

BESTUFS

Good Practice Guide on Urban Freight Transport



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Good Practice Guide on Urban Freight Transport

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Introduction



Urban freight transport

The urban freight transport problem

Until the mid-1990s, researchers and policymakers paid relatively little attention to the increasingly severe freight transport problems facing urban areas. More recently this has changed, and there is growing interest in the logistics of collection and delivery services in town and city centres in particular. Several projects in Europe and elsewhere have attempted to pinpoint the key urban freight transport problems and identify potential solutions.

However, the fundamental urban freight transport dilemma remains; the future success of town and city centres depends on their effectiveness in different, often conflicting dimensions. On the one hand, urban areas must be attractive places to live, work, shop and spend leisure time. In these respects they face increasingly severe competition, notably from out-of-town retail parks. If retailers and other employers and

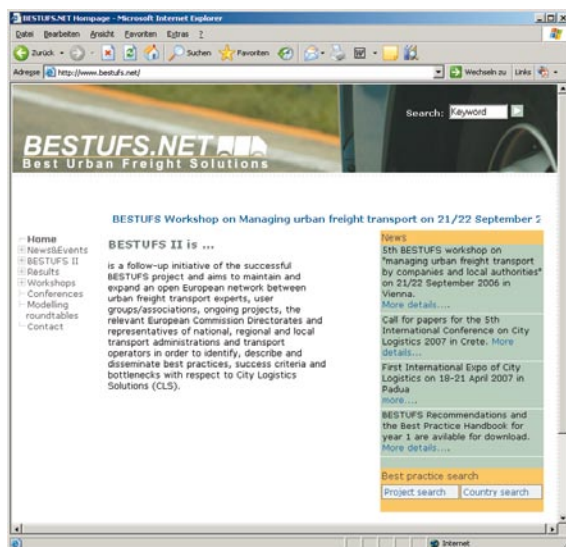
income generators are to retain confidence in town and city centres, efficient logistics systems must be provided so that commercial premises can be serviced in a cost effective manner. On the other hand, urban planners are very conscious of the need to maintain or improve the quality of city centre environments, to attract shoppers, tourists and workers and perhaps to persuade people to live there.

There is a popular perception that goods vehicles are detrimental to the urban environment, contributing significantly to the problems of congestion, pollution, safety and noise. It is not surprising therefore that conflict can arise between commercial interests and the environmental lobby as far as urban logistics is concerned.

What is BESTUFS?

The European Co-ordination Action on “BEST Urban Freight Solutions” (BESTUFS) is funded by the European Commission (DG Transport and Energy) and is active from 2000 until 2008. The main objective is to identify, describe and disseminate best practices, success criteria and bottlenecks of urban freight transport solutions. Furthermore, BESTUFS aims to maintain and expand an open European network between urban freight experts, user groups/associations, ongoing projects, the relevant European Commission Directorates and representatives of

national, regional and local transport administrations and transport operators. The project team organises regular workshops and conferences all over Europe and reports about interesting urban commercial transport related developments, demonstrations and events on European, national, regional and local level. BESTUFS reached a considerable attention from practitioners as well as from researchers and all information is publicly available via the web site www.bestufs.net.



BESTUFS Homepage

Why is urban freight transport important?

Urban freight transport is important for many reasons including:

- ▶ The total cost of freight transport and logistics is significant and has a direct bearing on the efficiency of the economy.
- ▶ The role it plays in servicing and retaining industrial and trading activities which are essential for major wealth generating activities.
- ▶ It is a major employer in its own right.
- ▶ The contribution that an efficient freight transport sector makes to the competitiveness of industry in the region concerned.
- ▶ It is fundamental to sustaining our existing life styles.
- ▶ The negative social and environmental effects of urban freight transport.



Urban traffic congestion

In most cases goods movements within an urban area in Europe are likely to be made by road because the trip distance will be relatively short and for reasons of connectivity. For shipments into and out of the urban area there is more scope for some degree of modal choice but road is still by far the dominant mode. Road freight vehicles clearly play an important role in the functioning of towns and cities, distributing goods to numerous locations that are vital to urban life. These vehicles undertake a number of types of urban movement including shipments of goods into an urban area for consumption, shipments out of an urban area of goods produced and waste materials, and collection and delivery operations within the urban area. Many goods are also temporarily stored in warehouses and storerooms within the urban area prior to use or sale.

The types and patterns of freight transport movement within an urban area will depend on a wide range of factors including:

- ▶ The location and type of industries present
- ▶ The supply chain structures of the companies in these industries
- ▶ Existing transport infrastructure including whether the urban area contains a major port or airport or rail freight terminal
- ▶ The location and extent of warehousing facilities
- ▶ The sizes and weights of goods vehicle permitted to operate in the urban area
- ▶ Access and loading regulations applied in the urban area
- ▶ The existing road traffic conditions
- ▶ Behaviour of customers (use of e-commerce, etc.)

BESTUFS approach to sustainable urban freight transport

The aim of a sustainable transport strategy is, “to answer, as far as possible, how society intends to provide the means of opportunity to meet economic, environmental and social needs efficiently and equitably, while minimising avoidable or unnecessary adverse impacts and their associated costs, over relevant space and time scales” (UK Round Table on Sustainable Development, 1996).

In addition to the positive impacts noted on page 5 existing freight transport systems in urban areas create a variety of negative economic, environmental and social impacts. These include:

- ▶ Economic impacts: congestion, inefficiency, and resource waste
- ▶ Environmental impacts: pollutant emissions including the primary greenhouse gas carbon dioxide, the use of non-renewable fossil-fuel, land and aggregates, and waste products such as tyres, oil and other materials
- ▶ Social impacts: the physical consequences of pollutant emissions on public health (death, illness, hazards etc), the injuries and death resulting from traffic accidents, noise, visual intrusion, and other



quality of life issues (including the loss of green-field sites and open spaces in urban areas as a result of transport infrastructure developments)

Sustainability policies can address economic, environmental and social objectives. The most effective sustainability freight transport policy measures are likely to be those that meet economic, environmental and social needs simultaneously; and so minimise trade-offs between objectives to reduce associated losses and costs.



BESTUFS approach to improving urban freight transport

Goods vehicle operators and drivers face a range of difficulties when carrying out freight operations in urban areas. These include:

- ▶ Traffic flow/congestion issues caused by traffic levels, traffic incidents, inadequate road infrastructure, and poor driver behaviour
- ▶ Transport policy-related problems including, for example, vehicle access restrictions based on time and/or size/weight of vehicle and bus lanes
- ▶ Parking and loading/unloading problems including loading/unloading regulations, fines, lack of unloading space, and handling problems
- ▶ Customer/receiver-related problems including queuing to make deliveries and collections, difficulty in finding the receiver, collection and delivery times requested by customers and receivers



Loading signs

It is important to distinguish between the two different groups who are capable of implementing changes to the urban freight system, namely:

Urban authorities

Changes occur through the introduction of policy measures that force or encourage companies to change their actions. Strategies available include improvements in signage and information provision, vehicle access and loading/unloading regulations, traffic management schemes, infrastructure developments, and road pricing.

Freight transport companies

They tend to implement initiatives that will reduce the impact of their freight operations, because they will derive some internal benefit from this change in behaviour. These benefits can be internal economic advantages from operating in a more environmentally or socially efficient manner, either through improved economic efficiency or through being able to enhance market share as a result of their environmental stance.

Instances of company-led initiatives include increasing the vehicle load factor through the consolidation of urban freight, making deliveries before or after normal freight delivery hours, the use of routeing and scheduling software, improvements in the fuel efficiency of vehicles, in-cab communications systems, and improvements in collection and delivery systems.

Some of these initiatives are technology-related, some are concerned with freight transport companies reorganising their operations, and some involve change in the supply chain organisation.



Why BESTUFS Good Practice Guides?

This BESTUFS Good Practice Guide builds on the previous Good Practice Handbooks produced in BESTUFS. It is intended to give guidance to anybody involved in, or interested in, the movement of freight in urban areas, when they are considering measures which may be implemented to improve the flows of products in urban areas and reduce the environmental impact of the operation. Three subjects are addressed in the guide that can be used by urban planners, freight transport companies and other supply chain parties to improve the sustainability of urban freight transport systems:

- ▶ Goods vehicle access and loading approaches in urban areas (Part I)
- ▶ The principal issues involved in last mile solutions (Part II)
- ▶ The principal issues associated with urban consolidation centres (Part III)

Further information can be found on the BESTUFS web site www.bestufs.net (mostly in English).



BESTUFS-References



PART I: Goods vehicle access and loading / unloading in urban areas

1. Efficient usage of infrastructure
 - ▶ Environmental zones/emission standard regulations
2. Guidance on measures for goods vehicle access and loading in urban areas
 - ▶ Signing
 - ▶ Lorry routes
 - ▶ Urban freight information and maps
 - ▶ On-Street loading bays
 - ▶ Nearby delivery area (ELP)
 - ▶ Urban consolidation centres
 - ▶ Vehicle weight and size regulations
 - ▶ Time regulations
 - ▶ Imposing and enforcing access and loading regulations
3. Technology in urban freight
 - ▶ Night delivery
 - ▶ Lorry lanes
 - ▶ Road charging systems
4. Environmentally-friendly vehicles
5. Enforcement issues
6. Joint working between public and private sectors

Efficient usage of infrastructure

The efficient usage of road infrastructure in urban areas is of high priority as in most cases urban road space cannot be increased. The management of the use of urban road infrastructure in terms of time and space is of fundamental importance to urban planners and results in various measures for regulating the use of this infrastructure. For example, some towns and cities already provide loading zones or bays for commercial traffic in order to improve the working conditions for transport operators and also to address the negative impacts that can be caused by delivery operations (e.g. double parking).

Over the last few years new experimental schemes have also been introduced. Information and communication technologies, together with mechanical access gates or variable message signs have become less expensive and offer a variety of new access schemes tailored to specific urban road infrastructures for goods delivery. Besides the provision of infrastructure, some cities also provide value-added services of loading zones to carry out the deliveries (e.g. the possibility for short-term storage or support in transshipment).

Efficient and reliable deliveries are required to support the urban economy, both by urban planners as well as by transport operators. Key issues that need to be taken into account in order to achieve efficient and sustainable approaches include:



Unloading in Copenhagen, DK

- ▶ Vehicles making the deliveries should impose as few social and environmental impacts as possible.
- ▶ Planners (from urban, city, municipal or local transport authorities), freight transport companies and other businesses must co-operate to ensure that these objectives are met.
- ▶ Urban planners may need to influence or control the movement of goods vehicles.
- ▶ Transport companies must optimise operational efficiency to reduce traffic congestion and environmental impact.
- ▶ The types of policy measures required depend on factors including:
 - The economic, social and environmental objectives of the urban authority
 - The level of freight transport and other road traffic
 - The size, density and layout of the urban area

The table shows approaches to bring about different goods vehicle access and loading objectives in urban areas that are discussed in this part of the Guide.

Objectives	Approaches availables
Gaining freight industry support for freight strategies and initiatives	▶ Freight transport partnerships
Improving journey time reliability of goods vehicles	▶ Telematics for urban goods transport ▶ Signing ▶ Urban freight information and maps ▶ Road pricing ▶ Allowing night deliveries ▶ Lorry lanes or no car lanes
Assisting the journey of goods vehicle drivers and reducing goods vehicle trips and kilometres	▶ Telematics for urban goods transport ▶ Signing ▶ Lorry routes ▶ Simplification & harmonisation of vehicle weight, size and construction regulations ▶ Urban freight information and maps ▶ Urban consolidation centres
Assisting freight transport companies at the point of delivering and collection	▶ Providing on-street loading bays ▶ Nearby Delivery Area (ELP) ▶ Urban consolidation centres
Reducing environmental impacts and the risk of accidents involving goods vehicles	▶ Vehicle weight, size and emissions standards regulations ▶ Time regulations for goods vehicle access and loading ▶ Allowing night deliveries ▶ Environmental zones ▶ Lorry lanes ▶ Infrastructure improvements ▶ Encourage use of environmentally-friendly vehicles ▶ Enforcement



Loading signs

Guidance on measures for goods vehicle access and loading in urban areas

Before introducing any new regulations for goods vehicles the urban authority must ensure that they are understandable and that they do not conflict with regulations in other local areas.

Signing

Clear and accurate road signs should be used by urban authorities to explain routeings and regulations to goods vehicle drivers in urban areas.

