



**CiViTAS**  
Cleaner and better transport in cities

**ARCHIMEDES**  
AALBORG • BRIGHTON & HOVE • DONOSTIA-SAN SEBASTIÁN • IAŞI • MONZA • ÚSTÍ NAD LABEM

## **D3.1 – Development and Experience of Travel Demand Management 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.

Travel Demand Management is one of the eight categories within CIVITAS ARCHIMEDES. Demand management strategies can reduce traffic through a variety of economic incentives, regulatory measures and modern communication technologies. CIVITAS cities experiment with a range of demand management measures to learn about the merit of different initiatives and share lessons learned. These include access restrictions, road pricing, parking policies and marketing campaigns.

Pricing strategies can work as powerful incentives to get people to try cleaner ways of transport and make the private car a less appealing choice. Some of the incentives cities are testing are special parking tariffs for low-emission vehicles, financial rewards for avoiding peak times and a “mobility credits” scheme that attaches a financial value to saving or exceeding emissions.

Travel Demand Management through transport pricing includes area-wide or city-wide pricing schemes that can be implemented in combination with innovative use of parking pricing and public transport.

Attempts to implement road pricing schemes have pointed out an acute need for harmonised regulation and coordination at national and European levels. The unclear legal situation regarding the status of congestion charges and their destination in public budgets has occasionally slowed down the decision-making process. The strong interdependence between urban pricing and national highway toll systems has complicated decisions and choices regarding technology and regulation. Lack of acceptance by citizens has played a significant role and is a tough barrier to implementation.

Despite the obstacles and associated delays, road pricing measures clearly lead to more sustainable, cleaner and more efficient urban transportation. Road pricing measures have been shown to have a substantial positive effect on city liveability thanks to the reduction of circulating cars, mitigation of noise and improvement in air quality.

Many urban areas are becoming more and more congested with vehicles as the demand for travel grows in our cities. An increased number of vehicles can lead to an unpleasant environment for people in the area and associated health problems. A number of restraint-based measures can be applied to assist in the reduction of demand for road use. These

include re-allocation of road space to sustainable modes or prioritising clean motorised vehicles, access control and parking restraint/tariffs, and workplace parking levies. These are receiving increasing attention as authorities recognise that improving capacity and network efficiency cannot provide complete solutions to traffic problems.

The objectives for the demonstrations in this work package are to:

- Reduce the use of the private car in sensitive areas of cities (i.e. CIVITAS Plus corridor) through economic signals;
- Achieve reduced congestion levels during peak hours;
- Achieve reduced emission of noise and air pollutants in sensitive areas; and
- Increase priority and incentives for using public transport, walking and cycling through a more equitable sharing of space.

## 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 sustainable 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 93.95km<sup>2</sup>. 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 3 of the CIVITAS ARCHIMEDES project – Travel Demand Management.

#### 3.1 Introduction to the Measures

Research and demonstration activities in respect of transport demand management have been conducted in five of the ARCHIMEDES cities, namely Aalborg, Brighton & Hove, Donostia - San Sebastian, Iasi and Ústí nad Labem, in the form of measures 20, 21, 22, 23, 24, 25, 26, 27 and 28. These measures are introduced in the following sections.

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

Measure Number and description	Research Deliverables	Implementation Deliverables	Category
<b>20</b> Changing parking behaviour in Aalborg		T20.1	Parking
<b>21</b> Clear Zones in Brighton & Hove		T21.1	Access control
<b>22</b> Access Control to a Historic Centre in Iasi		T22.1	Access control
<b>23</b> Changing Parking Behaviour in Donostia - San Sebastián	R23.1 R23.2	T23.1 T23.2	Parking
<b>24</b> Extension of the Infrastructure for Cycling and Walking in Donostia - San Sebastián		T24.1 T24.2 T24.3	Sustainable modes
<b>25</b> Short Term Parking Scheme in Ustí nad Labem	R25.1	T25.1	Parking
<b>26</b> Strategic Traffic Management in Ustí nad Labem	R26.1	T26.1	Sustainable modes
<b>27</b> City Centre Access Control in Ustí nad Labem	R27.1		Access control
<b>28</b> Noise Reduction in Ustí nad Labem	R28.1		Access control

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 20: Changing Parking Behaviour in Aalborg**

Parking charges are currently the only financial measure controlled by local authorities in Denmark that can be used to affect private car traffic. The city of Aalborg operates with differentiated parking charges in order to influence traffic behaviour. As of 1st of January 2008 the charges were changed and are continuously under revision. The parking guidance system is from the mid 1990s and was in need of a thorough review, especially due to the new parking situation along the waterfront which over the following years will be revitalised.

Many urban areas are becoming increasingly congested with vehicles as the demand for travel grows in our cities. An increased number of vehicles can lead to an unpleasant environment for people in the area and associated health problems. The motivation was to design and implement a parking strategy with a new pricing and zoning policy, to decrease the number of cars driven to certain destinations and enhance accessibility to the city centre commercial area. A renewal of the parking guidance system using the most recent technology was also part of the measure.

### **Measure 21: Clear Zone in Brighton & Hove**

A clear zone was introduced in Brighton & Hove. The main aim was to reduce road traffic and the impact on the environment. The measure also explored the social and emotional impact of street improvement schemes upon different user groups. The measure focused on two complementary schemes in Brighton city centre:

- New Road, which was converted into a shared surface as part of a £2m scheme in 2007
- Church Street junction with New Road and Jubilee Street. This junction forms part of one of the busiest pedestrian routes in Brighton city centre.

The schemes aimed to change the behaviour of different users in the two areas and create attractive street environments for the different user groups. The working hypothesis of the measure was that the environmental improvements would make the use of the junction more balanced between different traffic modes. It was envisaged that road users' behaviour would change according to the new street layout and design. Previously the priorities in these two areas were to maintain easy vehicle movement, constraining vulnerable road users rather than the vehicles that pose the risk to those users.

