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How URBeLOG project will enable a new governance model for city logistics in Italian metropolitan areas

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Abstract

In order to optimise the freight transport in urban areas, the different stakeholders needs a new set of tools that enables better condition of work and supports the sharing of information between public and private stakeholders. This report present an innovative and integrated platform developed under the URBeLOG project which includes a set service and develop a communication “channel” to share data and information between the users. URBeLOG is a SMART-CITY project co-funded by the Italian Ministry of Education, Universities and Research (MIUR) under the Program “SMART CITIES and Communities and Social Innovation”.

The URBeLOG project aims to develop and test an innovative open, dynamic and cooperative telematics platform providing services and applications for the last mile logistics in urban areas, It enables to aggregate the stakeholders transport ecosystem and to manage the distribution processes – from production to delivery – in real-time.

The project objective is to achieve a virtuous system of freight transportation to rationalize and make the last mile delivery process cost-effective, efficient and sustainable and to promote the creation of an ecosystem for the development of advanced B2B real-time services to be used by stakeholders of the urban area. As a result, the URBeLOG platform supports the provision of added value services, simplifies the transactions for the logistics resources usage, provides secure dynamic fee payments, facilitates the use of advanced forms of brokering and enables complementary services for certification and accreditation to urban freight transport.

In a nutshell, the URBeLOG project integrates the main functions that allow developing and operating the processes, services and applications for City Logistics of the future, in particular it aims at:

- Redefining the business model for the consolidation of loads and the sharing of assets;
- Creating an innovative middleware for the integration of data from heterogeneous sources and the provision of ICT services for the implementation of the of planning, management and optimization process in order to provide a real-time dynamic routing service for delivery;
- Enabling services and applications allowing the testing of public policies and management mechanisms dedicated to the environmental sustainability assessment and accreditation of the urban logistics distribution system actors.
- Adopting vehicles with low environmental impact (electric and hybrid) to make the process environmentally sustainable and to determine the operating conditions able to encourage the use of innovative vehicles.

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The project includes research, development and testing on an urban scale of a complex distributed platform for the collection, processing and fusion of open data intended to manage real-time dynamic routing of the fleets. To achieve these objectives the project includes a set of technological solutions and belonging to a complex ICT architecture which will enable the delivery of a wide range of integrated services and vertical applications for different users, available in multi-channel mode. Specific focus will be given to the adoption of innovative technology solutions, based on international standards and, therefore, replicable in different geographical areas of the country.

Keywords: urban freight logistics; smart cities; ITS; mobility management; new governance model; inclusion; recognition scheme

1. Introduction

URBeLOG project aims at developing a virtual platform oversees the delivery of high added value services, interfaces transactions for the use of logistic resources and safe, facilitates use of the most advanced forms of trading and enables use with certification and recognition scheme for urban goods transport. The project did start in June 2015 and is expected to be completed within 2017. URBeLOG integrates main functions allowing the development of processes, services and applications for City Logistics of the future. Pilot sites are Milan and Turin along with a number of different follower sites in Italy (i.e. Bologna, Rome, and Naples, among others). With their characteristics, the two pilot cities represent different application and process case studies that will allow significant testing of project results and possible application to many other metropolitan areas. The final objective of URBeLOG project is to develop and test a distributed, innovative ICT environment along with innovative governance model which consists of an open, dynamic and participated automated platform of services and applications for last mile urban logistics. It will stimulate the setup of stakeholders' ecosystem and manage distribution processes, from production to delivery, in real time. The key relevance of URBeLOG project is particularly focused on Directive 2010/40/EU being enacted in Italy by Decree Law no. 179 of 18 October 2012, amended by law no. 221 of 17 December 2012, "Further Urgent Measures for the Growth of the Country", under article 8 – "Measures for the innovation of transport systems". The Italian government, authorized by Parliament, adopted Ministerial Decree of 1 February 2013, on the "Dissemination of Intelligent Transport Systems (ITS) in Italy", which contains the methodology and operating fundamentals of the National Action Plan, of which priority is highly applicable to URBeLOG project. From the sustainability side the project is also compliant with either the 2011 White Paper Roadmap to a single European transport area, (European Commission (2011)), in achieving essentially CO2 free city logistic in major urban centres by 2030, and the 2013 Communication from Commission to European Parliament, the Council, the European economic and social Committee and the Committee of Regions in management of urban logistic at the national and primary local level, development of co-operation and agreement and relevant ITS development.

