



CiViTAS
Cleaner and better transport in cities

ARCHIMEDES

AALBORG • BRIGHTON & HOVE • DONOSTIA-SAN SEBASTIÁN • IASI • MONZA • ÚSTÍ NAD LABEM

D2.1 – Development and Experience of Collective Transport and Intermodal Integration Demonstrations in ARCHIMEDES

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1. Introduction

1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for City-VITALity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

CIVITAS I started in early 2002 (within the 5th Framework Research Programme);
CIVITAS II started in early 2005 (within the 6th Framework Research Programme) and
CIVITAS PLUS started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

Objectives:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

Horizontal projects support the CIVITAS demonstration projects & cities by:

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

Key elements of CIVITAS:

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement
- Cities are living ‘Laboratories’ for learning and evaluating

1.2 Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

Collective Transport and Intermodal Integration Demonstrations is one of the eight categories within CIVITAS ARCHIMEDES. Many European cities face increasing problems of congestion. A high-quality, modern and energy-efficient Public Transport system that is well integrated with other modes is key to reducing car traffic and creating an appealing urban environment. CIVITAS cities are working on innovative ways to maximise the potential for local Public Transport through an accessible service that is a fast and convenient alternative to the private car. Efforts include for instance improving security and safety, and making it accessible to people with reduced mobility. There is also a focus on building up clean and energy-efficient Public Transport fleets. Moreover, integrated ticketing is crucial to make Public Transport and intermodal travel attractive options. Examples include smart cards that allow users to travel on different modes of Public Transport, or Park and Ride services that integrate parking fees and Public Transport fares.

CIVITAS has supported a very large number of Public Transport measures, which are diverse in nature and entail varying levels of investment. Some of the most popular measures include:

- Innovative projects for integrated fares and smartcards;
- Creation of mobility centres for centralised information and coordination of Public Transport services;
- Initiatives to increase security onboard vehicles and at stations and stops;
- Regulation of roads and traffic to give priority to Public Transport vehicles;
- Provision of new facilities such as park and rides;
- Integration with other modes and the introduction of new services for special users, e.g. disabled people.

The integration between different Public Transport services and the integration between Public Transport and other transport modes remains an important issue. Lack of integration is the source of bottlenecks and limits customer choice regarding seamless Public Transport solutions. There is room for improvement within transport systems, between companies within modes, and between Public Transport and other modes, including taxi, bicycle and car.

Convenient, efficient and clean collective passenger transport is an essential part of a sustainable transport system in urban areas. In order to maintain or increase the modal share of collective passenger transport, services need to be made more attractive to use, safe and punctual. The main aim of this Work Package is to build an optimised and user-friendly environment for Public Transport modes that will encourage people to use clean, collective transport facilities, for the benefit of citizens staying or visiting the city.

The objectives are to:

- Promote reliable, high quality and flexible alternatives to individual transport and encourage their use;
- Lessen dependency on the car, especially during peak periods;
- Link areas of employment and the peri-urban fringe with the city centre; and
- Link areas of education to residential and business districts to increase student share of Public Transport.

2 Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

2.1 Leading City Innovation Areas

The four Leading cities in the ARCHIMEDES project are:

- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient urban transportation. In all cases the Public Transport company features as a partner in the proposed project.

2.2 Aalborg

The City of Aalborg, with extensive experience of European cooperation and having previously participated in CIVITAS I (VIVALDI) as a 'follower' city, is coordinating the consortium and ensures high quality management of the project. The City has the regional Public Transport authority (NT) as a local partner, and framework agreements with various stakeholder organisations.

Aalborg operates in a corridor implementing eight different categories of measures ranging from changing fuels in vehicles to promoting and marketing the use of soft measures. The city of Aalborg has successfully developed similar tools and measures through various initiatives, like the CIVITAS-VIVALDI and MIDAS projects. In ARCHIMEDES, Aalborg aims to build on this work, tackling innovative subjects and combining with what has been learned from other cities in Europe. The result is an increased understanding and experience, in order to then share with other Leading cities and Learning cities.

Aalborg has recently expanded its size by the inclusion of neighbouring municipalities outside the peri-urban fringe. The Municipality of Aalborg has a population of some 194,149, and the urban area a population of some 121,540. The ARCHIMEDES corridor runs from the city centre to the eastern urban areas of the municipality and forms an ideal trial area for demonstrating how to deal with traffic and mobility issues in inner urban areas and outskirts of the municipality. University faculties are situated at 3 sites in the corridor (including the main university site). The area covers about 53 square kilometres, which is approximately 5 % of the total area of the municipality of Aalborg. The innovation corridor includes different aspects of transport in the urban environment, including schools, Public Transport, commuting, goods distribution and traffic safety. The implementation of measures and tools fit into the framework of the urban transport Plan adopted by the Municipality.



Figure 1: The Archimedes Corridor in Aalborg

2.3 Brighton & Hove

Brighton & Hove is an historic city, in the south-east of England, known internationally for its abundant Regency and Victorian architecture. It is also a seaside tourist destination, with over 11km of seafront attracting eight million visitors a year.

In addition, it is a leading European Conference destination; home to two leading universities, a major regional shopping centre, and home to some of the area's major employers. All of this, especially when set against the background of continuing economic growth, major developments across the city and a growing population, has led the city council to adopt a vision for the city as a place with a co-ordinated transport system that balances the needs of all users and minimises damage to the environment.

The sustainable transport strategy that will help deliver this vision has been developed within the framework of a Local Transport Plan, following national UK guidelines. The ARCHIMEDES measures also support the vision, which enables the city to propose innovative tools and approaches to increase the energy-efficiency and reduce the environmental impact of urban transport.

2.4 Donostia - San Sebastián

The city of Donostia -San Sebastian overlooks the sea and, with a bit more than 180,000 inhabitants, keeps a human scale. Some people consider the balanced combination of small mountains, manor buildings, and sea as the setting for one of the most beautiful cities in the world. We have a tradition in favouring pedestrians, cyclists and Public Transport.

For about twenty years, the city has been enforcing a strong integrated policy in favour of pedestrians, bicycles and Public Transport. Considering walking and cycling as modes of transport, has led to the building of a non-motorised transport network for promoting this type of mobility around the city.

Likewise, the city has extended its network of bus lanes. The city holds one of the higher bus-riding rates, with around 150 trips per person per year.

The CIVITAS project is being used as the perfect opportunity to expand Donostia -San Sebastian's Sustainable Urban Transport Strategy. With the package of CIVITAS measures Donostia-San Sebastian will:

- Increase the number of Public Transport users
- Decrease the number of cars entering in the city centre
- Increase the use of the bicycle as a normal mode of transport
- Maintain the high modal share of walking
- Reduce the number of fatal accidents and accidents with heavy injuries
- Reduce the use of fossil fuels in Public Transport.

2.5 Iasi

The City of Iasi is located in north-eastern Romania and is the second largest Romanian city, after Bucharest, with a population of 366,000 inhabitants. It is also the centre of a metropolitan area, which occupies a surface of 787.87 square kilometres, encompassing a total population of 398,000 inhabitants.

The city has five universities with approximately 50,000 students, the second largest in Romania. The universities and their campuses are located in the central and semi-central area of the city. In the same area, there are also a large number of kindergartens, schools and high schools with approximately 10,000 pupils. This creates a large number of routes along the main corridor, served by the Public Transport service number "8" (Complex Tudor Vladimirescu - Copou) with an approximate length of 10 km. The City of Iasi will implement its integrated measures in this area to be known as the "CIVITAS+Corridor".

The city's objectives in CIVITAS - ARCHIMEDES are based on the existing plans related to transport, Local Agenda 21, approved in 2002, and the Sustainable Social-Economic Development Strategy for City of Iasi. The CIVITAS Plus objectives will be integrated in the Strategy for metropolitan development which was finalized in October 2009.

2.6 Monza

Monza is a city on the river Lambro, a tributary of the Po, in the Lombardy region of Italy, some 15km north-northeast of Milan. It is the third-largest city of Lombardy and the most important economic, industrial and administrative centre of the Brianza area, supporting a textile industry and a publishing trade. It is best known for its Grand Prix.

The City of Monza, with approximately 121,000 inhabitants, is located 15 km north of Milan, which is the centre of the Lombardia area. This area is one of the engines of the Italian economy; the number of companies is 58,500, i.e. a company for every 13 inhabitants.

Monza is affected by a huge amount of traffic that crosses the city to reach Milan and the highways nodes located between Monza and Milan. It is also an important node in the Railways network,

crossed by routes connecting Milan with Como and Switzerland, Lecco and Sondrio, Bergamo and Brianza. "Regione Lombardia", which in the new devolution framework started in 1998, has full responsibility for establishing the Local Public Transportation System (trains, coaches and buses) and has created a new approach for urban rail routes using an approach similar to the German S-Line or Paris RER.

Monza has recently become the head of the new "Monza and Brianza" province, with approximately 750,000 inhabitants, so will gain the full range of administration functions by 2009. Plan-making responsibilities and an influence over peri-urban areas will require the city to develop new competencies.

In this context, the objective of the City of Monza in participating in CIVITAS as a Learning City is to set up an Urban Mobility System where the impact of private traffic can be reduced, creating a new mobility offer, where alternative modes become increasingly significant, leading to improvements to the urban environment and a reduction in energy consumption (and concurrent pollution).

2.7 Ústí nad Labem

Ústí nad Labem is situated in the north of the Czech Republic, about 20 km from the German border. Thanks to its location in the beautiful valley of the largest Czech river Labe (Elbe) and the surrounding Central Bohemian Massive, it is sometimes called 'the Gateway to Bohemia'. Ústí is an industrial, business and cultural centre of the Ústí region.

Ústí nad Labem is an important industrial centre of north-west Bohemia. The city's population is 93,859, living in an area of 93.95km². The city is also home to the Jan Evangelista Purkyně University with eight faculties and large student population. The city used to be a base for a large range of heavy industry, causing damage to the natural environment. This is now a major focus for improvement and care.

The Transport Master Plan, to be adopted in its first form in 2007, will be the basic transport document for the development of a new urban plan (2011), which must be developed by the City subject to the provisions of the newly adopted Building Act. This will characterise the development of transport in the city for the next 15 years, and so the opportunity to integrate Sustainable Urban Transport Planning best practices into plan development during the project means an ideal match of timing between city policy frameworks and the ARCHIMEDES project.

The projects main objective is to propose transport organisation in the city, depending on the urban form, transport intensity, development of Public Transport, and the need for access. The process, running until 2011, will include improving the digital model of city transport that Ústí currently has at its disposal. The plan will have to deal with the fact (and mitigate against unwanted effects that could otherwise arise), that from 2010, the city will be fully connected to the D8 motorway, running from Prague to Dresden.

3. Background to the Deliverable

This deliverable summarises the research and demonstration activities conducted in relation to workpackage 2 of the CIVITAS ARCHIMEDES project – Collective transport and intermodal integration.

3.1 Introduction to the Measures

Research and demonstration activities in respect of collective transport and intermodal integration have been conducted in five of the ARCHIMEDES cities, namely Aalborg, Brighton, Donostia - San Sebastian, Iasi and Monza, in the form of measures 1, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19. These measures are introduced in the following sections.

The results from the individual measures are reported in detail as follows:

Measure No:	Research Deliverables	Implementation Deliverables
1		T1.4
8		T8.1
9		T9.1
10		T10.1
11		T11.1
12		T12.1
13		T13.1
14		T14.1
15		T15.1
16	R16.1	T16.1 T16.2 T16.3
17		T17.1
18		T18.1
19	R19.1	T19.1

This deliverable draws together the experiences gained from the individual measures and presents the common issues and conclusions that can be drawn at the workpackage level. Further information and outcomes of the measures can be found in D10.3 Final Evaluation Report and D12.4 Final version of measure level result templates.

Measure 1: Biofuels in Aalborg

Aalborg has launched a shuttle bus line to provide effective urban transport for tourists and citizens in the city centre part of the ARCHIMEDES innovation area. This, in combination with other ARCHIMEDES measures like the City Bikes and the Parking Information System, give a unique coverage of the city centre with eco-friendly transport. The City Circle, as the shuttle bus is called, is free of charge and runs between parking areas and key places in the city such as the tourist attractions and the new waterfront. The City Circle is operated by a hybrid bus with 30 % lower fuel consumption and hence lower CO₂ emissions than regular buses.

Measure 8: Travel Smart Card in Aalborg

A smart travel card system - an innovative national project with a core system at the forefront of technology - is being implemented in Aalborg. The core system and two new ground-breaking facilities are part of the demonstration.

Existing ticketing systems with zone structures and fare calculation rules are, whilst mathematically logical, not easily understood by customers and constitute a barrier to the use of Public Transport. There are also barriers within trip chaining, characterised by different ticketing and pricing systems in different regions. Together with the fact that existing ticketing equipment throughout most of Denmark

is worn out and ready for replacement, this has led to initiating a national travelcard project. Through this the entire country adopts the same ticketing system based on the most up to date technologies for ticketing in buses, trains and metro.

In the measure, the Travel Card System was implemented in 80 buses and two new facilities for the travel card in Aalborg were introduced, designed and implemented:

- Integration in the buses between the Travel Card Unit and the Bus Computer System. ARCHIMEDES contributes to the design of this integrated system.
- A light version of the travel card to expand the use of electronic ticketing to Public Transport taxis. ARCHIMEDES contributes to the design of this light version system.

Measure 9: Modernising Travel Information in Aalborg

Availability of updated and reliable traffic information is important to enable travellers to make sensible choices in terms of modal choice and timing of their journeys. This measure has comprised the planning and implementation of improvements for two existing web services www.aalborg-trafikinfo.dk and www.NordjyllandsTrafikselskab.dk in Aalborg, with new services and information developed through ARCHIMEDES.

The web-page www.aalborg-trafikinfo.dk was established as a part of the VIKING project, and the purpose was to give a complete view of the different modes of traffic in the Aalborg area. It contains information about road traffic, Public Transport, parking, bicycle, pollution and other traffic related information. Before the ARCHIMEDES Project the page had about 3,000 visitors every month.