### **Measure 22: Access Control to an Historic Centre in Iasi**

Before the implementation of the ARCHIMEDES project, the historic centre of the city of Iasi was open to all traffic modes. In order to increase the attractiveness of this area, traffic levels had to be reduced and, consequently, the appropriate measure was to adopt a control scheme to restrict vehicle access in the historic centre.

The scheme involved signposting and fining of unwanted car traffic. Access is allowed only to emergency services, trams, cyclists and pedestrians during the day. The measure involves cooperation between the Municipality and the local post office in order to deal with traffic generated by the supply activities related to the post office.

### **Measure 23: Changing Parking Behaviour in Donostia - San Sebastián**

The work in this measure was divided into four tasks. There were two research tasks, zoning and pricing policy research and paid parking in employment areas research, and two demonstration tasks, changing parking behaviour and business parking charges.

As part of the city's parking service, the provision of parking in business areas represents a critical element in the city's strategy to influence the environment and quality of life in Donostia- San Sebastián. Current parking provision in all business areas of Donostia-San Sebastián is free, so driving to work is seen as an attractive option to all private car owners. This is not conducive to people using other, more sustainable, modes of travel, particularly when they may have to pay for them. In addition private motor car use results in early occupancy of the whole parking provision, which means that people requiring space later in the day are unable to find anywhere to park. Regulation of parking provision and the new parking strategy should therefore support road traffic fluency, equitable use of parking places and increase the use of public transport.

To cope with the very high-pressure levels on parking spaces and change parking behaviour, an extension of the Controlled Parking Zone was developed and recommended through the research study and implemented in Donostia - San Sebastián. Residents were informed about the new controlled surface parking service, through a mailing campaign and information leaflet. The purpose was to explain all requirements that residents had to fulfil to get parking display permits. In order to carry out the new parking initiatives, the Local Controlled Surface Parking Service Bylaw had to be updated. New regulated areas including the new service features were implemented, which legally covers the city's controlled surface parking service.

#### **Measure 24: Extension of the Infrastructure for Cycling and Walking in Donostia - San Sebastian**

This measure addressed a number of pre-requisites for cycling and walking to play an important role in urban transport. The main action was that road space dedicated to these modes was increased. The city extended the pedestrian zone by 4 kilometres. The cycle network was completed with 22 kilometres of additional cycling lanes since ARCHIMEDES started. This meant the network had over 50km of lanes in total.

An interesting action was the reuse of two obsolete rail tunnels as cycle lanes connecting the centre of Donostia - San Sebastian and its broader metropolitan area, important neighbourhoods and the Anoeta Stadium, avoiding hilly itineraries and bridging highways. Altogether three new cycling axes were built where the rail tunnels was a part of these axes. The new itineraries allow a direct and quick cycle direct connection between the University, diverse neighbourhoods, other cities of the metropolitan area and the city centre.

There are plans to implement bicycle parking for residents in public car parking but this is still being analysed.

#### **Measure 25: Short Term Parking Scheme in Ustí nad Labem**

The research conducted in this measure aimed at providing the information necessary to develop a feasibility study for a short stay parking scheme in Ustí nad Labem. A survey of existing current traffic situation was conducted in the central part of the city and in a typical residential housing estate - Dobětice. As a result, traffic problems and lack of space were revealed. A package of appropriate solutions for implementing differentiated parking charges was proposed, in order to reduce environmental impact and individual transport in the area. The problems were also generalised to apply to other localities.

Based on the research results, a short term parking scheme was implemented in Ustí nad Labem. The objective was to improve conditions for parking in residential areas and the city centre with regard to the future development of the city. The proposal for implementing differentiated parking charges aimed at reducing environmental impact and individual transport in

the area. Ústí nad Labem has a target to enhance and expand its parking system by introducing differentiated parking charges in specific city zones. Suitable actions to improve its parking conditions were implemented, such as paid parking zones and Park and Ride (P&R) systems. The measure involved a traffic survey conducted in the city centre to map parking of vehicles and their parking patterns. Furthermore, the measure included implementation of 6 sample paid parking lots in the city centre, production of parking information brochures for companies located in the city centre.

### **Measure 26: Strategic Traffic Management in Ústí nad Labem**

This measure comprised a strategic traffic management study and implementation of a strategic traffic management scheme in Ústí nad Labem. A new architecture of specific subsystems of traffic management was introduced to better manage traffic and priorities of different modes in the city. The new management system involved management and organisation of traffic on city roads (control of traffic lights, traffic marks and signs, emergency systems where rescue vehicles get priority in traffic signals), transport data and information (information board, traffic information via radio, internet and SMS), navigation to parking lots, upgrading of public transport (prioritisation at traffic lights and information to passengers), freight, traffic surveillance systems, management and maintenance of transport infrastructure and SMS-ticket parking.

### **Measure 27: City Centre Access Control in Ústí nad Labem**

A study was developed to investigate the feasibility of implementing city centre access control and as part of the city's Sustainable Urban Transport Plan (SUTP). The aim was to reduce the volume of traffic through the city centre and to improve its environment.

A classification of traffic was made based on origin and destination. Moreover, tools to analyse ways to reduce transit traffic were provided (demand management, traffic organisation and traffic management). Also parking problems were addressed through three types of proposed solutions: parking zones, Park 'n' ride and Park 'n' go. Finally, other elements in the transport system were strengthened: improvements for public transport, biking and walking, and promotion of these modes.

### **Measure 28: Noise Reduction in Ústí nad Labem**

Ústí nad Labem had a target to reduce the proportion of residential areas that are located in areas exposed to traffic noise levels above 65 dB by the year 2012. Studies were undertaken to gain a better understanding of the impact measures for reducing noise and to develop a noise map so that problem areas can be targeted as part of the SUTP.

Different elements to reduce traffic related noise were suggested: greenery, noise walls, speed reduction, construction changes on roads, suitable road surfaces, road gradient profile, renewal of the vehicle fleet, avoiding crossroads where possible, noise protection for buildings, traffic management, improving the flow of traffic and transport demand.

