TRANSPORT LEARNING

Empowerment of practitioners
to achieve energy savings
in urban transport

TRAINING
MODULE

4

Public transport models

Supported by
INTELLIGENT ENERGY
EUROPE

The material for training module 4 “Public transport models” was compiled by Emily Toumpoulidou, Korina Koutraki, Ioannis Koliousis and Stratos Papadimitriou in 2011.

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www.transportlearning.net

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About the project TRANSPORT LEARNING

TRANSPORT LEARNING – Empowerment of practitioners to achieve energy savings in urban transport – started in May 2011 and is a 32 month project supported by the European Commission within the Intelligent Energy Europe programme.

TRANSPORT LEARNING aims to create knowledge and capacity on sustainable transport policies and measures in municipalities and energy/ management agencies of Europe's convergence regions. It further aims to strengthen market activities on sustainable transport by integrating them into the business portfolio of energy/ management agencies, thereby supporting regions which are catching up economically.

The project aims to reach a wide audience, creating a large-scale impact and in the long-term safeguarding ongoing training and education on sustainable transport. In order to achieve this, TRANSPORT LEARNING creates and implements its training and site visits and exploits its outputs for a long-term impact. It will realise:

- 64 2-day training modules on topics mirroring the needs of the trainees in Bulgaria, Spain, Greece, Hungary, Italy, Poland, Portugal and Romania; to a minimum 650 participants;
- Mini-projects (practical training projects) resulting in a minimum of 170 projects being successfully carried out;
- Site visits for politicians and decision makers in order to support trainees' actions and sustainable transport generally in the convergence regions;
- Integration of training materials into academic and training courses to ensure long-term impact on students and working professionals;
- Website providing information, news, e-Learning platform, Online Training Resource Centre and all outputs of the project in 9 European languages.

Through all these measures TRANSPORT LEARNING will substantially contribute to energy-savings in transport by creating the required knowledge and capacity to work effectively in the field of sustainable transport.

The TRANSPORT LEARNING consortium

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1 Introduction

1.1 About this material

The aim of this material is to support the two-day training session of the module ‘Public Transport Systems’ by presenting the practical side of the several strategies that were analysed, in order to promote and enhance accessible transport systems. It is mainly composed of existing EU funded projects and case studies that have been implemented in their context and will examine key concepts that can be further analysed in similar initiatives in the local environment of the training participants.

1.2 Structure of the material

This training material consists for the following chapters:
Chapter 2: Raising awareness of public transport
Chapter 3: Enhancing and promoting accessibility of public transport
Chapter 4: Accessible public transport systems: Case studies and experience from Europe
Chapter 5: Suggested reading

2 Raising awareness

2.1 Introduction

In aiming to change the behavior of commuters, and persuade them to use public transport systems, there are two main action plans. Firstly, a reform of the public transport system is required, as described in the presentation given on the first day of the seminar 'Public Transport Models'.

These actions, in brief, include:

- Provision of dedicated lanes for public transport
- Priority for public transport at traffic signals
- Use of real time data to control public transport operations and improve planning
- Actively promote public transport in neighbourhoods
- Improve safety in modes and at stops
- Provision of website with detailed information
- Integration of public transport with cycling

An equally important action plan, however, is an intervention program, consisting of awareness and a behaviour-change approach. Together, these action plans will convert the understanding of sustainable transport to effective action, and will result in a modal shift towards more sustainable modes of transport.

Group	Interests	Perceived Problems
Passengers	Reliable, low cost, public transportation system	• Unreliable transportation system • Accidents occur frequently • Vehicles break down frequently • Vehicles in bad condition • Slow and inconvenient routes • Infrequent services
Non-Passengers	Congestion reduction	• Frequent traffic jams
PT employees	Better work conditions	• Low salaries/Long work hours • Vehicles in bad condition/unsafe • Streets and rail tracks in bad condition
PT operator companies	Provide an essential, safe, and efficient PT service system	• Vehicles are old and badly maintained • Passenger complaints about PT service routes, safety, and frequency
Government Bodies	Congestion reduction Improve street condition Reliable, low cost, public transportation system	• Insufficient budget • Vehicles are old and badly maintained • Passenger complaints about PT service routes, safety, and frequency • Streets and rail tracks in bad condition

Table 1: Improving Public Transport Systems

(Source: Training Course 2nd edition: Public awareness and behavior change in sustainable transport, Division 44, Environment and Infrastructure, Deutsche Gesellaschaft fur Technische Zusammenarbeit GmbH)

2.2 Segmentation of population

Reforming the public transport system in order to make it more reliable, efficient and sustainable, will not necessarily raise awareness about it, nor will it guarantee a modal shift towards public transport. A real change will require a dynamic action plan, with several steps. Initially, it is necessary to become familiar with the characteristics of the population that is to be affected. Therefore, the first step is the division of the population into several target groups, and familiarisation with their characteristics, behaviours, awareness, and general perceptions of transport.