The web-page www.NordjyllandsTrafikselskab.dk is the main page for users of Public Transport in the City of Aalborg and was updated in 2006 with a new design that enabled users to find the most important information from the entry page. As new services have been developed the need for a more flexible personalised access to information has grown. Before the ARCHIMEDES project the page had about 160,000 users every month.

Measure 10: Multi-modal ticketing in Brighton & Hove

At present, customers travelling by different modes in the UK have to buy tickets for each leg of their journey. Providing passengers with an integrated ticketing system will offer passengers a simpler and more seamless way of travelling and will increase the attractiveness of Public Transport in the city. The Brighton & Hove Bus Company, in conjunction with the local rail company, has therefore introduced multi-modal ticketing.

Brighton Buses have a growing mode-share and it is hoped that integrated ticketing will further stimulate this trend. The multi-modal ticketing project is just one of the latest innovative schemes designed to generate further increases in usage of the bus network, with resulting downward effects on car traffic and thus an increase in air quality and improvement in the general environment in the city.

Measure 11: New School Bus Link in Iasi

The distance between Ciurea village and Iasi, and poor Public Transport services on this route, make it difficult for the Romany population to access community facilities, e.g. education facilities. With help of a County Council decision, Iasi has introduced bus line 41b which connects the CIVITAS Corridor with Ciurea village, primarily for the children of the Romany community. In the CIVITAS corridor there

is a very high number of day-care centres, schools and high schools with a total of approximately 10,000 pupils. Also, Universities are placed in this area.

The measure comprises the implementation and promotion of the new school bus link, and studies demonstrating its impact.

Measure 12: Improved Ticketing in Iasi

Before the ARCHIMEDES project, the ticket distribution system in Iasi had 56 selling points, 20 of which also functioned as dispatching centres, mainly placed at the last stops of tram and bus lines. Within this measure, ARCHIMEDES has contributed to the purchasing and installing of 10 ticket vending machines (TVMs) along the CIVITAS corridor.

The TVM system permits the operation of automatic tickets via a touch screen. The degree of acceptance of currencies is high: coins, notes, chip cards and credit cards can be used. Various settings for data transfer to a centralised system can be designated depending on requirements, e.g. GSM/GPRS/Edge, wireless LAN or ISDN.

Additional to the installation of the TVMs, promotion and training work has been carried out.

Measure 13: Video Surveillance System in Iasi

Before the ARCHIMEDES project, there were no video surveillance systems inside Public Transport vehicles in Iasi. This had a negative affect on driver and passenger security. Therefore, Iasi introduced a video surveillance system inside vehicles that also integrates IT equipment.

Within this measure, Iasi purchased 800 video cameras and 200 video management and storage systems. They were installed on 200 Public Transport vehicles. The video cameras capture images from inside and front of the vehicle; these are then sent to the video recorder equipped with a storage hard-disk. Video recorders are connected to an on-board wireless communication system, planned to make possible the WLAN data connectivity with Maintenance Facility Centres network (connection with measure 76).

The aim of the introduction of the system was to help identify and reduce travel fraud and offences, thus contributing to increasing passenger safety.

Measure 14: Bus Priority Measures in Iasi

The combination of increasing car traffic and lack of special priority for Public Transport services in Iasi has led to an increase in delays to these Public Transport services. Furthermore, the high number of traffic accidents and the fact that the traffic control systems were old and obsolete led Iasi City Hall to propose the installation of new detection and control units. This project presented itself as a good opportunity to improve the mobility of citizens, reduce the time lost in traffic congestion and reduce pollution in one of the biggest and most important cities in Romania.

Because of the intense overall level of traffic (especially in the city centre), Public Transport services have frequently not been able to follow their schedule. This problem has increased as traffic jams have become more frequent, mainly within peak hours. In order to reduce the frequency and severity of these occurrences and to help Public Transport users benefit from efficient Public Transport services without delays, the local authority decided to create special traffic lanes reserved for Public

Transport (buses, minibuses, taxis). These are marked accordingly to international standards, separated from the other lanes.

Measure 15: Business District Shuttle Bus in Iasi

Before the ARCHIMEDES project, commuters travelling alone in private cars on their way to the business districts, contributed significantly to congestion problems in the morning. Additionally, valuable urban space was occupied during daytime by their parked cars, making it more difficult for visitors and customers to find parking spaces.

This measure has therefore aimed at creating a more cost efficient way to cater for the needs of commuters, by providing business district shuttle buses rather than expanding existing bus services. Also the possibility of connecting the route to other sustainable transport interchanges or Park & Ride sites has been considered.

Measure 16: High Quality Bus Corridors in Donostia - San Sebastián

Within this measure the ambitious UNE EN-1313816 quality standard on Public Transport has been implemented in two main corridors in San Sebastian (lines 5 and 28). The aim is to provide the most populated districts, University, Hospital, Sport Centre, business areas and Park & Ride with a high quality bus service (every 6 minutes on weekdays) and excellent intermodality with the rest of the urban bus network, inter-city station and train stations. The quality standards cover a wide range of service operation aspects, which are monitored yearly. Complementary infrastructural changes will also help improve Public Transport reliability and operation.

The measure is part of a package of measures (measures nº 16, 17, 73 and 74). They aim at increasing the quality offered by the Public Transport service in the municipality of Donostia-San Sebastián, inducing a modal shift toward Public Transport.

Measure 17: Business District Bus Service in Donostia - San Sebastián

Compania Del Tranvia De San Sebastián Anomina (CTSS) has introduced new bus services to connect the Belartza, Zuatzu, Miramón and Polígono 27 business districts on the peri-urban area of Donostia - San Sebastián to the CIVITAS high quality Public Transport corridors (Measure 16) and major Public Transport interchanges including the regional train network.

The bus service has been operated using bio-diesel to maximise the environmental benefits of commuters choosing to use the service instead of the car.

Measure 18: Advanced Park & Ride Network in Donostia - San Sebastián

Data collected in 2006 showed 51,343 vehicles entering the city daily along the CIVITAS corridors. Although these figures do not equate to the saturation level of the roads, for a city whose population is around 180,000, this is a worrying figure that leads to significant urban traffic problems.

One of the actions towards reducing the number of vehicles entering the city's central areas has been the provision of Park & Ride facilities. These facilities are a way to avoid the difficulties and cost of parking within the city centre and also allow commuters to avoid the stress of driving a congested part of their journey. They are meant to avoid congestion by encouraging people to use Public Transport as opposed to their own personal vehicles.

This measure has included changes in the management strategy of four existing Park & Ride sites to ensure a better integration between car and Public Transport trips. A new pricing strategy and the Park & Ride service have been promoted through campaign work.

Measure 19: Demand Responsive Public Transport Connections in Monza

The introduction of a demand responsive connection service implies the creation of a more efficient service to citizens, to ensure adequate responsiveness to mobility demand of citizens as well as to encourage modal shift. In addition, this kind of service makes urban Public Transport more energy-efficient in periods of low demand.

The Commune of Monza, with the co-operation of ATM/NET, the PT operator in the urban area of the city, has assessed the feasibility of a demand responsive bus service, in order to demonstrate a Demand Responsive Transport Service (DRTS).

When ARCHIMEDES project proposal was first submitted in 2007, the idea was to replace the night service, which is very expensive and underused, with a DRTS. Due to administrative challenges it was decided to implement the measure in a reduced way, in order to test the interest of citizens in such a service. Therefore, a DRTS for the San Fruttuoso district residents connecting the district to the location of important events in the city has been implemented and evaluated.

4. Analysis

4.1 Comparison of Measures

4.1.1 Objectives

Five measures focused on shuttle bus services. Common objectives across cities regarding these shuttle bus services have been to obtain more cost-effective and cleaner transport modes that encourage modal shift.

Three measures focused on improving the quality of bus services by introducing measures that improve interconnectivity, travel time, reliability and passenger safety.

Four measures focused on improving ticketing and information within Public Transport. The main objectives of these measures were developing more user-friendly services for Public Transport passengers making it easier to plan and complete Public Transport journeys.

The main objective of the last measure in this workpackage implementing a new management strategy for Park & Ride facilities in Donostia - San Sebastián was to offer alternative parking facilities outside the city centre at locations not well connected to the Public Transport system.

The measures can therefore be divided into four major themes:

- Shuttle Bus services
- High Quality Bus services
- Ticketing and Information
- High Quality Park & Ride

The more specific objectives for the cities will be presented corresponding to these four themes.

Shuttle Bus

In Aalborg, the objectives of the implementation of the City Circle shuttle bus line were to provide effective urban transport for tourists and citizens in the city centre part of the ARCHIMEDES innovation area, and in combination with other measures to give a unique coverage of the city centre with eco-friendly transport. Removing the barriers formed by language, knowledge of the bus network etc., and linking the shuttle bus system to major parking lots will encourage tourists and visitors to park and use sustainable transport instead of private cars from attraction to attraction. It will also discourage circling around in the city centre in search for an unoccupied parking slot. Thus the tourist shuttle bus line serves two purposes - to solve existing local transport needs in a sensible way and to be an “eye opener” for a user group likely to be particularly open to new impulses. A target of 7,500-15,000 passengers per year was set.

In Donostia - San Sebastián, the main aim of the Business District Bus Service, together with a higher use of Park & Ride facilities, was to meet the needs of commuters and to help implement a user-friendly environment for Public Transport modes encouraging people to use clean, collective transport. A target of 100,000 passengers using the service was set.

The objective of the new school bus link in Iasi was to provide a safe transport mode for the children of the Romany community and to encourage its people to use Public Transport, thereby increasing social inclusion and educational opportunities.

The Business District Shuttle Bus in Iasi aimed at creating a more cost efficient way to serve commuters instead of expanding existing bus services. The main benefits for the companies involved reducing transport costs and increasing punctuality of employees.

The main objective of the DRTS in Monza was to ensure adequate responsiveness to mobility demands of citizens as well as to encourage modal shift. In addition, this kind of service makes Urban Public Transport more energy-efficient in periods of low demand.

High Quality Bus Service

The main aim of the measure of implementing two high quality bus corridors in Donostia - San Sebastián was to build an optimised and user-friendly environment for Public Transport modes that will encourage people to use clean, collective transport facilities. It aimed to improve interconnectivity of the two major transport corridors in the town and to serve commuters, students, tourists and visitors with the new shuttle service. Combined with the other ARCHIMEDES measures targeting Public Transport, the measure was expected to result in a passenger increase in urban buses by 5 %, at the same time reducing the number of cars entering the city centre by 5 %.

The objectives of the bus priority measures in Iasi were to increase the quality of Public Transport by addressing problems with travel time and reliability. It was expected that these measures would improve overall traffic flow and increase the efficiency of Public Transport within the overall transport system. One of the aims was to reduce travel time by 10 %.

The video surveillance system in Iasi was introduced to identify travel fraud and crime inside Public Transport vehicles, thus contributing to reducing these problems and increasing passengers' safety.

Ticketing and Information

The aim of introducing the Travel Card System in Aalborg was to further develop an optimal, user-friendly environment for Public Transport users, to increase numbers of passengers. The idea is to encourage people to use collective Public Transport by making it easy, for the benefit of passengers and for improved economic and environmental efficiency of Public Transport. The deployment of the "Travel Smart Card light" version in tele-taxis will increase area coverage and contribute to an integrated PT system. Another aim was to make the working environment of bus drivers more secure. The integration of the Travel Card System with the BusPC System will ensure that the driver

will only have to respond to one ITS system. This will also secure the integrity between data in the two systems.

The Internet has become a very important channel for traffic information. Travel planning, traffic information, webcams and other kinds of traffic services are very popular. As the number of Internet based services grows, it becomes increasingly difficult for the user to find relevant information quickly and easily. The goal for modernising travel information in Aalborg was to further develop the two web-pages www.aalborg-trafikinfo.dk and www.NordjyllandsTrafikselskab.dk, by implementing functions enabling users to personalise the services, so that information is accessible, and to incorporate new types of information such as dynamic congestion data, when it becomes available. This demonstration will improve two existing web services in Aalborg using new services and information developed through ARCHIMEDES.

The main aim of the multimodal ticketing project in Brighton & Hove was to increase the number of people travelling by bus and train to/from and within the city by offering an attractive, simple, multi-modal ticketing offer that provides good value for money. Increasing the number of people travelling by bus and train will discourage car use and thus result in less congestion, more reliable bus services, quicker journey times, less pollution and an improved general environment in the city.

In Iasi, the modern option to purchase travel tickets any time Public Transport motivated the decision to install TVMs. The aim was to increase passengers' comfort, change their travel behaviour and increase the number of students and pupils using Public Transport

High Quality Park and Ride

The objective of the new management strategy for Park & Ride facilities in Donostia - San Sebastián was to offer alternative parking facilities outside the city centre at locations not well connected to the Public Transport system. Travellers towards the city centre, who do not have a Public Transport connection at the origin of their trip, form the main target group for Park & Ride. The challenge for the measure was to adapt the management and communication for these areas, so they would be filled by PT users to at least 80 % of available capacity.

By reaching this goal the measure will contribute to reach the main objectives of a 5 % increase in passenger level and a 5 % decrease in the number of cars entering the city centre in Donostia - San Sebastián.

4.2 Differences in Approach

Different approaches have been undertaken across the four main themes within this workpackage and across the different participating cities.

The planning of the Shuttle Bus schemes has been performed in different ways in the five measures. In Iasi, the new Shuttle Bus line connecting Ciurea to schools and university was implemented as a result of citizens' discontent regarding the quality of the existing transport services between Iasi and Ciurea offered by a private company, whilst communication with potential companies was an integral part of the initial planning of the Business District Shuttle Bus in Iasi. Likewise, CTSS carried out a design study to assess the needs of Public Transport in the four business districts in Donostia - San Sebastián. The pricing strategy, frequency and servicing of main attractions were important elements for planning the tourist Shuttle Bus service in Aalborg, whilst a research activity was performed to analyse possible solutions for implementation and demonstration of the DRTS in Monza.