## **4. Analysis**

### **4.1 Comparison of Measures**

There are some overall similarities of the objectives for the measures presented in this deliverable:



- The measures seek to change the balance between urban traffic modes and/or reduce the negative effects that high levels of individual motorised traffic cause.
- The initiatives implemented aim at reducing traffic levels in order to create more liveable cities both in regard to environmental issues (noise, pollution, street environment) and the limited space available (using parking spaces more efficiently).
- There was a focus on strategically changing citizens' behaviour in relation to parking and mode choice. The aim was to encourage citizens to use more sustainable modes such as walking, cycling or public transport.
- The measures aim at better using the existing capacity for individual traffic and prioritising space e.g. for cycling and walking.

The objectives can more generally be divided into three major themes:

- Parking
- Access control
- Sustainable modes

The specific objectives for the cities are presented corresponding to the three themes were:

### **Parking (measure 20, 23, 25)**

Some general objectives regarding parking can be derived from the cities that implemented such initiatives:

- Control demand - use the existing parking spaces more efficiently, and minimise traffic generated by people searching for free spaces.
- Reduce demand for parking and improve quality of urban environment.
- Achieve modal shift by decreasing car usage.

The specific objectives from each city are:

The main objectives of changing the parking behaviour in Aalborg (Measure 20) relate to the development of policy to discourage long stay commuter parking and reduce the impact of associated traffic on the environment. Another objective was to reduce the traffic from cars searching for free parking spaces.

In order to change parking behaviour in Donostia - San Sebastián (Measure 23), the objective was to control parking and traffic in the city by developing and using new parking schemes. The schemes should help in achieving a modal shift towards public transport, walking and cycling, decreasing the number of cars entering the city centre/in industrial and business areas and improving the quality of urban space.

The short term parking scheme objectives in Ústí nad Labem (Measure 25) were to use the current infrastructure as effectively as possible in terms of the number of supplied parking places. By enhancing and expanding the parking system, differentiated parking charges were introduced in specific city zones. Other objectives were to reduce parking deficits - ideally to match supply with demand and keep certain reserve in the number of parking places for future development, to prevent illegal parking and to prevent road safety hazards.





**Figure 2: Illegal parking in Ústí nad Labem**

**Access Control (measure 21, 22, 27, 28)**

Some general objectives regarding access control can be derived from the cities that implemented such initiatives:

- Improve local quality of life, creating more liveable and attractive urban spaces
- Create 'urban zones' where car traffic does not dominate
- Decrease car access and create incentives for the use of sustainable modes.

The specific objectives from each city are:

In establishing Clear Zones in Brighton and Hove (Measure 21), the objective was to create clean and safe spaces for people to go about social, work and shopping activities. It was also intended to reduce road traffic and impact on the environment, hence improving the local quality of life. More specifically, improvements at the Church Street junction with New Road and Jubilee Street aimed at reinforcing a 'walking network' in the area. Another objective was to increase priority and incentives for using public transport, walking and cycling through a more equitable sharing of space.



**Figure 3: Change in street design New Road Brighton (Before - after). The priority of traffic modes in this space has changed.**

The objective for access control to historic centre in Iasi (Measure 22) was to forbid cars to pass through, to reduce pollution and noise in the city centre and to increase the attractiveness of the area for tourists and citizens. It was also intended was to limit the consequent negative impacts on congestion levels on neighbouring roads and enhance the use of public transport, walking and cycling through a more equitable sharing of space

In the study of possibilities for implementing city centre access control scheme in Ústí nad Labem (Measure 27), the objective was to propose possible options for regulating city centre traffic. The emphasis was on describing the expected positive impacts, considering the risks and negative consequences of individual actions and integration of these results with appropriate conclusions.

The study of possibilities for noise reduction in Ústí nad Labem (Measure 28) had the objective to reduce the proportion of residential areas located in areas exposed to noise levels above 65 dB as a result of busy roads. This would be done by developing and using an emission noise map to identify problem areas and propose noise reduction solutions.

### Sustainable Modes (measure 24, 26)

Some general objectives regarding sustainable modes can be derived from the cities that implemented such initiatives:

- Increase priority for sustainable modes.
- Create incentives to use sustainable modes.
- Facilitate a more equitable distribution of space between sustainable modes and individual motorised modes.
- Reduce congestion and pollution created by individual motorised transport.
- Improve the street environment, making it more inviting for sustainable modes.

In Donostia - San Sebastián (Measure 24), the objective was to integrate and increase priority and incentives for using public transport, walking and cycling through more equitable sharing of space between the modes. The number of cyclists among the residents of the CIVITAS zone should increase, and so should the use of bicycles by commuters and visitors for combined trips with public transport. It was also intended to reduce the level of private cars, thereby reducing congestion and pollution.



**Figure 4: Implementation of bike lanes in Donostia - San Sebastián (Before and after)**

The objective of the strategic traffic management scheme in Ústí nad Labem (Measure 26) was to regulate and segregate motor transport to avoid safety risks for the population and to limit emission of harmful gases, noise and vibrations. Another objective was to give priority to public transport, and support walking and cycling modes in order to promote quality and

cleaner life in the city. Traffic flow in the city should be improved, hence reducing environmental impact.

## 4.2 Differences in Approach by City

The experiences around implementation of demand management strategies show the importance of using both the 'carrot' and the 'stick' approach. The initiatives implemented under this workpackage exemplify this.

- Carrot: new infrastructure, new traffic guidance systems.
- Stick: pricing initiatives, restricting access for some modes.

When restricting existing demand, alternatives must be provided to facilitate change in transport behaviour and modal shift. Also it is important to note that sustainable modes such as public transport, cycling and walking also 'compete' for users. Potentially, there could be an increase in public transport use resulting in decrease in cyclists or pedestrians, without having any significant effect on the modal share of car traffic. Hence it is important to consider these effects when implementing demand management strategies. Successful outcomes are often a combination of several initiatives - and a combination of both carrot and stick.