In this framework URBeLOG project integrates different functions to enable an efficient, cost-effective and eco-sustainable last mile logistics process. It is important to underline that the system that will be developed will operate in synergy with many of the existent ICT platforms integrating the different solution. Starting from available systems in use, the project will identify elements necessary to establish a suite of logistic processes that are more efficient, cost-effective and eco-sustainable and to design and test ICT solutions in the field to effectively meet the needs of the local public administration and of industry operators. The project aims to develop and test a virtuous goods' transport system that will streamline, make efficient and eco-sustainable and cut the costs of last mile services, allowing for the development of B2B type, advanced, real-time e-services, for stakeholders to use in an urban fabric.

2. State of the art of city logistics in Italy

2.1. Urban freight transport

Urbanization in OECD nations has increased considerably: from 50% of the total population in 1950 to 77% in 2008, up to recent estimates of 85% in 2020. As a result, 70% of the EU's population now lives in cities, which

produce 85% of overall GDP. Therefore, if goods' transport is a driver of economic and social development on different geographical scales, it is even more important in urban areas. In fact it is also the element that allows businesses to procure goods and distribute their products to end customers in metropolitan areas. In this regard, goods' transport is strategic for the economic growth of cities and urban areas, and for relations between production sectors, and between regions and states. In evidence of the above, the urban transport of goods by private individuals and third parties ranks first in road transport, in terms of tons transported (ISTAT, 2012). However, goods' traffic flows in cities disturb residents and businesses for different reasons and in different ways. Transport is increasingly significant as a source of CO₂ emissions, with effects on atmospheric pollution at local and regional level and on the global climate, as it is the main source of emissions of PM10 and PM2.5 – particulate matter – which is one of the main pollutants that are extremely harmful to health.

On an urban level, local air pollution and the contribution to greenhouse gas are significant environmental external effects associated with logistics. Energy consumption and emissions of goods' vehicles are affected by a wide range of factors – vehicle type and model, load capacity, traffic, roads, driver conduct and the number of times the vehicle stops and restarts – which is usually frequent in an urban context. Data from the European BESTUFS II project show that over a distance of 10 km, five stops increase fuel consumption by 140% (Shoemaker et al.,(2006)). Moreover, commercial vehicles are mainly diesel, with a particular impact in terms of emissions, and – as shown by analyses in different cities, including Italy – they are also old. For example, according to a study by ACI, the Italian Automobile Association (ACI, (2011)), commercial vehicles transiting in Italy are unevenly distributed among Euro 0 to Euro 6 categories. So the impact of the goods' sector in terms of emissions in urban contexts is significant, despite commercial traffic only making up a fraction of total urban traffic. On average, in European cities, commercial traffic comprises 8% to 15% of urban traffic in terms of vehicle flows, but accounts for 20-30% of total traffic emissions (MDS Transmodal, (2012)). Over the last twenty years, European directives have “steered” construction specifications for engines and materials used in the production of vehicles, reducing emissions of marketed vehicles by over 90%. However, changing technologies have only partially helped reduce the impact of goods' transport on emissions, as traffic volumes have progressively increased. This situation, particularly in Italy, connects pollution to traffic congestion, with significant economic effects. Traffic congestion is often related to peak passenger traffic times coinciding with peak goods' traffic times (8.00–11.00 am and 3.00–6.00 pm). Congestion may also be made increased by illegal parking in reserved loading/unloading bays. Besides external factors due to pollution and road congestion, other relevant external factors associated with urban traffic exist for logistics, such as noise and potential conflict with other forms of transport, in particular “weaker” forms (passenger and cyclist mobility), in terms of accidents. All these aspects require specific policies at local level, aimed mainly at regulating the use of urban spaces. The need to develop new forms of access to town and city centres, with a particular focus on metropolitan areas and historic tourist cities, in order to optimize goods' transport in coordination with passenger transport, while also promoting the use of vehicles with high standards of eco-sustainability. This scenario means that in recent years there has been a growing awareness of the need to combine technological improvement with tools and methodologies that allow for integrated planning and an optimized use of existing transport resources, in order to reduce the undesired effects that lead to a deterioration in the quality of life without diminishing economic, social and cultural development. This has led to the notion of city logistics, which can be defined as a process for the global optimization of transport and logistics activities of public and private companies in urban areas, while also considering environmental, social and economic impacts. This holistic, multi-disciplinary approach to logistics comprises distribution and transport costs and costs relating to the impact of these activities on citizens and environment. As indicated in most of the literature on city logistics, considerable gains on all fronts can be achieved by optimizing distribution, leading to a better use of ITS in urban areas and a better use of vehicles (Perboli et al. 2010). In addition, load consolidation requires coordination between the different operations made to achieving the city logistics objectives. Lastly, the use of green vehicles and integration with public transport can improve system performance and further reduce vehicle transit and relative emissions (Benjelloun (2010), Grainic (2009)).

