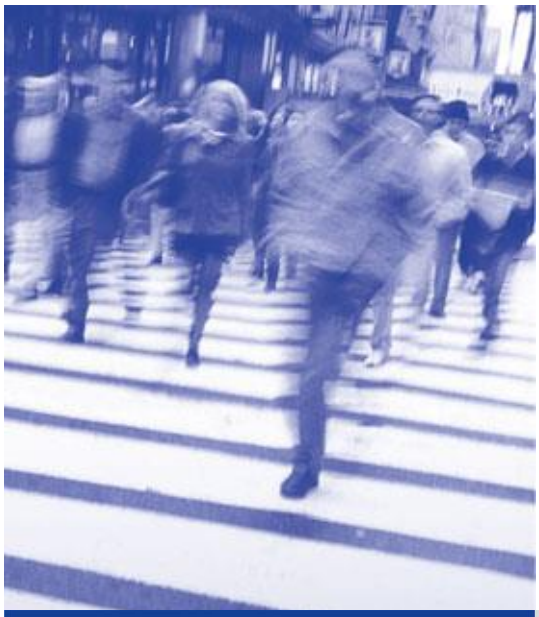

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POINTER

Cluster Report 4: Logistics and Goods Distribution

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1. INTRODUCTION

This report is a part of the work of Pointer Workpackage 2, 'Evaluation'. The main objectives of the report are to provide a technical cross site summary and comparison of impact evaluation results, and identify key drivers and barriers for measure implementation at cluster/sub-cluster levels. For more detailed results, the individual Measure Evaluation Result Templates should be consulted.

Historic cities were not designed to cope with the pressures of freight deliveries that are required to meet the population numbers and varied product and service demands of 21st century consumer-led societies. The environmental impacts such as noise, nuisance, air pollution, historic building damage, and congestion associated with continual multiple freight deliveries are at odds with the free-flowing traffic required by municipal planners for successful local economies, and the 'quality-of-life' expected by modern-day city residents. As part of the CIVITAS POINTER "*Cluster 4: Logistics and Goods Distribution*", 21 measures across 10 European Union member states were introduced to mitigate immediate freight delivery problems, whilst also seeking to contribute to the on-going sustainable development of historic European cities. Regardless of the levels of implementation, these measures have provided valuable insights into the importance of planning, communication, research, testing, and especially meaningful collaboration between stakeholders. The results and experiences from these projects provide a valuable output to guide future logistics and freight distribution schemes.

The 21 measures representing this cluster have been divided into 4 main sub-clusters consisting of:

a) New distribution schemes (11measures)
b) Access restrictions to freight vehicles (7 measures)
c) Vehicle and driver support (2 measures)
d) Freight partnerships (1 measures)

Comparing 17 measures in three 3 sub-clusters in CIVITAS II, there is a new sub-cluster of 'Access restrictions to freight vehicles' in CIVITAS Plus. In the sub-cluster of 'New distribution schemes', the number of measures increased from 8 to 11. However, the number of measures in the sub-cluster of 'Vehicle and driver support' reduced from 6 to 2 (Table 1.1)

Table 1.1 Number of measures in each sub-clusters

	CIVITAS II	CIVITAS Plus
New distribution schemes	8	11
Access restrictions to freight vehicles	0	7
Vehicle and driver support	6	2
Freight partnerships	3	1

It must be noted that the outcomes of some measures cut across sub-clusters and are therefore addressed in more than one sub-cluster where appropriate.

2. IMPLEMENTATION

2.1. NEW DISTRIBUTION SCHEMES

Initial assessment of current freight operational systems

The measures within this cluster have demonstrated that the first key step when implementing a new freight operating mode or a distribution scheme is to assess the current freight logistics and transport activities within the target area. This includes analysis of current freight delivery flows, types and characteristics of transported goods, vehicle type, identification of freight routes and schedules, loading and unloading characteristics, and the specific requirements of the target groups and core businesses (the nature of business and operation will determine different delivery needs e.g. catering compared to construction). Furthermore, a detailed understanding of the road and traffic network (e.g. one way streets, statutory directions), spatial limitations and legal constraints is advantageous. From this initial assessment, potential opportunities to increase efficiency can be reviewed and targeted.

Consultation and engagement with stakeholders

During consultation with stakeholders goals can be disseminated and openly discussed. Feedback on proposed goals and actions can highlight concerns and focus schemes to optimize success. Due to the complexity of urban goods delivery, which involves numerous different stakeholders with conflicting requirements, it is unlikely that proposals will be well received by all. New distribution schemes may not gain the required support if stakeholders consider that the existing system is adequate. As a result, measures might not develop further than the consultation stage. Wide consensus of a need for action can lead to acceptance of a measure and pave the way for further developments. On-going regular communication through client and working groups (Bath), consultation committees (DSS), freight quality partnerships can ensure that all appropriate parties have a direct input which can reduce potential barriers. Involvement of local government (e.g. municipalities) in an overseeing capacity can facilitate the effective exchange of information between stakeholders and successful implementation.

Examples of new operating modes and distribution schemes

-Consolidation of deliveries (consolidation centres, van sharing schemes)

Deliveries into city centres are typically arranged independently in accordance with individual business needs with no cooperation or sharing of vehicles or infrastructure. Urban consolidation centres have the potential to reduce the number of delivery vehicles entering a city centre, if strategically positioned in close proximity to major road networks and the onward distribution area. Goods are delivered to a central facility located on the periphery of a city where they are consolidated for onward dispatch in pre-arranged time slots to maximize vehicle utilization for the “final mile” (Bath). In addition, take-back schemes for product returns or waste materials could be offered as part of the delivery service where they are collected and returned to the consolidation centre for processing, further reducing city centre freight movement impacts. Depending on the geographical distribution of towns and cities, a consolidation centre could be used to service more than one area (Bath). The location of which would need to be close to both cities.

The potential impacts associated with a freight delivery consolidation scheme can be modelled prior to implementation through the analysis of current transport and freight delivery

data, for example using PTV Visum software (Ljubljana). This could demonstrate the benefits of consolidation before investment is made.

The urban consolidation model could be trialled and modified. Cities may benefit from having several to include non-traditional types of goods such as construction materials, and fresh and non-perishable goods. Freight vehicles servicing cities with large-scale construction materials significantly contribute to the traffic flows due to the “just in time” management techniques used (Utrecht). Strategically positioned buffer zones could provide these vehicles (e.g. freight and construction worker vehicles) with a decentralized place to park with good accessibility to construction sites throughout the duration of the project. In addition to buffer zones, building materials could be bundled at one central transfer site (consolidation centre) before transported to the construction sites in one complete load, out of peak traffic periods. The success of this concept would be dependent on the participation of different suppliers through a shared recognition that the construction traffic would have a negative impact on the traffic flow.

Unless incorporated into planning permission, participation in consolidation schemes cannot be enforced. However, access restrictions for freight vehicles (e.g. time windows or pedestrian areas) could make participation in such schemes more attractive. New businesses could be recruited through introductory offers, which after an agreed time could be replaced by standard delivery charges levied per cage or pallet (Bath).

-Organized delivery services

Merchandise Pick up Points (MPuP) at key locations (e.g. consolidation centres or park and ride) could enable the collection of pre-purchased goods by the public instead of visiting the inner city (Utrecht). Feasibility studies could confirm the viability of the MPuP ensuring that retailers and the public would use this alternative service. Such schemes could benefit from being implemented with existing bundling operations where a vehicle (single operator) is already delivering goods to and from a centrally located hub outside the city centre close to main road networks. Collection of goods from pick up points could provide shoppers with an alternative option to obtain goods purchased, resulting in reduced vehicle movements and associated impacts in city centres.

Furthermore cities could be divided up into zones depending on the types of goods, street typology and the distance delivery points or proximity delivery areas (PAs) which act as urban transfer platforms for the loading and unloading of goods (Vitoria-Gasteiz pictured). From the PAs to the shops goods could be transported using clean vehicles or machinery developed specifically for distributing goods in urban areas (e.g. hand trucks). The occupancy of vehicles at the PAs will need to be controlled through time windows to ensure reduce the likelihood of congestion and a traffic light system which times occupancy and notifies drivers of availability when empty would be beneficial. Such a system should make the control and supervision by municipal offers simpler.

-Additional services for goods distribution

An alternative way of enabling new distribution schemes is to develop a virtual common logistics platform as part of a van-sharing scheme for smaller freight operators. The platform collects information on orders, organizes loading and unloading trips, calculates the optimal routes using real-time traffic data, and reserves parking slots which are monitored in real-time specifically for vehicles (Bologna). Such schemes should have a direct impact on average saturation levels of vehicles used to delivery to the city centre by aggregating orders originating from different logistics operators performing the 'last mile' service. Economic incentives may need to be provided to engage operators to participate in van sharing schemes and consortium to offset against potential lower revenue and loss of flexibility (Bologna).

-Modal shifts in goods transportation and innovative technologies
A further way of developing new distribution schemes is to explore the viability of intermodal opportunities where innovative technologies could be operated in conjunction with other conventional systems. Clean, low emission vehicles appropriate for the types, volume and weights of goods to be transported could replace diesel freight vehicles completing final mile deliveries into city centres. Vehicle access restrictions (e.g. time windows, bus lanes) in addition to physical local circumstances (e.g. dense city centre, narrow streets, waterways) might make alternative modes of transport more attractive. These could include the use of electric low emission freight trucks (Bath), cargo bicycles for smaller volumes (Donostia-San Sebastian), electric mini-trains (Cargohopper – Utrecht) or more innovative sustainable modes of freight transport.

Increased collaboration between cities and well-established transport providers could provide opportunities for the integration of more sustainable freight vehicles into existing vehicle networks. One option could be to replace existing diesel vehicles used by the operator transporting goods between a distribution centre and the city centre, and to bundle loads (Utrecht). Such a set up would enable the utilization of innovative clean technologies such as 'Cargohopper', or a mini electric train (Utrecht). Customer demands should remain constant with transport providers not needing to look for new business. The benefits of waiving access restrictions along bus lanes or even bicycle paths could be investigated to enable cleaner vehicles to deliver outside normal delivery windows (Utrecht).

Cities with businesses in close proximity to waterways could benefit from introducing electric waterborne freight transportation instead of using trucks or vans to transport goods. The vessels could be adapted in accordance to the types of goods and businesses they are delivering to. Instillation of refrigeration would enable the transportation of goods to catering businesses, while multi-purpose vessels could be adapted to deliver a wider range of goods including clothes or even for return flows like paper and plastic (Utrecht). Due to the cost of investment it would be preferable that the city municipality take responsibility for the market set up. This would allow the service to be offered with tariffs that only have to cover the costs thus making it a more cost effective alternative for suppliers. As Municipalities are not eligible to transport third party goods, suppliers or transporters would hire the boat (per hour, half a day or whole day) and a representative would always be required on the boat, ensuring safe delivery of the freight. The operation models are complex and optimization would benefit from collaboration between suppliers and transporters.

In Utrecht there are opportunities for multimodal deliveries through the expansion of Cargohopper and Beer Boat services to transport goods from the distribution centre to the city centre. Other innovative systems could include development of a network of bidirectional tubes such as underground, suspended on pylons, or running along existing transport networks (e.g. mini metro) to transport medium-sized batches of goods in capsules to make small, fast and frequent deliveries to businesses in the city centre. The length of the pipeline

could be adapted to fit a range of scenarios including the short transportation of goods within a city (distribution centre to an intermodal station/city centre) to longer non-urban scenarios. The flexibility of the system allows for a wide range of delivery times, batch size and types based on demand without affecting the system performance.

Marketing and promotion activities

To promote new distribution schemes, various promotional and educational materials (e.g. leaflets, posters, brochures, stickers) could be produced to highlight the benefits of the new services. In addition to traditional printed media (newspapers, magazines, leaflets, letters), the use of radio (Donostia-San Sebastian), Internet e.g. YouTube (Donostia-San Sebastian), social media campaigns (Facebook and twitter e.g. Ljubljana) and the use of web portals (Ljubljana) could be exploited. The recruitment of a face-to-face contact point (Bath) could further stimulate interest and participation.

An outline of each individual measure implemented within the New Distribution Scheme sub-cluster is given in Table 2.1. The table provides a summary of the key features implemented and also provides details of any possible delays or issues experienced during the project duration. Details of feasibility studies that did not result in the implementation of a hard measure are also given in addition to measures that were not fully implemented.

Table 2.1 Summary of new distribution schemes implemented

City	No	Title	Measure	Comments
Bath	7.2	Urban Freight Logistics new concepts for goods distribution	-New Urban Consolidation Centre served 2 cities & used 2 electric delivery vehicles. -Demonstration project serviced 19 retailers in Bath. -Service included take-back of packaging of recycling.	-Demonstration Project widened to set up a consolidation operation that served 2 cities. -The procurement exercise to identify a subcontractor delayed implementation, preventing identification of an optimally located distribution centre. - Built on work carried out under CIVITAS VIVALDI.
Bologna	7.1	City freight delivery plan	*-Not fully implemented* -Van Sharing technological platform with virtual transit point designed for smaller operators -Integrated a new traffic control centre (CISIUM) (measure 8.3) with the van sharing scheme to send data on real-time road events. -Operators were able to join the scheme via the internet. -8 optimally located 'pull in areas' were selected to enable participating companies to make advanced bookings.	-Freight operators and goods dealers were not attracted to the Van Sharing scheme or to joining the consortium & as a result it never progressed. -Small operators were concerned about losing market share & revenue although the Municipality planned to introduce an economic incentive to close the economic gap. -The van sharing scheme provided an alternative option for distribution in the 'pay to access' Limited Traffic Zone'

Donostia-San Sebastian	65	Efficient goods distribution	-New Urban Consolidation Centre & goods delivered by 6 electric bicycles. -Loading/unloading bays were regulated by the deployment of 60 new mobility agents -Four cameras were strategically installed to ensure streets were clear after delivery time. -The loading & unloading timetable was reviewed and updated. -Stakeholders were notified about the new distribution scheme e.g. mailings, local & regional media & the internet.	-Freight Quality Partnership initiative was cancelled due to lack of stakeholder interest. - ITS technologies were initially planned to improve communications between distributors, shops and police but were later dismissed due to organizational & technical difficulties. -Identified that a single consolidation centre is not sufficient to undertake last mile delivery throughout the city due to the layout.
Ljubljana	7.2	Sustainable freight logistics	-*Computer simulation model* designed to demonstrate the potential impacts of a proposed Urban Consolidation Centre. - National web-portal, which included an interactive map to calculate optimal delivery routes, was launched to promote sustainable freight logistics.	-Refocused measure as original plans for Urban Consolidation Centre were rejected & cancelled by Ljubljana traffic department due to lack of interest in interest in consolidation. -Original plan replaced by the computer simulation model and the national web portal.
Perugia	7.1	City logistics & alternative innovative distribution system - Pipe§Net	- Full *feasibility study* demonstrated the application of an innovative technology, 'Pipe§Net', for the efficient movement of goods in freight distribution. -'Pipe§Net' - a network of vacuum-sealed pipes allows for the transportation of capsules containing freight at high speed. - Different operational scenarios including urban (1 & 4km) & non-urban (222 km) were modelled to identify the best preforming configuration for Perugia.	-Physical implementation would require the construction of supporting infrastructure e.g. network or pipes, distribution centres with stations for loading and unloading of capsules.
Utrecht	6.3	Merchandise pick up points (MPuP)	-*Feasibility study* identified an opportunity to combine merchandise pick-up point with bundling concept called "*Binnenstadservice*". -This service could include the bundling of deliveries, waste or parcels and could provide an outlet for customers to pick up their goods.	-Highlighted that a stand-alone MPuP concept was too ambitious due to small target group and lack of interest from retailers. -Decided to pilot the MPuP with the bundling concept – "Binnenstadservice." -Delays of about one year.