There are some general statements that can be derived from the different approaches in the cities:

- Communicative and engaging processes with affected stakeholders and citizens seem to be crucial when implementing Travel Demand Management initiatives, especially when restricting initiatives are used. An example is restrictions of parking in business areas of Donostia - San Sebastián which caused objections from the employees even though the process of implementing the new schemes focussed on communicating the changes and the reasons and arguments behind them.
- Different approaches have been applied to change the balance between transport modes in different cities; some have focused on restrictions for specific purposes (parking, individual vehicle access) and others have changed the physical layout of the urban environment to support more sustainable modes (establishing cycling lanes and differentiated parking zones).
- Technical solutions in the form of Intelligent Traffic Systems (ITS) have provided incentives for more use of collective modes. These solutions are priority of public transport in traffic lights and collection of traffic data to provide passenger information.

The more specific initiatives, carrot or stick approaches or a combination of both, were:

### **Parking (measure 20, 23, 25)**

The approach of implementing a new public parking system in Aalborg (measure 20) was to focus on limiting traffic searching for parking spaces in the city centre, hence creating better traffic flow and avoiding congestion. This was done by introducing a parking guidance system (P-guidance) designed to limit the circulation by giving more targeted and comprehensive information to drivers on where to find available parking spaces.

Through the process of implementing zoning and pricing policies research in Donostia - San Sebastian (measure 23), the city's Controlled Surface Parking Service adapts parking conditions (rates and maximum length of stay) to the available parking spaces and requirements in each zone.. The policy applied diverted parking from areas with a high

demand to less pressurised zones. Turnover of available parking bays was increased by reducing the permissible length of stay or guiding users seeking long stays to zones with less demand. Research showed that it was necessary to find ways to manage parking demand as part of the daily activity of business areas. One solution was to establish car pooling zones where vehicles with more than one passenger (HOV - High Occupancy Vehicles) can park. Another was to introduce limited parking time and fees for parking. Opposition from the employees of each business area showed that they are not prepared to pay to park at work. This changed the process and created a need for an even more dialogue around future parking demands with affected stakeholders.

The parking strategy research (measure 25) carried out in Usti nad Labem was based on realisation of a lack of foresight in previous traffic policies. These policies had prioritized car traffic, regardless of the problems that this could generate especially in terms of parking demand. City growth with residential construction has also increased traffic volumes and private vehicle use. These issues were addressed by two solutions:

- A short term solution, which tried to maximize effective usage of existing infrastructure. It is considered a cheap solution but with low efficiency.
- A long-term solution, which takes into account future traffic developments and also provides traffic calming and demand management. It is considered a more expensive solution but with long term effectiveness.

Parking demand varies according to the needs and nature of different areas in the city. Issues such as quality of public transport, local facilities and transport links, type of buildings and demographics were taken into account when implementing a new parking policy. To help understand these factors, a field survey was carried out in a sample residential zone, Dobětice. This representative area experienced the most common parking problems could be revealed so the results could be applied to all other parts of Usti nad Labem.

To address the lack of parking places the following solutions were proposed in the research study:

- Change of parking policy: Acting on the road to use space more effectively
- Parking areas: Setting up new parking lots where building density is lower.
- Parking houses: Large capacity, charged garages in areas where parking capacity is critical.
- Charging long-term and permanent parking vehicles: Zones of street parking with differential rates (e.g. city centre would be more expensive than a residential area). Residents would be provided with a parking permit.

### **Access Control (measure 21, 22, 27, 28)**

The process of introducing Clear Zones in Brighton & Hove (measure 21) was carried out through extensive consultations with local businesses and residents to ensure that there was local support for the physical changes in the street environment. Video recording of transport behaviour in the two locations (New Road and Church Street) was used to evaluate the effects of the new street design, comparing use before and after the intervention. This created a transparent process and support for the projects among the different stakeholders.





**Figure 5: Video analysis stills from Brighton, Church Street junction.**

In Iasi the approach to limit individual vehicle usage in the city centre (measure 22) was managed through access restrictions enforced by posting of signs and fining individuals ignoring them. Articles communicating the interventions were published on the website of Iasi City Hall. Posters presenting the necessary information were displayed in the historical centre of the city. Informative meetings were organized for the businesses based within the area.

In Usti nad Labem (measure 27) advantages and disadvantages of individual measures for regulating city centre traffic flows were compared in a research study. The optimal solution consisting of a combination of restrictions was presented. It was recommended as a part of the research study that the city centre should be regulated in the following ways:

- Access allowed only for transport services (including residents and PT)
- Access allowed only for vehicles meeting low emission standards (not applied on transport services)
- Maximum speed 30 km/hour
- Park & Go system implemented
- Implementation of a specific residential zone
- Establishing a system of roads with regulated traffic (e.g. no entry roads, one-way roads).

The approach to noise reduction in Usti nad Labem (measure 28) was to link noise emissions with road maps to provide a noise map for the city. Some proposed solutions were modelled to reduce the noise and make it possible to evaluate the effectiveness of individual proposed scenarios.

### **Sustainable modes (measure 24, 26)**

In Donostia - San Sebastian (measure 24), the approach to increasing incentives to use public transport, bike or walk extended the cycling infrastructure and the pedestrian zone. As shown on Figure 6, old rail tunnels were included in the network which reduced cycling distances between the neighbourhoods remarkably (along the Antiguo cycle lane distances between neighbourhoods was reduced from 4 to 2 km). Also the tunnels gave a possibility of less hilly routes in the city.



**Figure 6: Large tunnel and short tunnel of Morlans, a part of the new cycling network.**

Also new pedestrian areas was constructed in the city, which provided attractive and safe spaces to walk, an example is given on figure 7.



**Figure 7: Example on new pedestrian area beside the river in Riberas de Loiola.**

The approach to the strategic traffic management scheme in Usti nad Labem (measure 26) was to provide data to control traffic management, outline principals for how to implement the scheme and implement ITS systems in vehicles and in relation to infrastructure.

