Urban Transport Benchmarking Initiative

Annex A3.2

City Logistics

Site Visits and Case Studies

July 2004

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City Logistics

Case Studies and Site Visits report

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by

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1. WORKING GROUP SITE VISITS

1.1 Aalborg, January 8th and 9th 2004

The site visit took place over two days. On the first day detailed introductions were made by the attending cities and they explained the issues they were facing with regard to City Logistics in their city. It was decided that the major issues that the cities were facing were in relation to the number of commercial goods vehicles entering the city to deliver goods, which can have large negative externalities on the street environment. This introductory session was followed by an early evening visit to Post Danmark's Nordjyllands Postcenter. There were two major points of interest to this visit; firstly Post Danmark are a major partner in the City of Aalborg's Scheme to improve city logistics in the pedestrianised area and secondly, they have successfully used benchmarking to improve their business.

Plate 1.1: Unloading clothes rails in the Pedestrianised Area of Aalborg

Day two began with a technical presentation of how the Aalborg city logistics scheme worked in practice and how the aims were achieved. The historic city centre has suffered problems with the volume of delivery vehicles entering the city centre to make relatively small deliveries of goods at individual retail outlets. The City of Aalborg's method of tackling this through transport co-ordination was by widening the links for better communication between the various parties involved in the supply chain. This was done on a voluntary basis and the scheme had four broad aims:

- Delivery on time
- More efficient freight delivery
- Improved working conditions for the drivers
- Fewer freight vehicles entering the city centre.

The City of Aalborg introduced various measures to encourage delivery companies to reduce their impact:

- Transport co-ordination
- One shop as joint receiver of goods for a number of shops
- Changing driving direction in one-way pedestrian streets
- Establishing drive by/unloading zones
- Backdoor delivery
- Common city freight document
- Two employees in each vehicle
- Change in behaviour among all drivers (role models)

Plate 1.2: **The 'Fine Sort' at Danish Post**

The morning's presentations were followed by a guided walk through the pedestrianised area of Aalborg, illustrating for the participants where new innovations had been implemented. On return to Aalborg City's Technical Department, a focused discussion took place, where the research question was defined, the thematic indicators were discussed and issues regarding the common indicators were examined. The results of this discussion are laid out section 4.

Plate 1.3: Communication between drivers approaching the Pedestrianised Area of Aalborg

1.2 Bristol, March 15th and 16th 2004

The Bristol site visit took place over two days. During the first day the city representatives explained the issues and problems that they faced from the perspective of a city authority. This was followed by a detailed discussion of the data collected by the cities for the indicators defined at the Aalborg meeting. This meeting was concluded on the second day, with the attending cities explaining what further information they were going to provide for the project.

Bristol City Council demonstrated their G-Wiz electric car, which was introduced as part of the Vivaldi project to be used by City Council employees when travelling around the city centre. This vehicle has low emissions, and with no CO^2 emissions at all. Despite being an electric car it has top speeds of 40mph and has a range of 50 miles. This is more than sufficient for use within Bristol City Centre and provides a very green but convenient alternative to travelling by internal combustion powered cars.

Plate 1.4: Bristol's G-Wizz Car

During the second day an interesting presentation was given by Ian Foster from Exel Logistics on the Heathrow Consolidation Centre (HCC) and how the benefits learned from it will be applied when the Bristol Broadmead Consolidation Centre is set up. Ian Foster described the motivations for establishing the HCC and the key drivers were environmental concerns and the need to restrict the movement of vehicles within a defined area, which in Heathrow's case was a secure area. Since the introduction of the scheme at Heathrow, there has been a constant decrease in the number of vehicles entering the site. Ian gave further explanation of how the environmental benefits felt at the HCC are going to be transferred to Bristol.

Bristol city logistics scheme information

Bristol is the largest urban area in the South West region, with an urban population of 400,000 inhabitants and is a centre of industry, commerce, education and culture. Bristol City Council's administrative area covers 110sq km, is split East-West by the river Avon and the terrain is quite hilly. Bristol is attractive to employers and is currently experiencing rapid growth to the north and large-scale redevelopment in the city centre and around the historic harbour area. Recently, Bristol has been attracting service industry, finance and tourism sector employers and these areas are expanding rapidly. Around 28% of the city's employment is concentrated in the service sector, 10% in the finance sector and 8% in the tourism sector.

Bristol has been involved in the VIVALDI project, as part of the CIVITAS programme. The two driving forces behind adding vitality to the City of Bristol are; environmental sustainability and social and economic vitality. The transport system of the city needs to support these aims and in Bristol a transport strategy is set out within its Local Transport Plan (LTP), which is now a mandatory requirement for all transport authorities in the UK. This plan sets out the long term vision for transport in the city and a plan for activities in the next 5 years. Bristol's transport strategy and programme of investment is reliant upon the central government funding, but the VIVALDI work in Bristol site is supporting the LTP and helping to drive forward a package of the more innovative and radical measures.

Plate 1.5: Unloading goods in a Broadmead unloading Area

Bristol, like many cities, has experienced problems with the number of delivery vehicles seeking to gain access to the city centre. The council has attempted to tackle this problem in a number of different ways. One of the solutions has been to provide a Commercial Vehicle Drivers Atlas to encourage HGV drivers to use only suitable roads, and to avoid bad practices like rat running.

Examples of problematic unloading experienced in Bristol

The city of Bristol was also experiencing problems resulting from poor unloading procedures in the city centre, although a solution is currently on trial. The VIVALDI package of innovative and radical measures contains a six month demonstration of the use of a consolidation centre for the delivery of goods into a defined city centre area (The Broadmead Centre and Galleries Shopping Centre). The scheme was not launched fully until May 2004, so it was not possible to conduct a site visit. It is anticipated that the scheme should deliver the following benefits for users of the city centre:

- Reduce the number of delivery vehicles operating in the area;
- Reduce the conflict between vehicles in loading areas and delivery bays;
- Provide the opportunity for value-added services to retailers such as waste and packaging collection, item level inventory management, and seasonal and peak storage facilities;
- Contribute to traffic reduction in Broadmead;
- Contribute to improving air quality in the area;

For retailers it will also lead to a reduction in the cost of their supply chain, which might motivate them to reassess their delivery strategy in other urban areas.

Plate 1.6: An Exel Consolidation Centre

The outcomes of the consolidation centre trial in Bristol are of great interest to the working group and may become a relevant case study of interesting practice over the course of the Urban Transport Benchmarking Initiative.

1.3 Rome, May 10th and 11th 2004

The site visit took place over two days. The technical visit took place on the afternoon of the first day with the group going on an interesting visit to the S.T.A. Control Centre, which is responsible for monitoring and controlling of traffic movements into the ZTML (Zone of Traffic Limitation Management).

The remainder of the meeting was given over to the discussion of the data that had been gathered by the group. Peter Sonnabend presented the data in a new format, which was discussed by the group; this format made the data clearer for presentation purposes and made it easier to identify gaps and inconsistencies. The data that had been provided was manipulated to create further 'derived' indicators.

The group thought of some ideas that they would like to take forward to the next year of the project providing new members join the group. The group would like to create some new

indicators that are based around the service that is provided rather than the infrastructure that is present in the city. Some indicators were identified of being of a questionable value for example the number of operators in an area, should be a dynamic number due to the (hopefully lively) state of the market for deliveries operators.

The group identified a range of new indicators to complement and extend the understanding they already have from the first year of benchmarking, these indicators include:

1. Standard retail time (shop opening hours)
2. Distribution of stops per vehicle (average mixes single stop of independent shop owner with 10-12 stops of larger operator)
3. Traffic counts would need to match with vehicles actually doing deliveries/pick-ups in the area, excluding those who are cutting through or service vehicles.
4. Distribution of deliveries over the day (peak hours, possibly indicating where this matches with peak hours of commuter or other traffic peaks)
5. Distribution of deliveries over business sectors (main drivers/demands for deliveries)
6. Indicators regarding economy of the system

Plate 1.7: A vehicle unloading on the busy streets of central Rome

Italian Association of City Logistics

Massimo Marciani gave a brief presentation on the, newly founded, Italian Association of City Logistics (www.aclonline.it). This group has been set up very recently and has public funding for 3 years, there has been a conscious decision been taken to make the association non-political. It is hoped that this will allow it to make tough recommendation and will not always take the populist route.