Utrecht	7.1	Construction logistics plan	-*Not fully implemented* -A Construction Logistics Plan was developed for the city. -4D planning software produced a map which was used to present stakeholders with a clear construction logistics & traffic circulation action plan. -Central buffer zone area was set up on site at the construction company for materials to be bundled and stored. -Set-up of a construction logistics centre implemented near to Utrecht central station.	-Construction logistics centre was not used during the MIMOSA period due to delays in the railway construction. -As a result there was no major congestion problems caused by construction vehicles.
Utrecht	7.2	City distribution by Boat (Beer boat)	-New electric waterborne vessel “Beer Boat” introduced replacing the existing diesel vessel. - As a direct result of CIVITAS MIMOSA a new contract was signed for another electric “Multi-Purpose Vessel” to collect waste and separated glass, paper and cardboard.	-Expansion of the waterborne transport market postponed until after the end of MIMOSA & reprioritized due to the introduction of a new Multi-Purpose Electric Vessel (Ecoboot) which replaced the existing garbage boat. -Due to the lack of market expansion & additional capacity, the old vessel was not adapted to a zero emission boat.
Utrecht	7.3	More flexible access for cleaner freight traffic (Cargohopper)	-An electric multi-trailer, mini-train called the “Cargohopper” was introduced to transport bundled goods from a central loading point a short distance into the city centres’ low emission zone. -Service also included the collection of paper & other clean wastes on the return trips. -Installed with solar panels enabled the vehicle to drive 8-9 months on solar power. -An increased capacity Cargohopper II was also launched during the project.	-Despite 40 supermarkets signing the declaration for night distribution, as of Sept 2012, no requests had been made. -Tests were delayed which sought to evaluate the potential impacts associated with freight traffic using bus lanes.

Utrecht	7.4	Distribution centres for fresh & perishable goods	-*Not implemented* -A concept business plan was developed for the bundling of fresh and perishable goods, using an Urban Distribution Centre and clean freight transport vehicles. -A suitable area was identified for a pilot study which contained a lot of catering businesses. -Research was conducted in this area among businesses and suppliers.	-There was a distinct lack of support for the bundling of fresh & perishable catering goods pilot study. -Pilot delayed beyond MIMOSA & will be conducted as a private initiative by Hoek Transport using their Cargohopper. -Concept will be a mix of a cross-docking system and a portal. -Results from this measure will be useful for the future implementation of the pilot project.
Vitoria – Gasteiz	7.01	Urban Logistics within the Superblocks model in Vitoria-Gasteiz	-*Not fully implemented.* - 9 miniblocks were created in the main superblock based on quantity of goods to distribute, street typology & distance to delivery points. -Each block was served by at least 1 Proximity Area (PA) (13 serving the area), which consisted of an urban transfer platform for the unloading of goods for final distribution. -Freight distribution companies & commercial operators performing self-provision were granted access to the PAs between 08:00-14:00 and 16:00-18:00, outside of which used for regulated parking. -Each PA was allocated with 2 different parking areas classified by user. -*High turnover areas* for operators performing self-provision were allocated 20 mins, & *conventional distribution areas* for freight companies were 60 mins.	-Delays in implementation due to lack of funds, unclear political strategies, poor understanding of freight distribution in the city and extended information dissemination campaign. -Opposition from carriers as they argued it would increase the cost of distribution given they could not deliver to the end point. -Remote control of the PAs not implemented, control is to be performed manually by the police. -Evaluation delayed due to above but also as it is recommended to allow time for mobility habits to change**.** **-**Reviewed previous CIVITAS and BESTUFS projects.

In previous CIVITAS programs the implementation of new distribution measures were less successful than anticipated. CIVITAS Plus measures focused primarily on consolidating freight deliveries through various means and/or introducing the use of clean vehicles. During CIVITAS II, over half of the measures originally included the implementation of a centralized urban distribution centre but only 1 was partly realized largely due to the opposition of local businesses or that the measures were deemed to be unnecessary. In CIVITAS Plus, urban distribution centres were successfully implemented in both Bath and Donostia-San Sebastian. In Bath, the specification and implementation for the new centre incorporated best practice and experiences gained from the introduction of similar schemes in Bristol (CIVITAS VIVALDI) and Norwich (CIVITAS SMILE). As with previous programs, delays in

implementation, and general lack of stakeholder engagement and acceptance were key issues that impacted on the implementation of some of the less successful measures.

2.2 ACCESS RESTRICTIONS TO FREIGHT VEHICLES

Assessment of current freight operations

The first key step in regulating freight vehicle access within a defined area is to review the current freight distribution system including the traffic flow (vehicle type, volumes, general characteristics, input/output matrices, loading/unloading areas), requirements of specific target groups and the freight regulatory infrastructure. Such reviews can highlight failings in current regulations, conflicts of interest (e.g. freight vehicles accessing pedestrianized zones at peak times (Gent, Brighton)), thus highlighting areas for improvement. Measures will need to be developed in line with existing legislation, or legislation will need to be amended.

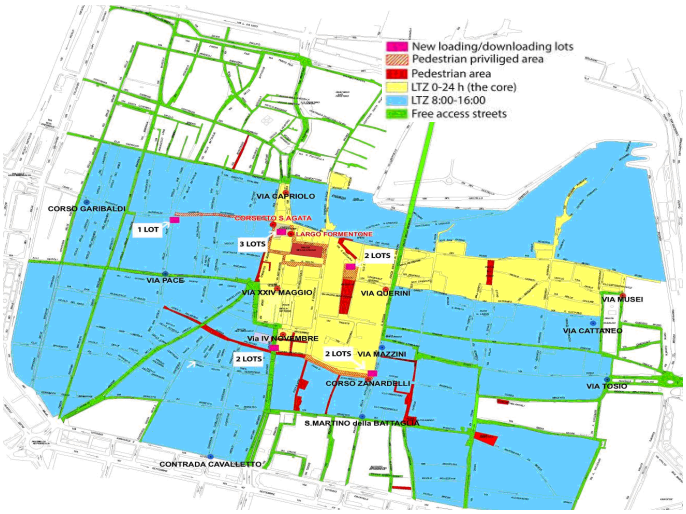
Consultation with stakeholders (local government, politicians, residents, transport companies, local businesses)

As with the implementation of new distribution schemes, consultation with the appropriate stakeholders (e.g. local government departments, logistics providers, businesses, traffic police, residents) should be instigated from the planning stage. Working groups (Gent) and public and freight partnerships (Zagreb) could be established in order to discuss freight issues, exchange information and discuss the potential benefits associated with solutions. By involving relevant stakeholders, it ensures that they are part of a solution and therefore schemes can be adapted ensuring they work for all. Providing comparable evidence from other successful schemes could be used to demonstrate the benefits associated with restrictive measures. Formulation of freight quality partnerships (between local government and business) could provide businesses with the opportunity to negotiate facilities to off-set restrictive measures in an attempt to minimise any potential negative impacts on their business activities (Iasi). A lack of cooperation and differences in objectives between stakeholders can lead to insufficient consensus on solutions and have been shown to make measures difficult to implement (Zagreb and Gent). Businesses may also benefit from political lobbying to assist with some measures being granted approval (Brighton).

Examples of new access restrictions to freight vehicles

-Amending the road network

One option to change the pattern of freight activity and reduce the levels of through traffic into city centres is to physically alter the road network. This could be done through the reconfiguration of streets and access (Gent) and the creation of pedestrian zones (Brescia pictured). Access could be permanently blocked if the access points are not shared by public transport, or could be regulated through the instillation of bollards or Pilomats (Brescia). Delivery corridors or loading bays could be placed on the rim of the pedestrian zone and accessed through secondary streets with lower traffic loads and further regulated (Zagreb). Introducing speed limits could also assist with calming the traffic flow. Potential inconvenience to businesses within areas undergoing extensive



reorganization could be acknowledged through compensation schemes where businesses could be offered a reduction in the cost of their rent, if owned by the Municipality (Brescia).

-Time window restrictions
The introduction of time windows for freight loading and unloading could regulate delivery traffic within peak traffic periods. Ideally, delivery time windows would need to take into consideration the operating needs and requirements of businesses in the area. New time windows for deliveries could be significantly reduced e.g. from 06:30-11:30 and 13:30-18:30 to 6:30-10:00 (Brescia), and as a result transport providers would be required to reassess their operations to ensure they still meet the demands of the customer. This could influence the types of vehicles used by the operator, leading to improved efficiencies through increased vehicle loading factors.

–Restriction zones
A further way of restricting access for higher polluting freight vehicles in city centres is to introduce a low emissions zone (LEZ), or environmental zone where vehicles entering the area are required to meet predetermined emission standards that limit the amount of particulate matter emitted from the exhaust. The introduction of emission standards could be phased in to initially allow access to HGVs and buses (>3.5 tonnes) that comply with EURO III (2000) or have had a particulate filter fitted, then subsequently upgraded to restrict access to EURO IV (2005) vehicles the following year (Aalborg). Schemes could also be extended to include the access of appropriate standard vehicles from other countries. Low emission schemes could encourage freight operators to update their vehicle fleets to improve their accessibility into city centres. Zoning could also be used to limit access by taxing as in Craiova.

<u>Regulating access restrictions</u>
To maximise the changes associated with the aforementioned access restrictions, measures need to be regulated and enforced to ensure that freight operators and drivers modify their behaviour. Vehicles could be granted different access rights into a pedestrian zone through the central control of vehicle stickers and permits. Permits could be issued based on category of usage (e.g. residents, deliveries of perishable goods, non-perishable goods and the postal services). Some categories may not be eligible for permanent permits and in these cases single access permits could be granted by email or SMS (Gent). Such schemes seek to control and reduce the number of permits issued in order to restrict the number of vehicles entering the pedestrian zone. In Low Emission Zones, access could only be granted if vehicles displayed a sticker in their window demonstrating that the vehicle fulfills the emission requirements of the zone (Aalborg). When delivering to these areas, delivery companies have to reconsider how they operate and change their behaviour or fleet to balance the demands of the road network operators and their customers.

Vehicles parked illegally (Zagreb), entering weight restricted areas (Bath) or pedestrian zones, could be penalized (financial or vehicle removal) or prosecuted by traffic enforcement officers if permit stickers are not displayed (Gent, and Aalborg). Enforcement during peak periods is a valuable tool although the cost of the manpower (time and financial) is questionable (Gent). The strategic installation of cameras (e.g. ANPR) with automatic number plate recognition could enable better regulation of access restrictions. Analysis of vehicle number plate registration through the appropriate data source can be used to determine the EURO emission standard (Aalborg) or the vehicle weight (Bath). This requires cross referenced with a central database which could identify whether a valid permit has been registered for the vehicle. If a vehicle does not have a permit, a photo could be kept for evidence in the event of a prosecution. The logistic providers could also be contacted to ensure that they are aware of the changes in restrictions followed by appropriate adjustment

of their delivery schedules and routes (Brighton). Appropriate legislation is required to ensure that such traffic offences can legally be enforced using camera technology (Bath).

Campaigns to inform residents and businesses of regulatory changes

Due to the legal implications associated with these measures, campaigns should focus on disseminating advance information of regulatory changes to all affected groups (e.g. transport operators, businesses, residents) through leaflets, posters, newspaper articles, signage and websites explaining the changes and perceived benefits of the measure. Inadequate signage might provide drivers with the misconception that they can easily violate the new regulations (Brighton).

An outline of individual measures implemented within the access restrictions to freight vehicle sub-cluster is given in Table 2.2. The table provides a summary of the key features implemented and also provides details of any possible delays or issues experienced during the project duration. Details of feasibility studies that did not result in the implementation of a hard measure are also given in addition to measures that were not fully implemented.

Table 2.2 Implementation of access restrictions to freight vehicles measures

City	No	Title	Measure	Comments
Aalborg	63	Efficient goods distribution in Aalborg	-Introduction of an Environmental Zone (low emission zone) in the city centre where access to HGVs & buses was restricted based on vehicle emission standards e.g. Euro 3 standards (Feb 2009), Euro 4 (July 2010) & extended to include HGVs and buses from outside Denmark from Autumn 2011. -Vehicles fulfilling the requirements were required to display a sticker in their window, no sticker-no access, the scheme was regulated by the police, signs displayed at access to LEZ	-Good cooperation between stakeholders & involvement of a well-established working group with experience of city logistics in Aalborg aided with implementation. -Signage at the entrance to the low emission zone had to be updated in 2010 when the requirements were changed to Euro 4 standards. -Implementation was aided by the involvement of a well-established working group with experience of city logistics in Aalborg.