The planning of the three High Quality Bus service schemes focused on improving interconnectivity, travel time, reliability and passenger safety. In Donostia - San Sebastián a research activity containing detailed design and planning of the high quality Public Transport services in Donostia - San Sebastián

was undertaken. The main topics addressed within this study included the design of the exact routes, design of necessary changes in infrastructure and service operation, and development of priority measures. Moreover, the study presents the recommended characteristics of the BRT (Bus Rapid Transit) system proposed to be introduced in Donostia-San Sebastian.

Planning, testing and implementing the ticketing schemes in Aalborg, Brighton and Iasi has focused on defining specification requirements, developing interfaces and purchasing and installing the different elements within these systems. Educational campaigning towards users and employees has also been an integral part of the work in these schemes. The modernisation of the two travel information websites in Aalborg focused on improving and customising travel information.

After locating possible Park & Ride sites, a new pricing strategy and the Park & Ride service have been promoted through campaign work in Donostia - San Sebastián. The new pricing strategy has met public and political opposition delaying the full implementation of this scheme.

The planning and implementation of the demonstration projects corresponding to the four major themes in this workpackage is described in more detail below.

Shuttle Bus

The City Circle line in Aalborg was planned by a working group with participants from “Nordjyllands Trafikselskab” (Regional Public Transport Authority), the department “Sundhed og Bæredygtig Udvikling” (SBU - Health and Sustainable Development) and the ARCHIMEDES team from Traffic and Roads in the City of Aalborg. Being responsible for planning of local Public Transport in the Aalborg municipality, most of the measure planning was done by SBU. The local tourist organisation, Visit Aalborg, was also involved in the working group where they contributed valuable knowledge.

In deciding the route, several important elements were taken into consideration, the most important being which attractions to service, the possible frequency of the bus line, and closeness to parking areas. A short route was preferred because a frequency of 3 departures an hour was considered important for the route to fulfil the function of a shuttle bus. The route covers the city centre of Aalborg with bus stops placed at key focal points in the city, at tourist attractions and transport nodes (City Bikes, Public Transport and parking areas). Early in the process the idea of a guide or host came up in the working group because it was perceived that this would add value to the bus service.

A Parallel Hybrid bus, the Volvo 7700 Hybrid bus, was chosen. The bus is 12 metres in length as are most standard city buses in Aalborg and has room for 36 seated and 32 standing passengers. The bus has more than 30% lower fuel consumption and thus lower CO₂ emissions than regular buses. At the same time NO_x and particulate emissions are lowered by as much as 40-50 %. Choosing a low-emission bus underlines the fact that sustainability has become a more integrated part of the image of the service.

The bus was in service for a period of 8 weeks during the summer in 2010, 2011 and 2012. To ensure the highest impact of the shuttle bus line, the City of Aalborg decided to make it free. As the fare level for using the city buses in Aalborg for tourists is relatively high, this should help to motivate car drivers to park the car and use the shuttle bus instead. This point was especially important as the introduction of a large new private parking house in the city centre initiated a ‘pricing war’ between the private parking lots in the centre, with the result that parking was made free for the first three hours.

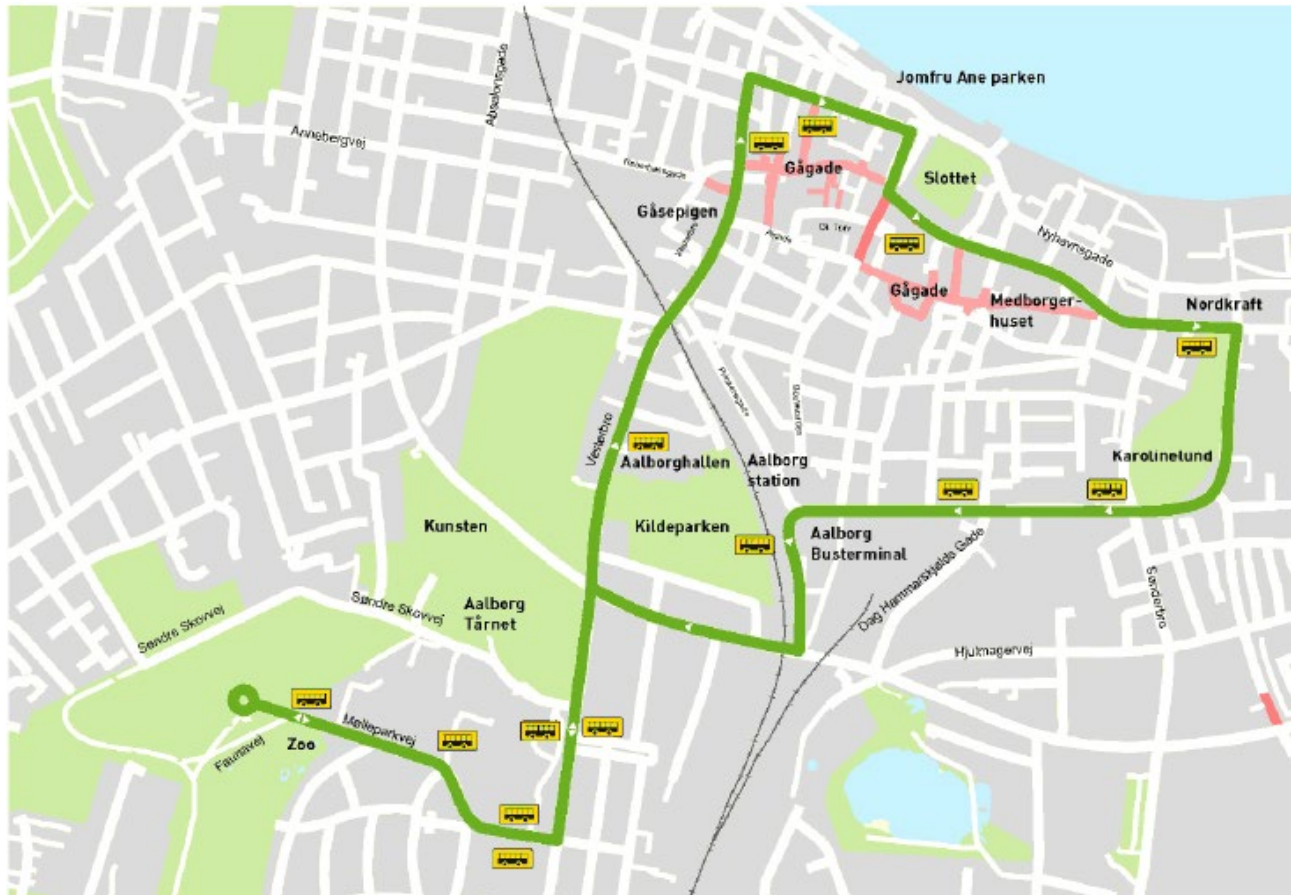


Figure 1: The route for the Clean Fuelled Tourism Shuttle Bus in the city centre of Aalborg.



Figure 2: The City Circle shuttle bus in service in Aalborg.

Surveys from the design study that CTSS carried out in September 2009 showed that commuters in Donostia - San Sebastián prefer to have a direct trip in one step from their home to their workplace instead of carrying out the trip in two steps as with the shuttle buses. The conclusion was therefore to implement direct bus lines to the four business districts (Zuatzu, Belartza, Poligono 27 and Miramon) instead of shuttle services, improving the frequency of the core bus service during weekdays.



Figure 3: New real time information at bus stops and onboard information system with next stop announcement in Donostia - San Sebastián.

The Mobility Department of Donostia-San Sebastián (ADS) realized the necessary changes in the infrastructure and bus stops in order to improve Public Transport operations in the business districts. In particular, priority measures such as dedicated lanes and priority at traffic lights were implemented (4 out of the additional 5 km of bus lanes implemented within CIVITAS affect routes connecting with business districts, while all 80 priority measures in traffic lights affect those lines). In addition, waiting facilities at bus stops in business districts were improved. CTSS-DBUS also improved the traveller

information system for commuters to the business districts, implementing real time information at bus stops and an onboard system in buses, as well as developing a new website, an SMS information system and a Bluetooth information system at the business district bus stops.

CTSS-DBUS started the operation of the new bus services connecting Zuatzu, Miramón, Poligono 27 and Belartza business districts on the peri-urban area of Donostia - San Sebastian with the CIVITAS high quality Public Transport corridors (Measure 16) and major Public Transport interchanges including the regional train network in summer 2010. The service was demonstrated until summer 2012. The bus service is being operated by bio-diesel buses to maximise the environmental benefits of commuters choosing to use the service instead of their own cars.

This measure is closely integrated with the measure on travel plans where there is a specific task on travel plans for employees working in the business districts (Measure 33). The measure is also linked with the implementation of the high quality corridors (Measure 16).

In Iasi, the new bus line connecting Ciurea to schools and university was implemented as a result of citizens' discontent regarding the quality of the existing transport services between Iasi and Ciurea offered by a private company. The main problem claimed by the passengers was the poor quality of the services (e.g. lack of timetable, low number of vehicles, minibuses crowded).

The discussions between Ciurea's local authority, Iasi Municipality and the Public Transport Iasi (PTI) led to the decision of creating a new bus line to link Ciurea village to the majority of city's schools and universities. Promotion campaigns were held to inform citizens about the new bus line, transport frequency of the buses, stations along the route, etc. The transport company and the City Hall of Ciurea concluded a collaboration contract regarding the issue of special passes for the students living in Ciurea, in order to help them use the Public Transport service.

Bus line 41b is an extension of line 41, the route of which is Copou – Piata Eminescu – Tg. Cucu – Podu Ros – Rond CUG. The terminal located at Rond CUG of line 41 lies at the boundary of the city of Iasi, and the extension of line 41 satisfies the transportation needs of the students living in Ciurea towards most of the educational institutions in Iasi, as it crosses the centre of the city and also reaches the university area. The bus line has a frequency of four buses per hour and the journey time is about 80 minutes for a round trip.



Figure 4: The new school bus link between the city of Iasi and Ciurea.

In the initial planning of the Business District Shuttle Bus in Iasi, PTI identified and contacted a number of potential companies located outside the formal city boundary in the suburban zone, to discuss

transporting their employees to and from work by bus. Only two companies (CET and Metro) were interested (450 staff at both companies), and further meetings were held with them to evaluate their transport needs and establish optimal routes and schedules for the buses. Taking into account that Iasi City and PTI have a concession contract called “Public Transport Services in Iasi”, both parties agreed to make an amendment in that way that PTI were allowed to operate on the new routes.



Figure 5: The bus transporting employees at CET to and from work in Iasi.

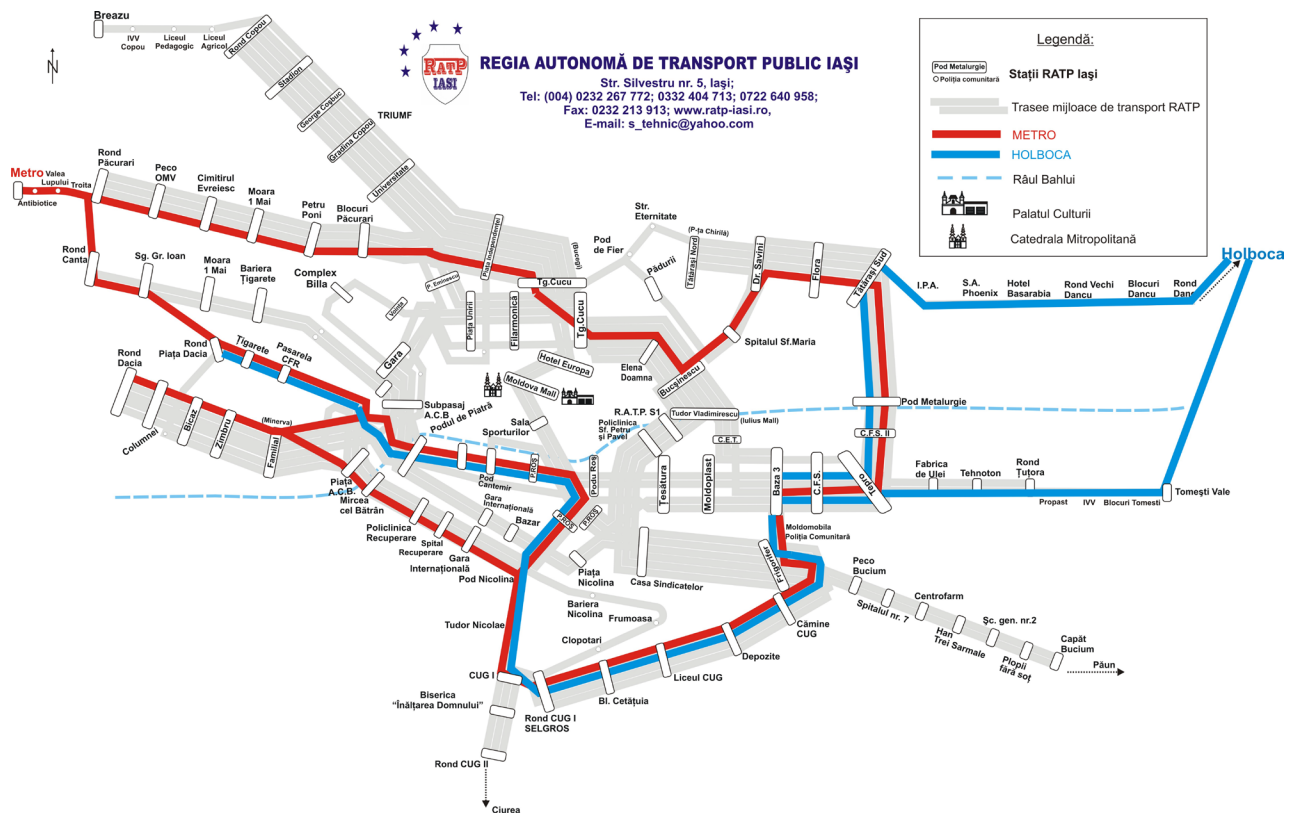


Figure 6: The routes for the bus lines to the two companies CET and Metro in Iasi.

The employees from CET were transported with buses or minibuses according to the company's needs, and those from METRO were transported with minibuses. PTI buses transported employees daily to match the shifts in operation. Surveys and passenger counts have been carried out before and after implementation phase to evaluate the use of the bus lines.