2.2. Governance and current regulations

The state of the art, in terms of governance models, is rather diversified. The tools and studies on the urban distribution of goods developed by the European Commission in recent years have created an awareness among local administrations of the specific issue of commercial vehicles accessing residential areas. However, initiatives taken by Italian local administrations have often been specific and targeted to urban areas not even focused on a provincial or regional level. This has led to inefficiencies, above all for operators who have had to tackle different regulations, costs and operating issues. For this reason, on September 27th 2012, the Ministry for Infrastructure and Transport signed an “Agreement on the urban distribution of goods” with the City Councilor’s responsible for mobility in Turin, Milan and Naples – as representatives of the network of Metropolitan Areas. The following guidelines were agreed by pilot municipalities in order to implement the project:

- prompt and structured involvement of categories concerned and the use of conventional and innovative tools;
- the use of measurable objectives in the field of goods' distribution services in terms of efficiency and energy saving, greenhouse gas reduction and traffic congestion reduction in urban areas;
- the non-mandatory and incentivized involvement of transport companies, accreditation criteria for vehicles and platforms, non-exclusive nature of accredited services based on the principle of free competition;
- economic and financial self-sustainability;
- technological fertilization, use of open, interoperable solutions, economic accessibility and use of applications.

This memorandum of understanding was the first step towards a shared URBeLOG platform to analyze and develop the most significant experience gained in the urban distribution of goods. This stage, hopefully with the involvement of all cities affected by the transition to Metropolitan Cities, is currently undergoing with specific actions to obtain information and experiences in the field in order to apply solutions and develop effective regulations for the urban distribution of goods. Moreover, the Ministry of Infrastructure and Transport has identified the three Cities that were the first to sign the memorandum of understanding as case histories to be considered by all representatives of Metropolitan Areas in order to jointly analyse the implications of a diverse and more innovative management of goods at an urban level. The aim is to promote not only an early process of harmonization among those involved, but also a more consistent and long-lasting system to share experience and know-how that local authorities will gain through the actions envisaged in the Agreement.

2.3. Development of Supporting Technologies

URBeLOG project is based on the C-ITS (Cooperative ITS) architecture, which has evolved from the CALM (Communications access for land mobiles) concept (<http://calm.its-standards.info/>), a communication architecture for Intelligent Transport Systems, ITS, which is currently the subject of standardization by the ISO committee ISO TC204. As part of the standardization mandate M/453 of the European Commission, ETSI TC ITS (<http://portal.etsi.org>) and CEN TC278 have harmonized different standards and the current C-ITS reference architecture is integrated in the European standard ETSI EN 302 665 (<http://www.etsi.org>), with a view to achieving uniformity at international level and defining the Intelligent Transport System – Station, ITS-S concept as in Fig.1.