### 4.3 Problems Encountered & Solutions Attempted

Most of the problems encountered in relation to this work package were process-related. The reason for this was that in many of the research and demonstration measures, well-known technologies (ITS systems, GPS devices for traffic data collection) were applied in order to change the distribution of traffic between the modes in the city. In many cases, technical issues were merely a matter of choosing the right solution rather than testing new



technologies. This induced more process related issues to occur, such as opposition from road users and other stakeholders to e.g. a new parking scheme that caused restrictions for parking, political processes to change legislation, interfaces with other development projects causing delays.

#### 4.3.1 Technical Issues

During construction of the Clear Zones in Brighton & Hove, the surfacing material had to be changed due to unexpected utilities equipment found underground. However similar material was quickly found, which met the requirements and supported the original concept for the new street layout.

#### 4.3.2 Process Issues

In Aalborg (measure 20) the implementation of a new parking system faced some process-related issues. It was challenging to divide the city into logical zones and deciding which car parks should be referenced with which signs. It was necessary to find a political compromise between reducing traffic by only giving targeted information to drivers on nearest car parks, and satisfying the anticipated, politically supported interest from the City Centre's commercial association by giving broad information on all free spaces. This originates from the association's competition with a big shopping centre in the city's outskirts. There was also politically supported interest from the owners of individual car parks in being presented on signs in all parts of the city to draw customers to the shopping centre associated with their particular car park.

In the end this zoning process was implemented through different phases. First the employee in the municipality responsible for parking made up a model for new zones based on the city's official parking strategy. Secondly an associate professor in Traffic Planning at the university made a new suggestion based on the former, modified after some more theoretical reflections. This proposal was modified in the city to make it politically acceptable and based on this a consultancy transformed the model into an operational description in the tender material.

During the implementation process, the selected supplier of the parking system had some general problems complying with the agreed time schedule and at one point in time, the supplier had to inform the city that his subcontractor for signs in Italy was two months delayed, which resulted in a similar delay in the implementation process.

In Brighton & Hove (measure 21) some delays were experienced in the advertising of the Traffic Regulation order for Clear Zones. This was caused by lack of political agreement on the design.

In Donostia - San Sebastian (measure 24) the main problem detected during the construction of the cycle lanes was that due to the inclusion of lanes within some larger urban development areas, they could not be open for public use until these developments were finished. This caused delays, which were difficult to eliminate because of the interface with the larger urban development project. Furthermore, delays in the construction of a new train and regional bus station caused delays to the bicycle parking facility that was also a part of this demonstration project. Other locations for covered cycle parking are now being studied. It also proved to be difficult to stimulate condominiums to implement bicycle parking areas inside their buildings. To overcome this barrier, a study was conducted which focused on new ways to stimulate condominiums to implement bicycle parking in their buildings, the outcome of this is not yet known.

When implementing restrictions for some modes in the city in Iasi (measure 22) (parking or access to the city centre) it was important to communicate this clearly to the road users and other stakeholders (shop owners, employees). This proved to be a good way to avoid conflicts with citizens.

Prior to implementation of a new parking scheme in the business areas in Donostia - San Sebastian (measure 23), it was necessary to inform employees about the proposed changes along with their purpose. This was done in order to gain understanding and acceptance of the proposed changes among the affected employees, and this was not an easy process. After implementing the new parking scheme, there was strong opposition from the employees of each business area. Employees formed groups on several internet platforms (blogs, Facebook) expressing their opposition towards the initiative of regulated parking. Their main complaints were that people did not wish to pay to go to work and the real source of the measure was only for revenue purposes.

In addition, employees met on street protests to show their revulsion, which has had a major impact in the media. These protests were organised once a week, in each business area and on different days during two consecutive weeks. In addition to these protests and because of the forthcoming municipal elections, other political groups took the initiative to attack the municipal government. The protests led to a political debate on local television. All this social pressure caused the intervention of the mayor who decided to delay the implementation of the measure until the results of the workplace travel plans measure were published. One of the most important mitigating strategies was to help employees find solutions to mobility problems (lack of parking spaces) at their workplace, to reduce the opposition towards the changes. It was proposed to develop company travel plans to address the benefits of the change of habits. The approach was that any restrictive action in a specific area should be compensated by an alternative attractive solution in a complementary area. Hereby people could have a realistic alternative to their previous behaviour. There are not yet evaluations of this initiative.



Figure 8: Employees' blog against regulated parking Donostia - San Sebastian

There were also legal process related issues in Donostia - San Sebastian. The Local Controlled Surface Parking Service Bylaws had to be changed. This was a quite long

process where the different political representatives could present arguments against the changes.

## 4.4 Main Outcomes & Results

### 4.4.1 Impacts

The main outcomes and results is categorised under the three themes:

- Parking
- Access control
- Sustainable modes

#### Parking

The general outcomes and results under this theme are:

- Renewals of parking systems
- Implementation of new systems that provides a better overview of available parking spaces
- Implementation of dedicated parking zones for e.g. High Occupancy Vehicles
- Prevention of illegal parking

The more specific outcomes from each measure were:

In Aalborg (measure 20) development has made it necessary to rethink and renew the Parking Information System. New big parking garages have opened in or near the city centre. Developments such as the new harbour front with a new Culture House and new Music Hall have changed traffic patterns and levels, and the need for a Parking Information System using the most recent technology that limits the traffic flows through the city centre has appeared. Hence a new and up-scaled Parking Information System was implemented and is in operation. The results from the evaluation of the new system can be distilled as follows:

- The new system was successfully implemented in Aalborg, and preliminary experience shows that it provides much more flexibility for adjustment, such as implementing additional zones
- Substantially more parking areas are included in the new system. Hence it gives more coherent information on the parking situation in and near the city centre. Traffic through the city centre is reduced because the system guides drivers to avoid the city centre during parking searches.
- Design and location of the Parking Info signs make the guidance system more intuitive. It is also more cost effective as the technology in the old system was obsolete and it became gradually more expensive and difficult to keep the old system running.
- With the previous technology it was difficult to connect new parking areas to the old system, while the new system is designed to be more open and includes all important parking areas from the start.