Monza conducted a study investigating the possibility of starting a demand responsive transportation service to replace the scarcely used night and holiday service with high management costs. Therefore, a shuttle bus (normal 12 metre bus) was activated on demand for special events in the city. This could be booked by telephone or e-mail.

The chosen district was San Fruttuoso, which is one of the most densely populated areas in Monza and is physically divided from the rest of the urban area by State Street (SS) no. 36. The area is also poorly serviced by Public Transport.

Demand Responsive Transport Service (DRTS) is an advanced, user-oriented form of Public Transport characterised by flexible routing and scheduling of small/medium vehicles operating in a shared-ride mode between pickup and drop-off locations according to passengers needs, usually using traditional PT service bus stops. This service is meant to fill the gap between individual transport and scheduled conventional transport and it can be developed starting from two different points of view - the scheduled conventional Public Transport and the taxi.

DRTS may be introduced according to concepts designed to reduce the operational costs and to give customers an offer of transport with a higher flexibility to meet their needs. Moreover, it can also be considered as part of a mobility management strategy suitable in situations such as low-density population areas or low travel demand periods. It is a more efficient and user-oriented Public Transport system to cope with the changing mobility needs. As an innovative transport system, it aims at replacing private cars with collective systems which are capable of keeping the advantages of private cars and totally, or partially, removing the disadvantages.

Important events within Monza were identified, which could attract many people interested in reaching the venue from San Fruttuoso without using their car. The chosen events were five live concerts by prominent artists and fireworks during Monza Patron Saint Fair (held in Villa Reale), other traditional events held during the Grand Prix week (live concert and charity football match at the Brianteo stadium), the European Female Volleyball Championship and the Cinema Festival.

The bus ran from San Fruttuoso district to the venue of the event for which the service had been activated, along traditional PT routes. It stopped at fixed bus stops where customers had asked to get on the bus when booking. The service was free of charge for the demonstration period in order to attract the largest number of users. In order to have a good cost-benefit approach, the shuttle bus was activated only with a minimum of five bookings.

For each event, strong communication activity was undertaken in order to inform citizens of the service. A press release was sent to all local newspapers. The Public Transport Company Nord Est Transporti (NET) placed notices on its vehicles and at bus stops served by shuttle buses and put information on its website. A page is dedicated to the service both on the Municipality and ARCHIMEDES websites, in order to reach the largest number of citizens. Information was put on Facebook page of the Municipality, where a memorandum is placed in the days before an event in order to remind people to book the shuttle bus in good time.

It was easy to manage DRTS bookings through the staff of Mobility and Transportation Office in Monza. Due to the novelty of the initiative, the number of phone calls and e-mails received could be dealt with during ordinary job activity. If the service was offered for every event in the city, it would be necessary to activate a call centre to manage bookings.

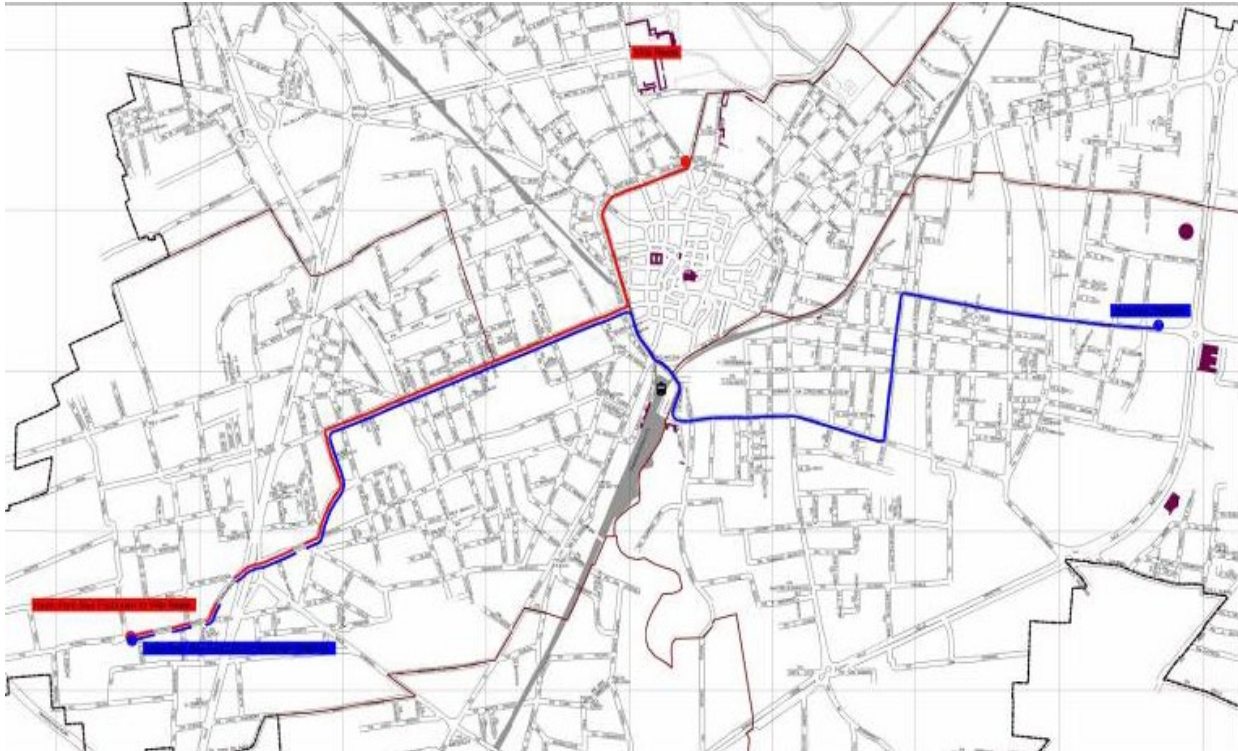


Figure 7: The shuttle bus routes on demand in Monza.

High Quality Bus

The study on detailed design and planning of the high quality Public Transport services in Donostia - San Sebastián presented the recommended characteristics of the BRT (Bus Rapid Transit) system proposed to be introduced in Donostia-San Sebastian, covering the following fields:

1. Infrastructure (lane types, stops, guidance systems & intermodality)
2. Operation ways (payment methods & tariff integration)
3. Technology (vehicle, control centre & traffic light priority)
4. Image & excellent customer service (vehicles, reserved bus lanes & stops)
5. Network definition

Following the planning and design phase, CTSS has introduced new enhanced bus services along the two high quality corridors according to the UNE EN-13816 quality standard (lines 5, 28 & 13). From the operational side, the main improvements with the innovative urban BRT lines are:

- Lines 5 & 28 are now completely served by 18 metre, high capacity, articulated buses;
- Service frequency of 6-8 minutes;
- Contactless payment system;
- Improved punctuality, with reliability provided by the new management system;
- Improved accessibility, security and intermodality standards;
- Clean and ecological buses: biofuels 30 % blend, EEV engines, less noise;

- Traveller information system: at stops, onboard, on mobile phones and on website;
- Connection to the University, the hospital, business and industrial areas at Miramon, Igara and Zuatzu and Park & Ride sites at Ibaeta, Anoeta, University and Ondarreta-UPV;
- Renewed attractive branding: little frog and green-blue colours.

In addition a promotion campaign stressing the advantages of the new service was implemented. The campaign was delivered by a specialist communication company in coordination with CTSS.

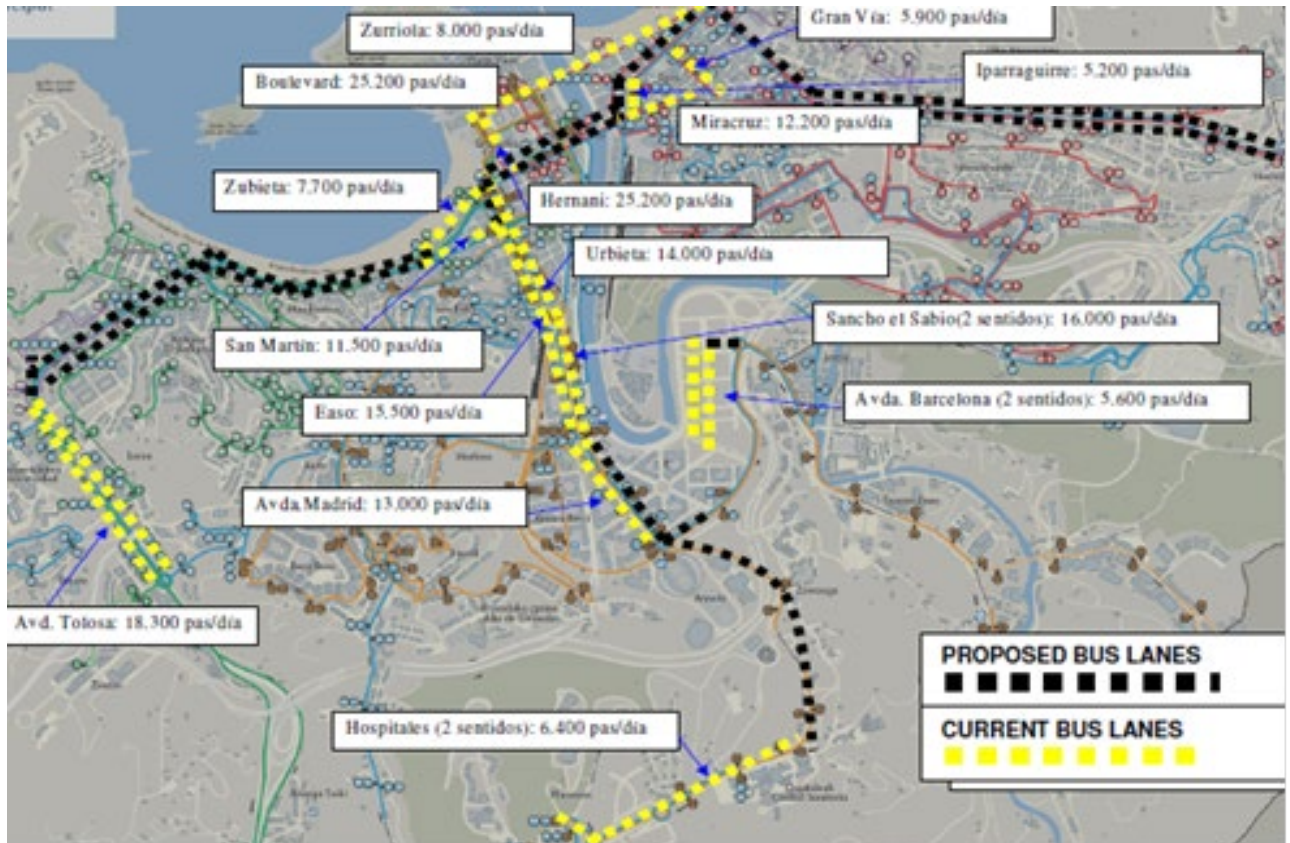


Figure 8: The BRT system in Donostia - San Sebastián with the implemented bus lanes in yellow and the proposed future bus lanes in black.

The Mobility Department of Donostia-San Sebastián (ADS) has implemented 12 km of dedicated bus lanes in order to improve Public Transport operation. In order to improve reliability and average speed of Public Transport, the city also has reprogrammed the traffic lights at 80 crossroads to ensure PT priority along the two corridors. The solution chosen for Donostia-San Sebastian is a mixed solution formed by:

- **Segregated bus lanes** in avenues or streets with 20-40m width. The central reservations are plastic pivots accompanied by painted road markings and identical traffic signs;
- **Marked or signposted bus lanes** in avenues or streets with less than 20m width where there is not enough space for segregated bus lanes. Separation from the rest of the urban traffic will be based on tactile surfacing, road markings (ONLY BUS) and vertical signs;
- **Mixed operation** when none of the previous options is possible, in streets less than 15m width.

To select the reserved platforms or bus lanes, the following factors were taken into account:

- The number of urban and inter-city buses and therefore the number of affected users;
- Itineraries where there were recurring traffic congestion which leads to significant delays in bus trips.



Figure 9: Some examples of the current protected bus lanes of the BRT system in Donostia - San Sebastián.

CTSS-DBUS implemented a GPS location system that is being used in daily planning and monitoring, to give real time information to users and to analyse different service information. 22 electronic boards with real time information about bus arrival times to bus stops were installed in the CIVITAS high quality Public Transport corridors. CTSS-DBUS also implemented an onboard real time information system that provides travellers with a next stop announcement. This system is completely integrated with the DV-BUS information and entertainment channel, which also provides travellers with local, national and international news, health advice, cultural agenda, sports, environmental news, games, etc. For the rest of the 500 CTSS-DBUS bus stops without electronic boards, travellers can get information on bus arrival times by SMS to a mobile phone. A website containing route and bus arrival time information and route planning has also been launched.

Intermodality (to facilitate the change of transport modes) is a necessary policy to improve the global quality of the Public Transport service. The main types of intermodality are:

1. Car - urban Public Transport by bus (Park & Ride);
2. Inter-city Public Transport - public bus urban transport.
3. Train services - public bus urban transport.

The whole CTSS-DBUS bus fleet has low platforms ensuring accessibility for all users. All the buses have two machines where smart cards can be validated. In addition, to stimulate the use of the contactless cards, CTSS-DBUS has discounts and bonuses. To discourage payment in cash, there are higher tariffs without discounts. 16 % of payments are in cash and although it is a relatively low number, it must be reduced in order to further increase use of cards.

Aware of the importance passengers attach to feeling secure as part of perceived quality, CTSS has installed 22 security cameras in buses that operate on the high quality corridors. The main innovation compared to other cities that have similar systems is the video recorded by the front view camera. It is expected that this evidence will be used by the Local Police to fine vehicles that slow down the operation of Public Transport, park at bus stops or drive along bus lanes. With this activity, CTSS-DBUS adapts the new technologies to improve bus service quality, and promotes and strengthens the use of the Public Transport. The security camera system has been a solution to reduce vandalism problems. In the first year of operation, CTSS-DBUS detected that the vandalism was reduced significantly in buses with the security camera system; several people have had charges pressed against them and several accidents have been prevented.



Figure 10: The conceptual design of the BRT system in Donostia - San Sebastián.