According to this concept, ITS-S abstracts the ITS application from the communication protocols used; in fact a typical station will include multiple communication channels which are exchanged transparently according to the application's requirements, in terms of performance, security or safety. As regards smart roadside infrastructure, C-ITS architecture does not currently envisage any reference to WSN type networks, which are assimilated with proprietary type networks for which a traditional type adaptation gateway is necessary.

This solution has evident limits as concerns architecture scalability, and this is expected to be overcome by extending specifications to include and define the use of IETF 6LoWPAN (<https://tools.ietf.org/html/rfc6282>) and IETF CoAP (<https://tools.ietf.org/html/draft-ietf-core-coap-14>) protocols in an ITS environment. Thanks to this extension, the ITS-S concept will be stretched to WSN networks based on the physical level protocol and MAC IEEE802.15.4, allowing pervasive installations in which the sensor node to become a potential active part of distributed applications are possible.

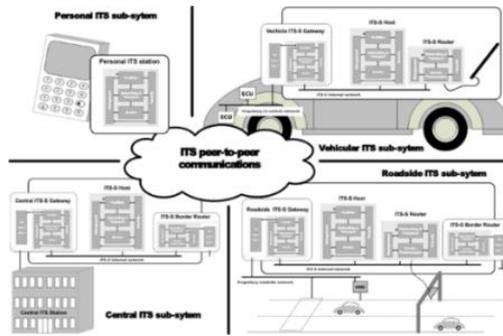


Fig. 1. The URBeLOG interconnected eco-logistics system.

As regards vehicle communication, C-ITS standards call for the use of the physical level protocol and MAC IEEE802.11p which enables “vehicle-infrastructure” (V2I) and “vehicle-vehicle” (V2V) proximity communication, that are often referred to, together, as V2X. V2X communication meets both safety-critical functional requirements and requirements more generally related to “comfort” and “infomobility”. The integration of “smart vehicles” and “smart road infrastructures” planned for URBeLOG project will pave the way for tests of last mile logistics applications based on a modern and technologically advanced approach, inspired by the activities and results of international standardization.

3. The innovation in URBeLOG

Within objectives of URBeLOG project there is not necessarily replace all ICT platforms used by relevant parties to manage the logistics process and/or mobility at a city level. On the other hand, as shown in the Figure 2, starting from available resources that are in use, the project identified elements necessary to establish a suite of logistic processes that are more efficient, cost-effective and eco-sustainable and to design and test ICT solutions in the field that can integrate and interface with available used resources, to effectively meet the needs of the local public administration and of industry operators.

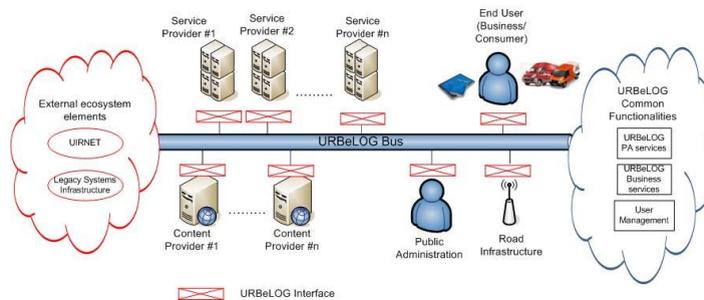


Fig. 2. The URBeLOG logical architecture.

The project is also evaluating the achievability of a number of targets, selected at the early stage of the project. These targets comprises aspects from the environmental side (such as emissions and noise savings), the economic side (cost savings) and the social side (reduction of traffic congestion from commercial vehicles and use of dynamic routing in order to reduce the travelled kilometres). The accurate definition of targets and the development of a complete set of KPIs is essential by industrial partners, in order to engineer and put into operation a solution, on project completion, that meets the actual needs of parties involved and is sufficiently modular and scalable to be expanded and gradually offered to all Metropolitan areas in Italy.

