Towards rational delivery

Gabriela Barrera, Fraser McLeod, Marit Natvig and Hans Westerheim set the scene for the Smartfreight project

Freight traffic using a bus lane in Barcelona, Catalunya, Spain

Commercial transport needs to be both efficient and clean if we are to minimise environmental, safety and congestion problems; yet it has never been given much attention in the transport planning process. Using new communication and navigation solutions, ICT offers one of the most promising ways of increasing the efficiency of the urban freight distribution sector. However, as the EC's paper, *Urban freight. Transport and Logistics – An overview of European Research and Policy*, points out (in reference to the BEST Urban Freight Solutions (BESTUFS) project), we still lack experience from European-scale demonstration projects of ITS potential in the sector. Specifically, the subject of integrating traffic management and freight distribution systems is seriously under-researched.

The current SmartFreight project aims to address the challenge of gaining better coordination between these two systems. It is developing ICT solutions that will allow bi-directional wireless communication between traffic control centres (TCCs) with and individual freight vehicles, to ensure better control of distribution operations.

The targetting of individual vehicles is the project's main innovative element, as the key to enabling more effective cooperation between urban traffic managers and logistics providers. We are assessing the potential of this new concept through a test site for technical solutions in Trondheim (Norway); supported by an assessment programme based on simulations in Winchester (UK) and Bologna (Italy) and a desktop study in Dublin (Ireland). A reference group made up of expert representatives from city authorities, logistic companies and other relevant stakeholders is contributing specialist input and monitoring the progress of the project.

Specific SmartFreight aims are to:

- Develop new traffic management measures for communication with individual freight vehicles using open ICT services, specialised on-board equipment, and an integrated wireless infrastructure.
- Investigate ways of providing transport companies with information that will improve their route planning.
- Improve interoperability between traffic management and freight distribution systems.

In response, SmartFreight will establish the means for coordinating all freight distribution operations within a city. The key will be the implementation of CALM (Continuous Air interface for Long and Medium range) MAIL in both on-board and on-cargo units in all freight vehicles (CALM MAIL enables dedicated short-range communications – DSRC – using small, low-cost battery-powered units).

To make the SmartFreight concept a reality, urban traffic management systems (UTMS) and freight distribution management systems (FDMS), which currently tend to operate independently of one another, need to be able to exchange data. The project has already carried out a comprehensive review of current user needs for information sharing.

Issues for consideration in combining FDMS and UTMS include vehicle types; their need for/right to priority access to urban centres; availability of UTMS data that freight distribution managers and drivers could use; availability of FDMS information that could benefit UTMS; the best UTMS/FDMS and vehicle communication methods; and possible barriers to data sharing. Other concerns include the need for city authorities to be able to ensure that any vehicle priority scheme used for freight distribution is equitable; and to explore the feasibility of matching priority access according to vehicle type (eg clean, environmentally-friendly trucks, or light ones delivering to or from a consolidation centre). At the same time, it has emerged that discrimination by load factor could be difficult to implement.

Consultation exercises have also confirmed the potential usefulness of UTMS data of a 'static' nature, eg delivery bay location and pre-booking information; road closure and reopening notices; and ability of freight vehicles to use bus lanes. The usefulness of dynamic traffic information for FDMS will depend on its accuracy (ie if it is constantly updated) and ability to allow personalised routing.

City authorities have already confirmed the value of FDMS data in the form of driver reporting of accidents/breakdown, and provision of freight statistics (eg on vehicle weights) or planning and modelling purposes. Finally, there has been unanimous agreement that the main barrier to information sharing is data privacy, regardless of the communication method used.

A new UTMS/FDMS could offer important functionalities, tailored to suit individual cities' own characteristics and planning priorities, including conditional route assignment, dangerous goods tracking, and the planned use of designated loading and unloading areas. A later stage of the project will subject these to specific performance indicators.

For route assignment, these could include trip journey times for individual lorries (FDMS) or average link-specific journey times on key routes (UTMS). For loading/unloading area management, they could include percentages of delivery windows missed, or of illegal use of loading bays.

The SmartFreight approach

Central to SmartFreight is the development of a new open-framework architecture, which will provide top-down specifications for solutions that can be applied in individual European cities. This is organised into specific abstraction levels and aspects. It identifies and defines relevant stakeholders by means of their generic roles, with the required functionality and information exchange as the basis for technical solutions.

It sets the key issues in a wider context by using the Norwegian-developed ARKTRANS ICT framework architecture for transport, which is common to all modes. The establishment process is iterative and based on the results of stakeholder consultations, logical relations and the realisation of open ICT services.