1. Road signs should be used to:

- ▶ Warn drivers about roads that may be inappropriate for their vehicle (e.g. narrow streets)
- ▶ Inform drivers about regulations on roads (e.g. vehicle weight, size, and time regulations)
- ▶ Inform drivers about on-street parking and loading regulations
- ▶ Direct drivers on advisory lorry routes
- ▶ Direct drivers to lorry parks and key industrial areas

2. Urban authorities should ensure that:

- ▶ The road signs convey the correct information
- ▶ The most up-to-date version of the road sign is being used
- ▶ The signs are easy to see and read and are in good condition
- ▶ There are sufficient signs with parking and loading information (so that drivers do not need to walk a long way to read the sign)

3. Urban authorities can work with owners and tenants in industrial zones to introduce new or improved information boards

4. Variable message signs can be used to convey real-time information



Lorry signs

Lorry routes

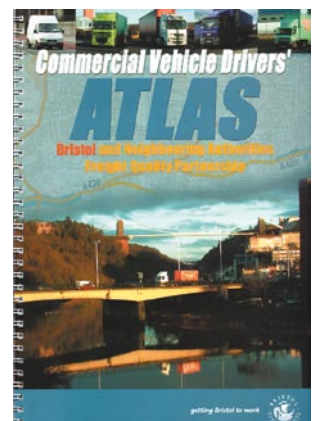
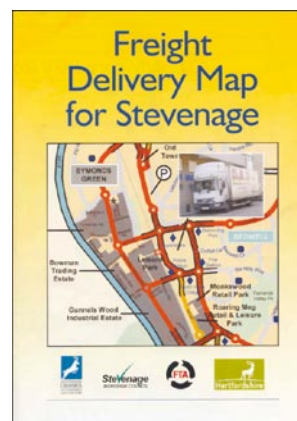
Advisory or statutory lorry routes can be used by the urban authorities to prevent goods vehicle drivers using unsuitable or sensitive routes. Whilst advisory lorry routes require little or no enforcement, statutory routes (which prohibit lorries from using non-designated routes) require enforcement, and are therefore more complex and expensive to implement and manage.

1. Different types of lorry route that can be considered include:

- ▶ Strategic route – a route using major roads for longer distance journeys between key locations or within major urban areas
- ▶ Zone distributor route – roads that link strategic lorry routes and which provide a route from a major road to a particular location or area
- ▶ Local access route – a route providing suitable access to a particular location

2. Factors to take into account in selecting suitable lorry routes include:

- ▶ Routes should contain all major roads in the area and links between them
- ▶ The routes should serve sites that are major generators of freight
- ▶ Roads used for lorry routes need to:
 - Be well maintained
 - Be sufficiently wide to accommodate heavy good vehicles
 - Involve no sharp bends and turns
 - Have sufficient overhead clearance
 - Have bridges capable of taking the weight or heavy goods vehicles
- ▶ Steep hills and sensitive land use areas (e.g. residential, high pedestrian activity etc.) should be avoided
- ▶ All planning authorities with responsibilities for roads in the urban area and the freight transport industry should be involved in the selection of proposed routes
- ▶ Clear and sufficient road signs and the dissemination of printed and electronic maps will be critical to successful introduction of the route



Freight delivery maps

Urban freight information and maps

Urban authorities can provide much valuable information to freight transport companies and drivers. Methods include the provision of maps and the use of real-time information.

Maps

1. Maps can show:
 - ▶ Lorry routes (both to the urban area and within it)
 - ▶ Information about weight, size, time access, loading regulations, loading bays and lorry lanes
 - ▶ Key buildings and locations such as industrial estates
 - ▶ Lorry parks
 - ▶ Sensitive areas to be avoided
2. Maps can be produced in paper and electronic form. They can be distributed by:
 - ▶ Local trading companies
 - ▶ Freight transport companies
 - ▶ Freight trade associations
 - ▶ Motoring associations
 - ▶ Urban authorities
3. Some urban authorities have produced entire freight atlases of their areas for goods vehicle drivers.

Real-time information

1. Web based information on traffic problems and road works can be made available.
2. This can be linked to GIS mapping systems to make identifying relevant information as easy as possible (for example the London Traffic Alerts Service provided by Transport for London).
3. Information boards at lorry parks can be used to provide:
 - ▶ Essential local information
 - ▶ Contact information for local help and assistance
 - ▶ Printed maps



Example FALK Trucker Atlas



On-street loading bays

On-street loading bays can be provided by urban authorities in locations that generate goods vehicle trips but do not have suitable off-street loading facilities – such as business districts and retail areas. They provide dedicated space for goods vehicles to load and unload.

- ▶ Loading bays can either be unrestricted (allow goods vehicle loading and unloading at all times) or can have time regulations applied to them.
- ▶ They can be designed for one or several goods vehicles and should take account of the size of vehicles that are likely to use them.
- ▶ They are most useful when there is competition for kerbside space between goods vehicles and other road users.
- ▶ They can reduce traffic congestion.

Example of loading zones in Aalborg

- ▶ Loading zones were introduced in a narrow pedestrianised area. Before their introduction one vehicle unloading blocked other vehicles.
- ▶ Each of these loading zones can accommodate several vehicles, and allow other goods vehicles to pass easing traffic congestion during the early morning delivery window.
- ▶ Local shopkeepers agreed to wait until 11.00 before placing showcases in the streets and rolling out sunblinds.

Nearby delivery area (ELP)

In Bordeaux, a system was established in 2003 to ease the delivery of goods in the city centre, involving the creation of 'nearby delivery areas' (Espace de livraison de proximité - ELP). The ELP approach comprises the installation of an urban transshipment platform on which dedicated personnel provides assistance for the dispatching of consignments for the last mile (inner city). Goods are unloaded from incoming vehicles, and can be loaded onto trolleys, carts, electric vehicles and bicycles for the final distribution leg. This approach can also be used to provide additional services (such as home delivery, short-term storage etc.).



ELP in Bordeaux

Example: Nearby delivery areas in Bordeaux

- ▶ The ELP is intended to make the delivery of goods to the city centre easier and reduce traffic congestion, noise and pollution associated with deliveries.
- ▶ The ELP is a collaboration between freight transport companies, the Chamber of Commerce of Bordeaux and the Bordeaux metropolitan authority.
- ▶ ELP is an area of street space that has been dedicated to goods vehicles for the loading and unloading of goods destined for the nearby shops.
- ▶ This space is reserved and controlled by up to two members of staff who can also help goods vehicle drivers to deliver their goods to the shops using trolleys.
- ▶ The space can accommodate 3 to 5 delivery vehicles at once (it is about 30 metres wide).
- ▶ The ELP operates from Monday to Friday between 09.00 and 17.00 and on Saturday between 09.00 and 11.00.
- ▶ Initial results shows that the ELP system is very popular with freight transport companies because it offers the guarantee of an available and secure unloading area close to the commercial area in the city centre.
- ▶ A second ELP was set-up in Bordeaux in 2005 and a third in 2006. ELPs are also being established in other French cities (e.g. Rouen).

Urban consolidation centres

An Urban Consolidation Centre (UCC) is defined as: “a logistics facility that is situated relatively close to the area that it serves (be that a city centre, an entire town or a specific site) from which consolidated deliveries are carried out within that area.” (UCCs are addressed in detail in Part III of this guide.)



UCC in Germany - Deutsche Post AG

Vehicle weight and size regulations

Regulations are frequently put in place by urban authorities for safety and environmental reasons to prevent vehicles above a certain weight, size (length or width), or number of axles from using either a particular road or a particular area (i.e. several connected roads). Reasons for introducing this type of regulation include:

- ▶ A narrow road
- ▶ A weak bridge
- ▶ A low bridge
- ▶ Overhanging buildings
- ▶ To improve the amenities of local residents

Regulations often exempt vehicles that need to access the road or area to make a delivery. Weight, size and time regulations often conflict with those of other municipalities. A careful consideration should be given to harmonisation.



Weight and time regulations

Time regulations

Time regulations can be imposed on goods vehicles in a particular road or urban area in two ways:

- ▶ Time regulations on vehicle access
- ▶ Time regulations on vehicle loading

Access time regulations

Access time regulations for urban goods transport are the most important and most commonly used instrument used by urban planners to influence urban goods transport. Access time regulations can be used to prevent vehicles from entering a road or area at particular times of day. They can be imposed on all road vehicles or just on goods vehicles (they can also be imposed only on goods vehicles of a certain size or weight). These regulations are usually imposed on roads or areas that are very sensitive to road traffic. Examples include:

- ▶ Pedestrianised shopping areas – often all vehicles are banned during the main shopping hours
- ▶ Residential streets – goods vehicles above a certain weight or size are sometimes banned from a road or urban area at night to prevent disturbance, or during the day near to a school to prevent accidents
- ▶ Entire urban areas – weekend bans are imposed on goods vehicles in some European towns and cities. Night bans have been imposed on half of French cities with more than 100,000 inhabitants.



Loading time regulations

Loading and unloading time regulations may be applied to the kerbside. These restrict the times at which vehicles can stop at the kerbside for loading and unloading activities. These restrictions must balance the needs to use the space for loading and unloading and other activities such as parking.

- ▶ Good kerbside management can enable better use of restricted space and limit congestion in the area.
- ▶ Details of the regulations are usually displayed on well sited traffic signs.
- ▶ The regulations should be consistent and meet the requirements of local businesses.



Imposing and enforcing access and loading regulations

It is important that there is clear signage informing drivers of the regulations applying in any area. Camera enforcement can also be used in order to deter drivers from breaking the law and for identifying any that do.

- ▶ Physical barriers may also be used. These include:
 - Retractable bollards (may be computer controlled to allow access to permitted vehicles).
 - Width restrictions (suitable alternative arrangements may need to be made for access by emergency vehicles or other permitted users).

- ▶ Whilst the enforcement of regulations by staff may be expensive its cost may be offset by the revenue generated from fines imposed on those breaking them (it takes 50 agents in Barcelona to enforce 5,000 loading bays in the city).
- ▶ Urban planners should carry out feasibility work to ensure that the advantages of implementing the access or loading regulations outweigh the disadvantages (taking into account the economy, society, and the environment).



Retractable bollards



Access control

Environmental zones / emission standards regulations

A “Low Emission Zone” (LEZ) or “Environmental Zone” is an area that can only be entered by vehicles meeting certain emissions criteria. They may be based on:

- ▶ A geographical area
- ▶ A time period
- ▶ Vehicle emissions standards
- ▶ Vehicle types



Examples of Low Emission Zones in European cities

1. LEZs have already been successfully implemented and run for several years in several Swedish cities including Stockholm, Gothenburg, Malmö, and Lund. These LEZs:
 - ▶ Were introduced to improve air quality and reduce noise
 - ▶ Can capitalise on EU vehicle legislation for road vehicles which sets progressively tighter emission limits
 - ▶ Target all diesel vehicles over 3.5 tonnes gross weight
2. An LEZ also exists in Rome. LEZs are also planned in London, Madrid, Paris, Copenhagen, Milan and urban areas in Norway.
3. Access regulations based on air or noise emission standards can be imposed without defining a specific LEZ area.

Night deliveries

Inner-city night delivery is the delivery to retailers and shops in the inner city area during the night hours when the city usually is quiet and inactive. Typical times are between 22:00 and 06:00. In several cities such as Barcelona or Dublin, successful experiences with trials on night delivery are made replacing a (higher) number of vehicles operating during day time by a (fewer) number of vehicles operating during night time.

In most European cities there are night time regulations with some notable exceptions such as Paris. Two types of night-time regulations may be introduced:

- ▶ Time regulations on deliveries and collections to and from a particular building (e.g. a retail outlet, office or factory)
- ▶ Regulations on goods vehicle movement in a part or the whole of an urban area

There may be a number of consequences for freight transport companies due to not allowing night time activities:

- ▶ More vehicles may be required to make deliveries in a shorter delivery window
- ▶ Deliveries may have to be made in periods of greater congestion (reducing vehicle & driver productivity and increasing fuel consumption)
- ▶ Journey times may be slower and less reliable
- ▶ The supply chain may be less efficient
- ▶ Total supply chain costs may be increased

Points to consider in relation to night time delivery regulations:

- ▶ Restrictive night-time regulations can result in an increase in total costs within the supply chain. By being allowed to make night-time deliveries, some companies can improve the efficiency of their operations and improve sales.
- ▶ Night time delivery regulations should mainly focus on noise issues.
- ▶ Well defined noise standards for night time operations could bring significant benefits to local residents increasing the acceptance of night time transport operations.



Example: The PIEK programme in the Netherlands.

Deliveries to shops are often made in the evening, early morning or during the night. Many people in Dutch towns and cities live close to or above shops. This has resulted in more people being subject to noise disturbance from delivery activity. A law was set up to address noise nuisance and states that the noise emission generated when loading and unloading goods must comply with strict noise emission standards. Research has revealed that many loading and unloading activities exceed the noise standards of 60 and 65 dB(A) proposed during the evening and night.

The Dutch government collaborated in the PIEK programme to help provide the market to develop techniques and equipment to meet the noise standards in the order. The PIEK programme consists of ten main projects: (i) transfer of knowledge to relevant companies, (ii) encouraging 'quiet' behaviour, (iii) optimum loading / unloading locations, (iv) quiet distribution vehicles up to 7.5 tonnes, (v) quiet distribution vehicles exceeding 7.5 tonnes, (vi) quiet transport-refrigeration installations, (vii) quiet on-board forklifts, (viii) noise reduction of rolling containers, pallet trucks, and hand pallet trucks, (ix) noise reduction to shopping trolleys, and (x) electric propulsion or a combination of electric propulsion with diesel or gas propulsion.