The main results of changing parking behaviour in Donostia - San Sebastian (measure 23) were:

- Parking management measures are very sensitive and often raise strong position from citizens. Increased negative perception was experienced even before the parking scheme started operating (59% before the implementation and 75% after it started operating).

- In a context of a previous steady increase in car travel, a modal shift towards sustainable modes of transport such as public transport and bicycle was achieved, resulting in a reduction in car use of 0.1%, compared with the situation before the CIVITAS project started
- If compared to the business-as-usual situation, the modal shift away from car was 0.4% in 2011, while cycling increased by 0.3% and public transport by 0.1%. Walking levels seem to be slowly decreasing which is not a desirable result.
- A reduction in traffic levels was also experienced. The number of cars entering to the CIVITAS corridor has been reduced by more than 7,500 cars per day as compared to the 'before' situation decrease in parking demand was also experienced, decreasing by 20% if the current situation is compared to the situation before the new parking management scheme started.

### Access control

The general outcomes and results under this theme are:

- Implementation of balanced street environments where cars are less dominant.
- Implementation of access restrictions to prevent unnecessary car traffic in the city centres.

The more specific outcomes from each measure were:

As in the case of Clear Zones in Brighton & Hove (measure 21), social and emotional benefits of successful streets are difficult to quantify, not least because of the intangible nature of emotions. However, consideration of these benefits is critical if we are to make fully informed decisions on the cost / benefit values of investing in well designed streets.

Main outcomes and result from the Clear Zones project are:

- Balanced street environments create positive emotions among users, shows evidence based on interview with different street user groups. Successful streets cannot be achieved through surface treatment alone - places have to attract an audience and create activity.
- Businesses were positive (80%) towards the benefits of the new street layout, which creates enhanced sense of community, empowerment, ownership and street appeal.
- Pedestrians (100%) and cyclists (94%) were slightly more positive about the balanced street design than vehicle drivers. Pedestrians felt more ownership of the street, and more comfortable using the space.
- Interviews with different user groups show that The Clear Zones support the community feeling; having a place to sit, meet and interact.
- Pedestrian traffic increased at Church Street - from 55.2% to 68.9%, but still the hierarchy of movement was in favour of cars.
- Lower speed levels in the areas. It appears that the works had an impact on drivers' behaviour, but a relatively small impact on cyclists and pedestrians. In order to achieve greater changes, it would be necessary to widen the scope of the measure to the surrounding area.

The main results of the access restrictions of the historical centre of Iasi (measure 22) were:

- The Access Restriction Scheme to the historical city centre was implemented - including speed and weight restrictions (30 km/h, 1.5 t/axle). The Post Office in the city centre changed its strategy for distribution of goods, restricting vehicle supply access in the rush hours. Establishing time intervals for supply activities of companies in the centre led to a decrease number of goods vehicles moving in the area, from

43 registered in 2009, to 10 in 2011 (reduced by over 76.7%) and 7 in 2012 (83.7% reduction).

- The residents showed a positive attitude towards the traffic restrictions, being aware of the impacts that these entail. Before implementation in 2009, interviews were conducted to measure awareness levels. Only 19% of the interviewees had heard about the planned measure, after implementation the percentage increased to 46% in 2011 and 64% in 2012. An acceptance level indicator reveals that the percentage of persons considering historical centre an unattractive place decreased from 75% in 2009 to 52% in 2012. Also, they agreed with the access restriction in this area, with acceptance levels increasing yearly, 77% in 2009, 82% in 2011 and 90% in 2012.
- The traffic prevented from entering the restricted area deviated to some extent to different roads without immediate obvious problems.
- All these restrictions led to a decrease in the level of CO<sub>2</sub> emissions, both during daytime and night-time, by 5.6% and 6% in 2011 and in 2012 by 7.7% and 8.4%, compared to the values registered in 2009. Also, the level of NO<sub>2</sub> emissions decreased since 2009, both during daytime and night-time, by 6% and 5.4% respectively in 2011, and by 7.5% and 9.5% respectively in 2012. Noise perception indicator had the same descending trend line, decreasing during daytime and night-time, by 4.7% and 3.1% in 2011 and in 2012 over 7.9% and 3.7%, since 2009.

As a result of the City Centre Access Control study in Ústí nad Labem (measure 27), some initiatives were recommended as suitable for limiting the entrance to the centre. It was revealed that the proper solution is a combination of tools forming a comprehensive system of traffic regulations. The solution will not eliminate traffic completely. It rather encourages car users to change their habits and use other means of transport. Due to traffic restrictions, the centre can become a calm zone more attractive for both residents and visitors. The results from the study are intended to be included in a future Sustainable Urban Transport Plan.

The key results are as follows:

- Traffic calming is feasible and the proposed scenario will be effective for improving existing conditions in the city centre;
- The solution requires complete exclusion of transit traffic from the city centre, by restricting access to the street Pařížská
- Access control of the street Pařížská should be supplemented with additional restrictions in the city centre involving introduction of paid parking zones, implementation of the Park & Go scheme and adequate ITS systems.

The primary result of the noise study in Ústí nad Labem (measure 28) is an emission noise map for existing motor vehicle traffic. The map for daytime and night-time period is attached in the annex to Research deliverable R28.1. The highest noise emissions are produced on roads with the highest traffic volumes and the highest percentage of trucks. The outcomes of the study have been incorporated into the newly written Sustainable Urban Transport Plan for Usti nad Labem which is currently going through the formal approval procedure and which will be implemented on a step-by-step basis in the coming years.

