The European Project eDRUL: a B2B platform for freight distribution in city areas

Giorgio Ambrosino, Walter Scapigliati*, Marco Boero**, Henrik Jess Jensen***,

*Siena Parcheggi Spa, Siena, Italy
walter.scapigliati@sienaparcheggi.com

**Softeco Sismat Spa, Genova, Italy
marco.boero@softeco.it

***Aalborg Kommune, Denmark
hjj-teknik@aalborg.dk

Abstract – **eDRUL is a relevant European Project founded by the EU FP5 IST R&D Programme, started on April 2002 spanning to 2004 and coordinated by Siena Parcheggi SpA, the Mobility Agency of the Siena City (Italy). The overall objective of eDRUL Project is to investigate, develop and validate an innovative B2B/B2C architecture / IST platform for improving the freight/parcels distribution and supporting logistic processes in urban/city area.**
The eDRUL solutions/architecture will be demonstrated, tested and validated, at different levels, in 4 cities/sites (Italy, Portugal, Netherland and Denmark) with different area characteristics and well-defined mobility policies and ITS transport infrastructures/mobility services. The paper will describe the overall context, the concept and system approach and innovation in eDRUL respect to the City mobility schemes and organization.

Keywords: Urban Transport Logistics, B2B and B2C infrastructures, ITS systems, Demand responsive approach

1. Introduction

In the last ten years major efforts have been carried out by the European cities in order to face traffic flow congestion and the related energy consumption and noise levels in urban areas.

In particular, limitations to traffic circulation and access restrictions (Restricted Traffic Zone - RTZ) to city centres have become common practice based on specific transport schemes (Park & Ride, public transport accessibility, traffic light co-ordination, etc.) innovative transit vehicles and fuels (friendly and safety characteristics, CNG, LPG, hybrid, electrical, etc.) and technological infrastructures (access gates, variable message signs, traffic lights, etc). No equal efforts and attention have been paid to the urban goods distribution process which is, together with private traffic flows, one of the major sources of energy consumption, noxious gas emissions and noise levels in urban areas, resulting in the well known negative impacts on life and environmental quality of our cities.

The main reason for this lack of efforts is that facing the urban logistic process implies acting on different, inter-related city management aspects: institutional, city regulatory and mobility **policies**; political, social and **citizens consensus**; city operational and **business processes**; infrastructural/technological **service organisation**.

The solution of the above issues are the basic conditions to create a coordinated development and management of the operational processes of the city logistic arena in the context of a current, partnership-driven approach, for designing and realizing an advanced freight distribution platforms and for demonstrating and evaluating new urban logistic IST systems and schemes integrated with e-Commerce services.

From the system and technological point of view, several projects have been initiated in many European cities, for the introduction and development of systems for urban logistics and logistic platforms oriented towards the distribution of goods at urban, regional, or urban-regional levels. The level of development differs among the various sites. The adoption of technological solutions and telematics infrastructures often has an experimental and step-wise character, through the realization of pilot or exploratory projects on the different technologies and/or on the different organizational solutions that they imply.

The development of telematics technologies within the last decade has had a primary role in contributing to the development of logistic platforms. Today the technological supply in this sector includes several technologies, methodologies, and tools, such as:

- communication technologies and fixed networks, primarily the strong development connected to the expansion of internet;
- mobile platforms (on-board terminals, palmtops and PDAs, code-reading peripherals, etc.) and wireless communication networks (GSM, packet networks, e.g., Mobitex, evolution of mobile phones 2.5G – GPRS, and in future 3G – UMTS);
- models and software tools for distribution management and planning (route planners, distribution planners, demand-supply managers, etc..)
- tools and services for message exchange and rationalization of information flows among the different logistics actors
- tools and systems for the integration of the logistics system with the available information on traffic and mobility (TIC, mobility service centres, etc.)

As expected, the introduction of such technologies is a slow process, depending on the maturity level of the technologies themselves, but also and especially on organizational and institutional impacts, and to techniques for managing the processes among the different actors involved in the freight system. The general trend shows a continuous growth of the phenomenon, as demonstrated by the numerous current experiences and pilot projects in several European countries where the use of IT systems is emphasized.
Many of the recent and current progresses in this sector are due to several RTD projects on ICTs carried out in Europe within the last 10-15 years (Cost 321, SURFF, IDIOMA, FREIA, ARTEMIS, MOSCA, etc.).

Such projects have often covered the introductory phases and the exploration of organizational and technological solutions for the development of logistic platforms, ensuring a partial coverage of the industrial risks through public fundings. In this area there are also two active European Thematic Networks: BESTUFS (Best Urban Freight Solutions) and THEMIS (Thematic Network on Intelligent Freight Transport Systems in Europe, DGTREN.