Lorry lanes

1. Road lanes designated for lorry use could help to reduce delay and improve journey time reliability. The following options exist:

- ▶ Dedicated lorry lane - lane only for goods vehicles
- ▶ Bus and lorry lane (also called "no-car" lanes)
- ▶ High occupancy vehicle lane – lane for buses, goods vehicles and cars with a specified number of occupants
- ▶ Bus lanes – which may be used by goods vehicles for unloading in specific locations but not for travel (e.g. the "Lincoln" delivery bays implemented in bus lanes in Paris)

2. Issues to consider in thinking about the use of lorry lanes include:

- ▶ Dedicated lorry lanes are often used on hills (known as Crawler lanes) and to direct lorries to industrial areas avoiding sensitive areas.
- ▶ "No-car" lanes can provide a viable alternative to a bus only lane in situations where bus usage is insufficient to justify an exclusive bus lane.
- ▶ Lanes available to all goods vehicles are easier to enforce, compared with those available to selected types or sizes of vehicles, but may result in too many vehicles using the lane to improve journey times and reliability.
- ▶ In designing lanes that permit a mix of vehicles to use them, urban planners need to establish how well these vehicles will interact with each other on the section of proposed road.



Road pricing systems

Several examples of urban road pricing schemes exist in European cities. The best known examples are infrastructure charging schemes for single tunnels or bridges, e.g. the Öresund bridge or the Warnow Tunnel in Rostock. One of the first successful examples of urban pricing is from the city of Trondheim. A very successful recent example is the London congestion charging scheme. Three main objectives are often followed in urban pricing schemes:

1. To cover construction and maintenance costs of urban infrastructure
2. To influence the transport demand for inner city transport processes
3. To charge external costs from transport processes

Example of urban road pricing: Tolls in Norwegian cities

Toll systems were introduced in Trondheim in 1983 and Oslo and Bergen in 1986.

- The tolls were intended to provide funding for road improvement rather than manage traffic levels.
- The schemes are operated by private companies partially owned by the city councils.
- The toll for vehicles under 3.5 tonnes is 1.5 - 2 euro and 3.5 - 4 euro for vehicles over 3.5 tonnes.

Example of urban road pricing: Congestion charging scheme in London

- ▶ A congestion charging scheme was introduced in central London in February 2003. It is operated on behalf of the urban authority by a private company.
- ▶ The priority of this scheme is to reduce traffic congestion and the related environmental impacts. Any surplus revenues generated are invested in transport in London.
- ▶ Drivers entering the charging zone were initially charged £5 (approx. 7.50 Euro) a day to drive within the zone between 07.00 and 18.00 on Mondays to Fridays. This was increased to £8 (approx. 12 Euro) in 2005. Goods vehicles pay the same daily charge as other vehicles.
- ▶ Exemptions and special tariffs are available for licensed taxis, vehicles carrying disabled persons, emergency service vehicles, motorbikes, and alternatively-fuelled and electrically-powered vehicles that attain strict emission standards.
- ▶ The charge can be paid for one day, one week, one month or one year by telephone, post, internet or at retail outlets.
- ▶ Drivers are not required to display a licence – but their vehicle's registration number is entered on a database.
- ▶ Number plates of vehicles entering or circulating within the charging zone are observed by a network of 700 fixed and mobile cameras. These numbers are then checked against the database.
- ▶ If the keeper of a vehicle observed in the zone but not shown on the database has not paid the charge by the next day they receive a penalty charge of £50 - £150 (approx. 75 - 225 Euro).
- ▶ Since the scheme was introduced traffic volume entering the zone has fallen by 18%, delays are estimated to have reduced by 30%, and there has been a broadly neutral impact on overall business performance in the zone.

Congestion charging sign
on road surface



Technology in urban freight

ITS for urban goods transport

There are various supporting technologies for ITS, including vehicle telematics (on-board units), global positioning systems (GPS), smart cards, and video messaging signs that can be linked to traffic management systems and/or to freight transport management systems. The demand for such systems has been growing in recent years. These systems are used to improve route and trip planning as well as services provided to customers (e.g. reliable estimated time of arrival). Many of these systems have been initiated and operated by urban authorities as part of the traffic management systems used to improve the traffic situation within the urban area (e.g. by traffic regulations or access control). Privately-operated freight transport management systems are mainly applied to optimise logistics and distribution processes, hence contributing to a cost optimisation of the supply chain.

ITS can be divided into:

- Freight transport management systems (e.g. fleet management systems and tracking & tracing systems)

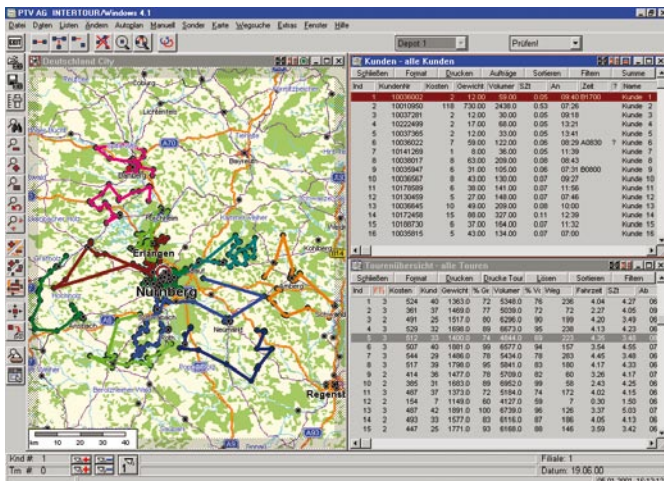


Traffic management center, Berlin

- Traffic management systems (e.g. access control systems, traffic management and information systems)

Freight transport management systems

- Computerised Vehicle Routing and Scheduling: Efficient planning by vehicle operators to plan vehicle loads and journeys
- Navigation systems and traffic control: Used to provide specific routing guidance and real-time information about vehicle location, traffic incidents and changes in customers requirements



Tour planning with PTV Intertour

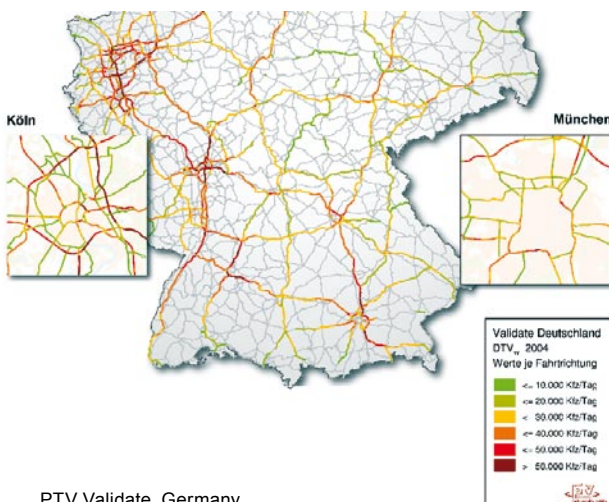
- In-Cab Communication systems:
These allow the driver to communicate with their company planners and also with customer by voice or computer.
- Slot booking systems:
Used to co-ordinate and plan goods vehicle arrivals at major sites generating large flows.

The use of ITS and telematics systems can help companies to reduce their operating costs, improve journey reliability and time, and deal efficiently with unexpected incidents. Although the use of such systems is relatively limited among logistics companies at present, it is growing.

Traffic management systems

1. Urban traffic management and control (UTMC) systems:

UTMC systems help to improve traffic flow, to reduce journey times and delays, and to improve road safety. In Germany there are several examples of traffic management centres that are working on a fully operational and commercial basis. Data on the traffic situation are collected and processed. Examples of urban traffic management centres include Berlin, London and Paris. In particular UTMC can involve the use of a range of technology approaches including:



PTV Validate, Germany



Mobile truck navigation

- Urban Traffic Control (UTC) systems to co-ordinate traffic signal timings
 - Variable message signs (VMS) to communicate information to drivers via roadside signs
 - Car park occupancy sensors
 - Journey-time measurement systems via automatic number-plate recognition technology
2. The provision of mapping or route guidance:
- Can encourage goods vehicle drivers to use the most suitable routes.
 - Information provided can include:
 - Preferred routes
 - Vehicle height and weight restrictions
 - Access and loading regulations
 - Locations of goods vehicle parks



Vehicle access control

3. Automated vehicle access controls:

- ▶ Can activate rising barriers or bollards
- ▶ Access can be managed using CCTV, smartcards or wireless communications
- ▶ Where barriers are considered visually intrusive, automatic enforcement systems such as number plate recognition can be employed to ensure compliance

Environmentally-friendly vehicles

Most European cities are confronted with problems of air- and noise-pollution caused by road traffic. Air pollution is linked to a range of health problems including premature mortality, aggravation of respiratory and cardiovascular disease, asthma, bronchitis, and decreased lung function. Many studies also link exhaust gases to increased incidence of lung cancer. Noise is also becoming a major problem in urban areas.

The introduction of environmentally-friendly vehicles (EFV) into urban transport is most common in Western European countries at present. Public authorities have made resources and financial support available to encourage innovative freight transport and logistics concepts including EFV and new vehicle technologies in urban areas, by a mix of incentives and regulations.



Environmentally-friendly lorry



Main types of EFV include:

1. Alternative fuels

- ▶ Including LPG, CNG, Bio-Fuels and Hydrogen-based-technology
- ▶ Technologies and fuels already exist but significant market penetration has yet to be achieved

2. Diesel and petrol

- ▶ Euro engine emissions standards for goods vehicles are helping to significantly reduce emissions
- ▶ Particulate traps can be fitted to vehicles to capture particulates before they enter the atmosphere

3. Electric and hybrid vehicles

- ▶ Electric vehicles are especially suitable to reduce noise emissions and produce no exhaust emissions

The promotion and usage of EFV in urban freight transport has been encouraged by several urban authorities and national governments. Many municipal and national activities have started to encourage the use of EFV in urban freight transport. National programmes like the PIEK-programme or the French “National Programme on Goods in Cities” have evidenced that national programmes and support measures can lead to successful results.

The following table shows the types of EFV initiatives that exist or have been trialled in urban freight transport.

Environmentally-friendly vehicle initiatives in urban freight transport

EFV initiatives in urban freight	Examples
1. Informal partnerships: urban authorities, transport operators and urban businesses have come together to set up sustainable solutions based on a more environment-friendly form of urban freight transport	► The PIEK and DEMO programmes in the Netherlands, and night deliveries using silent vehicles and equipment in Barcelona
2. Tax reductions and advantages for the use of EFVs, alternative fuels, and the installation of modern filter technology on diesel vehicles	► Lower rates of vehicle tax for goods vehicles that meet the required emissions criteria in UK & France ► Lower tax rates for alternative fuels for example in the UK, France and Switzerland
3. Freight transport operators that have used EFVs for urban deliveries, often as part of research projects co-funded by public authorities	► Hermes Logistic Group in Germany ► La Petite Reine in France ► L'Oreal/Gefco/EDF experiment with electric vehicles ► Monoprix/GEODIS experiment with CNG vehicles
4. Special permission to access parts of the urban area such as shopping and business districts for vehicles that meet certain emission standards	► Environmental zone (Low Emission Zone) scheme in Sweden ► ELCIDIS project in La Rochelle Urban Consolidation centre in France which uses electric vehicles ► The Copenhagen trial in Denmark ► CUDE project in Malaga, Spain
5. Road pricing schemes that provide discounts and exemptions for goods vehicles that meet certain emissions standards	► The London Congestion Charging Scheme in the UK ► The Heavy Vehicle Fee (LSVA) in Switzerland
6. Funding of innovative research projects and trials in the field of urban freight transport by using EFV	► Programme National Marchandises en Ville in France (experiments of electric and CNG delivery vehicles in French cities - with financial support from ADEME) ► "Green truck experiment" under financial support of the ADEME-project and promotional support of the city of Paris



Emission-free environment

1. There are currently several obstacles to wider use of EFVs. The main failure factors that have been assessed are:

- ▶ Higher operational costs of EFV
- ▶ Low capacity/volume of electric vehicles
- ▶ An insufficient filling station (loading station) infrastructure
- ▶ Reliability problems and defects resulting in high maintenance requirements of EFV

2. Most EFV projects are currently supported by public financial budgets.

3. Private operators tend to only change their fleets if:

- ▶ There is a clear financial benefit for the company
- ▶ There is an adequate alternative fuel station network
- ▶ There are marketing benefits for the company

▶ The company has a strong commitment to environmental issues

▶ Suitable vehicles are available

4. Moreover, the success for promoting EFV often depends on framework conditions like:

- ▶ Emission and environmental regulations and standards
- ▶ Incentives like tax reduction (fuel price development)
- ▶ Filling station network availability
- ▶ Individual transport strategy and deployment of vehicles

A combination of incentives and restrictions as used by public authorities in Germany, France, the Netherlands and other European countries has shown that developments in EFV have started. However, only if the operating cost and reliability of EFV improves compared with traditional fuel technologies will a large-scale introduction of EFV be achieved. Public funding and support measures can help to foster and promote EFV.