The selected pilot sites (Milan and Turin) significantly represent different application and process case studies that will allow for significant testing that in turn will make the subsequent promotion of project results and possible

extensive application to other national scenarios more credible. The listed pilot sites have a main focus on a specific, exemplifying application, in particular Turin will test the use of drop boxes and access management; Milan will test the use of an ITS system in order to manage loading bays and the traffic restriction area. URBeLOG benefits the potential of ITS investments and the existing physical infrastructure, testing a new technological infrastructure with limited interventions to develop a new physical infrastructure. Involvement in the platform is not mandatory, but extremely attractive because it stimulates the virtuous aggregation of operators for load consolidation and the sharing of vehicles, with cost reductions and the use of a rewarding business model.

URBeLOG is an open model that enables operators to easily access to the recognition scheme and to the local transport planner to manage the effects of single or combined measures within city framework. The model does not concern the delivery tariff system, which is exclusively determined by market drivers and free competition. Within project lifetime the following services will be tested:

- Dynamic, real time management and optimization of fleet routing, with the integration of data from real time heterogeneous sources;
- Management of loading/unloading bays, using predictive applications;
- Dynamic management of restricted traffic lanes in critical conditions;
- Introduction and management of drop boxes as a shared multi-player consolidation points;
- Fleets of hybrid and electrical vehicles, enabled based on their optimal use;
- Measurement and certification of excellence in logistics transport;
- DSS application and services and dynamic policy making enabled by the measurement and certification system.

In Turin there is also the involvement of a proper freight village in the close surroundings of the city (S.I.TO located in Orbassano, 18 km from the Turin's centre) that acts as both a hub and transit point, giving more flexibility for both one-tier and two-tier models. In this framework the main project application to be tested in terms of efficiency is the drop box, the second application is the test of real time dynamic routing enabled by the platform which integrates data from heterogeneous sources. It will be used in areas with traffic restrictions, without excluding extension to other areas without restriction and penalty systems.

In Milan, the project is enabling the activation of a loading and unloading bay management system, with features integrated with the traffic control unit that can monitor and plan the use of areas in real time, also allowing for the automatic control of unauthorized use of bays. Independent management by operators and automatic enforcement (with fines) will be applied for loading/unloading bays in a city area where the demand for commercial vehicles parking is higher than the available lots and where there is no possibilities to increase the level of infrastructures.

URBeLOG development stage is currently addressing a number of technical/scientific issues that are highly innovative in terms of the eco-sustainable management of the logistics process and ICT solutions. In particular, specific attention is placed to the prototype development and validation of "ITS Cooperative" (C-ITS) communication solutions, which are currently the subject of standardization at European level and are part of the objectives and priorities of the European Commission's ITS Action Plan.

4. The URBeLOG Portal

Architectural design is the process aimed to identify the patterns, models and frameworks to be used in the development phase, the sub-systems that made up the system to be developed and their inter-relations in terms of exchangeable data and communication modes. The main activities that are undergoing in the URBeLOG architectural design phase are the following:

- Comprehension and formalization of the requirements and processes defined in the preliminary phase with system end users (functional requirements) as well as those concerning performance, security, durability and other goals and restrictions the system must satisfy;
- Definition of the architectural models and main system technologies (base technologies, frameworks, integration modes, etc.);

- Identification of the components and relevant interfaces designing, the component diagrams to show the main system parts and interfaces they interact through.

Interactions between components: the platform will be designed using open source solutions, models and enabling technologies and Service-Oriented architectures (SOA), 3-tier and MVC (Model, View, Controller) that will guarantee flexibility, modularity, scalability, security and interoperability with local legacy systems and large national logistics platforms. Figure 3 presents an architectural outline of the platform layers according to the currently defined paradigms and user front-ends via the Portal Presentation layer on the one hand and to external systems via the middleware module on the other.

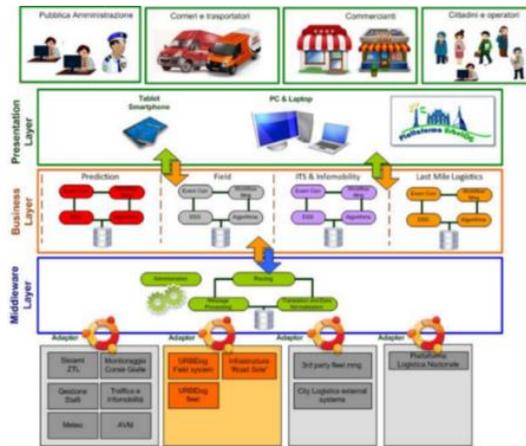


Fig. 3. The URBeLOG platform layers.