### **Sustainable Modes:**

The general outcomes and results under this theme are:

- Extension of pedestrian and cycling networks creates better facilities for sustainable modes and proved to be successful to attract more users of these modes. However,



sustainable modes also compete for users. Users might be attracted from other sustainable modes rather than from private cars.

- New cycling routes and more direct cycling routes enhances mobility in the city.

The main results of the extension of the infrastructure for cycling and walking in Donostia - San Sebastián (measure 24) were:

- This extension prompted a steady increase in cycling, a 33% increase during the CIVITAS project (2008-2011). In 2011 the increase in cycling was 26% compared with the previous year.
- Most of the population regards the cycling and pedestrian networks as positive (98% in 2010 and 91% in 2011). A slight increase in the number of negative ratings was noted, most probably linked to some friction between pedestrians and cyclist at certain locations, and lack of bicycle parking space, caused by the increased cycling in the city.
- The benefit to cost ratio (BCR) is 5.87 which means that benefits are nearly six times larger than costs. This result reveals that the implementation of non-motorized infrastructure is a very cost-effective measure.

#### 4.4.2 Changes to Processes

The changes to processes that occurred during the demonstration measures happened due to problems faced during implementation of Travel Demand Management strategies. However the problems did not change implementation processes fundamentally, they caused adjustments to the processes. Process related problems can normally be categorised as either being structural or societal. Typically they arise at different stages of the process:

- *Structural problems* appear earlier in a study or project development, being related to infrastructure and available material resources
- *Societal problems* relate mainly to citizens' approval of the measures to be implemented; these arise when you turn to them to know their opinion, and often this maybe one of the last stages before the project starts.

Referring to structural problems, when undertaking changes in a city, its urban characteristics must be taken into account, since this can cause changes to the process. This includes assessment of the location of buildings with regard to public roads, the width of the streets and even the location of the customer service centres within the city.

In the case of societal problems, there have been demonstrations by affected groups which have gone so far that they forced postponement of measure implementation (measure 23). A major barrier identified is a lack of culture around sustainability: successful implementation requires society to be aware of the reasons of the proposed actions. Frequently it seems that only personal interests are pursued, even when measure implementation is intended to have collective benefits. This makes the implementation of such measures very difficult. In the cities where there were opposition to restricted access for some modes, there was emphasis on finding other mobility solutions that could compensate.

Despite the many concerns regarding restriction of parking in Donostia - San Sebastian (measure 23), the implementation of Car-pooling zones where vehicles with more than one passenger had priority has had a positive effect. This was because it served as an example to all business areas to start to show awareness of the importance of sustainable mobility. Committees were set up to support more car pooling initiatives. A platform where users could sign up was established and designated parking spaces were, reserved for those signed up. The platform has a search engine to contact people with similar travel needs.



Processes can also change due to delays in other works that affects the implementation of the measure. In these cases temporary solutions should be addressed, as the case of bike parking possibilities at the train and bus station in Donostia - San Sebastián (measure 24).

## 4.5 Future Plans

The experience with traffic demand management projects show that many cities sees this approach as a necessary way of controlling traffic levels and supporting a better balance between different transport modes. The purpose of controlling traffic demand is highly linked to the discourse of the liveable city and the struggle for space. There seem to be a political willingness in many cities to implement restrictions on individual motorised traffic, even though this rarely is a popular decision with the public.

In Aalborg the Parking Information System will continue to be an important ITS solution. The system will continue to run, and will be extended to new areas and with new functions during the coming years.

Based on experience with restrictions to the historic centre, lasi has considered potential extension of the zones to other parts of the city. The choices will be based on the level of the traffic in the different urban zones. Furthermore lasi will continue to maintain the weight and speed restriction in the historical city centre, and will ensure that the time schedules approved for supplying activity are respected.

In Donostia - San Sebastian a promotional campaign for new parking schemes will be launched which will cover the entire municipality. A new parking meter network will be extended to both the new regulation zones and other city districts, gradually replacing the old network. In addition, the main business areas of the municipality will be part of a new regulation study area that will cover 15% of their parking surface. Within these business areas new ways to reduce the pressure on parking could be addressed, for instance through travel plans and other associated measures. The continuous monitoring of the parking system has suggested restructuring of certain parking rates, which caused cheaper parking areas to be full, while nearby more expensive zones remain nearly empty. Furthermore there are plans to extend the high occupancy vehicles (HOV) zone close to universities to increase the popularity of this service.. This service has also allowed parking for vehicles with 2+ occupants instead of 3+ as was previously required. This change meant that in one month of operation, the occupancy rate increased from 25% to 35%.

Construction of cycle lanes in Donostia - San Sebastián will go on as planned and another 6 additional kilometres should be operative. Targeted dissemination activities will be delivered to accompany the implementation of specific cycle lanes. There are ideas to include parking for bicycles in public car parking in the city centre.

Implementation of city centre access control in Ústí nad Labem can be achieved effectively only after completion of the highway D8. This leads from Prague to Dresden, passing the city, and can be utilised by transit traffic. Without such completion, it is not possible to find substitute routes for transit transport and, therefore, impossible to prohibit transit through the centre of Ústí nad Labem. Construction of the highway should be finalised in coming years. The solution was incorporated into the Sustainable Urban Transport Plan for Ústí nad Labem, which will be submitted to city authorities for approval and further realisation of action plans in the future.

## 5. Conclusions and Recommendations

Workpackage 3 focuses on various traffic demand management strategies, to create better balance between urban transport modes, optimise traffic flows and create more liveable cities. There are various demand management strategies, such as restrictions of vehicle flows (parking, traffic flow, and city centre access), ITS systems, and changing physical layout of the urban environment. These strategies can be implemented separately or via a combination of 'stick' and 'carrot' approaches.