Because of the intense overall level of traffic (especially in the city centre) in Iasi, Public Transport services have frequently not been able to follow their schedule. This problem has increased, as traffic jams have become more frequent, mainly within peak hours. In order to reduce the frequency and severity of these occurrences and to help Public Transport users benefit from efficient Public Transport services, the local authority decided to create special traffic lanes reserved for Public Transport (buses, minibuses, taxis). These are marked accordingly to international standards, separated from the other lanes. Analysing the situation, they concluded that the only part of CIVITAS corridor having enough space to allow this kind of traffic separation was an area of 1,250 metres section of Independentei Boulevard, in both directions.

Independentei Boulevard is one of the busiest routes in Iasi, along which many representative institutions of the city are located: the impressive University Hospital and the University of Medicine and Pharmacy Grigore T. Popa. This boulevard also links 9 different Public Transport lines with an average of 1,556 vehicles per direction on each working day.

Special priority lanes for buses, trams and taxis were created in both directions within the chosen road section. A traffic control system was installed with new radar detection units and traffic controllers at 15 intersections, linked to a central computer server and monitor for coordination of the system.



Figure 11: Bus priority lane on Independentei Boulevard in Iasi.

The most important aspect in this system is that controllers work in real time, adapting cycle timings according to the number of cars counted by detectors on the approaches to controlled junctions. The software installed on the central server communicates through GPRS with the signal control systems. Diagnostics and traffic data are presented using tables or directly on the Common Graphic User Interface. Two training sessions were organised for staff members with main responsibility for monitoring and maintaining the installed equipment.



Figure 12: Traffic signal and radar detector at a junction on Independentei Boulevard in Iasi.

By organising a public procurement tender, Iasi bought and installed a video surveillance system on 100 public transport vehicles (64 buses and 36 trams), in order to improve the quality and safety of the

public transport service. The video surveillance system is based on a digital Network Video Recorder (NVR), model AXIS Q8108-R). This receives and stores digital images from four IP cameras (model AXIS M3113-R) mounted onboard (cockpit, front, middle, rear). Network video surveillance solutions are based on open IP standards. The video images from cameras are locally recorded on board and transferred wirelessly to local storage when buses are in depot. Using the VPN infrastructure, images are forwarded and stored at a Central Maintenance Facility. The images can be seen on the 19" LCD bus display installed inside the vehicle. The video images from the buses can also be viewed in real time from the Monitoring Centre, which is part of the Central Maintenance Facility, accessing the GSM interface mounted on the NVR.

Ticketing and Information

As part of a national plan developed in last years, the Public Transport Authority of North Denmark (NT) in collaboration with the City of Aalborg implemented the Travel Smart Card in Aalborg, including design and implementation of two new untested facilities:

- A fully integrated contactless Smart Card IT-system linked with bus PC infrastructure.
- A Travel Card Light solution to expand use of electronic ticketing to Public Transport taxis.

After specification requirements from NT and the national travel card company, the travel card supplier East-West/Thales and the busPC supplier FARA developed the interface for the two systems. The principles for the open communication interface between an onboard travel card system and the onboard computer system, the busPC, is seen in the diagram on the next page. The interface between the travel card equipment and the busPC was found to be desirable and beneficial, both for the drivers, customers and the Public Transport Authority, NT. ARCHIMEDES contributes to the design, ideas and knowledge about the integration between the two systems. The light version ensures a complete system without expensive installations in small vehicles.

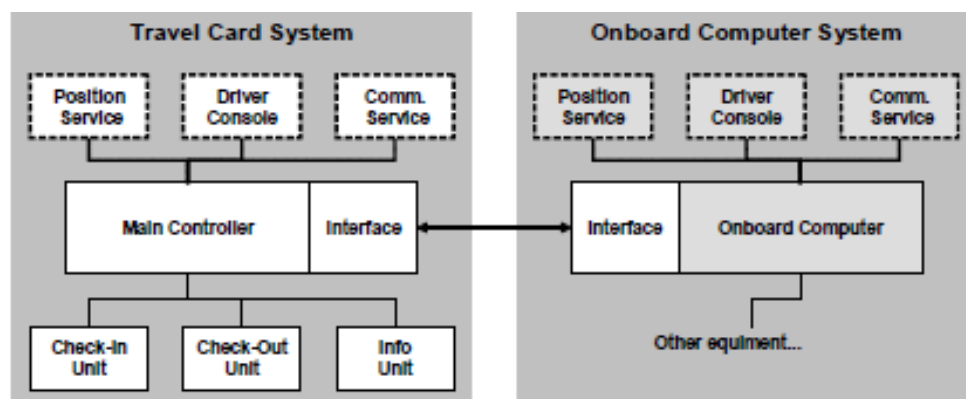


Figure 13: The integration of the travel card system and the busPC in Aalborg.

The planning and purchase of the complete travel card system started several years ago. All the Public Transport authorities formed a common company to handle the whole project. The work with the two ARCHIMEDES features started in 2008 by forming a local working group with representatives from the Travel Card Company, the system provider and the provider of the BusPC.

Implementing a travel card system is a large and complex project. Together with the rest of the organisation at NT (planning department, sales, marketing and other groups) the working group was involved in many activities concerning testing, preparing topology and fare data, and educating/introduction to customers. Installation of equipment in buses started in April 2010. Parallel to this work, wireless access points at the bus depots were prepared for delivering and receiving data to and from the buses. A complete connection with data from the central system into the first bus was established

in the beginning of September 2010. Since then the system has been ready to handle check in and check out of travel cards and to sell tickets from the travel card system in the buses.

New ticketing units were installed in April 2011 and a test project with 45 buses successfully operated since May 2011. An information campaign and introductory offers attracted 500 test users within the first month, with three alternatives: a personal, a family and an anonymous travel card, with different flexibility and discount conditions. In September 2011, the measure was extended to the 130 buses of Aalborg network (80 financed by ARCHIMEDES), integrating a necessary education campaign for drivers. In October 2011 a new marketing campaign was implemented specially for young people and students.



Figure 14: The information campaign in Aalborg, May 2011.

NT will continue the work in 2012 with the Travel Card Light solution integrating public taxes and school buses. It will prepare an “after” evaluation when Travel Card users reach a satisfactory number. It was decided to postpone this task until late 2012 - early 2013, to ensure an optimal and smooth implementation and roll out of the system, when the travel card system will be in operation in 325 buses. The current contract expires in 2020, with a possible 5 year extension.

The modernisation of travel information in Aalborg has been ongoing since May 2009. The websites www.nordjyllandstrafikselskab.dk and www.trafikken.dk/nordjylland were modernised and features to provide users with tailored information about city transport were implemented. Data from other measures have been implemented within www.trafikken.dk/Nordjylland. Functions have been incorporated enabling users to personalise web-pages and services so that information is accessible. New types of information such as dynamic congestion data were made available.

The web-page www.aalborg-trafikinfo.dk was moved to the Danish Road Directorate web-page www.trafikken.dk/nordjylland as a sub domain. The web-page www.trafikken.dk/nordjylland gives a complete view of the traffic in the Aalborg area. It is managed in collaboration with the Danish Road Directorate and is an important part of the ITS strategy for the City of Aalborg. It contains information about road traffic, parking, bicycle information, ferries and Public Transport. Functions were developed to allow users to set up a profile to select the services they want to see on their personal page. In 2010 the web-page was updated with congestion data (measure 70). In 2011 real time data about the traffic situation was launched on the website, to improve comparisons between modes and to enable travellers to choose the optimal mode of transport, route and departure time. By summer 2012, data from the new parking information system (measure 20) will be available on the webpage.

The web-page www.NordjyllandsTrafikselskab.dk is the main page for users of Public Transport in the City of Aalborg. The page contains all information about Public Transport, e.g. dynamic travel planning, timetables, fares, delays, maps. As with www.trafikken.dk/nordjylland, this site was extended with functions allowing users to set up a personal profile that enables them to choose between different gadgets and to customise these.

Arbejde

Afgange/ankomster fra Østerbrogade

[Tip en ven](#) 14:59

Tid	Linie	Destination	Bemærkning
14.56	1L	Godthåb/Svenstrup	Forsinket 4 min.
14.59	1A	Grindsted	Forsinket 3 min.
15.01	74E	Asaa	
15.02*	42	Sulsted	
15.03*	1M	Nibe	
15.08*	1D	Hals	Forsinket 1 min.
15.11*	1K	Svenstrup	Forsinket 1 min.
15.14*	73	Aalborg Busterminal	
15.16*	973X	Frederikshavn Bust.	
15.16*	1C	Langholt	

* = Køreplantid

Min Trafikservice

Stoppested midlertidig nedlagt - Aars

113 52 57 52N

[Læs mere](#)

Udgået tur

1

Periode: 11.09.2009 kl. 07:00 - 11.09.2009 kl. 09:00
 Afgang kl: 07:10
 Fra: Gandrup
 Til: Hals

Busdefekt

[Luk](#)

Forsinket 10-15 min

1

Periode: 11.09.2009 kl. 07:00 - 11.09.2009 kl. 09:00
 Afgang kl: 07:35
 Fra: Hals
 Til: Busterminalen

[Luk](#)

Omkørsel - Støvring.

107 52

Periode: 21.09.2009 kl. 00:00 - 09.10.2009 kl. 15:00

Pga. vejarbejde spærres Hjedsbækvej. Der køres Vestre Primærvej-Nibevej-Juelstrupparken. Stoppestedet på Hjedsbækvej, for rute 52, flyttes til Vestre Primærvej. Rute 107 henvises til Over Bækken.

[Luk](#)

Figure 15: Real time gadget for a selected bus stop (left) and gadget informing incidents and rescheduling of Public Transport (right) from www.nordjyllandstrafikselskab.dk in Aalborg.

In Brighton & Hove, the initial planning of a multi-modal ticketing system consisted of defining specifications and searching for the right equipment suppliers. Only one ticketing equipment supplier (VIXERG – www.vixtechnology.com) was in any position to work with us to enable bus and train integration of a smartcard system within a reasonable timeframe. Smartcard producing equipment and back-office smartcard purchasing software are all separate but all have to interact with each other and a national smartcard server. This was a key aspect for these additional equipment suppliers getting the business. It was important that all existing products were issued and accepted by the ticket machines and through smartcard technology too. There also had to be much scope for flexibility in terms of special ticketing offers, and introducing new, enhanced ticket ranges at short notice based on customer feedback.

The introduction of the smartcard-compliant ticket machines on all 280 buses was the first stage of implementation. This in itself required a new software reporting system (EP Morris) to be introduced, which was capable of merging with previous reporting systems to provide seamless data transfer. This was based on an “off-the-shelf” package, but heavily modified to take into consideration local reporting and accounting requirements. The implementation of this went very smoothly, as does continued operation of this software. This is separate from the individual ticket machine reporting software that could not integrate with more systems, hence the purchase of the EP Morris system.

On-bus smartcard readers were introduced at the same time (purchased as a package with the ticket machines). Extensive smartcard producing equipment was also required and delivery began during

March 2011. Following background testing, it was tested by staff, initially in an office environment, and then on buses from June 2011 (using staff cards to test the hardware and software), before roll-out to selected customers during September 2011).



Figure 16: Smartcard reader and ticket machine from Brighton.

Students were selected first to use smartcards, as historically they are the most technologically savvy and up for trying out something new, and particularly as the start of the new academic year tied in with plans for initial roll-out. Students are a very valuable market and so it also made commercial business sense to launch it to them first. It also made sense for the launch to be staggered, to limit the number of cards issued, minimise risk and prevent a deluge of enquiries and potential issues. All of these would have taken up valuable staff resources and could have meant a public relations backlash.

Full implementation was carried out on buses; testing involving trains is still underway but due for implementation by September 2012. A comprehensive audit survey amongst passengers is presently being undertaken, including whether using the smartcard encourages increased use of Public Transport.

In Iasi, the scope of the improved ticketing measure was changed to installing 10 TVMs in the CIVITAS corridor and at a few other stops throughout the city. Iasi organised a tender procedure for the acquisition of TVMs. The machines permit the operation of automatic tickets via a touch screen. It ensures user-friendly, quick and efficient provision of tickets.. Demand for tickets at the chosen stops is particularly high, both during the opening hours of the kiosks beside which the TVMs have been installed, and after the kiosks are closed. There are very many crowded stops outside the CIVITAS corridor, so that further criteria for choosing the location for the remaining TVMs were necessary:

- The existence of surveillance infrastructure so that the TVMs can be constantly monitored, especially until they cease to be perceived as new items (which are particularly prone to vandalism);
- A balanced distribution throughout the city.

The TVM system follows a client-server model. For a detailed specification of this model, see deliverable T12.1. The training process included activities regarding maintenance operation of hardware and software, and operating and helping passengers operate TVMs. A short campaign for training citizens in using the machines was also been implemented.



Figure 17: One of the new ticket vending machines in Iasi.