The population can be divided into groups scaled according to their level of awareness or actions committed towards a sustainable transport system. The lowest scaled group is the one that consists of people that do not know anything about, nor use sustainable transport, while the highest scaled group is the one with the highest level of awareness about sustainability in transport, and take actions accordingly. Each group requires being addressed and dealt with in a totally different way.

The following figure (
Figure 1) illustrates the levels of awareness of a population in terms of its knowledge and actions in sustainable transport. These population groups are analysed below.

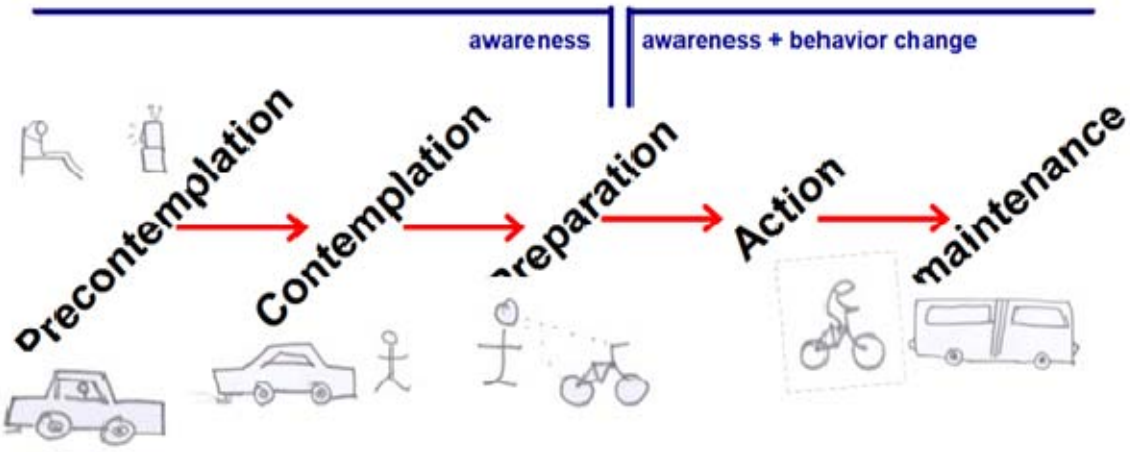

Figure 1: Levels of awareness
(Source: Training Course 2nd edition: Public awareness and behavior change in sustainable transport, Division 44, Environment and Infrastructure, Deutsche Gesellschaft fur Technische Zusammenarbeit GmbH)

- **Those that use cars and see no other option**

This group consists of people that use the car as their primary transport mode, and are not aware of any alternative means of transportation. They do not know about the importance of sustainability, nor do they understand why it would be more efficient to use public transport

for their journeys, therefore their actions are not consistent with the sustainable efforts of their community. This group is made up of people from all age and income backgrounds, and contains some decision makers. This group is in the pre-contemplation phase.

- **Those that know of other options but still use cars**

This group consists of people that are to some extent informed about other options of transport, and about how they promote sustainability, and benefit the social and environmental setting. People in this group are aware of the advantages of public transport, but still prefer to use cars, whatever the purpose of their trips. They might have tried using the public transport system a few times, and can probably be more easily persuaded than the first group, to start using it consistently. This group is in the contemplation phase.

- **Those that have tried using sustainable transport a few times**

This group consists of people that have tried using the public transport system several times, and have a higher level of awareness of its benefits than the other two groups. They might not be fully convinced about the sustainability of public transport, but are quite sensitised about the environmental and social advantages of this system, and are willing to take action. This group is in the preparation phase.

- **Those that have begun to use sustainable transport**

This group consists of people that have started frequently using public transport instead of cars, and understand that the use of a car is not always necessary. They are completely aware of which transport modes are the most sustainable, and have made progress in favouring them against all others. This group is in the action phase.

- **Those that are using sustainable transport on a permanent basis**

This group consists of people that are fully aware of the benefits of sustainable transport, have complete knowledge of its environmental and social benefits, and are constant users of public transportation. This group is in the maintenance phase.

The above categorisation of the population is very useful, since it describes the different groups, and provides ways of approaching them in uniquely tailored ways, according to their level of awareness. It could also be useful to complement this segmentation according to other categorisations (income level, age, etc.), which will allow for even better understanding and therefore more effective intervention strategies for each group.