Police control

Enforcement issues

“Enforcement” refers to activities that are carried out by administrative bodies to ensure that traffic laws and regulations are observed by road users. Enforcement activities can only take place on the basis of legal regulations that offer the possibility to take account of offenders through penalties and the legal system. Typically, some urban freight transport policy measures are advisory, while others are statutory.

1. Advisory measures suggest a possible course of action to drivers, but there is no need to ensure that drivers comply, so there is no need for enforcement.
2. Statutory measures are introduced with the intention of ensuring that drivers comply.

Many traffic regulations require enforcement to prevent drivers ignoring them. This is especially true of vehicle access and loading regulations, speeding regulations, and statutory lorry routes. However, enforcement of traffic regulations can require significant resources and can be very expensive.

In addition, bodies responsible for enforcement may not see it as their priority. Traditionally, much enforcement has involved police officers patrolling the streets. However this is changing:

- In some countries, power for the enforcement of certain traffic regulations has been passed to the urban authorities that can earn significant revenue for transport investment from this work.
- Greater use of technology (such as roadside cameras and databases) is being made to enforce traffic regulations.

The following table shows the points that should be considered about enforcement when developing freight transport measures in an urban area.

Points to consider about enforcement when developing urban freight transport measures

1. It is very important to consider the issue of enforcement at the start as this can play a key role in deciding the best measure to implement.
2. Whenever possible, freight traffic schemes should be designed so as to minimise the need for enforcement.
3. Freight transport measures that do not require active enforcement (such as advisory routes, width limits, bollards and other barriers) will be much cheaper than those that do need enforcement.
4. Effective enforcement of traffic regulations can make a major contribution to driver compliance but can be very expensive.
5. Technological solutions are making it possible to carry out effective enforcement without needing a large staff to carry out patrols.
6. Producing traffic regulations in conjunction with the freight transport industry will also help to achieve compliance.
7. Bodies such as the police that will be responsible for enforcement should also be included in discussions about urban freight traffic schemes at an early stage.
8. Providing information about traffic regulations to goods vehicle drivers, freight companies and their customers can help to improve compliance with the traffic regulations.
9. Clear and accurate road signs are needed for drivers to understand the traffic regulations.
10. Compliance rates with urban freight traffic regulations should be monitored.



Urban transport



Joint working between public and private sectors

Various examples of public-private partnerships (PPP) exist in urban freight transport in recent years. PPPs in urban freight transport have been used for the financing, building and operation of infrastructure projects, as well as for the negotiation and setting of framework conditions and agreements between the public and private sectors. An example of such partnerships are the city logistics schemes that were heavily promoted by the public sector in some countries in the early 1990s.

However, most of these city logistics schemes have since failed. The main reasons for these “failures” were that the profitability of such approaches were overestimated and the critical mass on consignments to be bundled for city distribution was never reached. Hence, most projects vanished or the activities were taken over by one private operator. The lesson learned from these city logistics experiences was

that PPPs which do not provide sufficient commercial benefits are not sustainable over time. More recent efforts to establish working relationships between the public and private sector to address urban freight issues have proved more successful – the example of Freight Quality Partnerships in the UK is provided below.

Obviously, the initiation and maintenance of a PPP is a complex task. However, bringing both sides together can result in mutual benefits, large synergy effects and efficiency gains especially for tasks which are not core duties of the public sector.



Within a co-operative partnership the government (local and national) is expected to play a responsible role for many reasons including:

- ▶ Coping with negative externalities (e.g. road congestion and air pollution)
- ▶ Co-ordination with other public purposes such as city planning, regional economic development and environmental management
- ▶ Cross-border administration

Presently, national governments and urban authorities do not have a good track record in involving urban freight transport actors in decision-making. Participation in policy-making has been often kept to a limited consultation exercise.

Example from the UK

An example on a more inclusive approach to PPP has been developed in the UK. This has included:

- ▶ The publication of documents that outline the government's determination to recognise problems caused by and faced by urban freight transport.
- ▶ Urban authorities being encouraged by the national government to focus greater attention on freight transport and to include consideration of urban distribution and sustainability in Local Transport Plans (LTPs) and to establish Freight Quality Partnerships (FQPs)

Freight Quality Partnerships (FQPs)

- ▶ FQPs are a means for urban authorities, businesses, freight operators, environmental groups, the local community and other interested stakeholders to work together to address specific freight transport problems.
- ▶ FQPs provide a forum to achieve best practices in environmentally sensitive, economic, safe and efficient freight transport.
- ▶ FQP partners exchange information, experiences and initiate projects regarding urban freight transport.
- ▶ FQPs have been formed by many local authorities in the UK.

In addition to FQPs in the UK, the "Paris Distribution Partnership" was recently established.

The following table shows the suggested action points for setting up an FQP in the UK.

Suggested action points for setting up a Freight Quality Partnership in the UK

Action points for urban planners before setting up an FQP	Action points in developing an FQP
1. Through consultation, develop a distribution strategy 2. Consider how an FQP could help you deliver your distribution strategy 3. Promote the benefits of the FQP - internally to secure the necessary commitment and externally to attract partners	1. Identify problems and collect the necessary information to clarify their precise nature 2. Assess the various solutions and reach consensus on what should be done 3. Draw up a timed action plan for delivering the solutions, identifying who is responsible for each task by when
Action points in setting up an FQP	Action points for maintaining momentum in an FQP
1. Set initial objectives that are specific, measurable, achievable, realistic and timed 2. Appoint a Freight Champion who will take responsibility for the FQP within the Authority 3. Identify and recruit partners that help achieve your objectives 4. Establish the FQP's management structure including a chair and secretariat 5. Decide when, where and how often you should meet 6. Identify funding sources and seek the necessary endorsement 7. Try to pre-empt potential problems	1. Consider how you can maintain interest and keep the momentum going 2. Use publicity to promote the Partnership and its activities 3. Constantly monitor progress of the process, outputs and outcomes

Source: UK Department for Transport 2003.



PART II: Last mile solutions

1. Defining last mile solutions
2. The supply chain
3. Getting the goods to the customer
4. Technology and telematics in last mile logistics
5. Guidance on last mile solutions
 - ▶ Advantages and disadvantages of last mile solutions
 - ▶ Urban transport impact of last mile solutions
 - ▶ Urban planning and regulation issues associated with last mile solutions
 - ▶ Success and failure factors

Defining last mile solutions

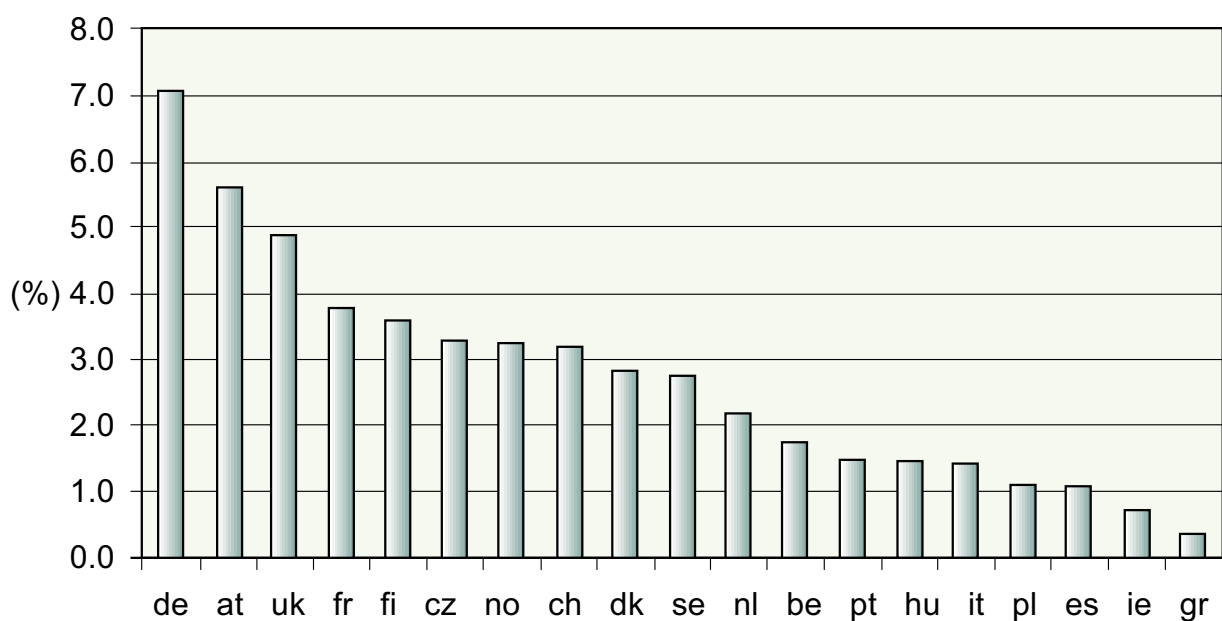
Home shopping via e-commerce

E-commerce (electronically facilitated remote selling) and other remote sales are rising rapidly each year in many European countries. Mintel estimate the total home shopping market in Europe was worth €67.2 billion in 2003, (approximately 3.6% of total retail sales). This estimate includes purchases of products from e-commerce companies (online sales of shop-based retailers, mail order companies with online catalogues and internet retailers), the catalogues of mail order companies, and direct selling companies. (The estimate does not include the purchase of products from other consumers (C2C e-commerce) or the purchase of goods in shops that are delivered to the consumer's home). Germany, the UK and France account for almost three quarters of all European home shopping sales (accounting for almost €50 billion of sales in 2003).



Home shopping callcenter

European home shopping sales as % all retail sales, 2003



Source: Mintel, 2005

- ▶ E-commerce is the fastest growing part of the home shopping market and is expected to grow rapidly in the coming years. E-commerce sales represented approximately 25% of the European home shopping market by value in 2003. This was made up of online sales by shop-based retailers, mail order companies with online catalogues and internet retailers.
- ▶ E-commerce sales as a proportion of the home shopping market varied substantially between European countries in 2003. E-commerce sales ranged from 4% of the total home shopping market in Hungary to 42% in Denmark.
- ▶ The size of the other parts of the home shopping market (traditional catalogue mail order and direct selling markets) are either static or falling in most European countries.



Limited space in city centers

Key issues in last mile solutions

1. From a survey in the UK in 2005:
 - ▶ Fewer than 12% of online retailers allow customers to select a delivery day
 - ▶ Only 20% offer Saturday deliveries
 - ▶ 95% of online retailers do not offer a guaranteed delivery
2. Research in the UK has shown that over 50 per cent of homes are empty between 09:00 and 16:00 (reflecting increasing numbers of single person and two working person households). Standard delivery times are usually from 08:00 to 17:00.
3. This results in a significant proportion of failed deliveries (often one in fifteen).
4. Deliveries attempted when the consumer is not at home result in:
 - ▶ The need to call again
 - ▶ Higher than necessary operating costs
 - ▶ Poor company image for both the supplier of the goods and their delivery agent
5. Failure to deliver at a time agreed with the consumer could threaten repeat purchases.
6. Failed deliveries are inconvenient for customers. In a recent UK survey, 38% of customers who have stopped using remote shopping, said that inconvenient or unknown delivery times were a factor. 39% of these customers said this was affected by them rarely being at home.

Benefits of home shopping for customers and retailers

Customer benefits

- ▶ Greater product choice and price comparison
- ▶ Ability to obtain goods not sold locally
- ▶ Useful for bulky and heavy goods
- ▶ Useful for people with mobility problems either due to lack of transport or disability
- ▶ Time savings
- ▶ Twenty-four hour per day ordering services
- ▶ Attractive to people who dislike shopping



Retailer benefits

- ▶ Selling without geographical limitations
- ▶ Cost savings by replacing “brick-and-mortar” stores with a web site or catalogue
- ▶ Overall cost saving due to a simpler supply chain
- ▶ Real-time pricing (before delivery is made)
- ▶ Better marketing possibilities

Defining last mile solutions

“Last mile solutions” (also often referred to “home deliveries”) are the logistics element of the fulfilment process within consumer e-commerce transactions (both business-to-consumer and consumer-to-consumer - B2C and C2C), other remote purchases from mail order, direct selling and television shopping companies, and deliveries from retail outlets.

1. Deliveries may be made to:

- ▶ The customer's home
- ▶ The customer's place of employment
- ▶ Reception/delivery boxes
- ▶ Collection points
- ▶ Locker banks

2. Most deliveries are of:

- ▶ Parcels and small packages (e.g. books, CDs, clothing and footwear, jewellery etc)
- ▶ Large items (e.g. furniture, white goods, other large electrical appliances)
- ▶ Food

3. Whilst most deliveries are made by one person, larger items may require two person delivery crews.

Compared to “traditional” distribution channels there are two fundamental characteristics of “last mile” approaches: most approaches cut out the middle-man and instead rely on direct business contact with consumers; but, more importantly, involve developing a supply chain that allows each consumer to order a personalized product. Shortening the supply chain and providing value added services to the customer can have a substantial impact on product quality and price.