Bath	3.4	Demand management strategies	- Automatic Number Plate Recognition Cameras (ANPR) and Vehicle Activated Signs (VAS) were installed as part of a *demonstration project* to regulate the number of HGVs breaching environmental weight restrictions of 7.5 tons along a designated route. -HGVs details were obtained from 2 separate UK government agencies, to establish weight and vehicles ownership details. -Vehicles identified as breaching the restrictions were contacted and asked to produce details of their journey. -If no valid reason was given for using the route a letter was sent notifying the driver of the breach.	-Various technological options to manage freight movements were assessed. --A new back office system had to be developed to analyse data from the 2 different agencies which was resource intensive. -Budget constraints impacted on the number of ANPR cameras installed. -Using new untested technology to capture HGV registration numbers by camera experienced many technical problems. -Legal restrictions meant that the use of cameras to identify HGVs breaching weight restrictions could not be enforced and was subsequently used to raise awareness. -The measure compliments other CIVITAS RENAISSANCE measures
Brescia	7.02	Freight distribution in Brescia	-Approval of the Municipal Decree, which introduced new freight restrictive measures. - Progressive reorganization of freight distribution in the historic city e.g. pedestrianisation, vehicle access restrictions (e.g. instillation of Pilomat & flower pots), removal of parking spaces, allocation of delivery spots. - Time bands for deliveries were restricted to a single slot (e.g. 06:00-10:30).	-Development of an Urban Consolidation Centre & new freight distribution fleet delayed & not started during CIVITAS. -Majority of transport operators demonstrated resistance towards the restrictive measures. -Restrictive measures & pedestrianisation were preparatory steps for a general reorganization in the city, which will include a new metro line (2013).
Brighton & Hove	64	Efficient goods distribution in Brighton & Hove	-Part-pedestrianisation of a major pedestrian route in the city centre as part of the Environmental Zone. -Reversal of one-way traffic flow.	- Formation of a formal citywide Freight Quality Partnership was unsuccessful due to lack of interest & concern that it would result in increased costs on businesses. -Environmental Zone encountered a series of delays due to budgetary changes.

Craiova	7.03	Policy option for freight distribution schemes	-Enforcement of existing freight distribution scheme (zoning and entrance fees). -City was divided into 2 zones, Zone 'B' for the city centre (smaller inner zone) & zone 'A' (larger) represented freight distribution throughout the rest of the city. -Entrance fees were levied for vehicles >3.5 tons accessing the zones depending on the type of goods transported. -For the transport of perishable good/per vehicle/per day in Zone A – 12 LEI and Zone B – 15 LEI. -For the transport of other goods/per vehicle/per day in zone A – 24 LEI and in Zone B – 30 LEI. -Free access granted to rapid intervention vehicles and municipality vehicles. -Display of a stamped pass allowed access.	-The municipality decided to only improve the existing scheme due to the on-going works within the city e.g. construction of a bridge and tunnel, rehabilitation of the city centre. -There was a 5-month delay while a study on goods distribution (including extensive data collection) in Craiova was conducted. - There was a lack of baseline data on freight distribution in the central area.
Gent	7.3	Institutional platform for freight management	*-Not fully implemented* -Pilot project conducted in which cameras with automated number plate recognition (ANPR) were installed to regulate vehicle accessing a pedestrian area. -Cameras were introduced in 2 locations with different characteristics. -New permit system was developed for the pedestrian area, permits were issued by category (e.g. residents, deliveries of perishables/non-perishables etc). -Some categories that previously had a permanent permit would be required to use the delivery hours (before 11:00 & after 18:00) while others may only be granted single access.	-Lack of political support for the instillation of the ANPR cameras almost resulted in the cancellation of this measure. -The police demonstrated strong resistance to the scheme due to the concerns that enforcement would increase their workload. - The measure wasn't fully implemented as instillation of cameras was delayed for technical and organizational reasons. -Implementation of this measure is planned for the end of CIVITAS ELAN, the serious delays meant that evaluation was not possible before the end of CIVITAS. --Cameras at another 7 locations will be installed after the CIVITAS period.

Zagreb	7.4	Freight delivery restrictions	*-Not implemented* - In coordination with stakeholders a new more flexible solution for freight delivery was developed & a demonstration area was identified around the main square and pedestrian zone. -The proposal included new regulations, which restricted delivery traffic after 7am, an additional time window was introduced from 10:30-11:30am in addition delivery spots were determined within the 2 delivery corridors (north and south) on the rim of the pedestrian zone.	-Delays as data required was not made available by the municipality & additional data had to be collected. -As the measure sought to revise traffic regulations, proposals were sent to the Transport & Traffic Department for approval, no official response was received before the end of the measure. -As it was apparent that the solution would not be implemented, a pilot project was proposed using the same set of measures, which again was not acknowledged. -Lack of cooperation between stakeholders caused insufficient consensus on conclusions.

In the CIVITAS GUARD Cluster report, a sub-cluster was not assigned to access restriction measures as they were not represented in any significant number.

2.3 VEHICLE AND DRIVER SUPPORT

Initial assessment of available technologies

A first step in developing technical assistance for vehicle and drivers would be to assess existing regional freight networks identifying areas of concern (e.g. congestion, air pollution), while reviewing the suitability of available technologies and their ability to alleviate any issues. These could include route planning and optimization for freight logistics using GPS technology (Utrecht), web-based (Ljubljana), mobile-based solutions (Utrecht) or roadside guidance systems (Tallinn). Inclusion of stakeholders in the development process, through working groups for example, would assist in the assessment of freight users' needs and priorities (Utrecht).

Development of technological based support

The development of dedicated freight navigation software (Smartphone) which analyses real-time air quality data (e.g. NOx) and can be adjusted to analyse any current traffic situation (e.g. road works, traffic jams and travel times), could be a valuable tool to reroute freight traffic at key points of the day. The continual availability of real-time data is integral and valuable data sources could be provided to traffic control centres (Utrecht). In addition, free downloadable routes (available in different languages where applicable) compatible with GPS devices (e.g. Garmin and Tom Tom) could be created to direct freight traffic along optimally pre-defined routes e.g. from a port to a national road network (Tallinn pictured). A further IT based support tool could be made available through the use of a national web portal with an online routing tool to calculate optimal freight delivery routes within defined areas, e.g. city centres or pedestrian zones (Ljubljana – New distribution scheme sub-cluster). Such a website could also be used to support and promote sustainable city logistics.

Upgrading of signage and marketing of schemes

Ineffective and inconsistent use of guidance signs combined with increased use of personal GPS based navigation systems using the “fastest” route frequently may result in heavy vehicles entering city centre locations or restricted residential areas. In areas with high flows of non-local traffic (e.g. city harbours) signage can be used as part of a re-routing strategy to direct freight traffic along optimally defined routes in and out of the city (Tallinn pictured).

To promote the benefits of vehicle and driver schemes, promotional and educational materials (e.g. posters, maps, leaflets, brochures, online pages) should be produced in different languages where appropriate and distributed to appropriate stakeholders (e.g. freight drivers, transportation operators, the general public) and made available in appropriate locations e.g. harbour terminals (Tallinn).

Outlines for individual measures implemented within the vehicle and driver support sub-cluster is given in Table 2.3. The table highlights the key features implemented in Tallinn and details of the feasibility study conducted in Utrecht. In both instances details are given regarding delays and issues experienced during the project duration.

Table 2.3 Implementation of vehicle and driver support measures

City	No	Title	Measure	Comments
Tallinn	7.1	Marking routes for smooth freight & city logistics	-Installation of guidance signs to direct freight traffic along optimal identified routes. -Freight routes were designed for different navigation systems (e.g. Garmin and Tom Tom) and were made available for download free of charge on the Tallinn website. -Promotional & educational materials produced in different languages.	-Measure was refocused as the original plans, which included ITS solution with the construction of a planned shortcut, were delayed indefinitely. -Overall, the measures experienced delays with additional time & investment required.
Utrecht	8.2	Clean route planning for freight transport	-*Feasibilities study* that assessed how to reroute road freight traffic using real-time air quality and also explored the feasibility of this information being adapted for a navigation app for smartphones.	-Pilot delayed & not implemented -Measure aimed to prepare for the implementation of a rerouting device. -Study indicated that the measure should focus on emissions of the whole city rather than rerouting freight away from locations with poor air quality. -Stakeholders had to be convinced that the focus should be on navigation software instead of roadside information panels. -Related to UTR 8.1 Traffic Control Centre as a provider of real-time data.

Previous CIVITAS GUARD vehicle and driver support measures similarly focused on implementing web based, in-vehicle and en-route information systems of which half were successfully implemented. The lack of available technologies and low levels of stakeholder involvement were key factors that impeded implementation. As only 2 measures in CIVITAS POINTER set out to implement vehicle and driver support measures (of which only 1 was implemented) it is difficult to make any comparisons on the implementation process with previous programs. Suffice to say that technical advances in software development e.g. Google Maps and navigations influenced the clean route planning project in Utrecht by

demonstrating how real-time traffic information (travel speed and accidents) can be used to divert freight traffic from congested areas. However, further technological advancements are required before a clean route planner for freight traffic is available as an app for smartphones.

2.4 FREIGHT PARTNERSHIPS

Review of Freight Quality Partnerships to identify best practice

A review of Freight Quality Partnerships (FQP) could be used to identify best practice in terms of the organizational set up, programs and measures that FQP's typically participate in, and how they can deliver long lasting results.

Identification and engagement of target group

Surveys with key businesses, freight operators and delivery drivers operating within the targeted area could provide a better understanding of the prevailing freight activity (Brighton & Hove, access restriction measure) and ensure that a FQP is best suited to the businesses in the area. Businesses and other stakeholders could be encouraged to participate in a FQP through a range of outlets including websites, workshops (Brighton & Hove), meetings (Iasi), interviews, posters and press releases (Iasi). Engagement may be stimulated further through providing stakeholders with the opportunity to negotiate improvements in response to new strategies regarding their supply and distribution activities. In cities where access restrictive measures have been implemented (e.g. parking and access restrictions), businesses could benefit from signing FQPs in order to negotiate mitigating measures such as access ramps, paths and traffic cells for parking (Iasi). A FQP will only be signed when all parties are in agreement.

An outline of the measures implemented as part of the Freight Quality Partnership sub-cluster is given in Table 2.4. The table highlights the key features of implementation and also identifies the main issues experienced during the project duration.

Table 2.4 Implementation of Freight Quality Partnership measure

City	No	Title	Measure	Comments
Iasi	66	Efficient goods distribution	-Restrictions introduced which denied access for animals & associated vehicles, forbade parking of vehicles >5.2m in length & restricted access within certain hours (07:00-09:00 and 15:00-17:00). - 59 Freight Quality Partnerships signed within the main business area, divided on groups of operators according to their current distribution practices & location. -Agreements contained restrictions & facilities were negotiated & awarded to each FQP group (e.g. fees and tax exemptions, new parking spaces, exemptions to stop on sidewalk to deliver).	-Insufficient agreements made it difficult to apply a strategy to improve goods distribution throughout the city before and during the implementation.

FQPs were also included in the original plans for measures implemented in Donostia-San Sebastian (New distribution scheme) and Brighton (access restrictions to freight vehicles), but were not fully implemented. Previous CIVITAS programs experienced similar problems with implementing FQPs and engaging stakeholder participation e.g. Norwich and La Rochelle (CIVITAS GUARD). The successful engagement of stakeholders in Iasi can be partially attributed to the provision of incentives in which participants were able to negotiate resources (e.g. tax exemptions, additional parking spaces) in order to meet new access restriction requirements.

3. DRIVERS AND BARRIERS

3.1 INTRODUCTION

3.1.1 Background and methodology[1]

The main goal of the process evaluation procedure of CIVITAS-POINTER has been to develop new findings about factors of success, and strategies to overcome possible barriers during the implementation phase of CIVITAS Plus measures by cross-site analyses of all relevant information. A specific focus lies in the identification of potential barriers, but information on factors of success, such as drivers, is needed as well. Barriers and drivers may differ during the various stages of the measure. Therefore distinction has been made in three different phases:

1. Preparation phase: the measure is developed in detail and design work for the measure is conducted. At the end of this phase all planning details are fixed, including all decisions and permissions that are a pre-condition for starting the implementation phase.

2. Implementation phase: the measure is implemented in real life. At the end of this phase the measure begins operation.

3. Operation phase: the measure is opened to the public, i.e. users are able to increase their utility. The first phase of operation lies within the time-frame of the CIVITAS Plus Initiative and can be analysed and evaluated by CIVITAS POINTER. The long-term running is the outstanding time (beyond the CIVITAS II Initiative) until the measure comes to the end of its life. This could be caused by technical issues, programme termination, end of funding, redesign, or reconstruction.

The process evaluation framework is built upon three information blocks, each of which has his own form. The first block is called measure evaluation and results in the completion of the so called Measure Process Evaluation Form. It should be completed for all non-focussed measures. The second building block consists of the subset of focused measures. These measures were selected based upon several criteria. One criteria was the potential to conduct a Cost Benefit Analysis (CBA). The aim of the focussed measures is to get a deeper insight into the selected measures. The forms which provide information for the two blocks above were completed several times during the programme and functioned as a basis for the last building block: the process evaluation part of the Measure Evaluation Report Template (MERT).

The raw information of the various forms showed that the drivers and barriers are extremely measure and site specific, however,for analyzing and reporting purposes they have been grouped into so called barrier and driver fields. An overview of these fields can be found in

[1] A detailed description of the objectives and methodology of the process evaluation is to be found in other POINTER reports

Annex 1. Specific and detailed information about the barriers and drivers of the measures is to be found in the individual MERT.

3.1.2 Aim and structure of this chapter

The starting point of the process evaluation at cluster level is that policy makers and other stakeholders are interested in understanding the barriers and drivers that may be relevant for the measures. The process evaluation data of the MERTs were put in a database and analysed on a aggregated level with SPPS for the various sub clusters. (Specific information should be obtained from the individual MERTs.)

For the cluster Logistics and Goods Distribution, the data from 21 MERTs are available, originally divided into the four sub clusters as presented in Section 1. Because the description of the process evaluation is on a more aggregate level three sub clusters have been distinguished for this analysis, as shown in Table 3.1.

Table 3.1: Sub clusters and number of measures

Subcluster	Number of measures
New distribution schemes	11
Access restrictions and control	7
Other (Vehicle and driver support, and freight partnership)	3
Total	21

A general overview of the cluster is given in Section 3.2 (see Annex 2). Sections 3.3, 3.4 and 3.5 are used to describe the barriers and drivers within the sub clusters and detailed background information can be found in Annex 3. The outcomes as distillated from the measure information are given in Section 3.6.

