operative time for single activities, while providing an appropriate safety frame to loading, unloading, and transport operations within metropolitan areas. The project is part of intervention priorities both on a European and national scale, as underlined by the Guidelines of the recent General Mobility Plan of the Ministry of Transports, with reference to the so-called "last mile" logistics.

The project consists of several phases, of which the implementation and experience of the support system to Palermo city logistics is financed through Measure III.4. The services offered to logistic operators are:

- monitoring, control, and management of goods mobility within urban areas, with information about traffic conditions and scheduled/unscheduled events likely to slow mobility;
- streamlining of routes and times according to mobility conditions;
- tracing of vehicles for goods transports along the whole distribution chain;
- guarantee of high safety level for the people involved and goods carried.

As for its architecture, the project will comply with ARTIST guidelines, which will allow an open, modular, scalable system able to expand the number of vehicles monitored quickly and cost-effectively, while integrating new functions and technologies.

As for its physical composition, the system consists of two levels - core level and field level. The core level concerns architectural functions related to:

- delivery planning and preparation;
- vehicle/route assignment;
- management and processing of information flows about fleet and business.

The field level relates to on-board functions for data collection and management concerning working and operating conditions of the vehicles, on-board generated data and messages to the control centre, and message and data reception from the control centre.

A better efficiency for goods loading/unloading together with a stricter control of the territory by the authorities and bodies in charge is due at the end of the experience. Further expected results refer to the availability of data about goods-related operations and journeys by the operators participating in the experience. Those data will allow local authorities to implement firmer control actions over their territory, thereby improving safety for the operators, while launching planning action of structural interventions based on the knowledge of the acquired data.

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Abbreviations

- ACTIF: Architecture Cadre pour le Transports Intelligents en France;

- ARTIST: Italian Telematics Architecture for Transport System;

- CCS: Cargo Community System;

- EC: European Commission;

- ERDF: European Regional Development Fund;

- FRAME-NET: Framework Architecture Made for Europe;

- IC: Information and Comunication;

- ICT: Information and Comunication Technology;

- ITS: Intelligent Transport Systems;

- ITU: Intermodal Transport Unit;

- LPT: Logistics and Public Transports;

- PGTL: General Plan of Transports and Logistics;

- PON Trasporti 2000 - 2006: National Operative Programme, Transport sector, for 2000 - 2006;

- S.I.T.I.P: Integrated Telematics and Information System for Bari, Brindisi and Taranto ports;

- SETA: SElection Tool of ARTIST;

- SIBEM RAS: Integrated electronic ticketing, passengers flow data acquisition and fleet monitoring system for public transports;

- SINTAS: Integrated Charging System for Mobility in Local Public Transport in Sardinia;

- SITI: Integrated System for Road Safety;

- SITUS-TP: Telematics Infomobility System of University of Salerno for Public Transport;

- STRIM-TP: Integrated Regional Telematics System for the monitoring of Public Transports;

- ULISSE: Unified Logistic Infrastructure for Safety and SEcurity in Campania.

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