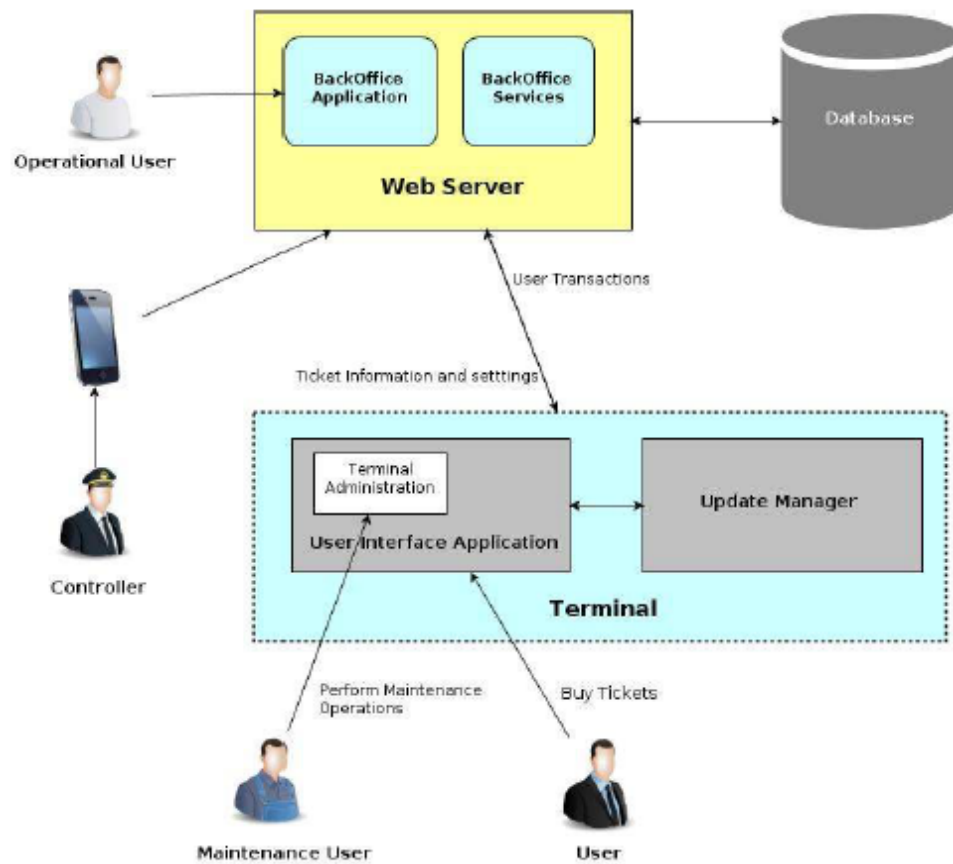


Figure 18: The client-server model for the TVM system in Iasi.

High Quality Park and Ride

This measure regarding implementation of High Quality Park and Ride in Donostia - San Sebastián forms part of the main goal to encourage people to use clean, collective transport and to improve interconnectivity of the two major transport corridors in Donostia-San Sebastián serving commuters, students, tourists and visitors.

To raise awareness of citizens about the new concept of Park & Ride and boost use of these facilities, a promotion campaign was launched in 2009 during the Christmas season. The campaign was aimed at people travelling by private car to Donostia-San Sebastián. If they parked at the selected car park facilities, they were given a free Public Transport pass (one for each occupant of the vehicle) to travel into city centre.

Four car park locations were selected to provide P&R services due to their good connection to the main public transport lines. This selection was made with the intention of covering most of the arterial corridors entering the city, thus providing an alternative to as much commuters arriving to Donostia-San Sebastián as possible. It was also intended to implement a new management scheme for these parking facilities, in line with the P&R concept, and ensure a better integration between car and public transport.

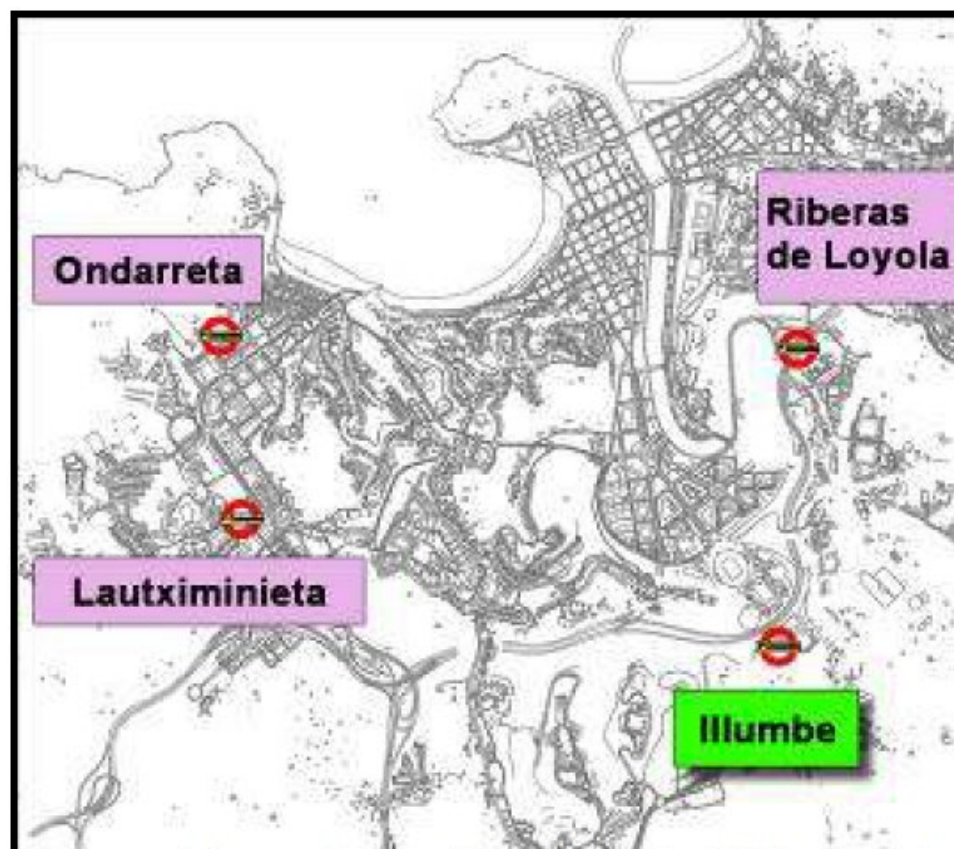


Figure 19: The four selected Park & Ride sites in Donostia - San Sebastián.

But several factors have delayed the implementation of this measure, being the main one the introduction of a generalized regulation for all four parking facilities, which would no longer be available for free. The idea was to start charging a fee for parking in any of the four P&R locations, while providing discounted rates to those connecting with public transport. Soon after the regulation scheme was implemented in one of the selected parking facilities (Lautximieta car park) strong public and political opposition emerged against the new regulation scheme and decision makers

postponed its implementation until more solid grounds for its political support and public acceptance are achieved.

Nevertheless, some steps ahead to strengthen the P&R concept have been taken. In particular, P&R facilities have been identified as such and vertical signing allocated along the main corridors entering the city pointing out its location and guiding commuters to them. Also, signposting indicating location and walking distance to public transport connections have been implemented in all P&R facilities. Finally, a share of available parking spots in each parking facility will be reserved for P&R users, guaranteeing its availability for such users. The citizen card will be used as a system to ensure that the occupant of the parking spot is connecting with public transport after he has parked.

4.3 Problems Encountered & Solutions Attempted

4.3.1 Technical Issues

Shuttle Bus

Generally the demonstration projects in Aalborg, Donostia - San Sebastián, Iasi and Monza have operated without any major technical issues.

However, it was necessary to alter the timetable for the City Circle shuttle bus in Aalborg, as it proved impossible for the bus to complete three trips an hour due to the traffic situation. This ensured that there was no waiting time for the passengers.

In Donostia - San Sebastián the scope of the demonstration project changed slightly from introducing shuttle buses to establishing direct bus lines to four industrial areas to have a better service for commuters. The surveys undertaken in different industrial areas showed that commuters prefer to have a trip in one step from their homes to their work places. With shuttle buses, the idea is to connect the industrial areas to the bus lines of the high quality Public Transport corridors, so that trips are carried out in two steps.

It was attempted to plan a traditional DRTS in Monza with a call centre for bookings and a bus equipped with an on-board unit to receive a journey plan. However, operational costs were too high for the Commune of Monza. For this reason the service was instead aimed at one particular district of the city of Monza and only in particular situations, like important events (concerts, sport events, summer shopping evenings, events for the Monza Patron Saint Fair and initiatives for the Grand Prix in September).

High Quality Bus

The BRT system in Donostia - San Sebastián and the bus priority measures and video surveillance system in Iasi have been implemented without any major technical problems. However, the topography of Donostia-San Sebastián, with many urban areas in hilly territories, made the planning of transport corridors and intermodality more challenging.

In Iasi, changes to the technical solution of the bus priority measures had to be made. The initial idea was to connect the bus priority system with the bus management system (measure 76). This had to be changed due to the difficulties encountered in implementing measure 76 (delays with tender procedures). The new solution was to separate the priority system from the management system to work individually.

Also, construction works temporarily influenced obtaining the measure's objectives with regards to a 10 % reduction in travel time for buses. It has been estimated that the targets will be achieved more easily after the end of the construction works.

Ticketing and Information

The decision to postpone the demonstration of the Travel Card Light solution in Aalborg until 2012 was taken to ensure an optimal and smooth implementation and roll out of the system. The answers of an online questionnaire in 2011 showed that during the testing period for the travel card 28.8 % of the passengers experienced technical problems more than once. This figure has decreased since.

The two information websites in Aalborg have been running without major technical issues.

The ticket vending machines in Iasi have been installed and are operating without any technical problems.

In Brighton & Hove issues in merging ticketing systems for buses and trains are that both the bus and train 'back office' systems need to "talk to" each other, and ensuring that rail and bus products on a smartcard do not interfere with each other. To use the system on separate bus operators, whilst still somewhat complex, is much easier to set up than for train operators, as long as all bus operators involved have ITSO-enabled¹ ticket machines. Such a scheme has already been implemented between bus companies in Oxford, although it is unlikely this will be added to trains in this particular city. The bus company has called on additional resources and assistance from suppliers, the parent company and by employing additional staff, in order to further develop the system and to counteract the problems that have been encountered.

High Quality Park and Ride

No technical issues regarding the High Quality Park and Ride scheme in Donostia - San Sebastián have been experienced.

4.3.2 Process Issues

Shuttle Bus

Several process related issues have influenced the demonstration projects in Donostia - San Sebastián, Iasi and Monza.

It was challenging in the current financial climate to introduce a bus service and have very few users. Support has been needed from industrial area managers to inform all the employees about the Public Transport service and encourage them to use it. Industrial areas managers informed all the companies of each business district about the bus service improvements and encouraged them to use the new services as the most efficient method of commuting. This information was conveyed by email and letter to all companies and individual commuters.

¹ ITSO (www.itso.org.uk) is a UK government-backed non-profit organisation which sets a common technical standard. It means that transport operators throughout Britain can link up, so passengers only have to use one secure payment 'smart' card no matter what bus, train or route they are using and that same card can be developed for multiple uses, including council services such as leisure centres or libraries.

In Iasi it was difficult to establish a new Public Transport operated school bus link between Ciurea and Iasi, because a private operator provided Public Transport services in the same area. It was also difficult to engage companies to use Public Transport to and from work. Some of the companies located near the city of Iasi having a significant number of employees were already transporting their employees between home and workplace with their own buses, and others were simply reluctant to take up the offer of the Public Transport Company. These initial problems were overcome mainly by persistent campaigning and informing companies of the advantages of using Public Transport.

The initial proposal to implement DRTS in Monza did not take into account the administrative situation in Public Transport, where DRTS was not managed by the municipality. Consequently, Monza implemented the measure in a reduced way, as an agreement with the authority operating the PT service in the region to replace the night and holiday service could not be reached. The following planning of the service has run smoothly.

High Quality Bus

In Iasi, tendering problems caused by the current legal and political situation created a culture of repeatedly contesting results of tenders. This necessitated a change in Iasi measures. Thus the scope of improving Public Transport information was changed to purchase and installation of a video surveillance system.

Although significant improvements of the Public Transport system in Donostia - San Sebastián have taken place over the last years, encouraging its use, recent decisions regarding the parking policy in the city, with mass storage parking infrastructure being built in the city centre, may counteract with public transport objectives, attracting users to drive their cars towards the city centre.

Ticketing and Information

The process issues within Ticketing and Information measures mainly contain issues regarding tendering, contractual disagreements and financial disagreements.

A delay of the implementation of the travel card system in Aalborg was caused by contractual disagreements between national authority and supplier, out of ARCHIMEDES scope. The national project is a large, advanced technology project. It seems to be a trend that these large IT projects get delayed. However, since December 2010, the project has been on track and the demonstration project started in Aalborg on 16th May 2011.

The whole multimodal ticketing project in Brighton was delayed by aspects outside the control of the city council, the bus company and the train company. The previous smartcard system being worked on had to be shelved shortly after commencement of the project, due to the UK government re-letting the local train franchise, plus directing that the national smartcard standard for bus ticketing should become ITSO. This was a different platform to what all bus operators at the time were working towards and hence plans for a completely new system had to be drawn up. Following initial roll-out of the bus system amongst the city's large university population in September 2011, a number of administration issues were identified (despite significant take-up) in the reporting side of the system, which took a lot of time to resolve and delayed further expansion of the system. These related to financial accounting issues, whereby problems with balancing payments received in the travel shops were identified, loading the smartcard system on to travel shop computers, and procedures for dealing with lost cards. Communication to customers on how to use and top up cards was also continually evolving, as it was a learning process all round.

One issue that remains for smartcard use with a range of bus operators is the price of tickets. By law, UK bus operators are not permitted to discuss prices behind closed doors. So the local authority should be involved to prevent companies involved in a smartcard scheme from charging different prices for the same ticket or journey.

Four cancelled tender procedures for the procurement of real-time information panels led to the change of scope in implementing a video surveillance system in Iasi. Likewise, four cancelled tender procedures for an integrated ticketing system led to the change of scope to implementing TVMs in Iasi.

High Quality Park and Ride

Due to the delay of the implementation of a new management strategy for the Park & Ride sites in Donostia - San Sebastián, the demonstration phase has not yet been concluded.

The idea to implement a new regulation scheme to start charging a fee for parking in any of the four P&R locations in Donostia - San Sebastián, while providing discounted rates to those connecting with public transport, has met strong public and political opposition and decision makers postponed its implementation until more solid grounds for its political support and public acceptance are achieved.

4.4 Main Outcomes & Results

4.4.1 Impacts

Shuttle Bus

The main outcomes from the Shuttle Bus schemes are:

- Shuttle buses can provide functions that normal bus services can not undertake; they can be used as direct non-stop lines between two localities or as a circular service;
- The implementation of direct bus lines to business areas with relatively poor Public Transport service has led to a higher use of Public Transport in Donostia - San Sebastián. The traveller perception of the quality of service has increased. The directness in these lines is an important factor for the passengers;
- The demonstration of shuttle buses to two companies in Iasi has also led to a higher percentage of employees using Public Transport to and from work. The employees' perception of the quality of Public Transport has improved. Engaging companies was difficult;
- The new school bus line between Ciurea and Iasi has improved the quality of service considerably, leading to an increase in passenger numbers and higher passenger satisfaction;
- Results improve if several initiatives complement each other together with traffic restrictions;
- DRTS is becoming increasingly popular as an alternative to underused bus services, though it must be marketed strongly to achieve a high awareness of the service.