The Association will examine many different methods of tackling the problems of city logistics, it is hoped that a wide variety and large number of methods and solutions will be considered as long as they are economically viable. One of these solutions is that the Association would work as a purchasing club for ecological vehicles. It is also hoped that the group will raise the profile of the issue of city logistics at the European Level, and to form links with similar organisations across Europe.

Rome traffic control scheme information

The Rome Metropolitan Area hosts about 4 million residents over an area of 5300 km^2 and comprises the Rome Municipality (1300 km^2) and other 120 small satellite municipalities (4,000 km^2). It is located on the west coast of the centre of Italy in the Lazio Region, which is the third most populous region and the third industrial pole in the country, claiming over 5 million people. As capital of the country, administrative, political and services are the main activities, including transport and all assets related to tourism: these activities are particularly concentrated in the central area, especially in its historical centre.

At present one of the most important problems, derived from this uncontrolled development, is the noticeable imbalance between transport demand and supply, which determined a dramatic modal split in favour of private vehicles. In the last 35 years the rate of motorisation grew from 0.2 to 0.7 vehicles per capita, with a threefold leap in terms of kilometres travelled by private vehicles due to the increase in the average trip length and the number of vehicles travelling (+650%).

Rome has being trying to tackle these significant congestion problems, for example by devising a sustainable mobility policy based on environmentally compatible choices. In addition, the City of Rom has created appropriate tools for implementing these choices;

- **Planning Tool** - The General Plan for Urban Transport has measures for limiting the overall demand whilst improving and increasing provision of collective transport.

- **Organisational Tool** - The Mobility Agency of Rome (S.T.A.) has been created with the task of providing design and operational solutions, to meet the mobility objectives.

- **Technological Tool** - S.T.A. created an integrated telematic system for Traffic Monitoring and Control, which facilitates the exploitation of transport resources, which are already in place.

Plate 1.8: The Traffic Control Centre Rome.

The Traffic Monitoring and Control system has been in operation 24 hours per day for 4 years. It uses an open modular system that is expandable, which has two control levels, firstly a supervisory and co-ordination level, and secondly a lower level that feeds information into and out of the supervisory one. The open system, it is hoped, will allow for expansion as the opportunity and needs arise; this should be a cost-effective procurement method as the operation system can be bought 'of the shelf'.

At the initial implementation stage the total investment cost 20 million Euros; the integration between the various subsystems has been highly successful and has meant that Rome's Intelligent Transport System has been identified as a European Leader. The System performs the following functions:

- **Variable Message Signs for road user information and safety -** There are 12 of these signs located on the great ring road and they are primarily used to inform road users of planned events and suggestions for mitigating their effects.

- **Automatic Gates for access control to Limited Traffic Zone -** There are 22 access gates in the streets surrounding the historical centre, vehicles that pass through these gates need to be enabled with a Telepass smart card which is detected by a receiver in the gate. If a smart card is not present then a camera takes a picture of the number plate of the vehicle which is then passed on to the fine procedure.

- **CCTV Traffic Surveillance System for traffic system for gathering information -** There are 60 CCTV cameras which are controllable by the Traffic Control Centre, this system has spare capacity and will be expanded in the future. The images are also available to the Police.

- **The Traffic Signal System -** This system controls approximately 400 traffic lights in the city, of which about 200 are located on the main radial routes. The system is dynamic and works on information fed through about 2500 magnetic loop detectors throughout the city.

- **Centralised supervisory system for gathering, processing and diffusing traffic information -** This system monitors and controls the other 4 systems.

The system provides various outputs principally to allow the urban Police to deal with traffic incidents and to communicate to the public information about traffic in the area. The information can be passed through variable message boards, but also through a website, a DATEX link to the National Highway Control Centre, a broadcasting function by email and a free telephone number.

2. CASE STUDIES FROM WORKING GROUP PARTICIPANTS

2.1 Aalborg

The project "Sustainable Citylogistic Solutions", a tri-city co-operation between Copenhagen, Aarhus and Aalborg supported by the Danish Ministry of Transport took place between April 2000 and December 2003. The three cities and the Ministry of Transport formed a steering group which established a joint forum - the Forum for City Logistics - with its own secretariat.

The overall objective of the "Sustainable Citylogistic Solutions" project is to develop and trial new methods to improve the freight distribution in middle size cities in order to reduce the negative environmental effect. The aims are:

- To establish a forum for new ideas and solutions for efficient goods transport;
- To learn by and use experiences from other European countries;
- To share our experience and knowledge to municipalities in Denmark and to other European countries;

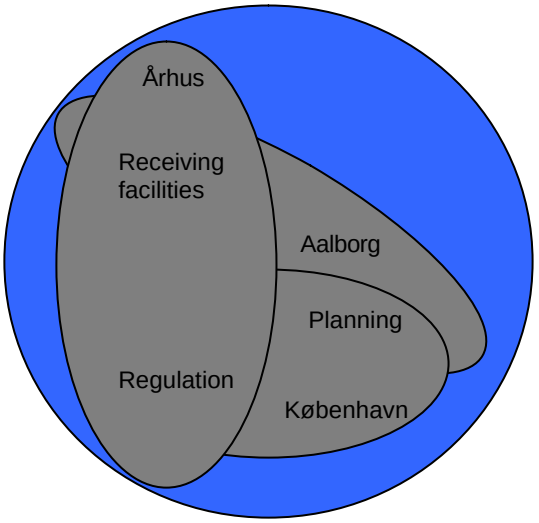


Figure 2.1: Approaches used by the cities in the city logistic project.

The overriding principle in this project was a practical, experience-based approach to the problems rather than a theoretical approach. The cities used different approaches to enter the project. Figure 2.1 shows the approach for each city.

Planning, receiving conditions and regulation were the focus areas in the three cities. The Århus project is not described in this document.

Aalborg is the fourth largest city in Denmark and is situated along the banks of Limfjorden in the north-western part of Denmark. Aalborg has around 162,000 inhabitants and, being the centre of the county a population of further 65,000 persons in the neighbouring areas form the part of daily activities in Aalborg – working, shopping, visiting public service facilities or making use of the recreational attractions in the city. Most of the commercial service and office activities are found in the City Centre. The Aalborg project started in April 2000 and ended in December 2003.

Target area

The freight transport in Aalborg City Centre is concentrated around the pedestrian area, primarily formed by 4 roads. Approximate 220 shops are located in this area and more or less receive goods everyday. However, the quantity and types of goods delivered depends on the size and type of shops. Figure 2.2 shows the target area in Aalborg.

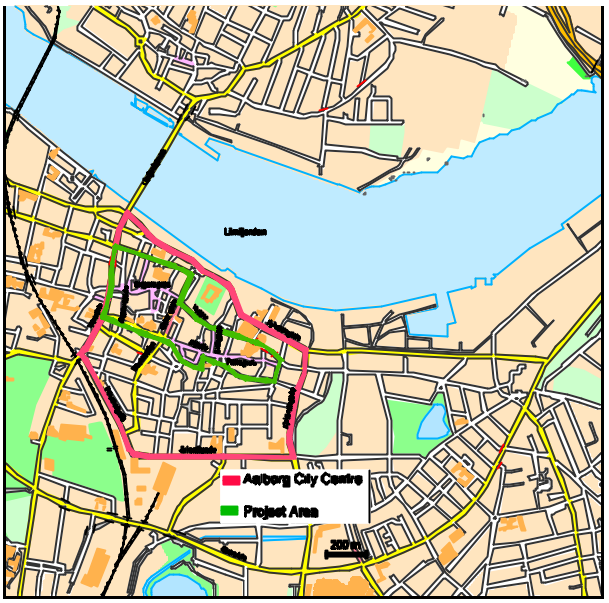


Figure 2.2: Aalborg target and project area.

Over 80% of the freight delivery in this area is performed by 4 distributors. Previously the freight delivery was spread across more distributors which often caused congestion in the narrow roads and irritation among the drivers.