2. eDRUL objectives

In eDRUL project, a main effort will be put on investigating and developing an e-logistics platform based on advanced architectures and tools for flexible management of city freight distribution processes and on the relationships and dependencies with the service infrastructure provided by e-Business/e-Commerce networks. Figure 1 below provides a general overview of the technical project context for eDRUL, highlighting the core objective and focus of the project: **integration of e-Commerce/e-Business services with advanced city logistics management architecture**..
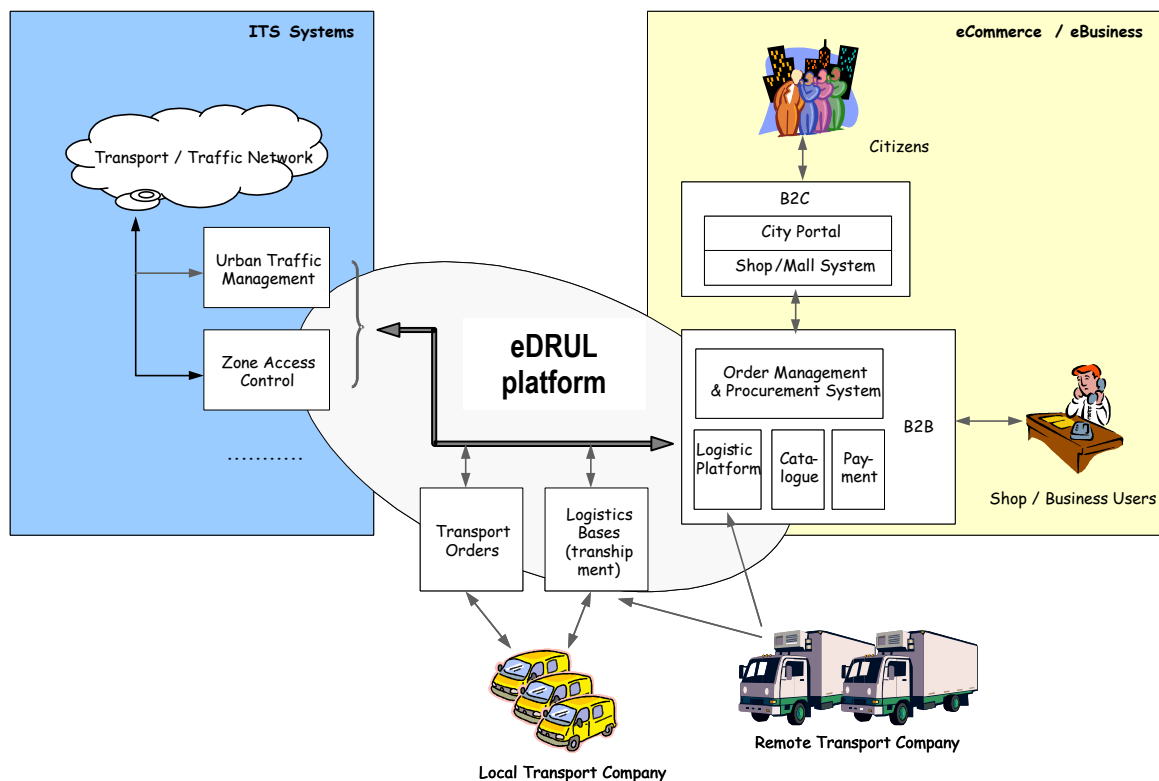

Fig. 1.General Context of eDRUL

Specifically, the overall objective of **eDRUL** – **e**Commerce Enabled **D**emand **R**esponsive **U**rban **L**ogistics – *is to investigate, develop and validate an innovative IST platform and schemes for improved management of freights distribution and logistic processes in urban area*. Strongly based on and integrated with e-Commerce/e-Business architectures and concepts, the developed solutions will enable:

(1) inter-networking and teamworking of the various actors involved in the freight distribution process, through a suitable set of **networked e-Business services** (B2B segment);
(2) improved interaction among the end-users of the goods distribution system and the logistics and retail system, through a number of **e-Commerce services** (B2C segment);
(3) optimal use and management of the available resources of the logistics system (fleets and available capacity, logistics platforms, goods collection and unload areas, routes, etc.) in a way to realise **flexible**, **demand-driven goods distribution schemes** integrated in the ITS urban scenario.

3. eDRULapproach and ICTechnologies

eDRUL addresses management of freight distribution services dynamically adapting to customers demand. This has two main implications:

- On the one hand, the users of these systems must be provided with the capability of accessing the services (for information, reservation, modification purposes) in many different, flexible ways ("anywhere and anytime" access).
- On the other hand, the organisation providing goods distribution services must be itself a flexible one, with the capability of managing dynamic relationships between different goods transport providers and a pool of transport resources (vehicle capacities) which, from time to time, may change to better adapt transport offer to customers requests.