### 5.1 Conclusions

The experiences regarding traffic demand management strategies are divided into the three categories: Parking, Access control and Sustainable Modes:

#### Parking:

- Parking restrictions and other restrictions to traffic flow can cause public opposition. Hence it is important to inform the public and other affected stakeholders about the interventions and why they are needed, and provide alternatives
- Regulation of parking provision should support road traffic fluency, equitable use of parking places and increase the use of public transport.
- Implementation of traffic management initiatives such as implementing new parking strategies can necessitate changes in legislation, hence delaying the process.
- Traffic generated by car drivers searching for available parking spaces is undesirable for the city environment. Intelligent parking systems can be helpful in limiting this traffic, and directing the traffic to parking zones with free parking spaces.
- Parking guidance systems should be flexible and allow for future extensions and changes in the parking structures - this provides possibility to control and change demand more efficiently.

#### Access control:

- Changes in the urban environment such as new street layout to support walking and cycling prove to be a successful tool to balance traffic modes. In general the public and businesses expressed positive emotions towards this. A balanced street design supports a liveable urban environment where the community can sit and meet. Vehicle drivers and cyclists become more cautious and conscientious, adapting their behaviour to the anticipated presence of pedestrians in areas traditionally set aside for vehicles.
- ITS systems can create priority for public transport and increase the attractiveness of this mode.
- Transit traffic is a particular challenge if no alternative routes are available. This can constitute a barrier to implement new initiatives.
- Historical city centres can benefit from restrictions for motorised traffic in order to make the place more attractive for citizens, tourists and other users. It is important that transit traffic is redirected from the city centre in order to implement such restrictions.
- Park & Go schemes and adequate ITS systems can supplement access control in a positive way, by providing alternative solutions for car drivers and facilitating more optimal traffic flow in the city centre.

### Sustainable Modes:

- In order to make cycling and walking play an important role in urban transport, space should be dedicated for these modes. In Donostia – San Sebastian existing car space has been used for this purpose. Implementation of bicycle facilities close to public transport can also be used to increase attractiveness of both modes.
- Sustainable modes also compete with each other for users. Increases in use of public transport or cycling can affect walking. Better facilities for these modes do not necessarily result in decreased car usage.

## 5.2 Recommendations

### General recommendations

- Consider the context in which demand management strategies are implemented. There can be significant barriers, for example in relation to legislation, culture, topography, urban structures. Demand management strategies can involve a “tool-box” of measures which should be adapted to the local context.
- Carrot and stick initiatives work well in combination. When access is restricted alternatives must be provided.
- Address major urban traffic flows in order to control and prioritize future demand.
- Available resources for monitoring and evaluation of solutions should be taken into consideration. Assess available resources and the need to adapt them to new working conditions.
- It is important that citizens are involved in strategies to change mobility behaviour; this creates ownerships of the strategies and plans amongst citizens.

### Parking

- A stepwise approach to implement new parking initiatives should be considered; define demand, decide if demand should be met or changed, choose measures to meet or change demand, and consider consequences, e.g. safety issues due to potential illegal parking.
- When planning new parking regulations, the type of areas to be regulated should be taken into account, whether they are residential, business, visitors’ parking, or in the city centre or peripheral areas. There can be very different requirements for demand in each area.
- Boundaries of areas where new parking strategies are implemented should be considered, to identify potential effects, like illegal parking or redistribution of demand and lack of space elsewhere
- Provide regular, clear information about objectives of new parking strategies, including overall sustainable mobility goals, especially to the media, so that this information can be used to boost the initiatives and not to penalize them. Regular contact with neighbours’ associations is also required to reduce social contestation. If citizens’ opposition is limited, political cooperation is more likely to be achieved.
- In order to gain support for and avoid controversy about a parking strategy, it is recommended to design an incentive programme to accompany restrictive measures. This helps target users realise that the ultimate goal is to improve their particular situation, as well as quality of life in the city.
- HOV (High Occupancy Vehicle) parking zones can be a way to prioritise car pooling.

### Access control

- Restrictions for cars in a city centre can be problematic and controversial. All proposed tools must be carefully assessed in terms of their likely effectiveness and impacts.
- It is necessary to provide adequate alternative routes for transit traffic along with restricting entrance to a city centre. Regulation must not shift traffic issues from the city centre to neighbouring areas. Ensure sufficient routes for transit traffic and appropriate traffic management (including suitable traffic signs and telematics) before measure implementation.
- Significant reduction in traffic volume can be achieved by building bypasses and transferring traffic from sensitive zones. However, such initiatives can result in only temporary improvement, if the increased capacity on roads in the city leads to more individual motorised transport and therefore traffic saturation.
- Ensure political support for implementation of unpopular restrictions for drivers. An adequate public awareness campaign is also recommended. It is important to gain political and public support before measure implementation, to present expected impacts and benefits. Subsequently, sufficient information should be provided about evaluation results in a comprehensible way.
- To reduce noise emissions in the city, it is recommended to apply technical solutions, such as noise barriers, use of innovative materials preventing noise, and tunnels. Tools for noise reduction should be supported by suitable demand management strategies for individual transport. These should be aimed at reducing vehicle numbers by reducing parking lots available, and introducing paid entrance to central zones, for example.

### Sustainable Modes

- The construction of safe, well designed, high quality infrastructure for sustainable modes is important to achieve successful usage. Political involvement and consensus is needed to agree on the required investment to build these infrastructures in different areas of cities.
- Intermodality and 'transport hubs' at activity centres should be considered. A cycle network should provide good connection with train and bus stations, university campuses, and commercial, to better promote cycling.
- When designing an expanded cycle lane network, the existing network should be analysed as should selection of the new lanes to be constructed. Proper design of cycling lanes is crucial make them safe and easy to use.
- The implementation of a well dimensioned bicycle parking network to accompany the extension of cycling lane infrastructure is essential to foster the latter's use.
- It is important to make cyclists aware of the rules for circulation in cycle lanes and other areas of a city. This type of information campaign makes possible better coexistence between different modes of transport, avoiding potential frictions, especially with pedestrians.
- To increase the effectiveness of new sustainable mode infrastructures, they should be accompanied with complementary incentives and promotion activities, as well as actions to restrict car use. This involves a combined "carrot" and "stick" approach.