In the pedestrian area access restriction defines in general terms that freight distribution should be undertaken between 5 and 11 a.m. However, some types of freight delivery needs special conditions for delivery e.g. outside the access restriction for which in most cases permission is granted.
In order to reduce the annoyance caused by freight delivery to the people living in the area and the visitors/consumers and thereby improve their living quality Aalborg has implemented several measures to make the freight distribution more efficient.

Purpose and potential

A stop interview survey was carried out in order to find out the purpose of driving in the pedestrian area. Figure 2.3 shows the results of the survey.

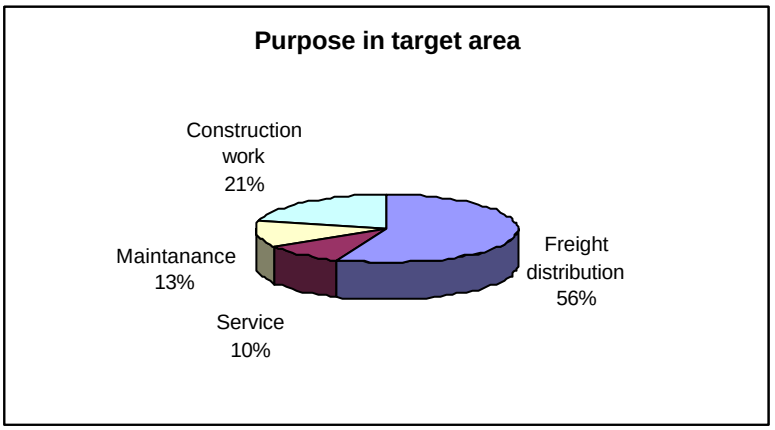


Figure 2.3: Vehicular trip purpose in the target area.

56% of vehicular trips in the target area were performed by freight distribution vehicles. The other 44% were carried out by maintenance vehicles, construction traffic and other services. This meant that about half the vehicular trips in the target area could be influenced by the measures implemented. The other half would only be influenced due to the change in driving direction.

However, not all freight transport can be influenced by the measures implemented. In order to estimate how much of the freight distribution that will be influenced by the measures an investigation was carried out to clarify the size of freight transport that potentially could be affected.

Figure 2.4 indicates that 41% of the deliveries in the target area have a citylogistic potential. Another 41% of the freight deliveries in the pedestrian area would not be affected by the measures implemented due to the nature of the freight delivered e.g. money transports and dangerous or sensitive freight. In total this means that approximately 69% of vehicular trips in the target area can be made more efficient by implementing the measures. The stop interview survey also registered the type of vehicle and type of fuel used.

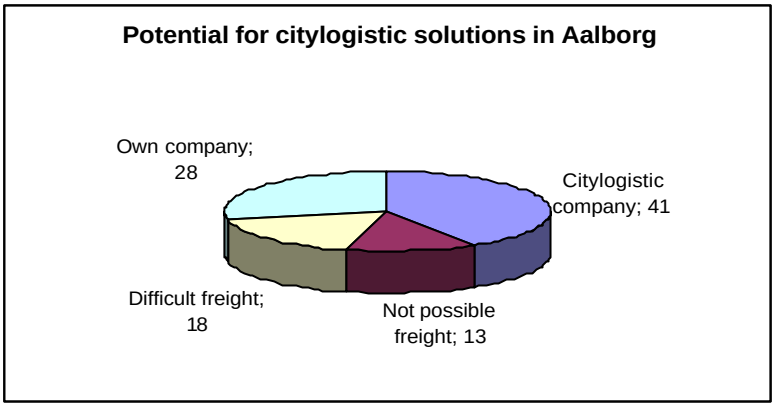


Figure 2.4: Potential for citylogistic solutions in Aalborg.

Figure 2.5: Age, type of vehicle and type of fuel among the vehicles in the target area.

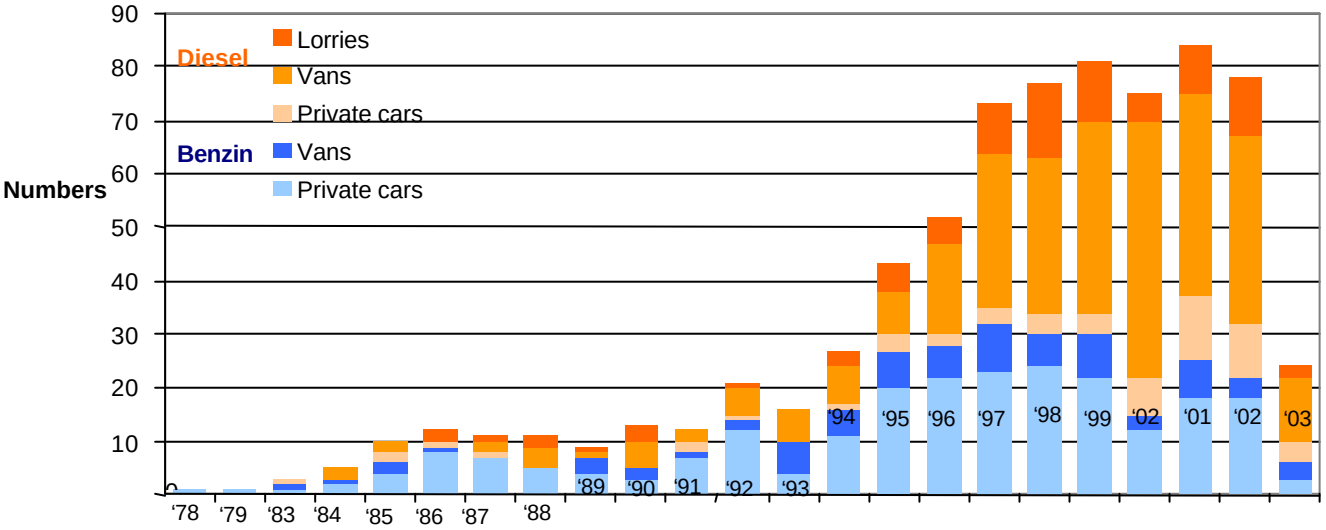


Figure 2.5 shows that most of the vehicles registered in the target area are less than 8 years old (1995). The vehicles younger than 8 years are mostly fuelled by diesel. More than half the vehicles registered in the target area are vans fuelled by diesel.

Objectives

The overall objectives for Aalborg in the "Sustainable Citylogistic Solutions"-project are the same as in Copenhagen to develop on a trial basis and to implement new methods to improve the freight

distribution in middle sized cities and reduce the negative environmental effect. However, the approach in Aalborg is different to the Copenhagen approach.

The principle in Aalborg was based on voluntary participation. This means that the municipality, the shop owners and the freight distributors started a dialogue and defined the measures in order to make freight delivery more efficient in the city centre. The objectives in Aalborg are outlined below:

- Improve on time delivery;
- More efficient delivery;
- Improved working conditions for freight distributors;
- Reduce the numbers of freight vehicles in the city centre.

Measures

Based on the objectives and the physical boundaries in Aalborg city centre, the parties defined a series of measures to be tried and if successful implemented:

- Creation of loading and unloading zones;
- Two persons in each vehicle;
- Creation of a consignment note among the distributors;
- Change of driving direction in pedestrian area;
- A coordination of freight delivery among the distributors;
- Electric driven vehicles;
- Regulation and access restriction in the pedestrian area for freight transport;
- One shop functions as drop zone for freight to shops nearby.

Results

The evaluation method was a before and after study undertaken in April 2002, (before study) May/November 2002 (after study 1) and in March 2003 (after study 2). Key parameters in the evaluation were:

- The freight distributors ability to comply with the access restriction;
- Time spend on freight delivery in the pedestrian area.

These parameters are used to describe the effort in order to meet the project objectives.

Also other parameters enabled an evaluation and conclusions to be drawn for each of the measures implemented. Figure 2.6 shows the average starting and ending time for deliveries in the pedestrian areas.

The average starting time for deliveries in the pedestrian area changed from 10:06 a.m. in the before situation to 10:00 a.m. in the after situation. The average ending time changed from 11:00 in the before situation to 10:48 in both after situations. On average the freight distributors comply with the time restrictions.