New selling channels and their associated logistics systems have significant implications on:

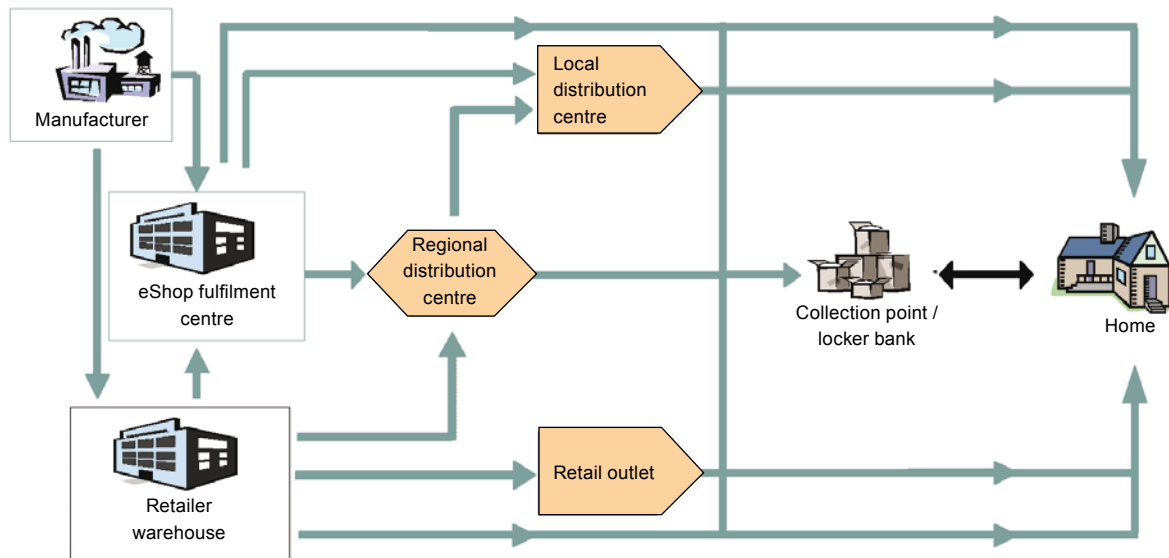
- ▶ Order picking - traditionally carried out by the customers in the store, retail outlet is now done by the retailer (results in a paradigm change from a collection system to a delivery system)
- ▶ New business relationships (logistics is becoming the main interface between retailer and customer)
- ▶ New delivery structures (the consignment size decreases from bulk shipments to individual packages)
- ▶ And have resulted in an increase in the fragmentation of orders and deliveries

The supply chain

The physical distribution of goods to the consumer is a critical factor in the success of the last mile business model.

There are different logistics options available in different parts of the last mile supply chain as shown in the table below:

Part of supply chain	Options
Order picking / distribution channel	▶ Via dedicated picking centre ▶ Via retail outlet
Transport organisation	▶ In-house with own vehicles ▶ External using third party logistics provider (3PL)
Delivery consolidation	▶ Only one company's goods delivered on delivery vehicle ▶ Several companies' goods delivered on delivery vehicle
Arrangements for delivery to customer	▶ Day agreed in advance with customer ▶ Day & time agreed in advance with customer ▶ No time/day agreements with customer
Delivery point	▶ Attended home delivery ▶ Reception/delivery boxes at home ▶ Locker boxes ▶ Collection points



Common supply chains in last mile operations

The starting point for all last mile processes is a retail warehouse or a eShop fulfilment centre. There are various supply chain options by which the goods reach the final customer.

- From the eShop fulfilment centre either own vehicles or 3PL network structures and vehicles are used. Most common is that goods are taken to a regional distribution centre before the final delivery leg is carried out.
- A consolidated trunk tour can start either from an eShop fulfilment centre or from a local distribution centre. Transshipment often takes place within the city or close to the city border. Most common is a transshipment from larger trucks to vans for the final delivery leg.
- Some approaches separate eShop activities and operating of last mile infrastructure. Ordered consignments will be collected from different retailers and eShop fulfilment centres in a collecting hub. From there either the final legs to collection points or a further tour split via a regional distribution hub takes place.
- Deliveries can also be made via a retail outlet store being delivered from a retail distribution centre. Deliveries are made to the customer either by own vehicles or with the help of 3PL.
- If the delivery is made to a collection point or locker bank, the consumer may have to travel to this location to collect their goods (although the operators will seek to minimise any additional travel).
- The consumer sometimes collects their goods from the retail outlet or the local distribution centre. However, it is more common that the delivery is made from these locations to the consumer using goods vehicles.
- The distribution/collection of the goods is addressed in more detail in the next section.

Getting the goods to the customer



Attended delivery systems

- ▶ Attended delivery or door step deliveries (i.e. where the customer has to be available to accept the delivery) is still the most common type of home delivery.
- ▶ Food deliveries usually take place on a pre-arranged day and within a given time-window, as the product may deteriorate over time.
- ▶ In some cases customers make an explicit payment for the delivery – in other cases a delivery charge is only applied below an agreed value of goods.
- ▶ Deliveries of large items (such as furniture and white goods) are usually on an agreed day and time-window basis, as they are expensive deliveries using two man delivery crews.

Unattended delivery systems

- ▶ Unattended deliveries are based on the concept that the presence of customers should not be necessary when making a delivery.
- ▶ Unattended delivery can either take place at the customer's home or to another location near to their home, workplace or somewhere else they visit regularly.
- ▶ Small products which fit through letter boxes or into mail boxes & that do not require proof of delivery (POD) may be delivered whether or not the customer is at home at the time of delivery.

- ▶ These products tend to be distributed to customers via existing national postal networks, and courier networks (both national and international).
- ▶ However if POD is required goods may be left with a neighbour or another delivery attempt is made at a later date.
- ▶ Recently logistics companies have designed alternative delivery solutions to minimise the problem of failed deliveries and the high costs of failed attended home deliveries.
- ▶ Unattended delivery systems at the customer's home include the use of:
 - Reception boxes
 - Delivery boxes
 - Controlled access systems
- ▶ Unattended delivery systems away from the customer's home include:
 - Collection points
 - Locker banks

Reception boxes

- ▶ Permanently fixed to a wall outside the customer's home
- ▶ Access to the box via an electronic code or key
- ▶ Customer can be alerted of the delivery by mobile phone or email
- ▶ Used mostly for parcels, but can be used for foods if the boxes are temperature controlled

Delivery boxes

- ▶ A pool of boxes owned by the retailer or delivery company
- ▶ Filled with the goods at the distribution depot
- ▶ At the customer's home, they are temporarily attached to the home via a locking device fixed on the wall in a secure place
- ▶ Empty boxes or boxes containing returned goods are then collected by the delivery company either as a separate collection round or as part of the next delivery





DHL Packstation, Germany

Controlled access systems

- ▶ Provide the delivery driver with a means of gaining access to a locked area to leave the goods in
- ▶ A key may be sealed inside a unit, which is mounted in a location where delivery staff can access it
- ▶ The driver enters an access code into the sealed unit to release the key and open the nominated delivery location to leave the goods

Collection points

- ▶ Based on the use of locations other than customers' homes to which goods are delivered
- ▶ Locations can include the nearest Post Office, a convenience store or a petrol station
- ▶ Often have long opening hours
- ▶ Goods are delivered by the retailer or their carrier to the collection point
- ▶ The customer is informed that their order is ready for collection
- ▶ Customers may arrange with the collection point for the goods to be delivered to their home
- ▶ Collection points result in fewer delivery locations and improved drop density

Collection point example: Kiala

Kiala provides a collection point service for long-distance retailers or e-commerce shops for non-food products in Belgium, Luxembourg, the Netherlands, France and in future in UK.

- ▶ It has established a network of collection points (Kiala Points) at which customers can collect, pay for and return their parcels.
- ▶ Transport between the retailer warehouses, pick-points and Kiala Points are organised.
- ▶ Two main networks are operated: a consumer oriented network and a professional network for time critical deliveries for express couriers, travelling sales staff, and field engineers.
- ▶ The customer can select a preferred store for collecting their delivery. Once the delivery to the store has been made the customer is informed via SMS or Call Centre that their goods are ready for collection.
- ▶ The application also manages the data flows from and to end-customers, direct selling companies, collection delivery points and transportation partners. State of the art technology reduces costs and increases efficiency.
- ▶ In addition the system allows the customers to track & trace their parcel on the Kiala Internet site

Locker-banks

- ▶ Locker-banks are groups of reception box units (lockers).
- ▶ Locker-banks are similar to collection points as they are not sited at each customers premises.
- ▶ Sited in apartment blocks, work places, car parks, railway stations etc.
- ▶ Customers are not usually assigned their own locker to optimize usage (lockers have electronic locks with a variable opening code, and can be used for different customers on different days).
- ▶ May be dedicated to one delivery company or used by many.
- ▶ Customers may be notified by message about when their delivery has arrived, the box number and location, and the code to open the box.
- ▶ Locker-banks require the customer to make the final leg of the journey. However, locker-banks are located to make the deviation in customers' journeys as short as possible.



DHL Packstation

Locker-bank example: Packstation

- ▶ PackStation is a system provided by Deutsche Post in Germany.
- ▶ Offers consumers and professionals the possibility of access to their parcels 7 days per week, 24 hours per day.
- ▶ Customers are issued with a PIN, an Internet password & a city plan CD-ROM showing all the PackStation locations.
- ▶ The system can also be used to make return shipments.
- ▶ A customer is informed of delivery by e-mail and/or SMS.
- ▶ Packages can be held for up to nine calendar days.
- ▶ Two types of machine are currently being used:
 - a static system, similar to a left luggage lockers in stations
 - machines without lockers that work using a rotary platter
- ▶ Can be used for packages up to a maximum size of 60 x 35 x 35 cm.
- ▶ First introduced in Germany in Dortmund and Mainz in 2001.
- ▶ By the end of 2005, DHL had introduced more than 600 machines in 90 cities, used by over 300,000 registered customers.
- ▶ National coverage is planned by the end of 2007.
- ▶ Large companies (including BASF, Microsoft, Siemens Medical Services and SAP) have locker banks on their premises to cope with personal parcels for employees that would otherwise have to be handled by their mail rooms.

The attributes of attended and the various unattended delivery systems are listed in the following table.

A comparison of attended and unattended delivery systems

	Attended delivery	Reception box / Delivery box	Controlled access system	Locker-bank	Collection point
Who covers the last mile?	Delivery company	Delivery company	Delivery company	Customer	Customer
Customer present?	Yes	No	No	No	No
Types of products	Any	Packages, groceries	Packages, groceries	Packages, groceries	Packages
Failed deliveries	High	Virtually none	Virtually none	Virtually none	Virtually none
Delivery window	Fixed delivery hours	Delivery company operating hours	Delivery company operating hours	Delivery company operating hours	CP opening times
Times at which goods can be collected	Not appropriate	24 hours	24 hours	24 hours	CP opening times
Retrieval time for customer	None	Very short	Very short	Short-Long	Short-Long
Drop-off time	Long	Short	Short	Very short	Very short
Initial investment	Low	High / Medium	Medium	Medium	Low-Medium
Delivery Costs	High	Low	Low	Lowest	Lowest
Possible operational problems	High failed deliveries. Poor use of vehicle capacity	Large number of boxes needed / Need to collect boxes	Customer concerns about safety. Need for suitable delivery location	Customer has to travel to collect	Customer has to travel to collect
Potential reduction in goods vehicle activity compared to attended delivery	-	Some reduction	Some reduction	Greatest reduction	Greatest reduction



Technology and telematics in last mile logistics

Information and communication technology, and telematics solutions can have an important influence in making last mile processes more efficient. Developments in the following areas may be beneficial.

Computerised vehicle routing and scheduling

- ▶ Vehicle routing and scheduling systems can result in journey time savings of 10 to 15%.
- ▶ Customers can receive more precise delivery time estimates.
- ▶ The proportion of first time delivery success should increase.
- ▶ Operational costs can be reduced.

GPS-based Route navigation systems

- ▶ Provides new drivers with detailed routing instructions to travel between deliveries.
- ▶ Overcomes lack of local knowledge – increasing speed of deliveries and driver flexibility.

Real-time traffic information

- ▶ Still in its infancy.
- ▶ Collection and dissemination of data to help update transport plans to maximise vehicle utilisation and first time delivery success.

Radio frequency identification (RFID)

- Still at an early stage.
- Vehicle and transit unit identification is possible and is under trial at sites in the Ruhr and the Netherlands.
- Transport process updates can be added to basic product information and are another way to give real time supply chain information for customers and operators.
- Early problems of reader sensitivity, standardisation of information and application costs still need to be overcome.



RealTime traffic information

Guidance on last mile solutions

Advantages and disadvantages of last mile solutions

The expectation of the various supply chain parties in last mile operations are quite challenging and can be difficult to achieve. On one side customers expect lower prices, more convenience and a larger product variety, while on the other side sellers want to reduce costs and achieve better placement of their products. The distribution of costs and benefits in the last mile chain has a large impact on the success of the overall approach. The table shows the advantages and disadvantages of the different last mile options in terms of distribution channels, transport operations, delivery to customers, and the use of IT for planning delivery windows for attended deliveries.