It uses, as a starting point, existing architectures and results from the ERTICO-ITS Europe-coordinated CVIS (Cooperative Vehicle Infrastructure Systems) project CVIS project. It will expand the range of CALM applications and establish the first CALM MAIL implementation.

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www.polis-online.org
www.smartfreight.info
www.cvisproject.org
www.bestufs.net

Bologna and Smartfreight

Bologna, the capital of the Emilia Romagna region in central northern Italy, is a key traffic hub and the location of one of the country's largest exhibition complexes. Its role as a SmartFreight simulation site reflects its recent record in implementing innovative urban traffic and freight management policies.

In 1989, to preserve its historic character and improve air quality, the municipality introduced a permit-based limited traffic zone and has subsequently equipped all streets giving access to the city centre, and bus lanes, with automatic enforcement cameras. Since the introduction of the LTZ, traffic volumes have fallen by up to 25% and bus lane infringements by 70%.

More recently, the 2006 City Freight Delivery Plan has been the main instrument for rationalising goods distribution freight delivery. Heavily IT-based, it aims to reduce the number of km being driven to deliver the same level of service, and to encourage the deployment of cleaner vehicles. Implementation has followed a three-step approach. The first has concluded with the introduction of new pricing policies for the issue of LTZ access permits, with annual freight delivery tariffs linked to air pollution level norms and stronger enforcement measures to discourage unauthorised use. The same pollution norms also influence the availability of delivery windows.

The second step has seen the launch of an LTZ 'pay-to-access' pass, introduced for the benefit of users who would not be entitled to general access. The net effect of these two measures has been a 27% reduction in the number of freight operators' permits.

The third step, currently in progress, involves the development of a 'technological transit point', designed to achieve the comprehensive rationalisation of freight transport flows and routes, loading procedures and pre-booking of designated parking slots. Key elements are centralised advanced vehicle monitoring and incentives for smaller freight operators to take part. This step matches closely with the SmartFreight programme, and forms an integral part of a comprehensive ITS-based city traffic management system.

www.comune.bologna.it

The SmartFreight consortium

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CHALMERS (Sweden)
Commune di Bologna (Italy)
Dublin Transportation Office (Ireland)
ETRA Investigación y Desarrollo (Spain)
Norwegian Public Roads Administration (Norway)
POLIS (Belgium)
Q-Free (Norway)
SINTEF (Norway)
Transportation Research Group of the University of Southampton (UK)

Winchester in SMARTFREIGHT

Winchester is a relatively small UK city with a population of around 40,000. Although Winchester has good road access via the M3 motorway, its historic city centre is characterised by narrow streets, a pedestrianisd high street, limited parking and a one-way system – all of which make it difficult for traffic and, especially, heavy goods vehicles to negotiate.

The city has its own modern urban traffic control (UTC) centre, operated by Hampshire County Council (HCC) as the regional authority and originally developed under the partly EU-funded Euroscope/ROMANSE project. Both the city and HCC are currently consulting on a freight strategy plan. They were previously involved in the EU-funded MIRACLES project which included a number of freight initiatives.

The Transportation Research Group (TRG) of the nearby University of Southampton will be simulating some of the concepts put forward in SmartFreight, using Winchester city centre as the test site. Concepts being modelled include shared freight/bus lanes, shared loading bays, pre-booked loading bay slots, and priority access to some parts of the city (as part of an emission zone concept).

Data being input to the model will come from a variety of sources. Among these is a comprehensive questionnaire survey of Winchester high-street (main street) businesses recently undertaken as part of another study that TRG are involved in, Green Logistics. The survey included questions about goods deliveries, servicing, and the origins of vehicles making these trips. Responses from the business managers interviewed will aid the development of a detailed origin-destination database of retail supply chain operations serving enterprises in Winchester city centre.

The TRG will supplement this material by other available freight vehicle data and general traffic flow data. It will then build a picture of freight and general traffic conditions in Winchester to be modelled for SmartFreight.

The simulation will run on a microscopic model of the city centre using an established simulation package such as Aimsum. The TRG will calibrate this using the freight O-D data along with general data on flow, speed and traffic mix obtained from the Winchester UTC centre. The TRG will then test the calibrated model against reported supply chain operating characteristics identified in the Green Logistics studies, clarifying any operational issues using applicable CCTV footage from the UTC centre. It will then be used to test the impacts of SmartFreight operating concepts.

Performance measures will include:

- Journey times for freight vehicles and other traffic on key lorry routes;
- Classified vehicle counts, by vehicle and goods type;
- Rates of legal loading bay use; and
- Proportions of delivery time windows met.

www.winchestermiracles.org
www.greenlogistics.org