2.3 Intervention methods

After segmenting the population according to the methods described above, it is possible to apply individually tailored awareness and behaviour change processes as complementary components of an intervention to each target group. An intervention approach that generates only awareness or behavioural change is not as effective as an intervention that generates both.

We can separate the applied approaches into three types: information, persuasion, and action. The informative and persuasive steps aim to raise awareness, while the action steps promote behaviour change, therefore making the whole intervention process effective.

2.3.1 Information

The first activity of an intervention strategy is delivering informative messages to the targeted population. The target groups should be informed about specific data that support the arguments, for example, facts about how public transport is the most sustainable form of transport, or how a sustainable transport system will have positive effects on the quality of life, the economy of a city, and the environment.

2.3.2 Persuasion

The second activity of an intervention strategy is trying to affect and persuade the targeted population, to change behaviour and embrace a more sustainable public transport system. This can be achieved by changing how people feel about public transport. A persuasive message should be strong, and positive, making the groups that are exposed to it feel that the new behaviour will generate comfort and other positive feelings.

2.3.3 Action

The third and final activity of an intervention strategy is trying to actually engage the targeted population to use the modes of public transport. The two previous steps should have fostered an environment ready for change, but the intervention strategy is not completed if the last step, providing ways in which behaviour can change, is overlooked. The desired result of the whole intervention strategy, which is also the potential result of this third step, is getting people to actually make consistent use of the public transport system.

2.3.4 Raising awareness in practice: Cork (IE)

Promoting and Marketing Mobility Improvements

→ *Background*

As part of the ADDED VALUE project, the city of Cork decided to organise an awareness campaign, in order to promote and market the recent improvements in its mobility system, and generally increase the knowledge on the benefits of sustainable public transport. Raising awareness and getting feedback on transport issues was significant in understanding the public and making them think about sustainable transport. Based on the results of the campaign, the city council would recommend appropriate solutions and measures, both for the transport system, and for the people themselves, in order to enhance mobility.

→ *Implementation*

The city carried out an online public consultation on sustainable mobility, aimed specifically at three key institutions of the city, the University College Cork (UCC), the Cork Institute of Technology (CIT), and the Cork University Hospital (CUH). The campaign included emails sent to the target audience, media press releases, and a website linked from the homepages of stakeholders. Information gathered on the target groups included personal details, travel patterns, and general perceptions regarding sustainable transport and mobility. Apart from the online campaign, dissemination was achieved through posters and flyers (displayed and handed out in each institution), and two promotional days held at each site.

→ *Objective of campaign*

The objective of the campaign was to reach a wide range of participants, and that was highly achieved, as the overall response was very representative. The awareness strategy was highly successful in establishing baseline data including personal information and perceptions regarding sustainable transport. The survey responses gave critical insight on how to proceed with developing a series of mobility measures.

3 Enhancing and promoting accessibility of public transport

3.1 Introduction

This section includes a brief summary of some innovative concepts that have been developed as part of the EU funded project NICHES+ (www.niches-transport.org) with a focus on new strategies that are necessary in order to make public transport more accessible, more efficient and more sustainable. It presents the main characteristics of the concepts, followed by their benefits and the key issues (city size, user needs, costs etc.) one should consider before implementation. An example of good practice is also presented briefly for each concept.

For more information on detailed aspects of each concept please see Chapter 4: Suggested reading.

(Source: http://www.niches-transport.org/index.php?id=7#390)

3.2 Travel Training for Public Transport

3.2.1 Characteristics

Travel training enables passengers to use public transport independently, without fears or concerns. The principal target groups are older people, people with disabilities or learning difficulties, and school children. The content of the training needs to be tailored to the needs of the trainees and can cover a range of different aspects, e.g. physical accessibility, planning a trip, handling of information sources, ticketing and behavioural aspects.
The format of the training needs to be tailored to the specific target group, e.g. short-term courses, longer-term buddying or travel games for children.
There is an important marketing component to this activity: a good training scheme can help gain new or keep current customers in public transport. The concept is becoming more and more popular, but is still not mainstream in public transport. However, due to its low cost and easy implementation, it is highly transferable.

3.2.2 Key Benefits

Travel training for public transport:
• makes a variety of target groups feel more comfortable, safe and secure using public transport;

• enables independent mobility by public transport;
• keeps existing customers and 'recruits' new customers;
• achieves image gains for public transport operators;
• may reduce the need for special transport services, e.g. through buddying schemes for people with special needs.