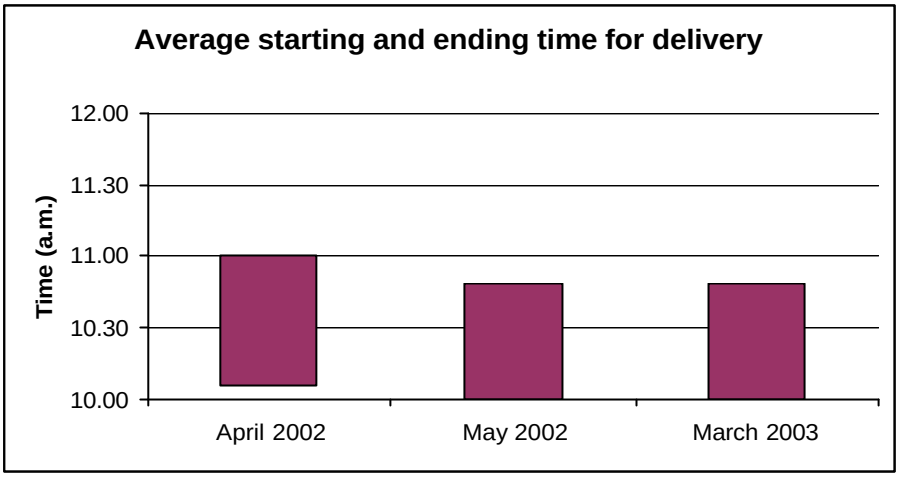


Figure 2.6: Average starting and ending time for deliveries in the pedestrian area.

The average time spent on delivery is shown in Figure 2.7.

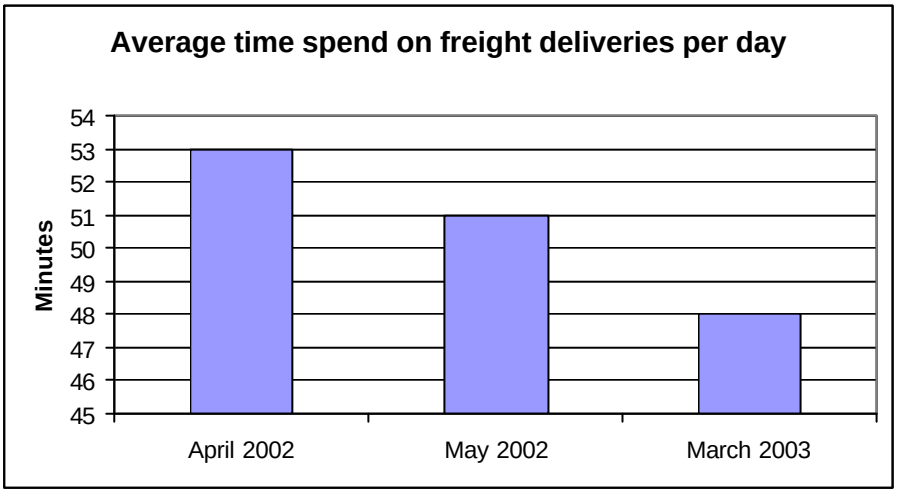


Figure 2.7: Average time spent on delivery.

The average delivery time was 53 minutes in the April 2002 registration. It dropped to 51 minutes in the May 2002 registration and finally to 48 minutes in March 2003, an average reduction by 5 minutes or an approximate 10% reduction in time. 5 minutes does not seem like a great deal, but assuming all vehicles entering the pedestrian area cut 5 minutes off their delivering time, there would be hours each day with less traffic in the pedestrian area.

Interviews among the drivers in the pedestrian area showed that the working condition had improved due to the measures implemented. A count survey showed that the numbers of vans and lorries delivering freight in the pedestrianised zone has not been reduced during the trial.

Best practice

To give an overview of the experiences gained in the Aalborg project a short description of each measure is given below:

Measure	**Objectives**	**Condition**	**Experience**
Optimisation internally by the freight distributors	Improve delivery time	A change in the internal logistic administration Dialogue with the drivers Pickups by using the backdoors	Optimisation of time spent on freight delivery. Left the pedestrianised zone earlier
Optimisation of the logistic chain	On time delivery	No delivery to other commercial operators before deliveries in the pedestrianised zone	Optimisation of time spent on freight delivery. Left the pedestrian area earlier
Establishment of loading and unloading zones	Reduced congestion in the pedestrianised zone	- Loading and unloading zones were located in co-operation between the drivers, the freight companies, the shopkeepers and the municipality - An agreement with the shopkeepers regarding putting commercial articles in the pedestrian area before freight deliveries	Less waiting time for the drivers, leaving the pedestrian area earlier
Delivery and pickup at the same time	Less delivery vehicles in the afternoon	Agreement between the freight distributors and the shop keepers	Visual improved environment and optimisation for freight companies
Two persons in each vehicle	Faster delivery	Agreement between the freight distributors	Not financial liable
Delivery to shops with late opening hours	Delivery at neighbouring shops	Agreement between the shopkeepers and the freight distributors	Less waiting time
Co-ordinated distribution plan among drivers	Less congestion because the drivers starts at different locations in the pedestrianised zone	Agreement with the freight distributors Necessary with extra car due to new starting points	Not tried due to expected high financial losses
Considerate driving	Improved working condition for the drivers	Agreement with the drivers	Improved working conditions for the drivers

Conclusions of the Aalborg trial

During the trial period Aalborg has implemented several different measures to reduce the growing demand for goods distribution in the City Centre. Most of the measures implemented during the trial were successful in meeting the project objectives.

The main conclusions drawn from the trial in Aalborg are:

- The Aalborg trial was built on voluntary participation. The creation of a local forum for citylogistic solutions where new ideas for freight distribution in urban areas could be discussed openly and with participation of the members of the logistic freight chain e.g. freight distributors, commercial operators, municipality and the Police resulted in a high motivation among the participants in order to make the trial a success for all.

- The measures implemented during the trial period have lead to an average 5 minutes time reduction in delivering freight in the City Centre. The driver's ability to comply with the time access restriction has improved e.g. they are leaving the pedestrianised area earlier after the implementation of the measures. Individually the measures implemented have lead to less time spend on freight delivery, visual and environmental improvements for all stakeholders in the area and improved working conditions for the drivers. The measures implemented were not equally successful in meeting the objectives. However, they still gave inspiration to further trials or projects.

Local conditions e.g. distribution flow and road network plays an important role for the measures in meeting the objectives. It is important that the measures are built on local conditions. Most importantly, the measures implemented during the Aalborg trial can be duplicated to improve freight distribution in other cities.

2.2 Bristol

Introduction

Bristol is the largest urban area in the South West region and provides a centre of industry, commerce, education and culture. Bristol City Council is a local authority with responsibility for transport, planning and other public services over an urban area with a population of some 400,000. The administrative area is 110sq km, the city is split East-West by the river Avon, and the city is quite hilly.

Bristol, like many other European cities, suffers from urban congestion, pollution and a constrained road network. However it also has a transport strategy that aims to support the economy of the city and create a city centre which is attractive to both business and the people who work, live and visit the city. For business to flourish the effective delivery of the goods they require is essential, but at the same time there is a need to minimise the impact of freight distribution on the area it is serving. Goods distribution is not always given priority by city authorities. However city logistics initiatives could help alleviate some of the problems found in city centres.

VIVALDI Project

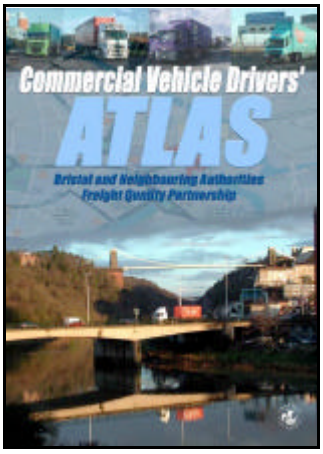
Bristol City Council is participating in the EC-supported VIVALDI project. VIVALDI (VIsionary and Vibrant Actions through Local transport Demonstration Initiatives) is a 4 year transport demonstration project which started in February 2002 and aims to implement and evaluate an integrated package of innovative transport measures. The project is led by 5 city authorities – Bristol, Bremen, Nantes, Aalborg and Kaunas, supported by a total of 16 local partners including transport operators, utilities, academic institutions and consultants. The project is based on demonstration activities under eight key themes (Clean and Efficient Vehicles, Access Management, Pricing Strategies, Stimulation of Public Transport, Measures to Promote Changes in Car Ownership and Use, Goods Distribution, Soft Measures and Telematics). At the Bristol site local VIVALDI partners are; Bristol City Council, Bristol Dial-a-Ride, First, Sustrans and the University of the West of England.