3.2 CLUSTER OVERVIEW: GENERAL ASPECTS

To put the findings of this cluster in erspective it is important to appreciate the quality of the process evaluation data gathered. Distinction has been made at three quality levels: (i) low quality means that data are not/or hardly useful due to the use of old MERT forms and/or a lack of understandable answers to the questions; (ii) medium quality means that the data are useful, although not all the crucial questions (barriers, drivers, actions and recommendations) have been completed well; (iii) high quality means that the data were very useful because all questions are answered well or at a generally acceptable level, although variability in the quality of the answers may exist. Some 14% of the process evaluation data are of low quality, 38% of medium and 47% of high quality. This is better than the quality division of the process evaluation data of all CIVITAS Plus measures. The division between the focussed and non-focussed measures was 33% and 67% respectively for the cluster and 30% and 70% for all the measures.

The results of the Logistics and Goods Distribution measures are generally in line with the overall cluster results for the innovative aspects of the measures,. Only three innovative aspects deviate from the total. In 29% of the measures in this cluster, one of the innovative

aspects was related to technological improvements, against 46% for all measures. This is understandable as the aim of the measures in this cluster is to provide valuable insights into the importance of planning, communication, research, testing, and especially meaningful collaboration between stakeholders. New modes of transport are more frequently mentioned in this cluster (29% against 14% for all CIVITAS Plus measures). Lastly, 48% of the measures in this cluster target specific users, against 38% overall.

The measures face many barriers and drivers over the different stages. An overview of both barriers and drivers is given in Table 3.2 below. One of the conclusions that can be drawn, is that involvement of stakeholders was a major hampering factor at the preparation stage (38%) and an impeding cause at the implementation (33%) and operation phases (19%). Problem related barriers such as a lack of shared sense of urgency among key stakeholders in the preparation phase was important and effects almost quarter of measures. Organizational barriers arose frequently in this cluster with 29%, 38% and 19% in the preparation, implementation and operation phases respectively.

Other important barriers found at the preparation phase were political (29%). Several measures involved conflicts between key (policy) stakeholders due to diverging beliefs in the direction of a solution. At the same time, the political context was also mentioned as an important driver at the preparation phase (38%). An example is the case of the Urban Freight Logistics within Superblocks Model measure in Vitoria-Gasteiz. The commitment of key actors based on political and strategic motives, the presence of sustainable development agenda or vision, positive impacts of a local election and coalition between key stakeholders due to converging believes in directions of solution, were all important drivers for the process.

Table 3.2: Barriers and drivers and measure stage

	Barriers			Drivers		
Fields	**Preparation**	**Implementation**	**Operation**	**Preparation**	**Implementation**	**Operation**
Political	29%	5%	0%	38%	10%	10%
Institutional	24%	14%	14%	19%	14%	14%
Cultural	10%	10%	5%	5%	10%	5%
Problem related	29%	19%	19%	10%	5%	5%
Involvement	38%	33%	19%	33%	19%	10%
Positional	10%	0%	5%	19%	24%	5%
Planning	14%	5%	5%	10%	5%	5%
Organizational	29%	38%	19%	33%	19%	19%
Financial	5%	0%	5%	10%	10%	5%
Technological	5%	14%	10%	10%	14%	5%
Spatial	5%	19%	0%	5%	5%	5%
Other	0%	0%	0%	0%	0%	10%

3.3 SUB CLUSTER: NEW DISTRIBUTION SCHEMES

3.3.1 Barriers

The delivery of the measures in this sub cluster, encouraging the implementation of new freight operating modes or distribution schemes, was hampered by several barriers at the various stages of the measures.

Some 45% of the measures mentioned were reported to have a lack of stakeholder involvement as the main barrier at the preparation phase. 36% faced organizational barriers and 27% encountered political barriers and about a quarter identified the relative 'stand-alone' position of the measure as a problem. These barriers in the preparation stage are to a large extent found in the six measures that were not successfully implemented (see Table 3.3 below). A striking example of this is the Utrecht measure 'Merchandise pick-up point' where not enough companies and visitors were interested. Also, the measure should have been linked to an e-commerce pickup centre in residential areas, but that was not started, so that the measure remained isolated. Moreover, the number of stores in the city centre selling cumbersome goods and the number of customers going to the city centre to buy these goods was minimal. At the implementation phase organizational barriers were mentioned for 45% of the measures. An example is the unsuccessfully implemented measure 'Sustainable freight logistics' in the city of Ljubljana, which faced the above barriers at the preparation stage. The reluctance of some Traffic departments of the City of Ljubljana (COL) that were not directly involved in CIVITAS affected the process of the measure preparation and implementation. Because the measure could not proceed without COL cooperation, the implementation of the consolidation scheme was cancelled. Instead a web portal was established, which faced technical problems such as unreliable traffic data, and data incompatibility. At the operation stage of the measures, relatively few barriers were mentioned (involvement and organisational barriers are mentioned for 27%).

Table 3.3: Measures and barriers per measure stage

Measure	Measure Title	Success[2]	Preparation	Implementation	Operation
Bath, 7.2	Urban Freight Logistics new concepts for goods distribution	3		Institutional, Spatial	Technological, Financial
Bologna, 7,1	City freight delivery plan	1	Organizational, Cultural	Organizational, Cultural	Organizational, Cultural
Donostia - San Sebastian, 65	Efficient goods distribution	3	Political, Spatial	Problem related, Spatial	Positional, Problem related, Involvement
Ljubljana, 7,2	Sustainable freight logistics	0	Organizational, Involvement, Political	Technological, Organizational	
Perugia, 7.1	City logistics & alternative innovative distribution system - Pipe§Net	0	Planning		
Utrecht, 6,3	Merchandise pick up points (MPuP)	0	Problem related, Involvement, Positional		

[2] Rating of success of implementation: 0=not successful, 1=moderately successful, 2=successful, 3=very successful. This rating is used in all of the upcoming tables regarding barriers and drivers

Utrecht, 7,1	Construction logistics plan	0	Involvement, Cultural, Planning		
Utrecht, 7,2	Distribution centres for fresh & perishable goods	0	Involvement, Institutional, Organizational	Organizational, Involvement, Institutional, Problem related, Political	Involvement, Organizational, Institutional
Utrecht, 7,3	More flexible access for cleaner freight traffic (Cargohopper)	2	Institutional	Spatial, Organizational, Involvement	
Utrecht, 7,4	City distribution by Boat (Beer boat)	2	Involvement, Organizational, Problem related, Positional	Involvement, Organizational	Involvement, Organizational
Vitoria-Gastiez, M07.01	Urban Logistics within the Superblocks model in Vitoria-Gasteiz	0	Positional, Political		

3.3.2 Drivers

At the preparation phase the lack of a supporting political context was the second most mentioned barrier, whilst the presence of political support is the most mentioned driver in preparation stage. An example was the successfully implemented measure 'Urban Freight Logistics new concepts for goods distribution' in Bath, where the political support played an important driving role at all the measure stages. Different types of political driver were indicated. There was a political and strategic need to tackle congestion and emissions. As many deliveries into the City of Bath are made by heavy goods vehicles, the impact of heavy goods vehicles was a key concern for residents and politicians in the World Heritage city. Beside the need to tackle current problems, there was also a need to meet wider strategic objectives. The 2006 Sustainable Urban Local Transport Plan (SULTP) forecast that heavy goods vehicle movements in the West of England sub-region would increase by 55% during peak periods. The Bristol Freight Consolidation Centre was recognised as a 'ground breaking development' in the SULTP and from this the following Action Plan was developed; 'To support the continuation and growth of the central Bristol freight consolidation centre and investigate the potential for expansion to serve other retail destinations'. Involvement and a good organization function were also as important drivers for the measures: both were identified for 45% of the measures.

From the measure in Bath as well from other measures in Table 3.4, it can be concluded that political commitment is crucial to raise awareness, put issues on the strategic agenda and generate the support of local policies, stakeholders and end users. In this sub cluster, 45% of the measures reported involvement of stakeholders as a driver to take the measure forward. In the case of the successfully implemented measure 'Efficient goods distribution' in Donostia-San Sebastian other drivers as mentioned included the CIVITAS Plus funding and, in the operation stage, the increase in the Mobility Agent staff.

Table 3.4: Measures and drivers per measure stage

Measure	Measure Title	Success	Preparation	Implementation	Operation
Bath, 7.2	Urban Freight Logistics new concepts for goods distribution	3		Political	Political
Bologna, 7,1	City freight delivery plan	1	Institutional, Technological	Institutional, Technological	Institutional, Technological
Donostia - San Sebastian, 65	Efficient goods distribution	3	Cultural, Political	Financial	Organizational, Other
Ljubljana, 7,2	Sustainable freight logistics	0	Planning, Organizational	Technological	Involvement
Perugia, 7.1	City logistics & alternative innovative distribution system - Pipe§Net	0	Political, Problem related, Involvement	Cultural, Involvement, Organizational	Cultural, Involvement, Organizational
Utrecht, 6,3	Merchandise pick up points (MPuP)	0	Organizational, Involvement		
Utrecht, 7,1	Construction logistics plan	0	Political, Organizational, Involvement		
Utrecht, 7,2	Distribution centres for fresh & perishable goods	0	Institutional, Spatial, Financial, Organizational, Involvement, Political	Institutional, Spatial, Financial, Organizational, Involvement	Institutional, Spatial, Financial, Organizational, Involvement
Utrecht, 7,3	More flexible access for cleaner freight traffic (Cargohopper)	2	Institutional	Involvement, Positional	
Utrecht, 7,4	City distribution by Boat (Beer boat)	2	Problem related, Financial, Involvement, Organizational	Problem related	Problem related
Vitoria-Gastiez, M07.01	Urban Logistics within the Superblocks model in Vitoria-Gasteiz	0	Political		

3.4 SUB CLUSTER: ACCESS RESTRICTIONS AND CONTROL

3.4.1 Barriers

The involvement of stakeholders at the implementation phase was mentioned as the main barrier (57%). It can be concluded that a high score of involvement barriers is often in combination with a relatively high score on problem related barriers. At the implementation and operational phases, 29% and 43% respectively of the measures had to overcome problem related barriers. In the ‘Demand Management Strategies’ measure in Bath, for example, this was ‘combined’ with technical problems regarding the software. At the preparation phase, the political and institutional barriers both were cited for 43% of the measures, often related with time consuming bureaucratic procedures. An institutional issue for the measure ‘Policy Option for Freight Distribution Schemes’ in Craiova was the delay due to the extension of the City Council review and approval. For the measure ‘Freight delivery restrictions in Zagreb’, the institutional barrier hampered the ability to influence the behaviour of drivers, because the penalties for unlawful parking are delivered annually with a

time delay of approximately one year. Such long response times means that delivery companies were not able to influence the behaviour of their drivers.

Table 3.5: Measures and barriers per measure stage

Measure	Measure Title	Success	Preparation	Implementation	Operation
Aalborg, 63	Efficient goods distribution in Aalborg	3	Political, Institutional		
Bath, 3.4	Demand management strategies	2	Financial	Technological, Problem related	Technological, Problem related, Institutional
Brescia, M07.02	Freight distribution in Brescia	2	Institutional	Cultural	Problem related
Brighton, 64	Efficient goods distribution in Brighton & Hove	2	Political, Involvement	Involvement	Organizational
Craiova, M07.03	Policy option for freight distribution schemes	1		Planning, Involvement	Institutional, Problem related, Planning
Gent, 7,3	Institutional platform for freight management	0	Institutional, Organizational, Political, Technological	Organizational, Involvement, Technological	
Zagreb, 7,4	Freight delivery restrictions	0	Planning	Involvement, Problem related, Institutional, Spatial	

3.4.2 Drivers

The political context was the 43% of the measures at the preparation phase. In Brighton, there was a political and strategic need to tackle congestion problems. Air quality was poor in some areas of Brighton & Hove and this was a high profile issues at times during the CIVITAS Plus project. As the measure sought to improve air quality, it was able to collect political and other local support. The 'Freight delivery restrictions' measure in Zagreb was pushed forward because the city had accepted a new traffic regulation policy in the city centre. Organizational aspects were also drivers at the preparation stage (29%). The successful measure on 'Efficient goods distribution' in Aalborg indicated that at all phases, organizational drivers were most important. A driver for this measure was the well established co-operation between stakeholders, including frequent meetings built on a process outside this measure. (The working groups previously worked for many years with city logistics in Aalborg).

Table 3.6: Measures and drivers per measure stage

Measure	Measure Title	Success	Preparation	Implementation	Operation
Aalborg, 63	Efficient goods distribution in Aalborg	3	Organizational	Organizational	Organizational
Bath, 3.4	Demand management strategies	2	Political	Political, Technological	
Brescia, M07.02	Freight distribution in Brescia	2	Institutional	Cultural	
Brighton, 64	Efficient goods distribution in Brighton & Hove	2	Involvement, Political		
Craiova, M07.03	Policy option for freight distribution schemes	1		Institutional	Political, Institutional

Gent, 7,3	Institutional platform for freight management	0	Political	Organizational	
Zagreb 7,4	Freight delivery restrictions	0	Positional, Organizational, Other	Political, Positional, Involvement	

3.5 SUB CLUSTER: OTHER (VEHICLE AND DRIVER SUPPORT, AND FREIGHT PARTNERSHIP)

3.5.1 Barriers

All measures had to overcome problem related barriers as shown in Table 3.7 below. In the measure on 'Clean route planning for freight transport in Utrecht' for example, the main problem was how to handle resistance from key stakeholders who did not believe in the direction of the solution. This measure faced local resistance on specific freight routes. Individuals focused on their own local air quality-problems, and did not care if this might result in problems elsewhere in the city. In the other measures, problem related barriers focused on the complexity to be solved, which required detailed studies and additional time.

As a consequence of the problem related barriers, the sub cluster measures suffered from a lack of stakeholder involvement at the preparation and the operation phases. The major problem was an insufficient awareness of the positive impacts of a strategy on pollution and traffic congestion problems by the stakeholders.

Organizational barriers were mentioned for two out of three measures mentioned at the implementation phase. However, the organization barriers varied between measures. For example, within the 'Efficient good distribution' measure in Iasi insufficient partnership arrangements made it difficult to apply a strategy to improve goods distribution throughout the city before and during the implementation of the measure. The measure 'Marketing routes for smooth freight and city logistics' in Tallinn faced problems such as losing information, poor communication and delays in the final implementation phase because the measure leader moved from the Tallinn Transportation department.