City delivery in a pedestrian zone

Advantages and disadvantages of last mile solutions - concerning distribution channel

Distribution channel	Advantages	Disadvantages
Picking centre (Warehouse / distribution centre)	▶ Increase in reliability due to stock transparency ▶ Economies of scale ▶ Efficient management of the processes	▶ High investment costs in infrastructure and staff ▶ Large volumes necessary to reach a satisfactory use of capacity
Picking in retail outlet	▶ Almost no fixed costs (store staff doing the picking) ▶ Local knowledge ▶ More flexible in management ▶ Higher service level (e.g. in delivery time or the provision of perishable groceries)	▶ Higher complexity in managing shop and picking at same time ▶ Slower picking speeds ▶ Risk of out of stock situations ▶ Possible negative effect for consumers visiting the shop

Advantages and disadvantages of last mile solutions - concerning transport operation

Transport operation	Advantages	Disadvantages
Shipper operates own vehicles for deliveries	▶ Complete control over transport chain, e.g. temperature sensitive ▶ Possibility to provide value added services ▶ More flexible dispatching ▶ Important for reputation as driver represents the company	▶ Higher costs ▶ Difficulties achieving good vehicle utilisation ▶ Own fleet management structures
Shipper uses 3rd party operator for deliveries	▶ No fixed costs ▶ Better planning in a volatile market ▶ Improved utilisation of vehicles	▶ Less flexibility and control for retailer ▶ Loss of direct contact with recipient

Advantages and disadvantages of last mile solutions - concerning delivery points

Delivery point	Advantages	Disadvantages
Attended home delivery	▶ High level of customer service ▶ Direct contact with customer	▶ Customer has to be at home ▶ Costs of redelivery due to failed deliveries ▶ Qualified drivers with local geographical skills needed ▶ Can be higher vehicle operating costs due to smaller vehicles used than in unattended deliveries
Reception & delivery boxes/access control systems at customer's home	▶ Fewer failed deliveries (benefits for customer and deliverer) ▶ More control over planning, routing and scheduling of delivery rounds ▶ Lower vehicle operating costs than attended delivery	▶ Cost of boxes/access systems ▶ Can be difficult to co-ordinate when receiving goods from several companies ▶ Delivery boxes need to be collected ▶ Limited space availability for boxes/units
Locker bank / convenience store	▶ Consolidation of consignments ▶ Pick up at any time after the delivery	▶ Infrastructure costs ▶ Customers also have to travel to receive goods ▶ Risk of non-acceptance by the customers ▶ Possible local car traffic generation

Advantages and disadvantages of last mile solutions - concerning information flow

Information Flow	Advantages	Disadvantages
Use of phone/text/email to communicate with customer for attended home delivery	▶ Ensure that customer is at home ▶ More reliable service ▶ Fewer failed deliveries ▶ High level of customer service and feedback ▶ Including customer in supply chain planning	▶ Less flexibility in scheduling deliveries ▶ Greater planning effort
Use of text/email to communicate with customer for delivery to locker bank/ collection point	▶ Customer likely to collect more quickly and free-up space ▶ More reliable service ▶ Encourages customer to use service ▶ Including customer in supply chain planning ▶ Direct customer contact and feedback	▶ Greater planning effort ▶ Obstacle for customers not familiar with newer technologies

Urban transport impact of last mile solutions

- ▶ Last mile solutions can result in reductions in total vehicle trips and vehicle kilometres (taking both goods vehicle and customer trips into account). For example, in a study of food shopping in the UK, it was calculated that if 10-20% of total food shoppers were to use home shopping:
 - The switch from car journeys to multidrop van deliveries could lead to a 7-16% reduction in the numbers of vehicle trips.
 - There could be a substantial reduction in vehicle kilometres for goods flows to customers using the home shopping services.
- ▶ However, any reduction in vehicle activity is dependent on:
 - The efficiency of the distribution systems.
 - Whether customers make other non-shopping vehicle trips instead.
- ▶ Whilst food shopping often involves a dedicated car journey and these may be reduced by greater use of new shopping channels and home delivery, many other shopping trips combine visiting a number of stores and other activities such as dining out or visiting friends. In these circumstances the reduction in car trips resulting from home deliveries may be reduced.



Urban traffic flow

- ▶ Time saved by shoppers using home delivery services may free up their time to make more leisure trips.
- ▶ Home delivery can increase goods vehicle activity in residential streets and may have a negative environmental impacts
- ▶ Many different companies may service the same delivery location/customer using their own vehicles.
- ▶ Heavy items – delivered on heavier vehicles, needing to get closer to the final delivery point may exacerbate this problem.
- ▶ The use of locker banks and collection platforms may also increase the number of car journeys required if they are poorly sited relative to the consumer locations.

Urban planning and regulation issues associated with last mile solutions



Dangerous goods transport

Legislation

- ▶ Product legislation, vehicle operating legislation and land use/town planning legislation can all impact on last mile solutions.
- ▶ Examples of product legislation that impacts on last mile solutions includes:
 - Food hygiene and temperature control regulations.
 - Dangerous goods regulation.
- ▶ Vehicle operating legislation may impact on:
 - The time at which deliveries can be made (both in terms of vehicle access to the street and unloading regulations).
 - The times at which customers are permitted to visit collection points to collect their goods.
 - The size and/or weight of vehicles that can be used to make home deliveries.
- ▶ Urban land use planning legislation can be used to control:
 - The number and location of home delivery fulfilment facilities, collection points and locker banks.
 - And the times at which home delivery vehicles can operate.
 - Planners can also decide whether there is a role for the urban authority in the development and operation of such facilities, and whether they will be operated by one or many companies.

Urban planning issues

- ▶ Remote shopping operations may pose a dilemma for urban planners.
- ▶ They could have significant effects on the future viability of many existing retail sites.
- ▶ New picking centres, local distribution depots, collection points and locker banks may be needed in or on the edge of urban areas. As multi-channel retailing grows the number of both warehouses and shops may increase.
- ▶ Current planning guidance across the EU centres on the reduction in car travel and the concentration of development in existing urban areas but there are few policies for addressing the impact of new selling channels and home deliveries.

Success and failure factors in last mile solutions

Success factors for last mile solutions include:

- ▶ Many companies that have a successful online business have a “traditional” business model to which they have added an “online” business.
- ▶ Many new e-commerce companies that developed with a “big bang” completely failed.
- ▶ Within each European country only a few dominant market players exist with the necessary skills and expertise to develop last mile solutions.
- ▶ Structural investment must be made carefully in an area where demand prediction is difficult.
- ▶ The provision of a fast, reliable, flexible service at a reasonable price is key to the success of an online/remote transaction.
- ▶ The use of widespread parcel networks has been successful for some shippers.
- ▶ Collection points and locker banks are most promising for non-food, standard-sized packages.
- ▶ Focusing on customer needs in a given country is important.

Failure factors include:

- ▶ Inability to achieve an acceptable return on investment.
- ▶ Inaccurate demand forecasting.
- ▶ Insufficient level of goods throughput.
- ▶ Many unattended delivery solutions were before their time or too expensive.

Issues specific to small packages

- ▶ To improve customer service and/or reduce operating costs:
 - Introducing pre-arranged delivery time where demanded by the consumer.
 - Increase the use of unattended solutions.
 - Critically reviewing the speed of delivery promise to improve vehicle utilisation and delivery reliability.
- ▶ Parcel delivery companies should work together to identify opportunities to improve vehicle utilisation and reduce the traffic and environmental impact of their operations.



Issues specific to food

Key issues include:

- ▶ Attended home delivery will continue to dominate until technical developments allow greater use of unattended delivery systems for foods.
- ▶ Retailers need to consider how they could work together to use shared or common fulfilment and delivery operations to reduce costs.
- ▶ The choice between fulfilment from the sales floor or dedicated fulfilment centres.
- ▶ To offer low cost services retailers must seek to reduce their peak hour throughputs through innovative service pricing, shared operations and technically acceptable unattended delivery systems.

Issues specific to large items

Key issues include:

- ▶ The introduction of shared fulfilment and home delivery operation.
- ▶ The introduction of shorter more regular delivery windows.
- ▶ Improved real time communication with the customer.
- ▶ Improved vehicle design to suit deliveries in residential areas.
- ▶ High standards of delivery crew appearance and training.



PART III: Urban consolidation centres

1. Definitions of UCCs
2. Classification of UCCs
3. Impact of UCCs
4. Advantages and disadvantages of UCCs
5. Issues in planning UCCs
 - ▶ Participation of interested parties
 - ▶ Location
 - ▶ Management structures
 - ▶ Products handled
 - ▶ The operations of UCCs
 - ▶ Funding
 - ▶ Success criteria
6. Guidance on UCCs
7. UCC check list

Many people are unaware of the potential benefits of a carefully researched and implemented Urban Consolidation Centre (UCC). Retailers and logistics companies often think that UCCs will increase their costs and reduce their control of their supply chains. Although much thinking on UCCs focuses on retail activities, they also have a potential role in other sectors including construction, offices, hotels and restaurants.

- ▶ An urban consolidation centre offers freight transport companies the opportunity to deliver goods destined for urban area to a specialist centre for final delivery rather than having to make the delivery to the final customer in a busy part of the city.
- ▶ UCCs have the potential to improve delivery reliability and to improve the utilization of goods vehicles.
- ▶ In addition, it is possible for a specialist fleet of environmentally-friendly goods vehicle to be used for the final delivery from the urban consolidation centre to the customer.
- ▶ Given the environmental credentials of such vehicles in terms of pollutant emissions, noise and other factors it can be possible to allow them to access and make deliveries in the urban area at times when delivery vehicles are usually prohibited, including during the night.
- ▶ UCCs can be used to assist in achieving economic, traffic and environmental objectives. Retail and other products such as construction materials can be delivered via a UCC.



Hammarby Logistic Center, Sweden

Experiences with publicly operated UCC have been mostly negative from a commercial perspective. Many UCCs have subsequently closed due to low volumes of throughput, on-going requests for financial support from urban or regional government, and dissatisfaction with service levels. Since 2000 most of the trials and operations were led by commercial enterprises (such as BAA at Heathrow Airport, London and Shopping Centre Operators) which recognised the benefits of controlling their logistics operations. Schemes currently operating in the UK are often operated by a single, major logistics operator.

The financing arrangements of UCC vary:

- ▶ Some are dependent on public funding from central, regional or urban government (e.g. La Rochelle, Amsterdam and Monaco).
- ▶ Some have received funding from EU projects (such as La Rochelle, Nuremberg and Bristol).
- ▶ Others have been partially or fully funded by centre operators, recipients or logistics companies delivering to the UCC.

Definitions of UCCs

1. The phrase Urban Consolidation Centres (UCCs) has had many different meanings.
2. Different terminology has been used over time and between countries.
3. Definitions are often vague or ambiguous.
4. Descriptions used include:
 - ▶ Public distribution depot
 - ▶ Central goods sorting point
 - ▶ Urban transshipment centre
 - ▶ Shared-user urban transshipment depot
 - ▶ Freight platforms
 - ▶ Co-operative delivery system
 - ▶ Consolidation centre (sometimes specific, e.g. retail, construction)
 - ▶ Urban distribution centre
 - ▶ City logistics (or city logistik) schemes
 - ▶ Logistics centre
 - ▶ Pick-up/drop-off location
 - ▶ Off-site logistics support centre
 - ▶ Freight village
5. It is often difficult to identify the boundary between UCCs and other similar schemes, such as:
 - ▶ Express parcels hubs
 - ▶ Collection points for home deliveries
 - ▶ Intermodal terminals
 - ▶ Retailer distribution centres
6. The concept has focussed on:
 - ▶ Communal (shared user) operations
 - ▶ Break bulk
 - ▶ Transshipment from larger to smaller vehicles
7. Today, a UCC is best described as:

“A logistics facility situated in relatively close proximity to the geographic area that it serves (be that a city centre, an entire town or a specific site such as a shopping centre), to which many logistics companies deliver goods destined for the area, from which consolidated deliveries are carried out within that area, in which a range of other value-added logistics and retail services can be provided.”

Classification of UCCs

Three distinct categories of UCC can be identified:

Area UCCs - serving a town/city

- ▶ Examples include many German city logistics schemes, La Rochelle in France, Monaco, Genova and Bristol.
- ▶ The geographical area served may vary from a specific retail area (e.g. Broadmead in Bristol), a city centre (e.g. La Petite Reine in Paris) to an entire town or city (e.g. Monaco).
- ▶ The number of companies operating the scheme can vary from a single company (e.g. La Rochelle, and Monaco) or be several companies (e.g. German city logistics schemes).

UCCs on single sites with one landlord

Usually:

- ▶ They are built, as part of, or to serve, a single operation.
- ▶ The landlord can insist that tenants use them.
- ▶ The final unloading points are usually off street and approached by a single designated route.
- ▶ They can be self financing from rents and handling charges.
- ▶ Examples include UCCs at airports and shopping centres (e.g. Heathrow retail UCC, and Meadowhall shopping centre).