Under the goods distribution theme the VIVALDI project has looked to address a number of freight issues and has embarked on three initiatives to help improve freight distribution in Bristol. These are; a commercial vehicle driver's atlas, the utilisation of community delivery points and the trial of an urban freight consolidation scheme. Details of these initiatives are set out in the rest of the document.

Commercial vehicle driver's atlas

The atlas was designed to help drivers of commercial vehicles find the most appropriate routes to main freight delivery destinations in Bristol and its surrounding urban areas in the neighbouring districts of Bath & North East Somerset, North Somerset and South Gloucestershire.

Plate 2.1-2.3: The Commercial Vehicle Drivers' Atlas



Atlas Cover


Atlas Map


Launch of the Atlas

The atlas pages were created using the current UK road hierarchy and national classifications. The atlas indicates advisory routes to the main freight destinations throughout the area, including trading estates, commercial, warehousing and industrial areas, shopping centres and retail superstores. Larger scale, detailed inset maps were also provided for the city's main business areas. Named trading estates were listed in an index at the rear of the atlas; each one grid-referenced to the relevant map. They were also each given a coded number which relates to the local authority area in which they are located.

Restrictions on vehicle weight, height and width and other relevant access restrictions were also shown to give as comprehensive a picture as possible to a driver who is unfamiliar with the local highway network. The highway authorities wish to discourage unnecessary use of routes other than those indicated.

The routings and information in the atlas assumed vehicles and loads no heavier than 44 tonnes, no higher than 15' 6" (4.72m) and no wider than 9' 6" (2.9m).

The atlas was compiled from information supplied by each of the four local authorities covered by the atlas. A comments form was also supplied inside the rear cover of the atlas in order to gain feedback. A total of 5,000 atlases were produced and distributed to operators through the FTA (Freight Transport Association) and RHA (Road Haulage Association).

The atlas was very well received and has since become a recognised national resource.

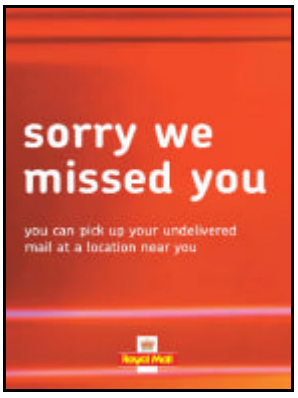
Community delivery points

The City Council has been working alongside Royal Mail to help implement a number of delivery solutions aimed at improving home delivery services and reducing unnecessary vehicle trips.

Retailers often rely on customers taking away their purchases or delivering them to the customer's home address. However problems and unnecessary journeys can arise when deliveries are attempted when the customer is not at home. The same can be said for the on-line shopping market, which as a growing retail sector, faces the same potential problems of delay and dissatisfaction to the end customer, together with potential difficulties and costs for the agent of re-delivery and storage of items. It can also involve the customer having to collect the item from a depot. For e-commerce and other delivery schemes to be effective in transport and environmental terms it is important that delivery vehicle travel is minimised, as if the home delivery trip simply replaces the customer delivery trip the transport "cost" can be the same, or even higher if larger freight vehicles replace car-borne shopping trips.

In Bristol the initiatives undertaken are known as "Local Collect" and "Locker Banks". "Local Collect" is a service specified at the time of ordering, whereby if the recipient is not at home the package is taken to the local post office instead of back to the depot. A card is left informing the recipient that the package is ready to be collected at the local post office at their convenience.

Plate 2.4 – 2.6: Royal mail local collect schemes pioneered in Bristol



Leaflets used for launch of the scheme

Locker banks in Bristol

The "Locker bank" system provides an unattended delivery solution to increase efficiency and convenience to the supply chain. The system is based on the deployment of secure electronic locker-bank technology in customer convenient locations. The carrier delivers the goods to a locker, the customer is sent a notification message, potentially by SMS or e-mail, and they are then able to collect their goods in their own time. To optimise locker usage, customers are not permanently assigned their own individual locker. Instead a locker is allocated dynamically for each parcel at the point of delivery according to its size.

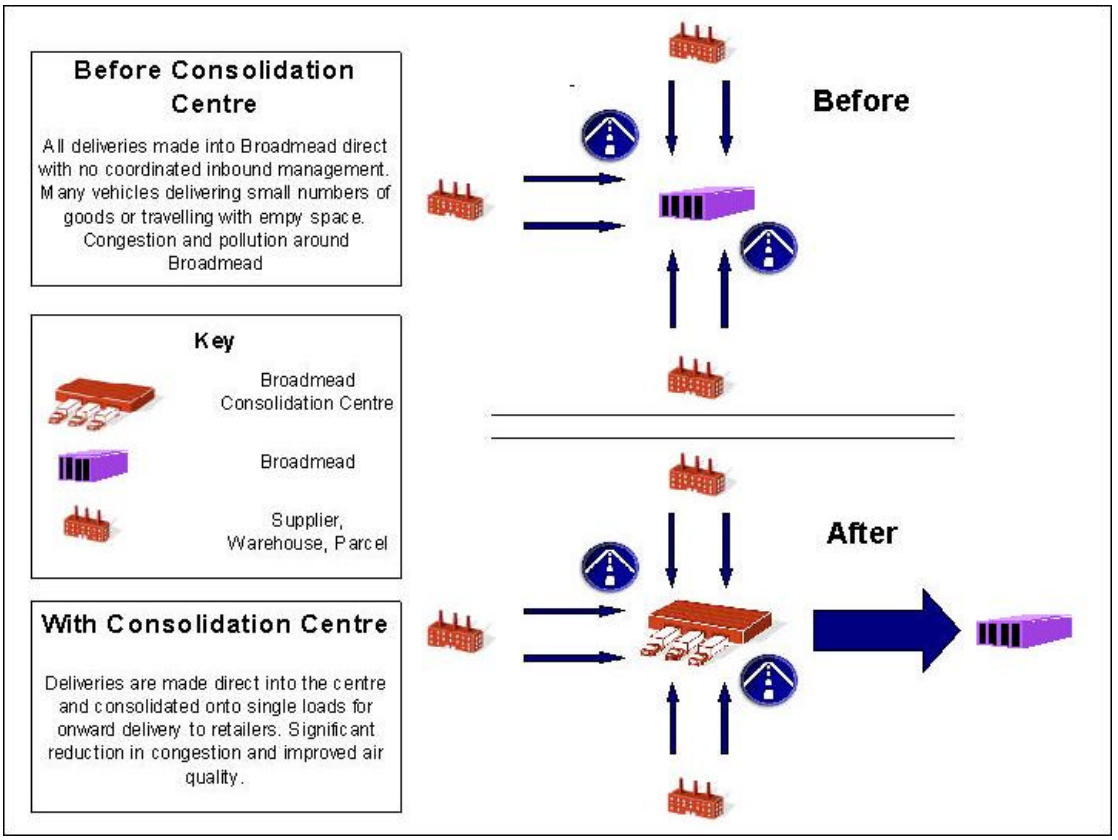
The locker banks are located in central Bristol postal wards which cover a significant geographical area and have attracted a large number of Rail Mail customers to the service. The trial scheme commenced in November 2003 and has had 450 users in the first six months; the service is now being rolled out nationally by the Royal Mail. The Council are currently investigating how the locker bank concept can be extended to include e-commerce.

Freight consolidation scheme

The City Council has developed a specification for a trial consolidation centre for Bristol. Logistics Company; Exel has been selected as the contractor to operate and manage the scheme for the trial period. Exel has previously established and run successful consolidation centres at Heathrow Airport and Meadow Hall shopping centre in Sheffield. In taking this project forward the City Council were keen to secure and has been successful in obtaining the full support of the Broadmead Board and Business West (formerly the Bristol Chamber of Commerce) and other stakeholders.