The Middleware level implements the interconnection functions with heterogeneous legacy systems, guaranteeing data exchange, intelligent routing, service orchestration and the recognition and management of platform process activation events. It is designed and developed with view to service orientation to allow for integration via Adapter/Wrapper SOAP, B2B, B2C and B2G integration (service catalogue), communication via multi-modal FTP, SMTP, http, etc. Implemented protocols will specifically support the technologies and systems interfaced with the “vehicle structure” in the test phase, for vehicle T&T and on-board – platform data exchange and with the “Smart” road infrastructure and technological support systems such as entrance portals, devices used to manage loading and unloading areas and other field systems. Additional interfaces will be installed to allow for added value legacy system data integration for the platform, as could be, for example, the carriers’ ITS platforms, urban mobility centers and UIRNet platforms (UIRNet SpA is a Public Company established in 2005 in accordance with Ministerial Decree, issued by the Ministry of Infrastructure and Transport. UIRNet SpA signed an agreement with the Ministry of Transport for the design, realization and management of a system which allows for the interconnection of modal interchanges (freight-village)).

The Business Layer is an intermediate layer made up by different modules including: Information Intelligence the module which, using an inferential engine, applies the data correlation rules allowing for new smart events to be generated. Decision Support System that offers data access, analysis and implementation tools for intelligent applications support system end users. Workflow that allows for the construction, configuration and regulation of processes supporting decisions, operations and system activities, identifying the actions to be taken automatically when an event occurs.

The Presentation Layer is the application layer that displays information and platform service access according to the different methods (PC, Smartphone, tablet, the latter also used as “On Board Units”). These services will be accessible to the user community mainly represented by the Public Administration, Carriers and Shipping companies, Businessmen, Citizens and Players.

The URBeLOG portal is the front-end of the players' platform and includes a public section accessible to all users dedicated to helpful services and information such as: news, events, weather & mobility, map of businesses and the Green Area, reference regulations and services offered, service policies for businessmen and consumers, storefront and e-commerce services, service registration methods and permission requests, social networks for businessmen, professionals, carriers and citizens with the goal to receive feedback on the effectiveness of the solutions implemented and ideas and improvement suggestions. The private section dedicated to associates where users are managed, supplied services set and services and applications distributed under Last Mile Logistics, ITS & infomobility and Predictive Applications.

The Last Mile Logistics function includes services and applications tied to goods pick-up and delivery management and Green Area operations. These solutions make up some vertical elements whose goal is to improve the conditions in which carriers work and limit the negative effects that could be caused by deliveries in urban areas.

Three areas of intervention are already identified as follows:

- Green Area services: these include tools that allow the management of subsystem in order to meet the environmental targets.
- CDU services: these include site access management functions and tools in order to simplify the communication and the relationship between the logistics operators and the CDU even from the economic side.
- Hub services: these include tools that goods services booking functions (loading/unloading, stuffing & stripping, customs, labelling, etc.) area access management, operating conditions and delivery/pick up and distribution goods documental management, delivery planning and travel management.

The ITS & Infomobility applications is the service area focused on intelligent area exploitation. It includes geo-localization functions on vehicle maps and events (optimized load planning, vehicle management, vehicle and goods T&T, delivery and return management, route, vehicle and load geo-prioritization), for the virtual community on the mobile network and city logistics policy management for the Public Administration.

The Field System function manages field systems meaning eco-compatible vehicles used for distribution and smart road infrastructures. It allows for vehicle preparation to support innovative functions and sensor fittings and on-board ICT for field tests. It develops the road-side infrastructure to create wireless distributed systems and for V2I communications compatible with EU standards.