The City Circle shuttle bus in Aalborg has been running in 2010, 2011 and 2012 testing three different technologies. In the first year a hybrid bus was tested. In 2011 a bus operating on 30 % 2nd generation biodiesel was tested and in 2012, a bus operating on 100 % biodiesel will be tested. The two first years the buses have run without any problems, carrying around 10,000 passengers each summer. This meets the target set of for 7,500 – 15,000 passengers annually. The use of biodiesel is expected to lead to a reduction in CO₂ emissions.

The implementation of direct bus lines to four business districts in Donostia - San Sebastián led to a rise in the use of Public Transport in these districts by 123,000 extra travellers in 2010 and 230,500 extra travellers in 2011 compared to 2006 levels. The target of 100,000 passengers was therefore exceeded. Car traffic levels entering these areas have decreased during the same period by almost 2,500 cars per day. The implementation of the new direct bus services to the business districts and the improvement of the infrastructure (bus lanes and light priority) also led to increased punctuality, with 97.2 % of all arrivals on time in 2011. The traveller perception of the quality of service has accordingly increased based on results from the before and after survey.

The new school bus service between Ciurea and Iasi was implemented successfully from an operational perspective. The average passenger number on a round trip is about 170, from which 85 are from the Ciurea village. The surveys carried out among Ciurea's citizens revealed a high level of awareness; 70 % in 2009 and 74% in 2010 and 2011. There was also an increase in the percentage of passengers satisfied with the new bus line service, from 78 % in 2009 to 86 % in 2011. As a consequence, the monthly bus journeys on this new line increased each year, from 542,997 in 2009 to 603,330 in 2011.

The business shuttle buses in Iasi transport a daily average of 250 passengers for CET and 200 passengers for METRO respectively. Before and after the measure's implementation, surveys were carried out among employees of these two companies. The awareness and acceptance of the buses decreased from 67 % and 66 % respectively in 2009 to 47 % and 45 % respectively in 2010, but increased again in 2011 to 72 % and 70 % respectively. The surveys also revealed an increase in workers' positive opinions regarding the quality of shuttle bus service from 29 % in 2009 to 53 % in 2011. The percentage of workers who chose to travel to work with Public Transport vehicles increased from 71 % in 2009 to 87 % in 2011, while the percentage of private car users decreased to 11 % in 2011, compared to 26 % registered in 2009. This change in travel behaviour has also been noted by the reduction in the number of cars counted in companies' parking places.

For the first period of the demonstration of the DRTS service in Monza (July-September 2011), six-seven events had occurred, which attracted many people interested in reaching the venue from San Fruttuoso without using their car. Specifically, the chosen events were five live concerts by prominent artists and fireworks during Monza Patron Saint Fair (held in Villa Reale) and other traditional events held during the Grand Prix week (live concert and a charity football match, held at the Brianteo stadium of Monza). The initiative was particularly welcomed for the fireworks in the Park of Monza, when 82 passengers were transported in two normal buses, whilst no bookings were made for the live concerts, so the service was not activated.

Another occasion for the activation of the service was the European Female Volleyball Championship, which was held in Monza sports hall, when it was activated for three days in order to reach the location of the matches from the railway station, since many people were coming to Monza from Milan. For this event the initiative did not achieve the same success gained for the fireworks, and about thirty people were transported for the three matches. Unfortunately, during the Cinema Festival, no bookings for the service were made.

It must be emphasised that this kind of service, although not a traditional DRTS, in most cases will be less expensive than the normal night time service as the Commune of Monza only pays for an estimated cost of € 300 for each service. It can be considered a good starting point to test the interest of citizens in the service. Nevertheless, people are not used yet to this kind of service. Booking requests for some of the following events were not enough to activate the service, in spite of a wide information campaign. At the end of one of the matches of the European Women's Volleyball Championship, just one person caught the bus (instead of the 8 people which had booked the service). This means the cost of € 300 was paid for only one person, which is not sustainable in terms of cost-benefit analysis.

High Quality Bus

The main outcomes from the High Quality Bus schemes are:

- Improving the quality of bus services contributed to an increase in the use of Public Transport, at the same time reducing the number of cars and motorbikes in Donostia - San Sebastián and Iasi;

- Improving the quality of bus services results in a higher average speed hence reducing the average journey time and improves punctuality with regards to arrival times in Donostia - San Sebastián and Iasi;
- Passengers regard effectiveness issues as very important for Public Transport, and improving the quality of bus services can contribute to an increase in passengers' perception of this quality of service;
- Public Transport Results improve if several Public Transport initiatives complement each other together with traffic restrictions;
- The new video surveillance system in Iasi contributes to a decrease in the number of acts of vandalism and of incidents involving drivers, both leading to lower costs.

The implementation of High Quality Bus Corridors in Donostia - San Sebastián is part of a package of measures (measures 16, 17, 73 and 74). They aim at increasing the quality offered by the Public Transport service in the municipality, inducing a modal shift toward Public Transport.

The measure was very successful in this regard, since between 2006 and 2011 there was an increase of 2.55 million extra travellers in CTSS's Public Transport system, which represents a 9.6 % increase in the number of users. The target to increase passenger numbers by 5 % was therefore exceeded. It should be highlighted that, according to the surveys conducted, nearly 40 % of all new users were former users of the car or motorbike.

From an operational perspective, the service improvements contributed to achieve an excellent punctuality index of 98.20 out of 100 on lines 5 & 28. Also, the average speed of buses along the corridors increased by approximately 2 km/h. Accordingly, the average journey time experienced a significant reduction of more than 3 minutes. This improved operation was acknowledged by users. A public survey showed that perceived quality of service increased from 7.3 out of 10 in 2006 to 7.6 out of 10 after the measure was fully implemented. The survey also revealed a high perceived effectiveness with regards to punctuality and reduced journey time with an average score of 8.79 out of 10 in 2011.

The implementation of the High Quality Bus Corridors has also contributed to a reduction in the number of cars entering the CIVITAS corridor by more than 7,500 cars per day. Overall, this situation has provided significant benefits in the form of better air quality and less carbon emissions, resulting in a better health and quality of life for Donostia-San Sebastian citizens.

Though a promotion campaign stressing the advantages of the new service was performed with success in Donostia - San Sebastián, a centralised mobility centre may be helpful in developing promotion and awareness activities and information campaigns.

In Iasi, the implementation of bus lanes contributed to an increase in arrivals on time from 78 % to 88 %. The average speed in peak hours rose by 5.93 % (15.90 km/h) and in off peak hours by 7.78 % (19.40 km/h). The objective of a 10 % reduction in travel time has not been reached completely, but the results were affected by tramway works which impacted on bus operation.

The new Public Transport vehicle video surveillance system in Iasi contributes to reducing acts of vandalism and hence a decrease in operational costs. It is also an efficient tool in preventing abuse and crime, as the footage from onboard cameras can be investigated in case of incidents, identifying those people involved. At the same time, the video camera installed in the driver's area allows recording of events taking place both in this area and in front of the vehicle. By keeping the buses safe and secure, PTI will also attract more passengers.

Ticketing and Information

The main outcomes from the Ticketing and Information schemes are:

- Public Transport users in Aalborg took to the new travel card and are mainly satisfied with the fare system "the more you travel, the cheaper each trip gets";
- A considerable amount of passengers in Aalborg experienced technical problems with the Travel Card system more than once;
- Brighton & Hove experienced high use of the multi-modal ticketing system and there is potential for this to increase further within a short timeframe;
- It has not been possible to see any change in modal split based on higher use of traffic information websites alone in Aalborg. The awareness of one of the web pages seems to be at the same level as in 2006 baseline. However, since the modernisation of the web page and the change of domain, more users are visiting the page also during peak days;

Results from the testing of the travel smart card in Aalborg are very satisfactory. In the first testing week in 45 buses of the busy line 2 in May 2011, 49 active journeys were registered with a total of 120 trips (boardings) with the smart card. Five weeks later, there were 255 active journeys and 650 smart card trips. The first 500 test customers received a special offer to purchase the travel smart card, which was a big success.

The Travel Card system as a sales device for regular tickets achieved during the first 3 months a monthly sale of more than 500,000 DKK, approx. 1,000 daily tickets. By September 2011, the active Travel Card test users reached almost 375 passengers. By the end of October 2011 with 90 buses in the system, there were 638 active journeys and 820 smart card trips. From October 2011 to March 2012, the number of active Travel Card users increased from 500 to 3,200 and the number of journeys within a week increased from 2,000 to 16,000. In the same period there was a weekly sale of approximately 35,000 cash tickets.

76.6 % of the users answering an online questionnaire in 2011 were satisfied with the Travel Card; 31.8 % indicated that it would result in a more frequent use of buses and Public Transport. The negative factor in this testing time was the 28.8 % of the passengers who experienced technical problems more than once. This figure has decreased since. 86.3 % of the passengers were satisfied with the fare system; "the more you travel, the cheaper each trip gets". The system should encourage the passengers to increase their use of Public Transport.

The two modernised websites in Aalborg now have more users. However, this can be explained by information needs related to heavy snowfall in some of the days in the evaluation period, when the sites were visited more than on days with no traffic challenges. The average number of visits per day has increased compared to before-data by 31 % for www.aalborg-trafikinfo.dk and by 134 % for www.nordjyllandstrafikselskab.dk, but the peaks are very few and high. Therefore the average number is not sufficient to explain the change.

It has not been possible to see any change in modal split based on higher usage of the websites alone. The intention was to collect information about how people used the website to choose their mode of transport, but it has not been possible to collect this data due to a rather small critical mass. Awareness of one of the web pages seems to be at the same level as in 2006 where the baseline was created. However, since the modernisation of the web page and the change of domain, more users are visiting the page, including during peak days.

Despite the previously described issues which delayed the implementation of the multi-modal ticketing system in Brighton & Hove, the system is now a real success. Within the first few weeks of the initial

roll-out to the student population in September 2011, some 12,000 journeys were undertaken daily by smartcard, plus a further 37,000 on national concessionary passes (this is a compatible pass issued by the UK government for those aged 60 and over to obtain free bus travel, but is only included here for information). On roll-out to further customers in April 2012, some 2,000 cards were issued within 5 days. It is not unreasonable to expect that within a short timeframe, around half of all daily bus journeys in Brighton & Hove may be undertaken with a smartcard. In general terms would therefore be a huge number compared with other operators and areas elsewhere in the UK. Whilst the train side is still in development it will come on board shortly too, so this can only result in further take up of the smartcard option.

A comprehensive survey amongst passengers is presently being undertaken. Questions include whether using the smartcard encourages increased use of Public Transport, and thus less use of the car, and whether it makes it easier to pay for journeys. A full analysis of results is expected during summer 2012. These results will feed into the evaluation process of the ARCHIMEDES project.

Due to delays and changes to the initial ticketing scheme in Iasi, the demonstration of the TVMs will be ongoing until December 2012 and evaluation is not yet finished.

High Quality Park and Ride

Due to delays to the Park & Ride scheme in Donostia - San Sebastián, the demonstration and evaluation is not yet finished.

Further outcomes and results can be found in D12.4 Final version of measure level result templates.

4.4.2 Changes to Processes

The process changes that occurred during the demonstration projects within this workpackage were mainly due to political issues.

The reduction of the DRTS in Monza was due to the fact that an agreement with the authority operating the PT service in the region aimed at replacing the night and holiday service could not be reached.

The process implementation of the High Quality Park & Ride measure in Donostia - San Sebastián has highlighted the importance of building a sound political consensus before implementing what could be seen as parking restriction measures by a share of the population. Also it is very important to provide regular and clear information about the measure objectives, including overall sustainable mobility issues, especially to the media, so that this information can be used to boost the measure and not to penalize it. Regular contacts with neighbours associations are also required to reduce social contestation. If citizens' opposition is limited, political cooperation is more likely to be achieved.

Changes in legislation that subsequently led to the cancelled tender procedures in Iasi were due to the change of scope from introducing real time information and a special contactless card system to implementing a video surveillance system and TVMs respectively.

Also in Brighton, the decision by the UK government towards re-letting the local train franchise, plus directing that the national smartcard standard for bus ticketing should become ITSO, led to the initial smartcard system being shelved shortly after commencement of the project.

The main scope of the business district shuttle service in Donostia - San Sebastián was changed - as the only demonstration project in this workpackage - due to the direct input from the citizens as an initial survey showed that commuters prefer to have a direct trip in one step from their home to their

workplace instead of carrying out the trip in two steps as with the shuttle buses. This survey result led to implementing direct bus lines to the four business districts instead of shuttle services.

4.5 Future Plans

Shuttle Bus

The City Circle shuttle bus in Aalborg will run each summer throughout the CIVITAS ARCHIMEDES project. The future of the project is in the hands of the Public Transport Authority and has not yet been decided.

In Donostia - San Sebastián further effort will be made to implement bus shuttle services in the four main business districts, including further dialogue to gain business area managers' support. Negotiations to operate a bus shuttle in Miramon business district have already started. It is expected that it will start during the second half of 2012. This pilot project will not imply any changes in the offered service.

In Iasi PTI will continue to offer these shuttle bus services to CET and METRO within the period after the project. As in Donostia - San Sebastián, PTI and Iasi will keep searching for new companies that want to use this kind of transport services.

After the short demonstration of the DRTS in Monza, it would be premature to activate this kind of service for travel to/from subsequent events in the city. Nevertheless, the night and holiday PT service is still underused, in spite of its high costs. Thus, in future it will be very important to plan surveys and passenger counts to understand if the night and holiday service can be replaced with a DRTS. This approach could prove successful, especially considering that central Government funding for the PT service is being further reduced due to the economic crisis. Hence there is a strong need to optimize the service using alternative forms of delivery - especially in off-peak hours and nonworking Periods - to offer PT users a service that provides all necessary connections, but does not represent a waste of resources.