The diagram below helps to illustrate how it is envisaged the consolidation concept would work in Bristol.

Figure 2.8: The Broadmead Consolidation Centre



The focus of the scheme was aimed at the central retail area in Bristol known as Broadmead (see location map) and had a number of key aims:

- Lessen the number of delivery vehicles operating in the target area;
- Contribute to traffic reduction in the Broadmead;
- Reduce the conflict between vehicles in loading areas and delivery bays;
- Help to improve air quality in the city centre area;
- Contribute to a reduction in supply chain costs;
- Provide an enhanced delivery service for retailers in the target area;
- Offer retailers the chance to take advantage of value-added services such as waste and packaging collection, item level inventory management, and seasonal and peak storage facilities.

Broadmead covers an area of some 1.7sq km, incorporates approximately 324 outlets and offers a wide variety of retail choice to the consumer. An integral part of Broadmead is an enclosed mall style shopping complex spread over 3 floors known as The Galleries.

An initial step in the process was to understand the current freight distribution situation in Broadmead and to establish a set of criteria that would help to identify the type of retailer best suited to partake in the consolidation trial. This was achieved by firstly contacting the retailers with an introductory letter and summary of our intentions for the trial and secondly, conducting a

face-to-face interview with the retailers, which involved completing a questionnaire on their current delivery patterns

Some of the key information obtained from the questionnaire included:

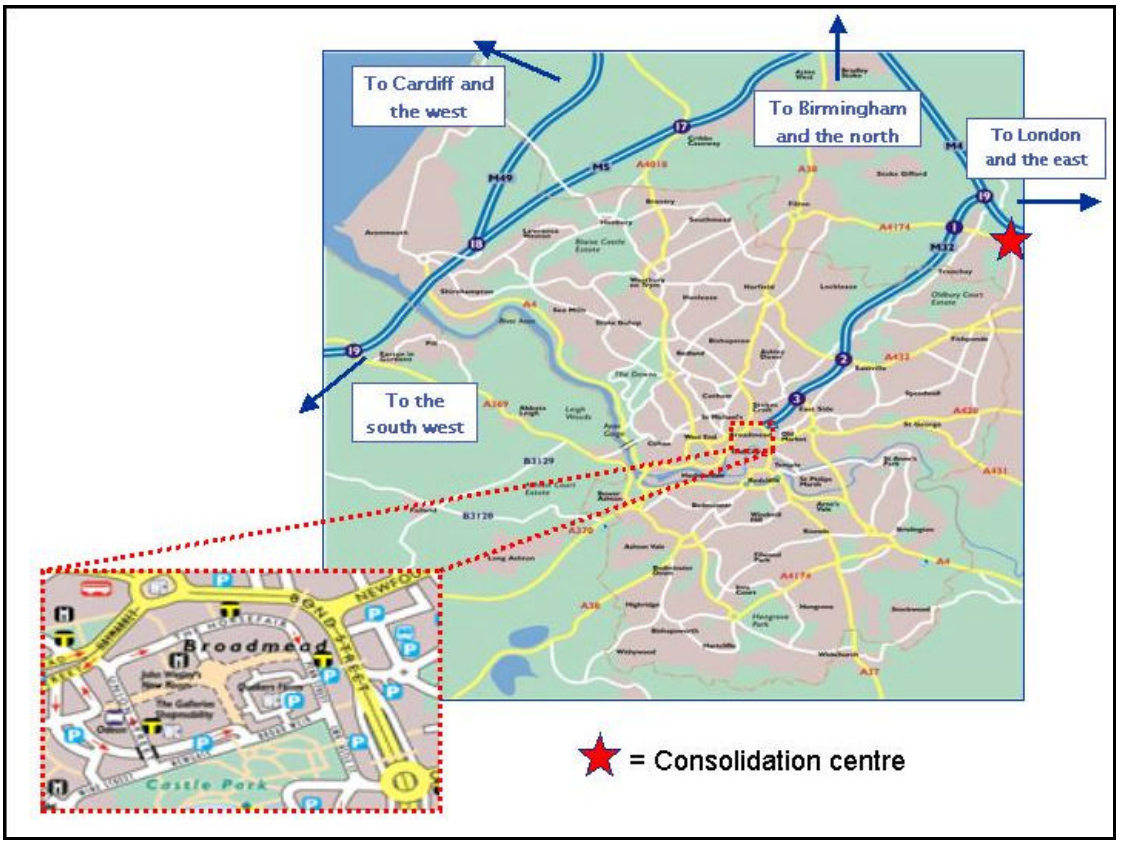
- Type of retailer and the goods they receive.
- How many deliveries they receive per week and how long a delivery takes.
- How the goods are packed when they arrive and where they are stored.
- Where the delivery originated and who delivered it.
- How rigid their current delivery schedule is.
- The average size of a delivery and any seasonal peaks or troughs.
- The type of delivery vehicle used and any problems incurred with the delivery.

In total 118 questionnaires were completed and then analysed. The analysis provided a list of retailers who could receive the maximum consolidation benefit and would be best suited to the trial. A further important factor was to identify retailers who had a previous distribution relationship with Exel as it was felt that this would help in the persuasion process. On this basis, the preferred type of retailer for the trial was established. The criteria specified goods that were non-perishable/ambient and excluded such commodities as gas canisters, cooking oil, kegs and very high value products. For the purpose of the trial these types of goods were excluded, however they could be catered for in such a consolidation environment.

The consolidation trial in Bristol will last for a total of eight months, approximately two months for the set up period and six months of operation. The set up phase began in April 2004 and operation began in May 2004. For the purpose of the trial the VIVALDI project is funding the scheme, meaning retailers are able to take advantage of using the consolidation centre free of charge for the six month operating period. The target number of retailers has been set at twenty; however, depending on the success of the scheme this may vary. It is anticipated the scheme will begin with a small number of retailers and build up to full capacity over a period of time. The main element of the set up phase involved the recruitment of retailers for the trial. Exel took a lead role in this exercise and carried out further face-to-face consultation with retailers, who have already been identified as potential participants, to ascertain their needs and provide an appropriate delivery solution. The set up period also included equipping the warehouse for operation, operative training, route familiarisation and vehicle acquisition. The vehicles used will be a minimum euro 3 standard engine and as part of the trial Exel aim to demonstrate a diesel/electric hybrid truck.

The consolidation centre is located to the North East of Bristol on the periphery of the city (see location map). The centre is ideally located to take advantage of the strategic road network and to maximise the benefits of the consolidation concept.

Figure 2.9: The location of the Consolidation Centre



The trial will be thoroughly monitored and evaluated in order to gauge its success at achieving the overall aims. A reduction in delivery vehicle movements of over 50% has been achieved at the Exel consolidation facilities at Heathrow and Meadow Hall. The opportunity to extend the operation beyond the trial period will be investigated as the scheme progresses and will involve input from the City Council, Exel and the retailers.

2.3 Rome

Rome's new schemes for city logistics have been allocated within the MIRACLES project as part of the CIVITAS I initiative. On the basis of the last surveys carried out by STA during 1999, provided before the access control system (ACS) was implemented, the following important results have been underlined:

- freight flows as the 10% of total flows entering in the city;
- 60% of emission and of pollution relevant to traffic are due to freight vehicles;

The historical centre Freight Limited Traffic Zone (FLTZ), which represents 1.1% of the surface of the city, absorbs 33% of the freight flows, with a flow of 25.000 freight vehicles/day. These numbers make the reorganisation of the freight service inside the FLTZ a priority for the Rome Administration.

Objectives

The task aims at achieving the following objectives:

- Re-organisation of the city logistic;
- Improve the dialogue between city authorities and goods operators;
- Facilitate the start up of e-commerce based transactions

Against the objectives the results expected are: improved coordination and cooperation between goods operator, including willingness to subscribe rates for demonstrator implementation, reduced delivery times (rationalised planning/enforcement); operational savings, energy & pollution reductions.

The simulation will offer the chance to assess the possibility of implementing integrated logistic freight delivery on full-scale. Furthermore, an increase of freight operators satisfaction index related to loading/unloading facilities by 10% is expected.