The Predictive applications function supports and optimizing routing and pricing based on exogenous system conditions dynamics. It guarantees the interface with the Open Data platform and suitably integrates the information obtained by this platform in order to guide routing optimization. In also provides predictive decision-making tools anticipating future conditions to enable carriers' choices and allow for the definition of parameters for dynamic pricing policies.

The middleware module implements external legacy system interconnection functions via Service Oriented architecture, multi-protocol communications and adapters with existent field systems.

The features include the design of innovative middleware to integrate data from heterogeneous sources to create a homogeneous and standardized information database to be used as a starting point to manage and link events, implement rules for modules supporting decisions or manage process workflows regarding last mile logistics as shown in Figure 4. The Middleware module is based on a service oriented architecture (SOA) adopted to develop the entire platform. Furthermore, the special features due to enterprise service architecture that concern Middleware are:

- Decoupling: the communication between internal components and external customers is fully independent and transparent
- Protocol conversion: they can be associated with external clients using various communication protocols
- Message standardization: received messages are transformed in a pre-set format based on a platform standard
- Message processing: any message information content enhancement integrating missing information
- Security: user authentication management and message encryption
- Monitoring: possibility of message flow run-time control

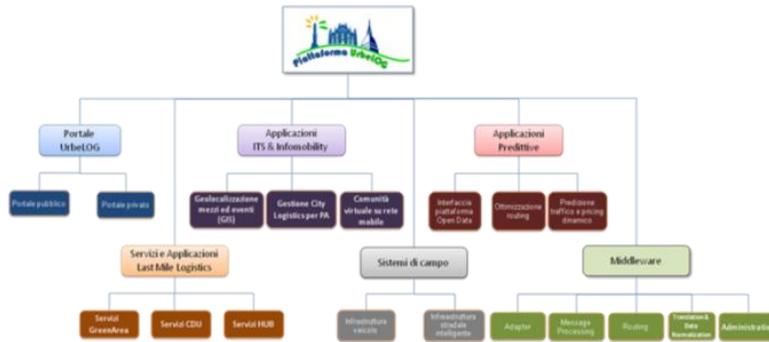


Fig. 4. The URBeLOG applications.

The logical blocks that made up the Middleware block chart are:

- Adapter: these are read/write interfaces with the exterior. there is a scanner for each supported protocol that can be activated on event or at set intervals and a specification of interface modes for each interfaced system
- Message Processing: this processes messages from Adapters and URBeLOG modules; it applies any logic tied to messages and converts formats if necessary.
- Routing: this implements routing logic for messages to and from URBeLOG modules based on message content (content-based routing).
- Translation & Data Normalization module: normalizes incoming messages reducing them to a platform standard format. Outgoing messages are returned to the format expected by the client.
- Administrative tool: module that allows for the configuration and management of client profiles that use Middleware services.

The application context is defined by the following broad classes of possible legacy systems:

- systems available to the Public administration (Town)
 - traffic and mobility data collection and processing systems as well as control tools;
 - Access control systems (for LTZ, reserved lanes etc.) and AVM systems Control
 - loading/unloading bay management systems;
 - national platforms able to provide forecasted and current heavy vehicle traffic data in transit in the urban area and infomobility data on main arteries in the urban context and along the main routes to port areas (UIRNET);
- external systems that support HUB, CDU, GREEN AREA activities involved in city logistics.

5. The URBeLOG Project enables new governance models

The accessibility (in the city) and mobility (within the city) are two aspects of the same need: access into a network and become part of the flows of people, businesses and ideas that distinguish social action. At this moment, no special measures to regulate the mobility of goods in urban areas are in force in Italian Metropolitan Areas, except those related to the shape and the engine of commercial vehicles. The evolution of mobility of people, vehicles and goods within an urban setting, the information services to users and the dynamic management of traffic are the issues that Italian public administrators and other stakeholders have to face in order to respond to the demand for freedom to move and to take advantage of the opportunities offered by urban centers. Yet, they also require to ensure efficient services to citizens and, at the same time, decrease the environmental impact of transportation. Mobility is a complex system made up of infrastructures, networks, and means of public and private transport, demands expressed by users, to which management policies are applied, often disorganized and strongly inhomogeneous in the components, exerting a significant impact on urban areas and on the quality of life. In

addition, there is the distribution of goods that tries to reconcile liveability and economic vitality of the city with the requirements of its commercial transportation, in order to reduce the impact of freight transport.