Table 3.7: Measures and barriers per measure stage

Measure	Measure Title	Success	Preparation	Implementation	Operation
Tallinn, 7,1	Marking routes for smooth freight & city logistics	2	Problem related, Organizational	Organizational	Involvement
Utrecht, 8,2	Clean route planning for freight transport	0	Problem related, Involvement		
Iasi, 66	Efficient goods distribution	3	Involvement, Problem related	Organizational	

3.5.2 Drivers

Positional drivers are mentioned at the preparation phase for all three measures, to bring the initiative forward, although this driver shows a strong linkage with political and strategic support. From the findings it can be concluded that it is very empowering for a measure to be

part of a city programme or a consequence of the implementation of a sustainable vision. For the 'Efficient good distribution' in Iasi, the measure was part of a global city strategy, based on a sustainable vision for urban transport. Also for 'Clean route planning for freight transport in Utrecht', the Air Quality plan of the city of Utrecht could be seen as a driver for a number of initiatives.

An important driver was seen to be a well-planned process in all phases. Within the 'Marketing routes for smooth freight and city logistics' in Tallinn, accurate technical planning and analysis to determine requirements for measure implementation helped the implementation process. This was also the case for the 'Efficient good distribution measure' in Iasi.

Table 3.8: Measures and drivers per measure

Measure	Measure Title	Success	Preparation	Implementation	Operation
Tallinn, 7,1	Marking routes for smooth freight & city logistics	2	Positional	Planning, Positional	Planning
Utrecht, 8,2	Clean route planning for freight transport	0	Technological, Involvement, Positional		
Iasi, 66	Efficient goods distribution	3	Postitional, Planning	Positional	Organizational, Other

3.6 OUTCOMES

- The main conclusion is that barriers and drivers that hamper or stimulate the process of Logistics and Goods Distribution measures, are focussed on political, institutional, problem related, stakeholder involvement, positional, planning or organizational issues.

- Drivers and barriers on cultural circumstances, the availability of public funds or willingness of the business community to contribute financially, availability of technology, or space for experimentation zones were seen as being less crucial for the development of the measures.

- Barriers were often linked. This reflects the complexity of urban goods delivery.

- Political aspects acted as a very strong barrier. For example, the political context played a crucial role for the Sustainable freight logistics measure in Ljubljana. The reluctance of some Traffic departments of the City of Ljubljana (COL) which were not directly involved in CIVITAS affected the process of the measure implementation. As the measure could not proceed without COL cooperation, the implementation of the consolidation scheme was cancelled.

- On the other hand, political commitment is a strong driver and crucial to raising awareness, putting issues on the strategic agenda and getting support from local policies, stakeholders and end users. In the sub clusters 'New distribution schemes'

(45%) and ‘Access restrictions to freight vehicles’ (14%), the involvement of stakeholders was mentioned as a driver.

- For most measures, institutional barriers were often related to time consuming bureaucratic procedures and to legislation restrictions.

- Although the innovative processes to stimulate collaboration between all affected stakeholders is one of the aims of this cluster, the involvement of stakeholders was often a major hampering factor. This can be explained as almost a quarter of the measures facing problem related barriers, such as a lack of shared sense of urgency among key stakeholders in the preparation phase.

- It is very empowering for a measure to be part of a city programme or a consequence of the implementation of a sustainable vision. For the Efficient good distribution in Iasi for example, the measure was part of a global city strategy, based on a sustainable vision for urban transport.

- Organizational barriers were mainly a hurdle at the implementation phase, and varied in nature, examples were insufficient partnership arrangements which made it difficult to apply a strategy, or the loss of information, communication and delays because of a departing measure leader. Organizational matters such as frequent and well organised meetings with the right people were mentioned as a driver for the process.

4. IMPACTS

The key outputs and impacts are presented under sub headings corresponding to the areas used for indicators: economy, energy, environment, transport and society.

4.1 NEW DISTRIBUTION SCHEMES

Eight of the eleven measures reported within the new distribution schemes sub-cluster was focused on the concepts of bundling or consolidating deliveries (e.g. consolidation centre, Merchandise Pick up Point, central buffer zone, virtual logistics platform, proximity areas). In addition, three *also* promoted the use of cleaner vehicles. Three measures were concerned with the development and utilization of cleaner more sustainable modes of transport for freight distribution. The key outputs and impacts for these measures are summarised in Table 4.1.

Table 4.1: Achieved Outputs and Impacts for New distribution schemes

City	Outputs	Economy Energy Environment	Transport	Society	Comments
Bath (7.2)	-New Urban Consolidation Centre serving 2 cities & use of 2 electric delivery vehicles -Reduction delivery trips to the city centre -Service includes take-back of packaging for recycling	-Operating costs €221,901 (year1) subsidized in year 2 by €80,800 revenue from levied charges (€10.80/per cage €14,40/per pallet) -56% reduction in energy due to electric vehicles -10,180 kg reduction in CO_2 emissions (01/11-10/11)	-Number of delivery journeys to Bath was reduced by 1,016 & Number of deliveries to participating outlets reduced by 76% (01/11 – 04/12)	-81% of participants were "very" likely to recommend the scheme -No businesses left the scheme following introduction of charges	Users of the scheme survey: 16 qualitative interviews, after only Survey of non-users, low response rate (25/125)
Bologna (7.1)	-Development of technological virtual transit point for van sharing in a Limited Traffic Zone (LTZ) -Testing of efficiency & effectiveness of van sharing system	-Costs & revenues for individual carriers not published as no one willing to divulge -No optimization of pollutant emissions because of increase in freight vehicles recorded in LTZ	-Minimal impact from van sharing equating to 0.01% of all deliveries in the LTZ -Potential for optimization of deliveries made by smaller operators as they make 32% less deliveries per vehicle compared to 3rd party operators -Potential to reduce vehicle access to the centre by 60%	-Not applicable	Goods vehicle movement: recorded by camera in the LTZ, an average working day once a year during the project

Donostia-San Sebastian (65)	-Establishment of a Consolidation Centre & use of 6 electric cargo bikes -New goods delivery regulations -Reduction in mileage from heavy & light duty vehicles	-Capital costs €296,102 -Operating costs €97,074/year - >€6,800/year saving in fuel consumption for freight companies -23% reduction in energy consumption associated with goods delivery (202,996 MJ/year) -Reduction in CO_2 emissions of 14.80 T/year, 08-12	-Slight reduction in average delivery trip from 4.5-4.1km, 08-12 -Cargo bikes saved up to 26,849km/year in van & truck journeys -Increase in parking offences from 1928-2707, 08-12 due to increase mobility agents	-48.5% of stakeholder respondents were aware of the initiatives -84% of respondents believed the delivery situation had improved since implementation	Freight vehicles movement: manually accounted for 30 minutes during 6 days for each data collection period, twice (before and after) Attitudes survey: 20 transport companies, 200 shopkeepers and 50 users/ citizens). After survey only
Ljubljana (7.2)	-Modeled impacts associated with the implementation of a consolidation centre -Predicted reduction in freight movements & emissions in the pedestrian area -Promotion of sustainable city logistics through web portal	*Predicted:-* -Reduction in fuel consumption of 2.2 litres/day (17.7%) -Reduction in emissions by 17-18%	*Predicted:-* -18% reduction in freight movements/year (188 vehicles) -34.3% reduction in freight km traveled/year	-87.5% of stakeholders support freight delivery consolidation & clean vehicles -Low public acceptance for freight consolidation - Increase in web portal visits 1230 to 4000/month, 03/12-08/12	Freight vehicle movement: field observation 15 days in February 2010 and 2012 Acceptance public: sample size 1069 (before) /1245 (after) households in the CIVITAS ELAN, randomly selected.
Perugia (7.1)	-Testing & evaluation of the Pipe§Net system within different operational scenarios e.g. urban (1 & 4km) and non-urban (222 km)	*Predicted:-* - Intermodal shifts along the freight delivery route led to higher operating costs ranging from €1.7T/km (4km) to €8.3T/km (1km) negative for non-urban €-0.025T/km (222km) -Greater reductions predicted for fuel consumption (22%) & CO_2 (20%) associated with the	*Predicted:-* -Less than effective traffic reduction for the urban pipelines as delivery vehicles are not moved from main access routes -Greater modal shift predicted for 222km pipeline (25%) hence lower operating costs	-Indicators not yet assessed	No data reported for awareness/acceptance evaluation Traffic flow and freight movements derived from other studies (no detail reported), after data only

		4km pipeline	-Transport capacity ranged from 1339 capsules/hour (1km) to 4320 capsules/hour (4km) >40% reduction in freight traffic levels		
Utrecht (6.3)	-Implementation plan developed for a pilot Merchandise Pick-up point (MPuP) -Potential identified for combining a MPuP with existing bundling service Binnenstadservice	-Not applicable	-Not applicable	-Not applicable	No impact evaluation
Utrecht (7.1)	-Development of a construction logistics plan -Buffer zone set up for construction vehicles	-Not applicable	-Not applicable	--Not applicable	No impact evaluation
Utrecht (7.2)	-New electric Beer Boat introduced -Operates 6 times a week, 4 days a week transporting 132 roll containers -Potential future expansion identified with suppliers & transporters - Contract signed for another electric "multi purpose" boat	- Purchasing cost of the Beer boat €600,000 -Operating costs €60,000/year -Revenue from rentals €90,000/year -Beer Boat already profitable with very low freight loads -13% reduction in CO_2, 09-12	-Increased vessel capacity reduced No. of Beer Boat trips by 11% -5,678 less van trips to the city centre, (6% of total van trips in the centre), 09-12	-Not applicable	Freight movement (breweries): before data in 2009 estimated, and after data in 2012 observed, data collection/estimation well explained

Utrecht (7.3)	-Use of an electric mini-train to transport goods from distribution centre to city centre -Daily deliveries, 5 days per week -Upscaling with Cargohopper II	-No operational costs evaluated but CBA indicates operational costs of €131,715 -Reduction in CO_2 emissions of approx. 5.8 T (73%), 09-12	-Cargohopper made approximately 18,500 deliveries, 04/09-04/11 -Reduction of 5 delivery van trips per day from distribution centre-city centre -Reduction of 4,080 freight movements saving 88,332 km diesel vehicle trips, 09-12 -Usage of bus lanes could lead to savings in travel times	-Not applicable	Estimation of freight movements well explained
Utrecht (7.4)	- Analysis of current catering logistics -Private pilot study planned for bundling of fresh & perishable goods in conjunction with Cargohopper	-Not applicable	-Not applicable	-Not applicable	No impact evaluation
Vitoria–Gasteiz (07.01)	-Reviewed existing freight distribution solutions (CIVITAS & BESTUFS) -Identified solution for the city (e.g. segregation of superblock, use of proximity areas)	-Not applicable	-Not applicable	-Not applicable	No impact evaluation

The original plans were fully implemented in Bath and Utrecht (Cargohopper). In Donostia-San Sebastian, the FQP was cancelled due to the lack stakeholder engagement and in Utrecht, market expansion of the Beer Boat was not conducted due to the introduction of the multi-purpose vessel, both of these measures were otherwise fully implemented. The remaining measures experienced a range of issues that impacted on overall reported outcomes and evaluation.

In Ljubljana, the lack of support and approval by the municipality for a consolidation centre resulted in the refocusing of the measure in which a computer model was developed to simulate the potential impacts associated with the full implementation. Other measures, including the development of a Van Sharing Scheme (using a virtual platform) in Bologna, were only partially implemented due to the reticence of small freight operators where the fear of losing market shares, lower revenues and the loss of flexibility in the delivery service, failed to entice them to participate. The implementation of measures in Utrecht (6.3 and 7.1) and Vitoria-Gasteiz were delayed outside the time frame of the CIVITAS project and no evaluation impacts were available. The pilot for using an urban consolidation centre for fresh and perishable goods in Utrecht was delayed to be trialled in conjunction with Cargohopper as part of a private initiative. The construction logistics centre was impacted by the delay of the railway construction project in Utrecht. Budget constraints and a poor understanding of the current freight distribution activities were factors contributing to delays in Vitoria-Gasteiz.

Changes to the original solution due to the lack of stakeholder interest and overall demand for the solutions (MPuP for cumbersome goods, logistics when construction delayed) have contributed to the difficulties experienced in these measures. As the measures in Ljubljana and Perugia were not implemented, the research is presented as a feasibility or impact study and predicted impacts have been included.

The results and outcomes from these measures have been broadly summarised and some of the key findings are summarised in the following paragraphs.

Economy Impacts

Sets up costs were given for the urban consolidation centres implemented in Bath and Donostia-San Sebastian. In Bath, costs were potentially minimized as the contract was awarded to a logistics provider who already operated a consolidation centre from their central depot servicing the nearby city of Bristol (21km west). The pre-existing consolidation centre was chosen due to tight time restrictions for the project, and as a result it was not at the best location to service Bath. The revenue generated from year 2 of operation when businesses were required to pay per pallet or cage were used to enable the scheme to break even in 2015. Users of the scheme showed no major concerns with the introduction of the charge as they considere that participation was already saving them money and was cheaper than other delivery services. In Donostia-San Sebastian, approximately half of the capital costs for the implementation of the distribution scheme were for technical devices and systems (€76,833) and also for the purchase and rental of the electric bikes (€73,145), with a further €97,074 required to conduct annual maintenance costs mainly to do with the centre itself.

The capital costs in investment in Utrecht for a new *electric* Beer Boat (replacing the diesel) were considered to be too expensive for private ownership, and therefore it is only appropriate to operate this as part of a public transport service. Partly financed by air quality improvement funds the Beer Boat operated at cost neutral and revenue is generated from rental by suppliers and transport operators. The investment was considered low risk due to the established, long lasting and stable relationships the service has had with existing major clients. The operational costs given for the Cargohopper in Utrecht make it the most expensive service implemented. However, no breakdown of costs or revenues were given. Costs associated with intermodal operations, as demonstrated through the Pipe§Net modelling study, could lead to

higher operating costs which could only be balanced through optimizing the quantities of goods to saturate the infrastructure capacity in addition to a high level of modal shift. Operating costs were not made available by the individual carriers for the Van Sharing Scheme, and also for the consolidation scheme in Bath (notional data was used from Bath and North East Somerset Council) as businesses were concerned about potential loss of competitive advantage.