Measures

In close cooperation with Studio Integral, a new logistic plan will be developed in MIRACLES, in the FLTZ in Rome. The actions designed in the project, will cover:

- Localisation and establishment of logistic platforms and interchange centres serving the historical centre combined with time-window slot management;
- Incentives for using common deposits based on production lines to increase attractiveness of night load/unload operations;
- Closer collaboration with operators of new home delivery services, in order to collect the trips, vehicle-hours and vehicle-km data and increase;
- Incentives to increase loading coefficients of commercial vehicles
- Incentive for fleet renewal with low environmental impact (LPG, CNG) used for good delivery.
- Analyse and tuning of the delivery network to improve the logistic chain of the system, reducing vehicle hours and kilometres.
- Implementation of an online network to enable information-interchange regarding quantity of goods to deliver, delivery-time, e-commerce, etc. connecting the freight delivery platform with the retailers and the recipient of the freight.

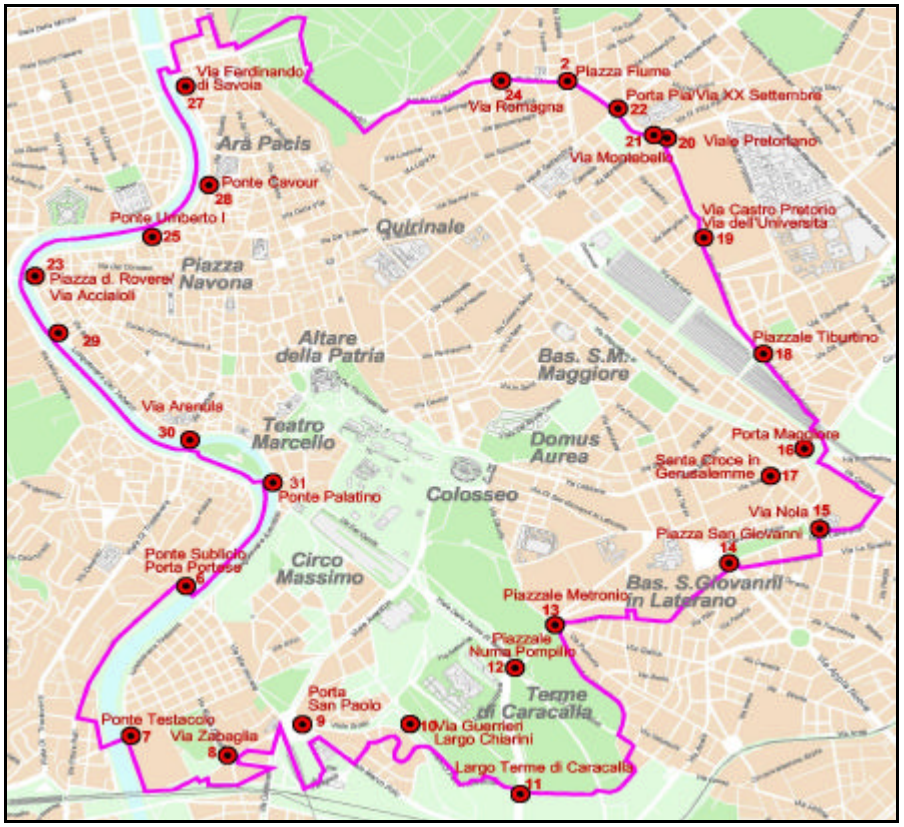
Innovative aspects

The most innovative aspects of the task are the implementation of the best practise initiatives developed in other EU cities, in the improvement of the logistic system solving conflicts between the several traffic flows (freight and passengers vehicles) and the large use of telematic technologies for freight delivery itineraries optimisation and to improve the dialogue between infrastructure and demand management.

Laboratory area

The laboratory area is the territory limited by the "Mura Aureliane" (pink line in the picture below) because of the deployment of commercial activities. The area lies on the District I, IX and III. The laboratory area is depicted in Figure 2.10.

Figure 2.10: Laboratory area of measure 9.



Key stakeholders and main actors

- The main actors involved in this measure are:
- Municipality of Rome, which is committed in the continuous improvement of mobility condition an in ruling all the activities with effects in the mobility, welfare and economy;
- ATAC S.p.A.: could be involved as Rome's Mobility Agency in the project coordination; the Atac S.p.A. mission includes a strong commitment in the mobility engineering and integrated government;
- Carriers and dealers associated, interested in a sustainable development of the internal distribution system;

Before MIRACLES

Surveys on goods deliveries were undertaken in the late '90s and the general framework for development of the transport plan was approved in year 2000.

The Administration has just launched "Studio Integral" project focused on freight distribution in the city centre.

The strategy of the project is based both on load/unload lots placed on the border of the FLTZ area and on policy actions oriented to incentive fleet renewal.

Studio Integral is included in the EU Project MEROPE, part of the INTERREG III B Program.

Measure design

The project will be carried out on the basis of the following elements:

- Logistic supply model
- OD matrix
- Indicators definition
- Do nothing scenario
- Critics elements analysis user needs analysis, general technological architecture drawing, impact survey operational plan
- New scenarios design
- Compared analysis of solutions project impacts and efficiency measurement

Each basic point of project design will be explained below.

1-Logistic supply model

The basic objective of this point is to have a detailed description of the urban logistic system, in terms of infrastructure, organisation and the performances of the fleet currently running in the city transportation network.

2-OD matrix

This action aims at assessing quantities exchanged between Origins and Destinations (O-D), the lines "of desire", the time distribution of the freight flows.

The analysis will be provided by disaggregating data by branch market.

The strategy to estimate the demand will be based on: information campaign to increase awareness of filling in questionnaires, the commitment of retailers associations: CONFCOMMERCIO, CONFESERCENTI, CNA, ANCO, direct contact for questionnaires distribution, to reward the answers with tools. The data to collect are:

- Transportation mode: by own account, by shippers
- Quantity of goods demanded

- Data on vehicle owned
- Data relevant provisioning scheme
- Frequency of provisioning
- The needs: desired consignment window, etc.

3-Indicators definition

In this case the aim is the definition of the proper parameters which describe the goods distribution. The choice of parameter depends on the "environments" that suffer the impacts. In this case, the most involved are: economy, logistics, environment and transportation. The definition of the indicators will the intervention scenario to be compared against the do nothing scenario.

4-Do nothing scenario: the current situation

This phase will simulate the current situation. This will enable the model to be calibrated in order to obtain the best analytical set-up and to carry out the value of indicators relevant to the current situation.

The current scenario will be projected into the next 10 years in order to assess the trend of the impacts.

5-Critical elements analysis

In this phase the bottleneck relevant to the three impact environments previously defined, will be measured /assessed. This will enable the basic elements to be re-designed in order to improve the systems performances.

The proper design will also take into account the user needs that will be identified in this phase through a dedicated analysis.

6-New scenarios design

During this phase, on the basis of the critical points detected in the current situation simulation, and on the basis of the best practice adopted all over Europe in this matter, a new scenario focused on the improvement of the present performances will be designed. In particular the key factors that will be taken as targets for improvement are as follows:

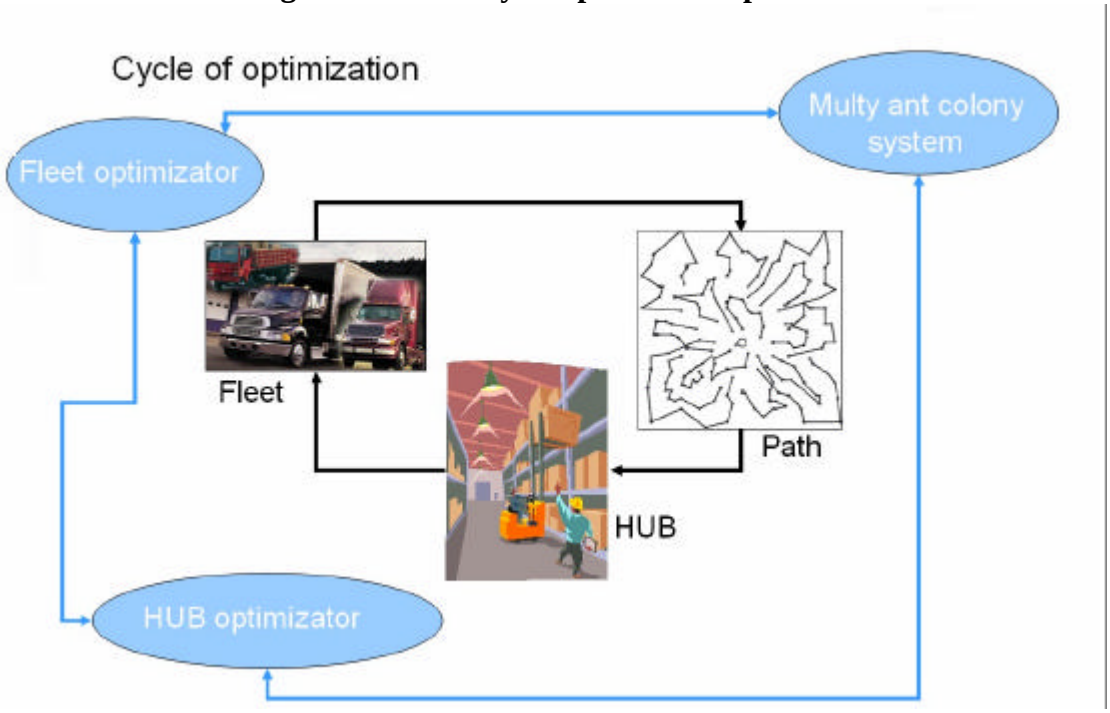
The fleet: how to reduce the fleet, how to increase the performance of vehicles, how to identify the optimal vehicle;

The paths: how to minimise the paths, how to re-design the paths on-line to face the intervening factors;

The hub and its position: where is the best location, and how many hubs?

The cycle of optimisation is depicted in Figure 3.2.

Figure 2.11: The cycle optimisation process.



The intervention policies will act on the following points:

Technology - in order to provide control and planning of distribution routes, booking and control of parking slots, managing emergencies in real time, supporting the on-time consignment;

Management model - in order to create a framework in equilibrium with the market and well placed with competitors;

Rules and regulation - in order to support any incentives to change.

A small set of future scenarios will be submitted to all the actors of the logistics chain – users and non-users in order to understand the most preferred scenario and to orient future implementation.

7-Compared analysis of solutions project impacts and efficiency measurement

During this phase the future scenarios will be compared through parameters against the do nothing scenario and among themselves in order to rate the projects ability to achieve the objectives.

Measure implementation

The implementation plan is coherent with the design previously presented. The most important activities will be described in detail in the following paragraphs.

Logistic supply model

The model will be carried out working in two different phases:

Zoning: the laboratory area will be divided into zones in order to support the system modelling. The zoning will be provided taking into account the features that characterise the logistics chain, such as the activities deployed in the area, the staff of each retailer and the branch market;

The graph construction: all of the transportation supply, with the infrastructure relevant logistic supply, lay bays, stores, parking for lorries, will be implemented in order to model the transportation network;

OD matrix

The goods moved between different origins and destinations will be assessed in order to obtain a value of what moves where. The assessment will be based on interviews submitted to the different actors of the distribution process, and on flow counts in order to estimate the vehicles moving in the laboratory area.

In this task the inquiries will be based on the following framework (Table 3.1):

Table 2.1 the framework of inquiries for OD estimation

Phase	Action	Target
I phase	Pilot flows measurement	To understand the phenomenon
II phase	Questionnaires to drivers	To asses the flows, the vehicle's performance, daily trend of demand
	Questionnaires to retailers	To asses quantities / items,
III phase	Ancillaries surveys to great distributors and shippers	To asses big quantities exchanged, and behaviours

The actions for OD estimation will be strongly related with the project Studio Integral, in order to realise an effective synergy between the projects operating good distribution optimisation.

The new methodology, which approaches to retailers to assess quantities provisioned and exchanged, will be implemented in this measure. The questionnaires to retailers will be submitted with the support of the class associations; in this way the awareness of the project will be boosted and this cooperation will increase the effectiveness of the results.

Indicators definition

The indicators will be defined on the basis of the similar projects implemented at other sites, and with the support of the methodology available in literature. A special agreement will be settled with a scientific partner (University, etc), if needed.

Do nothing scenario

The current situation simulation will be carried out, after a definition of the logic underlying the nowadays distribution process (the most linear path, the shortest path, how many return to the

store, the consignment way etc); the behaviour of all the actors in the process will be simulated with a different model, from the typical model based on time and cost attribute for "own account" drivers to logistic attributes model for carriers.

The development of the current scenario will be designed through a statistical projection of the indicators.

New scenarios design

At the moment, three basic scenarios have been outlined, using the parameters of technology, management model and rules and regulation: the scenarios will be described below. The details are only examples of possible choice.

Scenario 1

This is based on a small development of control system and of technology in order to curb implementation spending; furthermore this can be considered as a start up point for breaking load policy.

Technology: in the table below (Table 2.2), the equipment forecast in the scenario is described.

Table 2.2: The technology equipment framework of scenario

Transit Point	Access	On–board equipment	Upload-download parking
In-out flow telematic counter.	In-out Access control (e.g. Telepass technology)	On Board Unit to access + GSM to communicate	Parking area controlled by Municipal policy

Management model: the current management will be unchanged: this will give a soft impact to the scenario and will ensure a great acceptance of the re-organization of the distribution process.

Rules and regulation: in this scenario the access to the lab area and the parking will be ruled to control the proper use by the commercial operators and to protect parking by non operators.

As first analysis the advantages of this scenario consist in a low investment for a great acceptability by the user, due to unchanged market conditions.

Scenario 2

A stronger transit point has been identified. In this case almost three transit points have been foreseen; the scenario 2 can be considered as long term set-up. Support from a private entrepreneur has been foreseen as availability of their infrastructure and their commitment in policy design

Technology: in the table below (Table 2.3), the equipment forecast in the scenario is described.

Table 2.3 The technology equipment framework of scenario 2.

Transit Point	Access	On–board equipment	Upload-download parking
In-out flow telematic counter; Logistic station for journey optimisation	In-out Access control (e.g. Telepass technology)	On Board Unit to access + GSM to communicate + GPS for positioning and tracking	Parking area controlled by telematic technology (e.g. telepass)

Management model: the current management will be changed: a new competitor for internal distribution will be provided, equipped with an eco-compatible fleet; the competitor will be formed by carriers under a consortium agreement.

Rules and regulation: in this scenario the access to the lab area and the parking will be more strictly ruled: the access and the parking will be under fare, except for the consortium partners.

As first analysis the advantages of this scenario consist in strict access control and in a deep optimisation of loads and journeys.

The results will be a decrease of road congestion and environmental impact.

Scenario 3

Technology: in the table below (Table 2.4), the equipment forecast in the scenario is detailed described.

Table 2.4 the technology equipment framework of scenario 3.

Transit Point	Access	On–board equipment	Upload-download parking
In-out flow telematic counter; Logistic station for journey optimization Route control and parking booking	In-out Access control (e.g. Telepass technology)	On Board Unit to access + GSM to communicate + GPS for positioning and tracking	Parking area controlled by telematic technology (e.g. Telepass); technology for incremental fares.

Management model: the current management will be deeply changed: further the carrier's consortium for internal distribution, the parking slot will be put up for auction, implementation of a taxi freight service, and transport amongst transit-points.

Rules and regulation: in this scenario the access will be allowed to eco-compatible vehicles only, coupled with optimised load. The route and the parking slot (in terms of time and space) will be constrained.

The advantages foreseen consist of total control of the access, the maximum of journey and load, of the environmental impact and the road congestion.

Compared analysis of solutions, project impacts and efficiency measurement

The target of this phase consists in generating a set of solutions in order to support a choice of scenario that satisfies all of the different objectives.

The scenario assessment will be done through the Multi-criteria analysis; this methodology will allow considering non - monetary attributes, and all the features of such a complex system will be evaluated.

The Gantt chart of the task is shown in Figure 2.12 below.

Figure 2.12: Gantt chart of the task