Based on this, the main innovative aspect of the eDRUL project is the **relisation of an innovative and advanced goods distribution IT platform** with the following main capabilities:

- integration of different actors of the city logistic chain through a multi-service, web-based **e-Business platform** supporting **on-line collaboration** among logistic parties and operation of a **City Logistic Agency**;
- decision support and aid to operation of logistic resources enabling integrated, **demand-responsive goods distribution** services;
- provision of a number of **e-Commerce services** to enable easy interfacing of end-customers of the logistic system.

Supporting the operation of the City Logistic Agency will be a central task of the eDRUL platform. The Logistic Agency acts as **virtual enterprise** ensuring the work of different logistics operators in a multi-organisation context. Despite the physical location of the operators and the goods terminals, the different types of fleet and the different booking systems and shop keepers requests, it will manage the entire goods distribution service chain (from customer booking to service planning, monitoring and control) as unique entity.

Specifically, the eDRUL platform will allow logistic operators to manage the following (macro-) operations:

- Trip planning and management for goods collection and distribution;
- Management of available transport resources (vehicle capacities), particularly if vectors belonging to different operators are used within the distribution system;
- Management of the economic costs related to the goods distribution services, particularly concerning the allocation of costs/revenues to the different vectors integrated within the system;
- Management of communication and exchange of on-line and real-time information with the different vectors within the distribution system;
- Management of communication with the vehicles for routine operations of goods collection and delivery;
- Interaction with e-Commerce/e-Business network services, particularly as regards
    - the reception of purchase orders,
    - the communication of information to the customers (e.g. planned time of goods delivery),
    - the communication with the producers and the goods collection points (e.g. notification of collection time, changes or anomalies in the service, etc.).

These functionality optimise the goods distribution chain and provide the fundamental core for coordinating and monitoring the overall goods delivery/pickup process, independently from the different freight distribution reference models operationally designed for coordinating and integrating the urban logistic service.

The implementation of the eDRUL architecture involves a number of advanced ICT applications and enabling technologies, including:

- web-enabled information and booking services for the customers (B2C segment), information exchange, resource sharing for e-logistics operators (B2B segment);
- delivery notification and information through mobile phones and SMS;
- goods dispatcher software for trip planning and resource (i.e. vehicle capacity) optimisation;
- in-vehicle display units and hand-held devices (palmtops, PDAs, new generation mobile phones based on WAP and GPRS) to support vehicle drivers and goods delivery operators tasks;
- GPS-based or GSM/GPRS-based vehicle location systems;
- long-range, wireless communication channels (GSM, GPRS) to support interactions and information exchange among the logistics planning/management platform and vehicles / goods delivery operators.

All of this represents the "light" base for the development and management of the logistics system, whose capabilities and functions largely determine the innovation and flexibility of the logistic service chain

4. Cities in eDRUL

eDRUL will achieve **general solutions** - i.e. **generic** ICT architectures, platforms and tools, based on **open architectures** and **IT standards** - addressing the integration between logistics support IST tools and e-Business/e-Commerce services, which will be then customised and validated in **three** different application and trial sites. The eDRUL project will thus include two main streams of activities: one stream of activities dedicated to the development of solutions and another stream dedicated to the application and validating of those solutions.
In the planned eDRUL applications, the strategy has been adopted to look for urban areas in different degrees of advance/maturation with respect to their urban e-logistic solutions. One city – Siena –has a mature idea of what is required to implement e-logistic in the town, and is looking for a rather comprehensive application of the solutions developed in the project. Two other sites – Lisbon and Kenniswijk – have reasonably advanced diagnostics of their problems and well established information base but not yet fully operational developed plans. Therefore these sites will check and assess the possible solutions they may want to adopt for such complex problems operating eDRUL concepts and solutions.

These three sites are the application sites proper of eDRUL. To these, a fourth city – Aalborg, Denmark – is added with the role of strengthening the city requirements definition and eDRUL impacts analysis. This city (leading a national initiative on urban logistics in one EU country) is already advanced in normative, regulatory, institutional decisions concerning city logistics processes and in the exploratory phase for the adoption of IT solutions. On the one side, it will contribute to the eDRUL project to consolidate user requirements and, on the other side, to identify the possible advantages of following a similar route as in the other pilot cities.

The eDRUL consortium comprises all main actors of urban logistics processes including Authorities (Aalborg, Siena), transport operators (Siena Parcheggi), IT and services suppliers (Softeco, Intarsys, Mobisoft, Memex, TISPT, NEI) and public-private organisations (Platform City Distribution) from 6 European countries. Based on eDRUL application site results, it will develop a new market for the identified IT solutions and determine the regulatory, institutional, operational dimensions for implementation of the eDRUL solutions in other European cities.

5. References

[1]   G. Ambrosino et al:eBusiness-eWork for Demand Responsive Mobility Virtual Agency: the European FAMS project" Telebalt Conference, October 2002 Vilnius LT

[2]   G. Ambrosino et. Al: eCommerce Enabled Demand Responsive Urban Logistics:The European Project eDRUL" ITSC2002 IEEE Conference Singapore, September 2002.