Energy Impacts

Analysis of data supplied by logistic providers indicated that usage of more energy efficient freight distribution (including use of electric vehicles) led to a 56% reduction in fuel consumption in Bath and 23% in Donostia-San Sebastian. No other measures reported the actual savings made by using cleaner vehicles as part of the new distribution schemes. The modelling of the Pipe§Net intermodal distribution system predicted that greater fuel savings could be made in association with longer pipelines where greater modal shift could be expected.

Environmental Impacts

Environmental performance modelling based on vehicle usage and characteristics (and also volume and mileage of goods shifted) reported actual and predicted reductions in emissions of pollutants (CO_2, CO, NOx and particulate matters) within targeted areas e.g. city centre low emission zones. Bologna was the only city that reported a slight increase in emissions in the targeted area, which was correlated to an overall increase in freight vehicles entering the low traffic zone. The inability of the van-sharing scheme to be competitive and engage participation did not improve the optimization of deliveries as planned. It is expected that City emissions could be reduced further through increased participation in consolidation schemes, collaboration between existing systems, expansion of schemes to include other markets (e.g. fresh and perishable goods), and continued optimization of delivery routes and loads.

Transport Impacts

There were observed reductions in freight movements (heavy and light vehicles, vans) into the city centres, associated with the optimization of freight distribution and use of ‘clean’ vehicles. In Bath, businesses participating in the consolidation scheme reduced the number of deliveries they received by 76%, which reduced the number of delivery trips into the city by 1016, (Jan 2011 – April 2012). These results highlight the potential savings that can be made by a relatively small sample of businesses participating within a consolidation scheme. A review of freight movements entering the low traffic zone in Bologna indicated that small delivery operators conduct fewer deliveries and

collections compared to third party operators. Optimization through van-sharing has the potential to reduce the numbers of vehicles accessing the centre by 60% in addition to reducing kilometers travelled while still providing the same level of delivery service. However, operators did not acknowledge the benefits associated with a common logistics platform, as they are concerned about losing market share and revenue. The introduction of the new larger capacity Beer Boat highlights the potential savings that can be made by consolidating deliveries using larger capacity vehicles. Improved traffic flows were also observed in Donostia-San Sebastian resulting from the optimization of freight distribution, improvements made in the regulations of loading/unloading bays, and improvements to the signage.

No measure reported any actual delivery timesaving's, although travel measurements recorded in Utrecht indicated that time savings could be made from clean vehicles being awarded access to bus lanes. Travel time savings could be used as an incentive for operators to switch to cleaner vehicles although further investigation would be required to understand the effects of increased shared usage of bus lanes for both freight and public transport prior to implementation.

The methodologies used to calculate the overall environmental performance did not account for the potential wider benefits associated with back-loading recyclate on the return leg of the journey in terms of reduced numbers of waste collections trips. They also did not consider the origin and final destination of the delivery vehicles, along with any potential detours to deliver to the consolidation centres which might have resulted in increased congestion, fuel consumption and associated environmental impacts.

Society Impacts

Societal indicators were only evaluated for 4 of the measures within this sub-cluster. For Bath and Donostia-San Sebastian, the schemes were well received by both stakeholders and residents. In Donostia-San Sebastian, 84% of residents surveyed believed that the situation regarding goods delivery had improved since the implementation of the measure. In Bath, 81% of participants reported that they were 'very likely' to recommend the service to other businesses. Even though the frequency of deliveries had not reduced since joining the scheme, many perceived there to be many benefits including: cardboard collection, which is not provided by others, the ability to agree the time of deliveries, in addition to the overall quality of the service provided. A small sample of 25 non-users were surveyed from which it was apparent that 60% were not interested in joining the scheme although concerns about the fees, or congestion did not appear to be important. The results from the evaluation of the Ljubljana model simulation highlighted that the public acceptance levels towards the consolidation of freight decreased by 10% during the CIVITAS period (2009-12). The decrease could indicate that the public do not perceive freight delivery transport in Ljubljana to be a problem.

4.2 ACCESS RESTRICTIONS TO FREIGHT VEHICLES

Three measures within this sub-cluster broadly focused on amending the existing road network (pedestrian areas) in addition to the coordination of deliveries (time windows). Two measures sought to enforce existing restrictions or improve existing schemes, while the remaining measure looked to regulate freight vehicle access to a low emissions zone. The key outputs and impacts are summarised in Table 4.2.

Table 4.2: Achieved Outputs and Impacts for access restrictions to freight vehicles

	Outputs	Economy Energy Environment	Transport	Society	Comments
Aalborg (63)	-Low Emission Zone (LEZ) introduced & signposted -Access regulations imposed based on vehicle emission standards -LEZ stimulated the purchase of newer cleaner vehicle fleets	-Set up & maintenance costs of €81,270 associated with the signage (includes replacement costs of €7,170), 09-11 -32% reduction in CO 32%, 05-10	-Slight reduction in freight vehicles entering the LEZ (6%), 05-10, -In 2010, 82-93% of vehicles were diesel & subject to the LEZ regulations - Increase in share of Euro IV trucks 28-54%, 08-10.	-Most non-compliance was registered in the first year of the Low Emission Zone	Goods vehicle movement based on license plate surveys (three times, 12 hours). Other details of the data collection not reported
Bath (3.4)	-Demonstrated potential benefits of using camera technology to regulate weight access -Instillation of cameras	-Estimated Capital costs for camera equipment & software €173,750, - Operating cost for monitoring the cameras & sending letters €25,000 -No revenue as demonstration could not enforce moving traffic offences with cameras -HGVs using unrestricted route used 4.42 litres per single trip (1.58km)	-Stable traffic flows in demonstration areas -HGV flows on weight restricted area reduced by an average 112 vehicles/per day following instillation of ANPR cameras	-Increase in delivery operator awareness of HGV routing strategy as a result of the demonstration from 48% to 80%, 09-12 -Measure well received by residents as HGV traffic is a key concern -Opinions of freight operators about the demonstration project were mostly neutral	Freight Movements based on routine automatic and manual traffic counts & feedback from ANPR camera. Data collection methods/ process well reported Acceptance based on operator surveys (sample size before: 30, after : 44)

Brescia (07.02)	- Re-organization of freight distribution in the city centre -Restrictive time widows for deliveries -Optimization of freight weighting factor	-Not measured	- Weighting factor of delivery vehicles increased by 12%, 10-12 -18% reduction in delivery vans & 14.5% trucks accessing the LTZ, 10-12	-73% acceptance of the of freight delivery operators accepted in the development of the freight distribution centre	Goods vehicle movements based on camera data in the LTZ (details not reported) Stakeholders Acceptance (n=15, before and after)
Brighton & Hove (64)	-Evaluation of Freight Quality Partnerships best practice -New pedestrian area -Reduction in number of vehicles & pedestrians in pedestrian area	-Set up cost of **€**323, 800 for changing street access -Air quality improved but not by a significant amount	-Vehicle flow through the pedestrian area reduced by 34%, 09-12 -66% increase in pedestrian numbers, 09-12	-Modest increase in acceptance level by local businesses	Goods vehicle movement based on traffic count (07:00-19:00), 2 days June 2009 and one day October 2012. On street questionnaires 500 respondents. Online survey 96 respondents Details of local business surveys not reported (e.g. sample size)

Craiova (07.03)	-Best practice study for freight distribution in Craiova -5 schemes identified for space organisation -Addition of new zone and tax system based on vehicle/type of goods transported	-Not applicable	-13% reduction in number of vehicles/per day entering the area of interest	-Awareness levels increased by 27%, 08-12 -Acceptance level increased slightly by 5%, 08-12	Inconsistency in the questionnaire: face-to face in before survey, and face to face, by phone or e-mail in the after survey.
Gent (7.3)	- Access control system (ANPR cameras) developed to regulate usage of a pedestrian zone -Scenario testing for future implementation	-Not applicable	*Predicted* -60% reduction in vehicle traffic	Not applicable	The impact of the measure not evaluated since the cameras were not installed yet.
Zagreb (7.4)	- New freight data collection activities within the city -Data collection identified demand for extra policing to enforce restrictions on Thursday & Friday -Revision of freight delivery regulations	-Not applicable	*Predicted* -Reduced number of trucks, lorries & vans entering into the city centre	-The acceptance level of the congestion charging concept among the citizens increased from 62% to 68%. -The acceptance level of the congestion charging concept among business subjects increased from 70% to 78%.	Survey on the acceptability of congestion charging policy among citizens: twice, repeated, sample size=599. Survey on the acceptability of congestion charging policy among business subjects: face-to-face interview, a random sample of 60 businesses in before , and 82 in after (most of people participated both surveys)

A wide range of measures was evaluated as part of the access restrictions sub-cluster. This included pedestrianisation of a busy city centre street and a historic square, the regulation of access to LEZ based on vehicle emission standards and the instillation of access control systems (ANPR cameras) to regulate weight restrictions and access to a pedestrian zone.

The original plans were fully implemented in Aalborg. In Brescia, the original plans, which included the development of an urban consolidation centre and a new distribution fleet, were not implemented, and in Brighton and Hove, the formation of a formal FQP was unsuccessful. Otherwise, both these measures were successfully implemented as planned.

The remaining measures experienced various delays and complications which impacted on the overall implementation and hence available impacts of these schemes. In Gent, stakeholders were not initially supportive of the use of cameras, which resulted in a temporary change in focus of the proposed measure and delays. The lack of response from the Transport and Traffic Department in Zagreb delayed the implementation of access restriction measures within the time frame of CIVITAS. For Gent and Zagreb, as the measures were not implemented, some of the predicted impacts have been estimated. In Bath, the measures were implemented as part of a demonstration project (moving traffic offences in the UK outside London cannot be legally enforced by camera technology). However, budget constraints limited the number of ANPR cameras installed and the pilot was not fully implemented. Key impact findings are summarised in the following paragraphs.

Economy Impacts

The set up costs were given for only 3 of the measures and estimated for one other. In Brighton it cost €323,800 to modify the street access, construct the pedestrian area and make other rearrangements. The capital costs for the scheme were also calculated per vehicle and pedestrian. Due to the reduction in vehicles accessing the area the cost per vehicle increased from €192 (06/09) to €292 (10/12) whereas the opposite was true for pedestrians in which increased usage reduced the cost from €18 (06/09) to €14(10/12). For the implementation of the LEZ in Aalborg, capital costs were incurred during the first two years with the initial outlay of €74,100 to construct and deploy the signs and a further €7,170 in maintenance costs a year later as changes to the vehicle standard requirements meant signs and stickers had to be updated allowing Euro 3 vehicles access into the area. Future technological developments in terms of vehicle performance and emissions could impact on the maintenance costs, which may result in the further replacement of signs. No details were given regarding the costs to businesses for cleaner vehicles to meet the LEZ requirements. In Bath the estimated capital costs were estimated to be €173,750 for the cameras, equipment and software development. With changes in legislation in the UK and depending on the how fines are to be levied e.g. parking charge notices (PCNs) and/or Magistrates Court Fines, it is likely that such a scheme could be economically viable over a relatively short period of time. Estimated operating revenue could be between €7,547-€143,750 per year assuming that 115 vehicles were issued fines. A potential merger of the back office operation with the current councils' bus gate monitoring operation in addition to the revenue from potential fines would enable the operation to cover its costs.

Energy Impacts
In Bath energy efficiency refers to the impact of the measure on the total fuel consumption of HGVs that avoid the weight restriction route. Minimal difference was recorded between the weight restricted and unrestricted routes, avoiding the city centre would cause an increase of about 4.5 litres. Fuel consumption was not given by any other measure.

Environmental Impacts
Modelling of vehicle emissions based on vehicle registration (Motor Registry) indicated that the use of cleaner vehicles in Aalborg's LEZ has led to a 32% reduction in CO. Businesses have been motivated to update their vehicle fleets with newer 'cleaner' models to meet the required standards. Future improvements in emissions levels may be recorded in line with the update of standards to include EURO VI vehicles. Emissions generated by HGVs travelling along the weight restricted and unrestricted routes into Bath city centre were calculated using data provided by the National Atmospheric Emissions Inventory (www.naei.defra.gov.uk). From regular HGV counts undertaken before and after the demonstration project it can be assumed the average daily reduction of 112 HGVs along the weight restricted route would reduce CO_2 emissions by 448,000g/per day. The re-routing of HGV traffic away from the weight restricted route may lead to increased emissions elsewhere in the City however as the alternative route is less densely populated pollutants can disperse quicker. Brighton recorded a slight improvement in local air quality from amending the road network but it is not significant. No other measures reported any actual or potential impacts on emissions.

Transport Impacts
The actual and predicted impacts on transport were well documented and it is evident that the restrictive measures reviewed contributed to localized reductions in traffic flows. The pedestrian area in Brighton resulted in a 34% reduction in traffic flow whereas it was predicted that the enforcement of an existing zone in Gent could achieve up to a 60% reduction. Other measures that created new delivery windows (reduced time frames) recorded a reduction in the number of journeys made, coupled with an increase in the weighting factor of vehicles by 12% (Brescia). Such measures may encourage delivery companies to reconfigure their fleets in order to meet the demands of their customers. The instillation of the ANPR cameras in Bath deterred freight from using the weight-restricted route which resulted in a significant reduction in HGV flow. No further details were given regarding the city wide transport impacts of these measures.

Society Impacts
Surveys of local businesses in Brighton indicated that there had been a slight increase of 7% in the acceptance levels since the traffic network had been amended. In Brescia surveys of 15 commercial operators highlighted that any negativity associated with restrictive measures had not impacted on their interest in the distribution centre development. The evaluation of acceptance and awareness of businesses in Zagreb and Brighton highlight their concerns over restrictive measures. Between 27-40% of businesses surveyed in Brighton believed that the perceived negative impacts associated with the measures would freight reduce the overall impact. The general lack of acceptance and concern associated with vehicle access restrictions impacted the development of schemes in Zagreb and Gent.

4.3 VEHICLE AND DRIVER SUPPORT

Vehicle and driver support measures were concerned with the development of technologies as part of city wide re-routing strategies. The scheme in Tallinn focused on improving guidance signs at the harbour terminals and the creation of free downloadable routes for GPS car navigations systems (e.g. Garmin and Tom-Tom) to direct freight traffic along optimally defined routes (during peak times) to the national road network. The other scheme in Utrecht focused on research and prototype development using software based navigation for a Smartphone app, based on the real-time air quality (NOx), where freight traffic could be re-routed to 'less vulnerable' areas. These are summarized in Table 4.3.