Even though the implementation of a DRTS may be rather expensive at the beginning, if such a service is launched in the future, it could be included as part of the next PT service tender. This will be held by the Commune of Monza in 2014 now that it is head of the new Province. In this way, costs can be more easily depreciated with a long term contract (the current contract runs for seven years). It will also be important to explain to people that, once the service is activated, costs will be incurred. Even though in the future fare payments could be requested, these will never be enough to fund the service fully. So it is important that people who book the service do use it for better efficiency and to avoid facing high costs for an underused service.

High Quality Bus

In the following years after ARCHIMEDES finishes, CTSS will work to extend the high quality bus corridor standards to other lines. It will concentrate on improving service frequency, introducing more articulated buses, existing the bus lane network and implementing further bus priority measures.

Iasi will maintain the traffic light control system beyond the end of the ARCHIMEDES project and will continuously monitor the intersections making necessary adjustments to achieve more fluent traffic. Iasi hopes to extend the video surveillance system, contributing to increase in passenger safety across the entire Public Transport fleet. The system will be integrated to the Traffic Management System, which will be implemented at the whole city level within the next two years. There are no specific plans for new bus lanes.

Ticketing and Information

NT will continue the work in 2012 with the Travel Card Light solution, integrating public taxis and school buses. It will prepare the evaluation after-studies when the number of Travel Card passengers has reached a satisfactory level. It has been decided to postpone this task until late 2012 - early 2013, to ensure an optimal and smooth implementation and roll out of the system by end 2012. The Travel Card System will be in operation in 325 buses in the whole NT area. The current contract is bound to 2020, with a possible 5 year extension.

The integration between the Travel Card System and the BusPC works both ways. When the Travel Card system is implemented in the whole region, the integration will be used in all 80 buses. This integration opens many opportunities for data communication and interaction with other systems in the bus and in the back-office system. The Travel Card System is an "off-line" system and the buses are only communicating with the central system at the garage. However, by having the integration, NT can monitor the travel system from the BusPC and thereby ensure that all trips are being serviced by the travel card system. It will also be possible to send and receive real-time data from the travel card system to the back office system via the BusPC. These could be important updates such as card blacklists (for example cards noted as lost or stolen). The central system can send instructions to the driver and give the passengers information on the "infotainment" monitors.

The measure of updating and maintaining the two web services in Aalborg is continuously under development, in order to fulfil the needs of the citizens. Requests and questions about this measure are taken into account when updating and improving the web pages. The measure will continue after the end of the CIVITAS ARCHIMEDES project.

It is intended to continue with the expansion of the multi-modal system in Brighton. Following promotion of the full roll-out on-bus early in April 2012, significant take-up followed and it is hoped that this will continue. It is planned to have a price differential for smartcard tickets, so that they will be cheaper than other tickets to encourage wider take up of the system. Further development of the project after the end of ARCHIMEDES could include an enhanced ticket range, potential integration with the London 'Oyster' system (one of the most successful multimodal smartcard systems in the world), mobile top-ups of cards and mobile 'phones being used as smartcards in themselves through their SIM card. This latter technology is only just coming to the fore through the very latest mobile 'phones. It is planned to exploit this as soon as possible, with all the funding to be provided by the bus company, rather than Brighton & Hove City Council (or other external partners). This is a further example of the extent of the public-private partnership that exists and the complete commitment of the bus company to make the system work. Potential also exists to develop inter-available tickets with other bus operators across the wider county area, providing they have the ITSO-compatible ticket machines that the UK government is now incentivising some smaller operators to purchase.

The local bus company in Brighton & Hove is in the process of purchasing 13 hybrid-electric double-deck buses (representing an investment of some £3.9 million). Some of the funding for these has come from the UK government, who are covering most of the difference in price between a conventional diesel and an electric-hybrid bus (about £80,000 per vehicle). These vehicles are already reporting fuel savings of 30% with other bus operators. The hybrid system ensures that the vehicle engine is turned off when the bus is stationary or travelling below 20 km/hour, thus improving the air environment in busy city streets. These vehicles can therefore only be of benefit to the city of Brighton & Hove, and will complement the plans for further expansion of the smartcard system.

With its performance abilities and modernity, the TVM system in Iasi has potential for further development. Being flexible, and thus adaptable to any future demands, it creates the premises for further extension throughout the city. Iasi plan to extend the implementation of this measure, by installing more TVMs in various zones of the city, while keeping the same main criteria for choosing their future locations.

High Quality Park and Ride

Due to the fact that the demonstration and evaluation of the P&R sites and strategy in Donostia - San Sebastián is still ongoing, the future of this project is unclear.

5. Conclusions and Recommendations

Workpackage 2 focuses on enhancing convenient, efficient and clean collective passenger transport as an essential part of a sustainable transport system in urban areas. The main aim of this workpackage is to build an optimised and user-friendly environment for urban Public Transport modes that will encourage their use by both citizens and visitors. Different solutions to make services more attractive, safe and punctual to maintain or increase the modal share of collective passenger transport were researched and demonstrated across the ARCHIMEDES cities.

This section summarises conclusions and recommendations regarding the various research and demonstration tasks within this workpackage. More detailed information regarding the different measures can be found in D10.3 Final Evaluation Report and D12.4 Final version of measure level result templates.

5.1 Conclusions

To make Public Transport an attractive service, it is necessary to implement a number of related initiatives within the local context rather than focusing on one element. High quality bus services that have a high frequency and run in separate bus lanes help to enhance bus transport, ensuring an increase in passenger numbers. By supporting these services with e.g. high quality parking facilities (as part of Park & Ride services), easy ticketing, real time information and video surveillance, the quality of the service will increase. Results will most likely improve if complementary traffic restrictions are implemented.

Shuttle Bus

Shuttle Buses can provide functions that normal bus services can not undertake; they can be used as direct non-stop lines between two localities or as a circular service. DRTS is becoming increasingly popular as an alternative to underused bus services. The experiences regarding implementation and use of shuttle buses are:

- The implementation of direct bus lines to business areas with relatively poor Public Transport service has led to a higher use of Public Transport in Donostia - San Sebastián. The traveller perception of the quality of service has increased. The directness in these lines is an important factor for the passengers;
- The demonstration of shuttle buses to two companies in Iasi has also led to a higher percentage of employees using Public Transport to and from work. The employees' perception of the quality of Public Transport has improved. Engaging companies was difficult;
- The new school bus line between Ciurea and Iasi has improved the quality of service considerably, leading to an increase in passenger numbers and higher passenger satisfactory;
- Results improve if several initiatives compliment each other together with traffic restrictions;
- The shuttle bus service in Aalborg has run on biodiesel at exceedingly higher blend levels without any problems;
- DRTS has the potential to be less expensive than normal Public Transport services that are underused. The reduced DRTS service in Monza has not attracted a high level of use, which could be the result of a lack of knowledge about the service and / or because DRTS is not yet

a customised service in Monza. Awareness of the DRTS service could have been better despite a strong information campaign.

- Managing DRTS bookings through the staff of Mobility and Transportation Office in Monza has been feasible, though if the service was offered for every event in the city, it would be necessary to activate a call centre to manage bookings.

High Quality Bus

High Quality Bus services usually consist of buses running with a high frequency in separate bus lanes ensuring a high regularity and faster service. The experiences regarding planning and implementing High Quality Bus Corridors are:

- Improving the quality of bus services contributed to an increase in the use of Public Transport, at the same time reducing the number of cars and motorbikes in Donostia - San Sebastián and Iasi;
- Improving the quality of bus services results in a higher average speed hence reducing the average journey time and improves punctuality with regards to arrival times in Donostia - San Sebastián and Iasi;
- Passengers regard effectiveness issues as very important for Public Transport, and improving the quality of bus services can contribute to an increase in passengers' perception of this quality of service;
- Results improve if several Public Transport initiatives complement each other together with traffic restrictions;
- Changes in legislation can complicate and delay tender procedures as experienced in Iasi;
- The new video surveillance system in Iasi contributes to a decrease in the number of acts of vandalism and of incidents involving drivers, both leading to lower costs.

Ticketing and Information

New Ticketing and Information systems should ensure easy ticketing and better information within the Public Transport system, and hence help improve the quality of Public Transport services. Integrated ticketing and information systems make intermodal commuting more feasible within Public Transport. The experiences regarding planning and implementing new ticketing and information systems are:

- Local implementation of smart cards may need to link to nationwide or similar wide-scale travel card systems. These can be complex, causing contractual disagreements and technological problems. In Aalborg, delays were experienced, whilst the initial smartcard system being worked on in Brighton had to be shelved shortly after commencement of the project. A high percentage of technical problems with the travel card system were experienced in Aalborg;
- Public Transport users in Aalborg took to the new travel card and are mainly satisfied with the fare system "the more you travel, the cheaper each trip gets";
- Brighton & Hove experienced high use of the multi-modal ticketing system and there is potential for this to increase further within a short timeframe;
- It has not been possible to see any change in modal split based on higher use of traffic information websites alone in Aalborg. The awareness of one of the web pages seems to be at the same level as in 2006 baseline. However, since the modernisation of the web page and the change of domain, more users are visiting the page also during peak days;
- Changes in legislation can complicate and delay tender procedures as experienced in Iasi which led to the change of scope from introducing a special contactless card system for students and pupils to the implementation of TVMs.

High Quality Park and Ride

High Quality Park and Ride services make intermodal commuting between cars and Public Transport more feasible. The experiences regarding planning and implementing High Quality Park & Ride systems are:

- Park & Ride sites play an important role as part of a collective effort to improve the quality and use of Public Transport and to change parking behaviour;
- Parking policy is one of the main drivers for car use, as well as one of the more effective tools to moderate its use;
- In Donostia - San Sebastián it was difficult to localise useful Park & Ride sites as many parking sites were being used as parking areas free of charge making it difficult to prioritise parking for commuters. The idea to implement a new regulation scheme to start charging a fee for parking in any of the four Park & Ride locations in Donostia - San Sebastián, while providing discounted rates to those connecting with public transport, met strong public and political opposition;
- The business model of the Park & Ride sites and its economic sustainability was one of the main concerns in Donostia - San Sebastián. Finding the right pricing strategy was difficult.

5.2 Recommendations

Shuttle Bus

For future projects regarding the implementation and use of shuttle buses, the following points should be considered:

- Public Transport Shuttle Bus services should preferably ensure that passengers have a direct trip in one step from their home to their workplace;
- It can be difficult engaging companies into using Public Transport and major efforts towards promoting the service and engaging potential users should be made. Stakeholders' support should be gained at the beginning stages of the measure planning, seeking their cooperation in the definition of the measure and its future development. Focus should be on large companies that are located in areas with poor Public Transport service;
- Modal shift as well as an increase in the traveller perception of service quality can be achieved as a result of improved Public Transport services;
- Results improve if several Public Transport initiatives complement each other together with traffic restrictions;
- DRTS as a chargeable service has the potential to become a good low-cost alternative to underused Public Transport services. DRTS as a chargeable service would avoid the risk of reservations without actually using the service, which would still need to be activated and funded;
- DRTS can help achieve sensible savings in terms of fuel -consumption and of CO₂ emissions;
- People expect DRTS to be reliable, easily accessible and safe;
- DRTS must be marketed strongly to achieve a high awareness of the service.

High Quality Bus

For future projects regarding planning and implementing High Quality Bus Corridors, the following points should be considered:

- Different transport and traffic policies should give homogenous support towards Public Transport to strengthen potential for increasing its use, e.g. recent decisions regarding the parking policy in Donostia - San Sebastián, with mass storage parking infrastructure being built in the city centre, may counteract with Public Transport objectives, attracting users to drive their cars towards the city centre;
- Integrated planning with other city departments and regional transport planning and management bodies should be considered;
- Bus priority measures (both infrastructural and technological) can be very expensive. Therefore careful consideration should be given to the cost implications and availability of resources to meet costs;

- Finding a technical solution as simple as possible for bus priority measures and a traffic management system to work alongside them could reduce the risk of delays;
- Good interconnection between Public Transport services is need, e.g. feeder lines to high quality bus corridors, contributing to increased use of Public Transport;
- A centralised mobility centre may be helpful in developing promotion and awareness activities and information campaigns.
- Integrated quality of Public Transport services also from the accessibility to bus stops side, as well as in the quality of waiting areas, should be addressed.

Ticketing and Information

For future projects regarding planning and implementing new ticketing and information systems, the following points should be considered:

- New travel smart card systems and multi-modal ticketing can make it easier for Public Transport users to travel across PT modes. However, it should be anticipated that large scale ticketing projects with advanced technology may get delayed and will may initially experience technical problems;
- It should not be expected that awareness and use of traffic information websites will increase due to modernised information facilities alone, though information should be available when needed;
- Target information so that transport users get the specific information they need. The information flow is vast and much of it may be irrelevant. Being able to customise information seems to be the trend. A thorough investigation of the need for information at which platforms are desired is important;
- It is important to ensure that sufficient resources are available for continuous maintenance of traffic information websites.

High Quality Park and Ride

For future projects regarding planning and implementing High Quality Park & Ride systems, the following points should be considered:

- The planning of Park & Ride sites should not be a single initiative, but part of a greater strategy to improve the quality and use of Public Transport and to change parking behaviour;
- The implementation and use of Park & Ride sites should correlate to other measures making car usage in town centres more difficult;
- It is important that Park & Ride sites are situated very close to high frequency bus lines;
- Even though P&R facilities and Public Transport stations are very close to each other or even physically integrated, high quality pedestrian infrastructures accessing public transport should be provided;
- Since cars will be stored in P&R facilities for long periods, sometimes in not very populated areas, safety conditions should not only be guaranteed but also clearly made aware for potential users. The same would apply to personal security, given the fact that P&R facilities may be used at not very crowded hours. The use of CCTV cameras and/or security staff is recommended.
- It should be considered implementing a pricing strategy at the Park & Ride sites, combining parking with bus fares.
- It is important to establish a sound political consensus before implementing what could be seen as parking restriction measures by a share of the population. Also it is very important to provide regular and clear information about the measure objectives, including overall sustainable mobility issues, especially to the media, so that this information can be used to boost the measure and not to penalize it. Regular contacts with neighbours associations are also required to reduce social contestation. If citizens' opposition is limited, political cooperation is more likely to be achieved.