UCC example in Bristol, UK

Special project UCCs

Usually:

- ▶ For non-retail purposes (e.g. construction material at Heathrow and Stockholm)
- ▶ Serving a single site
- ▶ Over a specific period of time

Each of the three types of UCC can offer consolidation services or can offer a wider range of value-added services including:

- ▶ Stockholding facilities
- ▶ Ticketing and pricing
- ▶ Goods return
- ▶ Waste collection services
- ▶ Community collection and delivery point
- ▶ Home delivery operation

Examples of each of the three types of UCC are provided in the boxes.

Area UCCs serving town/city



UCC in la Rochelle, France

Example: Broadmead, Bristol, UK

Current status (2007):	Extended trial
Objective:	Benefits of consolidation to suppliers / benefits to retailers (improved supply chain & potential added value services) / benefits for community (reduced congestion, improved air quality & improved waste recycling).
Start date:	2004
Description:	Deliveries are made from the consolidation centre to retailers in the Broadmead retailing district in the centre of Bristol. Suitable customers for the trial identified as "medium size, non-perishable goods, not high value goods". UCC located close to strategic road network (M4 & M32); 465 m ² of space; 25 minutes journey time to Broadmead. Delivery made by one 7.5t and one 17t Euro III standard engine vehicles. Value-added services also being offered.
Parties involved:	Bristol City Council, The Broadmead Board, The Galleries Shopping Centre, Business West (formerly Chamber of Commerce), Exel EU funding through the Vivaldi project (part of CIVITAS).
Voluntary/compulsory:	Voluntary
Users:	Currently 51 retailers in the Broadmead retailing area ranging from major high street stores to small independents with the clothing and fashion sectors particularly well represented.
Outcomes:	The number of roll cages which passed through the centre rose from 101 in May 2004 to 401 in December 2004. 68% reduction in vehicle trips into Bristol centre for retailers in scheme. To October 2005 - 42,772 total vehicle km; 5,29t of CO ₂ emissions; 0,8 kg of NO _x and 11,0 kg of PM10 emissions had been saved.

Example: La Petite Reine, Paris, France

Current status (2007):	Trial initially – now permanent.
Objective:	The objective is to test an alternative to motorised vehicles for final delivery of goods and reduce the impacts of urban freight transport.
Start date:	2003
Description:	Two types of tricycles with electrical assistance have been used during the experiment to provide delivery services. The tricycles have a maximum payload of 100 kg, maximum volume of 450 litres, and maximum speed of 20 km/h. The four central arrondissements were initially served by La Petite Reine in the experiment. This has since been extended to the whole of the city. Three types of delivery service have been tested by La Petit Reine: ▶ Ad hoc deliveries from businesses to customer's homes ▶ Driver and tricycle dedicated to a business for deliveries to customers (dedicated shop-based service) ▶ Consolidation and final delivery of goods entering Paris (using a consolidation centre located in the centre of Paris offered by the Mairie de Paris at low rent). Products targeted by la Petite Reine during the experiment have included: food products, flowers, non-food products (including parcels) and equipment and parts. In the 24 months since the experiment started the number of tricycles has increased from 7 to 19.
Parties involved:	The City of Paris has been supporting la Petite Reine company in the experimentation of deliveries using tricycles since May 2003. This experiment has been also supported by the ADEME (French Agency of Environment Management) providing financial aid representing 50% of the feasibility study and evaluation reports, and 15% of the investment in tricycles.
Voluntary/compulsory:	Voluntary
Users:	Major parcel carriers, transport operators, retailers and other Paris-based businesses.
Outcomes:	Use of the delivery services has been increasing during the trial. 796 trips in month 1 to 14.631 trips in month 24. Parcel freight has become the most important type of freight during the course of the trial. It has increased from 51% of all items handled at the beginning of the experiment to 97% after 2 years. 156 248 km of diesel van activity have been avoided as a result of the trial. This has saved 43.3 toe (tonnes oil equivalent) of energy consumption, and helped to avoid 112 tonnes of CO ₂ , 1.43 tonnes of CO, and 280 kg of NO _x .

UCCs on single sites with one landlord

Example: Heathrow Airport Retail UCC, London, UK

Current status (2007):	Operational
Objective:	To alleviate congestion within airport / reduction in vehicle movements / security / environmental improvement / reduction in handling costs/improve delivery to retail units/improve waste management.
Start date:	Commenced 2000 as a trial, 5-year contract awarded 2001 – ongoing.
Description:	A retail operation supplying all shops at Terminals 1, 2, 3 & 4. All deliveries (except newspapers and high value / high insurance items) are made to a consolidation centre outside the airport perimeter where inbound deliveries are security checked (scanned) and sorted by delivery address into sealed roll cages and then delivered to a regular schedule. Some low value items e.g. soft drinks are delivered on pallets. The service includes: delivering to individual premises by a dedicated “delivery team” located within each terminal and the return of packaging / waste to the depot. 2,320 m ² warehouse (325 m ² chilled), 1500 roll cages, 38 operational & clerical staff, 6 management. 24 hour / 7 day operation. 3 rear-steer urban articulated vehicles and 3 rigid vehicles.
Parties involved:	A partnership between British Airports Authority and a logistics provider (Exel).
Voluntary/compulsory:	Initially voluntary. Compulsory for all retailers in the terminals since 2004.
Users:	All retailers with premises within the 4 terminals. In 11/01 chilled & frozen facilities added so as to cover all temperature bands thereby adding catering outlets to customer base.
Outcomes:	Results show that in 2004 the centre received 20,000 vehicle deliveries; this resulted in 45,000 store deliveries being made from the centre on 5,000 vehicle trips. 190 out of 240 of the retail outlets are using the centre. Vehicle trip reduction of approximately 70% is being achieved for those goods that flow through the centre. This was estimated to result in 87,000 vehicle kilometres saved in 2003, and 144,000 vehicle kilometres saved in 2004. Vehicle emissions reductions have also increased as goods throughput has grown, with CO ₂ savings of 1,200 kg per week in 2003 and 3,100 kg per week in 2004.

Special project UCCs: construction consolidation centre

Example: Hammarby, Sweden

Current status (2007):	Operational
Objective:	Minimising the impact of the largest ongoing urban development in Sweden on the early residents (8,000 apartments being built in total). To be achieved largely by eliminating unco-ordinated delivery vehicles “touring” the site in search of their delivery point. Deliveries to the building site are difficult due to the location.
Start date:	Spring 2001 and to remain until the building project is complete (2010).
Description:	Deliveries of construction materials are routed via the consolidation centre where they are labelled and stored on a short-term basis prior to delivery on a JIT basis. Ideal maximum storage period is 5 days. Deliveries made on a consolidated basis in “work packs” as requested by the Trade Contractors. Some bulk items such as concrete and steel are not routed via the consolidation centre, but their delivery is co-ordinated via an internet based scheduling system to avoid delivery clashes. The UCC is located at the entrance of the construction-site. It consists of: ▶ 10 people working at the UCC (office and storage area of 8,000 m²) ▶ 8 goods vehicles (Euro IV standard) are used for deliveries within the construction-site ▶ Web site and a supervision system The UCC is run by a subcontractor who is responsible for the operation of the centre, which includes fleet purchase and operation, employment of drivers and other staff, warehouse and office management, and web supervision system.
Parties involved:	All the contractors on the site (10), Investors (in the development), City of Stockholm
Voluntary/compulsory:	Compulsory except for exempted materials.
Users:	All contractors working on the site
Outcomes:	Estimated that for every one truck delivering under this system there would have been 4-5 without the use of the centre. 700 tonnes delivered per day / average of 1.5 tonne per final delivery. Reductions in energy use and emissions will be calculated as part of the evaluation work.



Impact of UCCs

Impact on transport operations

1. Substantial transport benefits can be achieved from the introduction of UCCs depending on the nature of the scheme and the level of uptake.
2. These may include:
 - ▶ Reductions in the number of vehicle trips
 - ▶ Reductions in the number of vehicle kilometres
 - ▶ Better vehicle and driver utilisation for suppliers delivering to UCCs
 - ▶ Quicker vehicle turnarounds
 - ▶ Potential reduction in number of drops
 - ▶ Better loading and unloading facilities
 - ▶ The ability to separate trunk movements from local deliveries
 - ▶ Making the use of alternative modes and vehicle types more feasible (e.g. rail for trunk movement and electric powered vehicles within the urban area)
- ▶ Improvements in the volume/weight utilisation of vehicles
- ▶ Reduced unit costs of transportation for the final delivery stage
- ▶ Fewer vehicles required within the area served by the consolidation centre
- ▶ Opportunities for revenue earning return loads
3. There have been relatively few attempts to quantify the actual transport impacts.
4. Several studies have claimed that vehicle trips and/or vehicle kilometres have been reduced by 30 to 80% for those flows using a UCC however low levels of uptake has resulted in very small reductions in overall transport activity.

Impact on other supply chain activities

UCCs can impact on other supply chain activities as discussed below.

1. Stockholding

- ▶ Subject to capacity and the availability of required storage conditions
- ▶ Generally designed to be short term
- ▶ Acts as buffer stock to:
 - improve product availability
 - improve customer service
- ▶ Could facilitate inventory monitoring linked to in-store systems to:
 - increase the visibility of the supply chain
 - improve product availability
 - improves service levels
 - reduce stock losses

2. Product quality and quantity checking

3. Pre-retailing of product

- ▶ removal of packaging
- ▶ preparation of products for sales floor
- ▶ pricing/labelling

4. Return and recycling of product, waste and packaging flows:

- ▶ as a result, storage and reception space at the delivery location can be freed up for more productive or profitable use
- ▶ more flexible and reliable delivery of fewer consolidated loads, may result in:
 - improved product or component availability
 - improved sales levels
 - improved site productivity

5. UCCs may offer the potential to improve the management of the supply chain to reduce costs and improve service levels.



Economic, social and environmental impacts of UCCs

UCCs can help to:

- ▶ Reduce the number of unsuitable goods vehicles and possibly the total number of vehicles operating in the urban area
- ▶ Reduce vehicle movements and distance travelled by improving load factors and reducing empty running
- ▶ Reduce the unit cost of transport
- ▶ Improve driver utilisation

- ▶ Offer the opportunity to operate environmentally sensitive vehicles on the final leg of the urban supply chain
- ▶ Reduce the number of deliveries to city centre sites.
- ▶ Reduce fuel consumption, emissions and noise pollution.
- ▶ Make the area more pedestrian-friendly

These potential benefits have to be weighed against potential cost increases associated with the operation of the UCC.



Last mile transportation

Advantages and disadvantages of UCCs

Advantages

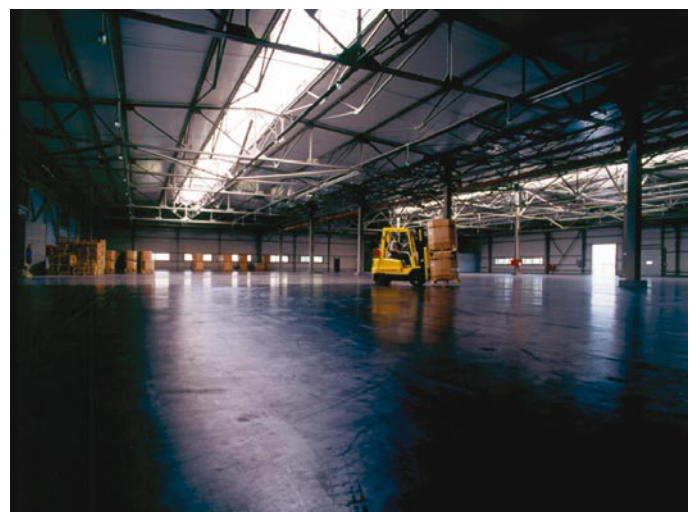
UCCs have the following potential advantages:

- ▶ Environmental and social benefits from more efficient and less intrusive transport operations
- ▶ Better planning and implementation of logistics operation
- ▶ The opportunity to introduce new information systems
- ▶ Better inventory control, product availability and customer service
- ▶ Facilitate a switch from push to pull logistics through better control and visibility of the supply chain
- ▶ Potential to link in with wider policy and regulatory initiatives
- ▶ Theoretical cost benefits from contracting out “last mile”
- ▶ Public relations benefits for participants
- ▶ Potential to allow better use of resources at delivery locations
- ▶ Specific transport advantages
- ▶ Opportunity for carrying out value-added activities

Disadvantages

UCCs have the following potential disadvantages:

- ▶ Potentially high set-up costs (especially with high land prices in urban areas)
- ▶ Operational complexity resulting from the differing storage and handling requirements of a wide range of products
- ▶ A potential cost (and time) penalty from introducing an additional point into the supply chain
- ▶ The introduction of an additional delivery point may negate transport savings for onward distribution
- ▶ Organisational and contractual problems
- ▶ Potential to create monopolistic situations
- ▶ Loss of the direct interface between suppliers and customers



UCC at work

Issues in planning UCCs

Participation of interested parties

1. The establishment of even the most basic UCC trial requires the involvement of many parties:
 - ▶ Representatives of the urban authority
 - ▶ Potential UCC operators
 - ▶ Trade associations
 - ▶ Logistics companies
 - ▶ Police authorities
 - ▶ Occupiers of premises in the area
2. It is essential that all interested parties are involved in the discussion and planning process to gain commitment.