Table 4.3: Achieved Outputs and Impacts for vehicle and driver support

	Outputs	Economy Energy Environment	Transport	Society	Comments
Tallinn (7.1)	-Optimal freight routes identified between the harbour & road network - -Guidance sign system installed & printed leaflets distributed -Freight routes for GPS car navigation systems available for free download	-Low cost of GPS files & storage of the 16 files on a server	-300 GPS routes downloaded (188 Tom-Tom, 129 Garmin) (02/12-09/12) -Modest visits to the webpage (167 Estonian language page, 60 to the English page), (02/12-09/12)	- Low but positive acceptance of measure after 6 months - 31% of surveyed truck drivers valued the guidance signs -41% were aware of route downloads -29% generally used both GPS & guidance signs simultaneously	4 out of 12 indicators were used Acceptance and awareness: 498 drivers were interviewed (after)
Utrecht (8.2)	-Market detailed insight how to develop a route planning app for freight vehicles taking into account real-time air quality	-Not applicable	-Not applicable	-Not applicable	No impact evaluation

The original plans for these two measures were not fully implemented, which has impacted on the reported outcomes and evaluation. Changes to the original solution (postponement in construction of a planned shortcut), the refocusing of the measure to include the GPS navigations system in Tallinn, and the lack of appropriate technologies to measure air quality and general budgetary issues experienced in Utrecht, contributed to the difficulties experienced in these measures. However, the

feasibility study in Utrecht produced some interesting conclusions that could influence future development.

Economy impacts

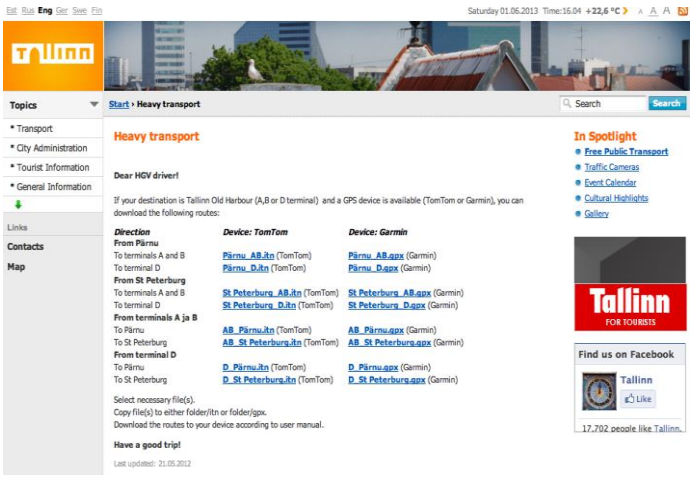
The set-up costs associated with both measures were not quantified although it was suggested that the development of the navigational software and storage of the GPS files on a server was considered relatively inexpensive in comparison to the instillation of signage.

Environmental Impacts

Environmental impacts were not evaluated in Tallinn as it was deemed difficult to connect the changes in air quality to the implementation of the measure since there were other sources of emissions and other transport related measures contributing to the changes in air quality in the city.

Transport Impacts

Transport factors including numbers of HGVs freight movements were not easy to evaluate in Tallinn, again partially due to the influence of other measures. Instead evaluation focused on the number of visits to the webpage and numbers of GPS routes downloaded. Both recorded modest usage. Evaluations before, after or BAU were not appropriate. The number of downloads exceeded the number of visits to the site due to the fact that there are 16 files available for download (different languages, terminals and formats). Overall, the modest download numbers could be explained by a lack of need for the service or that the drivers used other navigational tools and could manage without the service. However, the measure was relatively inexpensive and the cost of the server is negligible and provides drivers with an alternative navigational tool.



Society impacts

Evaluation concentrated on identifying freight drivers' awareness and acceptance on the solutions provided in the measure (not including before, after or BAU) and also identified the types of navigational tools that were used by drivers (e.g. road atlas, GPS, guidance signs, booklets). Results were analysed across different driver groups, different harbour terminals and different origin-destinations. Overall, 41% of drivers were aware of the possibilities of downloading routes. This indicates that lack of awareness was not a key factor impacting on the number of downloads. Usage of GPS navigation systems and guidance signs were also identified as appropriate navigational tools used by approximately half of those surveyed with 29% using both simultaneously. Recorded usage rates of both were higher among drivers with foreign origin. These results highlighted the complexity of implementing navigational tools and the unpredictability associated with personal preferences. Although the society impacts in Utrecht were not evaluated, local resistance was observed during

the feasibility study in particular. NIMBY (not in my back yard) effects were noted where individuals were focusing on their own air quality issues and did not care if rerouting resulted in problems elsewhere.

For these particular vehicle and driver support measures, the time frame associated with developing the software and technology was lengthy. Due to time restrictions and the barriers experienced, the potential benefits may not have been fully identified or evaluated. A detailed understanding of freight drivers' navigational habits and behavioural change is integral to ensuring that appropriate re-routing schemes are implemented. Freight drivers may choose to ignore rerouting advice irrespective of how it is conveyed, but clear communication strategies; information campaigns and close cooperation between different stakeholders can only be beneficial. These results highlight the complexities of implementing 'appropriate' freight navigational tools to support drivers. It is predicted that full implementation of the App could reduce citywide emissions, congestion and fuel consumption associated with freight transportation.

4.4 FREIGHT PARTNERSHIPS

One scheme attempted to initiate new logistic partnerships in conjunction with hard measures. A summary of the outputs and impacts is given in Table 4.4.

Table 4.4: Achieved Outputs and Impacts for freight partnerships

	Outputs	Economy Energy Environment	Transport	Society	Comments
Iasi (66)	- 59 Freight Quality Partnerships involving local government & businesses -New access regulation scheme -Negotiation as part of FQP to improve delivery access for businesses	- Reduction in CO levels in 3 out of 4 locations (max reduction 14% daytime, 09-12). - Reduction in NO_2 at all 4 places (max 8% daytime, 09-12).	- Reduction in freight movements 109 to 33 vehicles/peak hours (7-9am, 3-5pm), 09-12 -Increase of 17 to 78 vehicles/ outside peak hours, 09-12	-Stakeholder acceptance that economic development has led to increased traffic, pollution Increased from 77% to 90%, 09-12	100 people interviewed: once in before (2009), twice in after (2011 and 2012) Freight movement: manually counted in before (7:00-9:00am) and after (3:00-5:00pm), morning peak and afternoon peak traffic compared

In total, 59 Freight Quality Partnerships (FQP) were signed covering 4 different locations on the CIVITAS corridor in Iasi. Businesses were provided with an incentive to negotiate new localized facilities (e.g. parking facilities, access ramps, parking cells) in order to meet the changing demands of the delivery time schedules

adopted for supply-distribution activities (prohibited 07:00-09:00 and 15:00-17:00). All indicators except energy impacts were evaluated

Economy impacts
The costs associated with the implementation of the measures were not provided, although this measure may have had an economic impact on the companies performing the supply and distribution activities.

Environmental impacts
Emissions were measured in four locations during the night and day along the CIVITAS corridor. CO levels had decreased since implementation at three of the locations by a maximum of 14% (daytime) although it is suggested that localized background levels from warehouses and a mall may have distorted results.

Transport impacts
The access restriction measures successfully resulted in a redistribution of freight activity with a reduction during peak hours (07:00-09:00 and 15:00-17:00) and an increase outside peak hours.

Society impacts
A survey of 100 stakeholders (traffic drivers, freight operators and shopkeepers) identified that the majority of respondents agreed that the economic development of the city led to more traffic, large numbers of goods vehicles contribute to increased pollution, and that businesses should use vehicles with lower emissions. Acceptance levels increased from 77% (2009) to 90% (2012) following the implementation of the measures. Stakeholder acknowledgement and acceptance of the wider problem is a key requirement in ensuring the successful implementation of freight quality partnerships

4.5 OUTCOMES

From the evaluation of the goods distribution measures documented within the four sub-clusters, the following conclusions have been made:

- Without the support of appropriate stakeholders, sustainable logistics measures are not likely to succeed which has been a common issue for both CIVITAS II and CIVITAS Plus projects. As demonstrated by each sub-cluster, stakeholders (including local government organisations) may not engage with a proposed measure if they have no issues with the existing freight distribution network or if they feel the new measure will have a detrimental impact on their business activities.

- As demonstrated in Iasi, the provision of ‘incentives’ where business can negotiate facilities to improve freight operations, can encourage stakeholders to sign Freight Quality Partnerships which can improve the success of a measure.

- A detailed assessment of current freight logistics and business requirements is essential before implementing any measure as it provides a baseline for evaluation. Inadequate baseline data cannot only delay implementation but can cause problems with evaluation.

- Expansion of an urban consolidation scheme to a neighboring local authority could reduce the cost of subsidy by sharing the overhead costs. Operational costs could also be optimized by subcontracting the operation to an established logistics provider that already has suitably located depots and fleets of clean vehicles.

- The bundling concepts used in consolidation distribution models could be adapted for non-traditional goods, which could include construction materials, and fresh and perishable goods. However further piloting is required to evaluate the potential demand and benefits. Integration with pre-existing services could be beneficial.

- The introduction of cleaner vehicles as part of freight distribution schemes for example electric trucks, electric cargo bike, the Cargohopper (mini electric train) and Beer Boat are likely to make significant savings to fuel consumption, emissions while reducing HGVs traffic in city centres. However the associated set up costs especially for the Beer Boat are likely to be too expensive for private investment and therefore are only viable for public ownership.

- Cities should take the opportunity to unify measures where appropriate as demonstrated in Utrecht with measures 7.2, 7.3 and 7.4 to maximise the benefits.

- Regulating freight access in restricted areas e.g. Low Emission Zones, based on emission standards of vehicles or weight, could encourage freight operators to reconfigure their fleets in order to optimize access and meet the demands of their customers.

- Access restrictions need to be regulated to maximise their impacts. The instillation of Automatic Number Plate Recognition Cameras (ANPR) and help enforcement.

- The development of in-vehicle and roadside support technologies for 'freight' drivers and vehicles could contribute to city wide re-routing strategies. New innovative technologies, which may include real-time data, not only take time to develop but there are no guarantees that they will be used. Communication strategies in close cooperation with transport operators could encourage usage.

- The experiences reported as part of Cluster 4: Logistics and Goods Distribution can be used to shape the future development of similar measures not only to ensure that the same mistakes are not replicated but to build on the progress that has been made

- Increased interest is seen by cities to develop new goods distribution schemes such as consolidation of delivery services which have proved to have great potential to reduce vehicle emissions. However, without the support of appropriate stakeholders, sustainable logistics measures are not likely to

succeed. This has been a common issue identified in CIVITAS Plus and in previous programmes. The urban logistics measures were less successful than anticipated for several reasons. Meeting sustainability targets can be costly and goods distribution is a very competitive business with tight profit margins. The city authorities probably underestimated what would be required to progress the measures adequately. Future projects will have to develop improved partnerships with a clear appreciation of the financial implications of any measure and how problems with them may be overcome.

5. UPSCALING AND TRANSFERABILITY

The potential for upscaling and transferability is summarized for each sub-cluster below.

5.1 INTRODUCTION

Up-scaling refers to the potentials for a measure (or group of measures) to be expanded more widely across a city. Several factors need to be considered for up-scaling. For example, there are likely to be geographical/location constraints and perhaps capacity limitations. In addition, a measure considered to be practically possible may well be affected by politically acceptability. In the CIVITAS evaluation, all cities were encouraged to assess upscaling taking the above factors into consideration.

A main objective of the transferability analysis is to assess whether the success of measures in a city are dependent on any particular conditions, and whether the success achieved and the lessons learnt in one city can be transferred to other cities. Successful implementation of a measure or a package of measures in a given city should provide ground for transferring the experience to other cities, if the right conditions are met. Transferability addresses the possibility of transferring/adopting successful measures to a given city.

5.2 UPSCALING

<u>New distribution schemes</u>
For the new distribution schemes evaluated, the potential of upscaling was reported by 5 of the measures. For the remaining measures, upscaling was not applicable primarily due to the lack of implementation. Potential upscaling opportunities may be evident after the completion of a pilot study for measures in Utrecht (7.4) (Distribution centres for fresh and perishable goods) and after the instigation of the reconstruction for the railway redevelopment project integral for the implementation of the measure in Utrecht (7.1) (construction logistics). In Bologna, the solution already covered the whole of the Limited Traffic Zone both as an origin and a destination and involved all available stakeholders so upscaling was not appropriate.

The measures that entailed the development of urban consolidation centres could be upscaled in different ways due to the different nature of the cities and the schemes themselves. Due to the unique characteristics of the old town in Donostia-San Sebastian, there is potential to upscale solutions to neighborhoods demonstrating similar characteristics. Upscaling in Bath would focus on expansion of the client base. The results achieved with a small sample of business are notable and if this could be upscaled for *all* retailers in Bath then a significant reduction in daily delivery vehicles entering the city could be achieved. With the high number of independent retailers and associated trade volumes characteristic in Bath, there could be greater potential for increased consolidation. However, detailed investigation and modelling would be required.

The measures in Utrecht, which implemented more sustainable modes of transport as part of the freight distribution network, demonstrated great potential for upscaling. The potential for market expansion for waterborne transport was not fully investigated as originally planned during the project timescale. However, the project identified that there iscapacity in the current system to cope with increased demand. Upscaling already took place during the CIVITAS POINTER period with the introduction of Cargohopper II which enabled more freight to be delivered to a larger area at a faster speed. As the Cargohopper operates from an

urban consolidation centre, there is potential that the Beer Boat could be included within this model, and also a pilot for the bundling of fresh and perishable goods (measure 7.4) could be trialled. As these measures are closely linked, upscaling opportunities are likely to require broader consideration. The multimodal transportation and bundling of goods could have a substantial impact on the reduction of freight traffic in Utrecht.

The experience and methodology developed as part of the Pipe§Net feasibility project could be used upscaled in Perugia. There are plans for construction of a second Minimetro line, which could provide the required infrastructure and a natural route for a different or complimentary Pipenet scenario. Although there are no established plans for the implementation of a Pipe§Net system, the development of a large-scale prototype would serve to demonstrate the feasibility of the project and produce tangible results which could lead to the implementation of a full Pipenet line. Direct exploitation of the measure would be to physically implement the system.