The approach that will be followed by the URBeLOG pilot is to develop a shared path and a coordination path among key actors and to integrate public and private systems of ITS in order to extend a sustainable model of governance of the system. URBeLOG project is strongly linked with the already operative SUMP (Municipality Mobility Plan) in which the objective to improve the efficiency of the delivery system is mentioned and provides the tool to reach this goal. In the above described framework URBeLOG project will provide technologies and solutions improving the transport of goods, in particular by ensuring balanced and sustainable trade flows inside within cities. URBeLOG project is thus contributing to the overall smart mobility solution through a platform that supports the management and regulation of goods distribution in urban areas.

6. Conclusions

URBeLOG project is developing a platform enabling metropolitan Areas in Italy to pursue a new paradigm of urban freight distribution management tackling with the limited access to incentives for sustainable operators. The first step is the signature of a dedicated Framework Agreement to share and develop the most significant experiences in the field of urban freight distribution. The Agreement signed between Ministry of Transport and the network of Municipalities (ANCI) in 2012, have had two important outcomes beside others, i.e. harmonization of regulations for users and the use of ITS systems to increase control and efficiency (i.e. enhancement control, increase transparency).

The measures that are under implementation in the Italian metropolitan areas have been designed in order to represent a mix of pull and push measures. In fact, if on one side it set fixed deadlines for banning polluting commercial vehicles (i.e. from 2014 onwards, minimum Euro 4 compliant and from 2016 Euro 5 minimum), on the other side it establish negotiations on public funding for fleet renewals with the Ministry of Economic Development. More crucially, the Agreement sets up a recognition scheme for commercial vehicles (registration in a specific database) with two conditions to be fulfilled: the vehicle has to ensure lower pollution, and it has to be endowed with on-board GPS devices (in order to allow the municipality to trace vehicles in the city). The upcoming steps of the project will demonstrate the impact of URBeLOG measures towards a “near-zero emission” urban logistics in Italian metropolitan areas.

References

- ACI (2011). “Automobile statistics”.
- Benjelloun, A., Crainic, T.G. and Bigras, Y. (2010). “Towards a taxonomy of City Logistics projects”. *Procedia – Social and Behavioral Sciences* 2: 6217–6228.
- Crainic, T.G., Ricciardi, N. and Storchi, G. (2009). “Models for evaluating and planning city logistics systems”. *Transportation Science* 43: 432–454.
- European Commission (2011). “White Paper. European Transport Policy 2010–2020: time to decide”.
- ISTAT (2012). Statistics on the road transport of goods. (<http://www.istat.it/it/archivio/52361>).
- MDS Transmodal (2012) DG MOVE European Commission: “Study on Urban Freight Transport. Final Report”. Organisation for Economic Co-operation and Development (OECD) (2003). “Delivering the goods: 21st Century Challenges to Urban Goods Transports”. OECD Publications.
- Perboli, G., Tadei, R. and Vigo, D. (2010). “The Two-Echelon Capacitated Vehicle Routing Problem: Models and Math-Based Heuristics”. *Transportation Science*.
- Schoemaker, J., Allen, J., Huschebeck, M. and Monigl, J. (2006). “Best Urban Freight Solutions II. Quantification of Urban Freight Transport Effects I”. BESTUFS II project deliverable.

Sitography

- <http://calm.its-standards.info/>
- <http://portal.etsi.org/portal/server.pt/community/ITS/http://calm.its-standards.info/>
- http://www.etsi.org/deliver/etsi_en/302600_302699/302665/01.01.01_60/en_302665v010101p.pdf
- <https://tools.ietf.org/html/rfc6282>
- <https://tools.ietf.org/html/draft-ietf-core-coap-14>