Padova freight center, Italy

Location

The location of the UCC in relation to its target market will have important consequences for the traffic and environmental and commercial benefits.

1. UCCs located at a distance from the delivery area:
 - ▶ Reduce the need for trunking & delivery vehicles to enter the delivery area at all
 - ▶ Maximise the distance covered by the environmentally friendly vehicle used in the final delivery
- but
- ▶ The number of delivery vehicles and the distance they travel may increase

2. UCCs located close to the delivery area:

- ▶ Reduce the distance over which environmentally-friendly vehicles travel
- ▶ Reduce the environmental benefits of the UCC.

Wherever possible UCCs should be located close to other intermodal transfer points and other private Distribution centres.

Management structures

A variety of management structures exist:

- ▶ UCC schemes in mainland Europe have a preference for legally constituted bodies.
- ▶ UK schemes tend to be led by commercial organisations with a single client.

Products handled

- ▶ UCCs are likely to be better suited to some types of goods and vehicle movements than others.
- ▶ They are unlikely to be suited to perishable and highly time-sensitive products (such as fresh food and newspapers) and goods with specific distribution and handling requirements.
- ▶ UCCs are best suited to handling non-perishable goods but must be designed to handle the wide range of packaging involved (e.g. hanging rails for textiles, boxes, roll cages and pallets).

The operation of the UCC

- ▶ Most schemes envisage the decanting of good from larger to smaller (more environmentally acceptable) vehicles at the UCC.
- ▶ However it is now recognised that applying this principle to well laden HGV's may be counter productive.
- ▶ If the transport operation is to be optimised the return trips from the delivery area must be utilised as much as possible.

Funding

- ▶ Initial funding from national, regional or urban government will be required for the research and pilot stage of any project which is not related to a new property or commercial development.
- ▶ If environmental improvement are the prime objective for operating a UCC, long term support from other hypothecated transport funds will probably be required (e.g La Rochelle).
- ▶ Although there is no strong evidence that any truly self-financing schemes exist, the long term aim must be for them to be self funding.





UCC rendez-vous

Criteria for success

UCCs most likely to succeed in the following circumstances:

- ▶ Significant existing transport problems within the area to be served (e.g. poor vehicle access, significant traffic congestion, constrained loading/unloading facilities).
- ▶ An inadequate transport infrastructure to cope with increases in freight flows.
- ▶ Historic town centres and districts that are suffering from delivery traffic congestion where there is a common interest in improving the street environment.
- ▶ Areas with a high incidence of independent small traders / outlets who are not part of a regional / national business with a dedicated and sophisticated supply chain and who are looking for a competitive edge.
- ▶ New and large retail or commercial developments (both in and out of town) where there is the opportunity to consolidate all the goods receiving and related activities within a dedicated part of the complex from the outset and as part of the total design.
- ▶ Major construction sites where the building programme requires an organised and disciplined flow of materials.
- ▶ A “spontaneous” bottom up pressure for such a development from a group of potential users who have interests and objectives in common.
- ▶ “Take up” will be greatest in situations in which little urban freight is already consolidated at the intra-company level or by parcels carriers.
- ▶ Availability of funding for the UCC scheme.
- ▶ Availability of existing buildings that can be used for the UCC scheme.
- ▶ Strong public and private sector involvement to encourage (or force) their use through the regulatory framework.
- ▶ Effective enforcement of any traffic regulations associated with goods vehicles not included in the UCC scheme.
- ▶ Imposed UCC solutions only seem to be successful if the imposing organisation is able to control or strongly influence all the players.

Guidance on UCCs

- ▶ There is clearly a need to raise awareness amongst urban authorities, retailers and transport operators to enable them to add the UCC concept to their set of possible policy measures for consideration.
- ▶ Governments should issue guidance to urban authorities that consideration should be given to the establishment of UCCs when major development proposals are being considered and when town centres are being restructured.
- ▶ Active support of an awareness building process is important to the success of the UCC concept. This can be achieved through:
 - Developing appropriate instruments (e.g. UCC planning guidelines or tools)
 - Training measures for urban freight planners
- ▶ Public funding needs to be made available to pay for the research work and pilot studies for any form of UCC that is not funded through a commercial development.
- ▶ When a UCC scheme is being considered there is a need for detailed measurement of existing traffic and goods flows in the prospective location(s).
- ▶ The detailed feasibility and measurement work should be followed by:
 - A period of consultation about the precise nature of the UCC scheme to be tested
 - An extended pilot scheme managed and scrutinised by representatives of all the interested parties at both local and national level
- ▶ When a UCC is set up it takes time to sign up users and establish the scheme. This gradual build up will adversely impact on the financial viability, traffic and environmental advantages of the scheme.
- ▶ UCC trials need sufficient funding to enable them to develop fully and to allow for meaningful evaluation of performance.
- ▶ UCCs are likely to need to be financially successful in their own right in the medium / long term and in many cases public subsidies will not be a viable solution.
- ▶ A case could be made for hypothecated funds from other transport-related sources such as congestion charging and road pricing being used to support UCC operations. This would certainly need to be the case if environmental improvement were to be the prime or sole reason for establishing a UCC.



Limited space for lorries

- ▶ One of the key financial considerations is how to allocate the costs and benefits resulting from a UCC scheme in totality and not solely the cost impact in one part of the supply chain or a single player. This is not a simple matter and the allocation of costs and benefits needs to be the subject of a more comprehensive and detailed study and ideally one based on a fully measured pilot project.
- ▶ Studies and evaluations of UCCs should take account of the financial costs / benefits along the whole supply chain but also the wider issue of how to handle the environmental costs and benefits.
- ▶ Strengthening the evaluation methodology used for UCC assessment is important as it helps build a case for the situations in which UCCs are most appropriate. More recent UCCs that have been commercially driven tend to place restrictions on the availability of certain information and data. However, even in these UCC schemes more wide-ranging evaluation should be possible that does not impinge on commercial confidentiality.
- ▶ Consistent and thorough evaluation of existing and future UCCs should take place.
- ▶ Publicly-organised UCCs do not have a good track record in terms of implementation and operation.
- ▶ For UCCs to be attractive to companies and to be successfully set-up they should be led and operated by one or several key commercial players that have identified the potential benefits of being involved.
- ▶ Prospective UCC operators need to be able to demonstrate their ability and willingness to adopt stock receipt, inspection and control procedures and to take responsibility for the “last mile” of a delivery.



UCC checklist - Part I

UCCs can be used to assist in achieving economic, traffic and environmental objectives. The checklist below contains relevant questions to address in considering the type of UCC required in a given situation.

Question	Options
Is the UCC intended for retail products or other products (e.g. construction)?	▶ Retail ▶ Other products
Is the UCC intended to be permanent or temporary?	▶ Permanent ▶ Temporary
Will the UCC make deliveries to a single site with one landlord (e.g. shopping centre) or multiple sites with many landlords (e.g. shops in different buildings)?	▶ Single site with one landlord ▶ Multiple sites
How much of the urban area will the UCC serve?	▶ Single site in urban area ▶ Part of urban area ▶ Entire urban area
Will the use of the UCC be voluntary or compulsory for companies receiving goods in the target delivery area?	▶ Voluntary ▶ Compulsory
What services will the UCC offer?	▶ Delivery services ▶ Collection services: waste, packaging and returns ▶ Pre-retail services: unpacking, ticketing, etc. ▶ Stockholding
What type of vehicles will make deliveries into the target area from the UCC?	▶ Vans, rigids or articulated vehicles ▶ Normal petrol/diesel vehicles or environmentally friendly vehicles ▶ Other modes such as bicycles

UCC checklist - Part II

Question	Options
Will the UCC be connected to other transport modes than road?	▶ Yes ▶ No
Will the UCC be operated by one or several logistics companies?	▶ One logistics company ▶ Several logistics companies
How close will the UCC be located to the target delivery area?	▶km
Will the introduction of the UCC be accompanied by any other transport measures in the target area?	▶ New access and/or loading time regulations ▶ New vehicle weight regulations ▶ Road pricing ▶ Environmental zone ▶ Other.....
Is there sufficient interest and intent to use the UCC among all relevant stakeholders?	▶ Yes ▶ No
Has a feasibility study been carried out?	▶ Yes ▶ No
Will the UCC initiative be led by the private sector, the public sector or is it a joint initiative?	▶ Public sector ▶ Private sector ▶ Joint initiative
In the case of a public initiative, is the urban, regional or national government ready to participate in the funding of the UCC operation?	▶ Yes, to help start the project ▶ Yes, on a permanent basis if necessary ▶ No, the project has to be financially autonomous from the start



More about BESTUFS

Network-thought

Exchanging experiences and knowledge with colleagues in similar positions in other cities is an asset when starting your own innovative projects. This type of information has a better quality and often has more initiation power compared to the recommendations of external consultants. BESTUFS is facilitating the establishment of personal connections and the widening of contact networks in the field of urban freight transport for all interested persons - without imposing any commitments or formal structures. BESTUFS is currently maintained by EC funding, but it is hoped that the urban freight transport network kind of community will continue after the project end.

BESTUFS encourages the readers of these Guides to approach BESTUFS network partners or the BESTUFS administration centre if they would like to find a suitable contact in Europe for a specific innovation or question.

Urban freight transport best practices, experiences and recommendations were collected under the umbrella of BESTUFS and only a collaborative approach of a large network could lead to such a wide coverage of topics, result in a very good European coverage and ensure that all points of view were considered.

The BESTUFS network is non-profit oriented and although the core expenditures are reimbursed by the EC, a crucial additional share of efforts was contributed by a motivated Steering Committee (comprising academics, consultants and industry practitioners), by interested stakeholders and by third parties.

European cities of all sizes

Experience has shown that the most active cities implementing freight transport innovations tend to be the country capitals or the largest metropolis. These conurbations have the resources to access support for innovative transport solutions, to participate in city networks and to exchange knowledge and experiences with each other. An important objective of BESTUFS and this Guide is to reach also small and medium sized cities since they are comparatively isolated from a European perspective.

It is not unusual for local representatives to experience foreign language problems which limits their opportunities to learn from other European cities experiences. This guide is therefore translated and printed in 17 European languages and thus complements the rich material in English made available by BESTUFS (www.bestufs.net).



BESTUFS workshops

16-17 May 2000	Brussels	Identification of thematic network priority themes
27 September 2000	Brussels	City Access, Parking Regulations and Access, Access Time Restrictions and Enforcement Support
17-18 January 2001	Turin	Optimised City Distribution Vehicles as demanded by Transport Operators and Cities
10-11 May 2001	The Hague	Changing urban Transport due to E-commerce and E-Logistics
30-31 August 2001	Dresden	Rail based Transport: A disappearing Opportunity or a Challenge for urban Areas?
08-09 November 2001	Genova	City Access Fees and urban Pricing: What are the Consequences for urban Freight Transport?
25-26 April 2002	La Rochelle	Land Use Planning and Business Models for urban Distribution Centres
12-13 September 2002	Malaga	Successful private public partnership (PPP) enhancing urban goods transport
23-24 January 2003	Budapest	Night delivery: a further option in urban distribution
28-29 April 2003	Dublin	Joint Workshop BESTUFS - EPTR
18-19 September 2003	Palmela	ITS in urban goods transport
13-14 October 2003	Maribor	Urban freight strategies: laissez-faire or following a comprehensive strategy?
13-14 January 2005	London	Approaches to Urban Consolidation: concepts and experiences
21-22 April 2005	Nuremberg	Last Mile Solutions
29-30 September 2005	Kaposvar	Freight logistics in small and medium sized cities: Approaches, solutions and success factors
09-10 March 2006	Zurich	Urban Waste Logistics
20-21 September 2006	Vienna	Managing urban freight transport by companies and local authorities
22-23 March 2007	Gothenborg	Port cities and urban freight
September 2007	Baltic states	To be confirmed
March 2008	Spain	To be confirmed

BESTUFS Best Practice Handbooks

Statistical data, data acquisition and data analysis regarding urban freight transport	BESTUFS I – BPH 1
City access, parking regulations and access time regulations and enforcement support	BESTUFS I – BPH 1
E-Commerce and urban freight distribution (home shopping)	BESTUFS I – BPH 2
Road pricing and urban freight transport	BESTUFS I – BPH 3
Urban freight platforms (UFP)	BESTUFS I – BPH 3
Intelligent Transport Systems (ITS)	BESTUFS I – BPH 4
Public Private Partnerships (PPP) in urban freight	BESTUFS I – BPH 4
Waste transport logistics in urban areas	BESTUFS II – BPH 1
Experiments and incentives for environment-friendly vehicles	BESTUFS II – BPH 1
Control and Enforcement in Urban Freight Transport	BESTUFS II – BPH 2
City Access Restriction Schemes	BESTUFS II – BPH 2

The Best Practice Handbooks, the presentations and minutes of all workshops and conferences, a link-list to this Guide, a best practice search tool as well as further material is available on the BESTUFS web page www.bestufs.net (in English only).



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