Access restrictions to freight vehicles

The potential for upscaling was given by 4 of the measures in this sub-cluster although the potential was minimal. As restrictions were already applied to the whole of the limited traffic zone in Brescia, any future upscaling could only focus on extending the area of managed deliveries beyond the city borders. This would be a complex process, but could contribute to a further reduction in freight traffic flows in the city, and could increase the demand for the use of the new distribution centre, once introduced. In Aalborg, the area of the environmental zone could be increased and the restriction could be amended to include EURO 5 vehicles. The effect of the environmental zone in terms of improving air quality will diminish over time if the requirements are not updated. As with the aforementioned cities, the measure introduced in Brighton could be upscaled to cover a larger area.

The demonstration project in Bath successfully increased the awareness of the weight restriction limit in the designated areas with consequent decreases in the number of HGVs travelling along the routes. As the evaluation section has shown, if the measure was introduced on a permanent basis with relevant legislative changes, the back office operation could be merged with the councils current bus gate monitoring operation. If cameras were installed across Bath and weight restrictions enforced, upscaling throughout Bath, the reduction in HGV traffic would be greater and air quality would improve as HGVs disproportionately contribute to NO_2 levels in the city centre.

In Gent, as the measure was only to be implemented in pedestrian areas upscaling was not appropriate. Due to the delays encountered in the implementation in Zagreb and Craiova the potential is uncertain.

Vehicle and driver support

For the vehicle and driver support measures, it is suggested that the use of signage systems, GPS navigation routes and general guidance principles could be applied to other harbours in Tallinn and throughout Estonia that have to manage heavy freight. Despite the innovative nature of the measure in Utrecht, which focused on designing a dedicated freight navigation tool using real-time air quality data, in principle it is possible that the software could be developed into a route planning ‘app’. After development and testing this could subsequently be transferable to other cities that have accessibility to real-time data sources. Both of these measures if accepted and utilized by freight operators could aid with the reduction of freight traffic on dedicated routes and improve air quality.

Freight partnerships

Any upscaling of such measures would primarily focus on maximizing the engagement and commitment of stakeholder to signing Freight Quality Partnership either city wide or within other designated corridors.

5.3 TRANSFERABILITY

One of the goals of the process evaluation was to develop specific recommendations on the transferability potential of a measure to other cities and on recommendations to improve the process around the measures. From the results, it was concluded that both types of recommendations overlapped. Thus, recommendations are mostly on how the measure process could be better organized in other cities. The recommendations on transferability became a warnings for pitfalls, often related to the barriers and drivers.

A simplified overview of the recommendations developed by the measures is shown in Annex 4. It can be seen that recommendations on transferability and process are often overlap. It is unsurprising that good planning and political support are both mentioned for 33% of the measures, and involvement and good planning to smooth the process are mentioned by 81% and 38% of the measures respectively.

Main condition for transferability
The complex structure of urban freight transport with a lot of activities and stakeholders with different interests forms a network more than a chain. This is the main prerequisite for transferability of the measures because all subsequent measure activities have to be made from this perspective. If this perspective is missing, there is no possibility to implement the measures successfully. There will be no stakeholder involvement and consultation, no political support, no adjustments of legislation or regulation, etc.

Sub clusters
For the various sub clusters, there are specific points related to transferability and / or process improvement:

- **New distribution schemes.** There are always possibilities for cities to develop new distribution schemes. However the geographical component may play an important role. If there are, for example, no canals of other waterways as in Utrecht, water transport is not possible. Another example was in Donostia-San Sebastian where the characteristics of the Old Quarter are hard to related to the standards of efficient distribution.
- **Access restrictions.** It's obvious that for the implementation of this type of measures political support is absolutely necessary. For example, time window restrictions (Brescia) and zoning (Craiova, Aalborg) often play a role as do access taxes, standards for vehicles, etc.
- **Other.** For the measures aimed at driver support it is important to have real time data available and a well establishment IT-support (Utrecht, Tallinn). Measures aimed at setting up Freight Quality Partnerships should realize the complexities involved, which can be stimulated by for example websites, workshops (Brighton & Hove), meetings, posters, press (Iasi), etc.

6. RECOMMENDATIONS

From the evaluation of the goods distribution measures documented within the four sub-clusters, some general recommendations have been made:

1. Urban freight transport should be seen as a complex system / network of activities and stakeholders with different, often conflicting, interests. This requies for a participative approach, including all the key stakeholders (citizens are key stakeholders!). This participative approach will have to (i) conduct feasibility studies (including city specific circumstances); (ii) lead to a shared problem recognition; (iii) explore alternative solutions; (iii) lead to implementation, monitoring and evaluation of measures.

2. Participative / involvement processes are often complex processes and need a professional approach. Therefore it is recommended not to let them run by one of the stakeholders, for example a municipality, but by independent professionals.

3. Stakeholder involvement should be maximized from the planning stage as partnerships underpin the success of sustainable logistics measures. Stakeholder collaboration may be stimulated through the acknowledgement of 'real' issues and from the provision of incentives, which could include the ability to negotiate for improved delivery access. Time needs to be invested to build collaborative partnerships (Freight Quality Partnerships) to ensure that information can be shared and potential problems identified.

4. Successful collaborative partnerships between appropriate stakeholders can lead to the formulation of high impact freight strategies that consider logistical needs for the city, businesses, transport operators and local residence.

5. Strategies need to be implemented gradually and communicated widely using a range of media outlets to maximize dissemination e.g. local media, leaflets, posters and the internet. Any changes made to the local road network need to be communicated effectively through the use of clear signage to ensure that freight is redirected along the appropriate routes.

6. Regulatory measures need to be enforced to ensure that the planned benefits can be achieved.

7. More collaboration is required between different transport solutions operating within cities to optimize consolidation and bundling of deliveries.

ANNEX 1: OVERVIEW OF BARRIERS, DRIVERS AND ACTIONS FIELDS

Overview of barrier fields and examples

NR	Barrier field	Examples of barriers
1	**Political / strategic**	Opposition of key actors based on political and/or strategic motives, lack of sustainable development agenda or vision, impacts of a local election, conflict between key (policy) stakeholders due to diverging believes in directions of solution
2	**Institutional**	Impeding administrative structures, procedures and routines, impeding laws, rules, regulations and their application, hierarchical structure of organizations and programs
3	**Cultural**	Impeding cultural circumstances and life style patterns
4	**Problem related**	Complexity of the problem(s) to be solved, lack of shared sense of urgency among key stakeholders to sustainable mobility
5	**Involvement, communication**	Insufficient involvement or awareness of (policy) key stakeholders, insufficient consultation, involvement or awareness of citizens or users
6	**Positional**	Relative isolation of the measure, lack of exchange with other measures or cities
7	**Planning**	Insufficient technical planning and analysis to determine requirements of measure implementation, insufficient economic planning and market analysis to determine requirements for measure implementation, lack of user needs analysis: limited understanding of user requirements
8	**Organizational**	Failed or insufficient partnership arrangements, lack of leadership, lack of individual motivation or know-how of key measure persons
9	**Financial**	Too much dependency on public funds (including CIVITAS funding) and subsidies, unwillingness of the business community to contribute financially
10	**Technological**	Additional technological requirements, technology not available yet, technological problems
11	**Spatial**	No permission of construction, insufficient space
12	**Other**	?????????

Overview of driver fields and examples

NR	Driver field	Examples of drivers
1	**Political / strategic**	Commitment of key actors based on political and/or strategic motives, presence of sustainable development agenda or vision, positive impacts of a local election, coalition between key (policy) stakeholders due to converging (shared) believes in directions of solution
2	**Institutional**	Facilitating administrative structures, procedures and routines, facilitating laws, rules, regulations and their application, facilitating structure of organizations and programs
3	**Cultural**	Facilitating cultural circumstances and life style patterns
4	**Problem related**	Pressure of the problem(s) causes great priority, shared sense of urgency among key stakeholders to sustainable mobility
5	**Involvement, communication**	Constructive and open involvement of policy key stakeholders, constructive and open consultation and involvement or citizens or users
6	**Positional**	The measure concerned is part of a (city) program and/or a consequence of the implementation of a sustainable vision , exchange of experiences and lessons learned with other measures or cities
7	**Planning**	Accurate technical planning and analysis to determine requirements of measure implementation, accurate economic planning and market analysis to determine requirements for measure implementation, thorough user needs analysis and good understanding of user requirements
8	**Organizational**	Constructive partnership arrangements, strong and clear leadership, highly motivated key measure persons, key measure persons as 'local champions'
9	**Financial**	Availability of public funds (including CIVITAS funding) and subsidies, willingness of the business community to contribute financially
10	**Technological**	New potentials offered by technology, new technology available
11	**Spatial**	Space for physical projects, experimentation zones
12	**Other**	?????????

ANNEX 2: BACKGROUND INFORMATION GENERAL OVERVIEW

Focussed / non focussed measures and quality ratings of process evaluation

Cluster Logistics				
	Low quality	**Medium quality**	**High quality**	**Total**
Focussed	2	2	3	7
Non focussed	1	6	7	14
Total	3	8	10	21
	Low quality	**Medium quality**	**High quality**	**Total**
Focussed	10%	10%	14%	33%
Non focussed	5%	29%	33%	67%
Total	14%	38%	47,6%	100%

Innovative aspects

Innovative aspect	Cluster Yes	Cluster No	Total Yes	Total No
Innovative aspects Conceptual	52%	48%	49%	51%
Innovative aspects New Technonogy	29%	71%	46%	54%
Innovative aspects New mode of transport	29%	71%	14%	86%
Innovative aspects Targeting specific users	48%	52%	38%	62%
Innovative aspects economic instrument	0%	100%	4%	96%
Innovative aspects policy instrument	14%	86%	18%	82%
Innovative aspects organizational	33%	67%	24%	76%
Innovative aspects Physical infrastructure	19%	81%	19%	81%
Innovative aspects other	5%	95%	5%	95%

Targets

Strategic Target	Number	Percentage
Reduce environmental impact	18	86%
Improve quality of life	3	14%
Reduce congestion	3	14%

Implement freight delivery management	3	14%
Increase modal shift	2	10%
Reduce number of vehicles in city centre	1	5%

Tactical Target	Number	Percentage
Introduce regulations (e.g. time windows, management plan)	13	62%
Increase participation and awareness	5	24%
Reduce number of delivery units or trips, and reduce congestion	4	19%
Research best practices	4	19%
Reduce emissions with x%	4	19%
Use cleaner vehicles	4	19%

Operational Target	Number	Percentage
Freight delivery management/strategy/cooperation	9	43%
Increase efficiency	6	29%
Increase sustainable vehicles	3	14%
Reduce vehicles in city centre	3	14%
Taxation	1	5%
Raise awareness	1	5%

ANNEX 3: DRIVER AND BARRIER OVERVIEW PER SUB CLUSTER

Sub cluster: New distribution schemes

Barriers

	Preparation	Implementation	Operation
Political	27%	9%	0%
Institutional	18%	18%	9%
Cultural	18%	9%	9%
Problem related	27%	18%	9%
Involvement	45%	27%	27%
Positional	18%	0%	9%
Planning	18%	0%	0%
Organizational	36%	45%	27%
Financial	0%	0%	9%
Technological	0%	9%	9%
Spatial	9%	27%	0%
Other	0%	0%	0%

Drivers

	Preparation	Implementation	Operation
Political	45%	9%	9%
Institutional	27%	18%	18%
Cultural	9%	9%	9%
Problem related	18%	9%	9%
Involvement	45%	27%	18%
Positional	0%	9%	0%
Planning	9%	0%	0%
Organizational	45%	18%	18%
Financial	18%	18%	9%
Technological	9%	18%	9%
Spatial	9%	9%	9%
Other	0%	0%	9%

Sub cluster: Access restrictions and control

Barriers

	Preparation	Implementation	Operation
Political	43%	0%	0%
Institutional	43%	14%	29%
Cultural	0%	14%	0%
Problem related	0%	29%	43%
Involvement	14%	57%	0%
Positional	0%	0%	0%
Planning	14%	14%	14%
Organizational	14%	14%	14%
Financial	14%	0%	0%
Technological	14%	29%	14%
Spatial	0%	14%	0%
Other	0%	0%	0%

Drivers

	Preparation	Implementation	Operation
Political	43%	14%	14%
Institutional	14%	14%	14%
Cultural	0%	14%	0%
Problem related	0%	0%	0%
Involvement	14%	14%	0%
Positional	14%	29%	0%
Planning	0%	0%	0%
Organizational	29%	29%	14%
Financial	0%	0%	0%
Technological	0%	14%	0%
Spatial	0%	0%	0%
Other	0%	0%	0%

Sub cluster: Other (Vehicle and driver support, and freight partnership)

Barriers

	Preparation	Implementation	Operation
Political	0%	0%	0%
Institutional	0%	0%	0%
Cultural	0%	0%	0%
Problem related	100%	0%	0%
Involvement	67%	0%	33%
Positional	0%	0%	0%
Planning	0%	0%	0%
Organizational	33%	67%	0%
Financial	0%	0%	0%
Technological	0%	0%	0%
Spatial	0%	0%	0%
Other	0%	0%	0%

Drivers

	Preparation	Implementation	Operation
Political	0%	0%	0%
Institutional	0%	0%	0%
Cultural	0%	0%	0%
Problem related	0%	0%	0%
Involvement	33%	0%	0%
Positional	100%	67%	33%
Planning	33%	33%	33%
Organizational	0%	0%	33%
Financial	0%	0%	0%
Technological	33%	0%	0%
Spatial	0%	0%	0%
Other	0%	0%	33%

ANNEX 4: BACKGROUND INFORMATION RECOMMENDATIONS

Transferability

Transferability	Number	Percentage
Good planning and divide of tasks	7	33%
Political/legislation support	7	33%
Study before start	4	19%
Involvement and participation of all stakeholders	4	19%
New technologies	3	14%
Best practices	2	10%
Good evaluation/monitoring	2	10%

Process

Recommendations	Number	Percentage
Involvement stakeholders or participants	17	81%
Good planning/action plan	8	38%
Best practices	4	19%
Political and legislation support	4	19%
Enough resources	3	14%