3.2.3 Good Practice: Salzburg (AT)

In order to encourage older people to take the bus, and to give them tips and tricks on how to prevent accidents, the Salzburg bus operator StadtBus Salzburg in co-operation with the local NGO ZGB Salzburg started a training scheme for older passengers in 2004.
Participants of the training event are invited to the bus depot in small groups, where a bus is made available for the training session. Additionally, a transport safety handbook was developed together with a variety of other marketing measures that address older people.
As a result of the training, many older people use the bus more frequently and feel safer. The travel training for older people not only got positive feedback from the users, but also received international attention from others who want to learn from these experiences. The training has been continually refined over time.

3.2.4 What you should consider before implementation

City size	No restrictions
User needs	• Potential target groups: older people, people with disabilities, people with learning difficulties, immigrant communities and children; • Acquiring knowledge and confidence on how to use public transport; • Knowing who to address in case of problems or obtaining information; • Feeling personally safe and secure; • Being taken seriously as a customer; • Wide range of different needs for people with permanent or temporary impairments (e.g. disabilities).
Costs	• A relatively low-cost measure that can be expanded from a small scheme to a wider range of activities; • Mainly staff costs and costs for marketing material.
Time horizon	• Planning of scheme and preparation of materials within a few months; • Quick implementation.
Key stakeholders involved	• Transport operators and authorities as well as public transport associations; • Schools; • Interest groups;

	• Charities; • Local authorities.
Crucial factors	• Dedicated team and cooperation; • Tailored scheme for each target group; • Good communication with users to build confidence; • Budget to get started and secure long-term funding perspective
Excluding factors	None

3.3 Neighbourhood Accessibility Planning

3.3.1 Key Characteristics

Neighbourhood Accessibility Planning (NAP) aims at improving local conditions for walking and cycling as well as facilitating safe access to local facilities (e.g. schools, shops) and public transport services.

A NAP scheme follows a participatory process with the local community to identify the main issues to be addressed.

The needs of more vulnerable groups such as the disabled, older people and children are taken into account. Despite its high relevance and potential to not only improve daily mobility but also social interaction in a neighbourhood, the concept is still not mainstream in Europe.

3.3.2 Key Benefits

Neighbourhood Accessibility Planning:

- improves conditions for walking and cycling and leads to the improved design of local bus services;
- creates more lively neighbourhoods, better use of public space and social inclusion;
- enables better understanding of citizens' needs and thus the design of more appropriate measures to improve neighbourhood accessibility through participatory processes;
- allows for better co-ordination within local administration and with external partners;
- may reduce car use for short distances.

3.3.3 Good Practice: Munich (DE)

A neighbourhood mobility concept ("Stadtviertelkonzept Nahmobilität") was implemented in several Munich regions in 2003. Various transport professionals and citizens worked together to recognise problems, assess them, and create effective solutions. The main goal was to develop simple, efficient measures to improve conditions for non-motorised transport, such

as walking and cycling, as well as enhance the local bus network. The extensive citizen participation was a big success of the project, which focused on and managed to improve organisational aspects of public transport, such as the re-location of bus shelters, new benches, pedestrian crossings and improved lighting.

3.3.4 What you should consider before implementation

City size	No restrictions, can be applied to different land use patterns.
User needs	• Quality of public space and liveability of neighbourhood; • Road safety, independent and healthy mobility; • Citizen participation; • Strong local economy; • Tailored solutions.
Costs	Costs depend on time and effort for the participatory process and the budget available for implementation.
Time horizon	• Several months for preparation; • Several months for participation process; • Measure implementation possible in short to long term.
Key stakeholders involved	• Local authority (mobility department, infrastructure and public works, town planning, etc.); • Local interest groups; • Local businesses; • Public transport operators; • External moderators and planners (optional).
Crucial factors	• Stakeholder participation and a well working structure and mentality for co-operative processes; • Confirmed political strategy and budget to back up process; • Well-designed methodology and professionally organised participation process; • Predefined budget for process and swift implementation.
Excluding factors	Lack of political support

3.4 Tailored Travel Information for persons with reduced mobility

3.4.1 Key Characteristics

This concept aims to provide tailored public transport travel information for people with reduced mobility (e.g. the disabled, parents with prams, older people and people with different impairment types, e.g. physically impaired, sensory impaired). The main characteristic of this concept is information on barrier-free travel options via the Internet (and hotline), as a convenient means for planning a trip in advance.
The concept includes static travel information on the accessibility of the public transport system, e.g. accessibility of rail stations and rolling stock and/or routing information, e.g. barrier-free travel-chains. The service provides accurate, useful, up-to date and understandable information that meets specific user needs.
Tailored online information and information via a hotline for mobility impaired travellers is still the exception in Europe, but has a lot of potential to improve the daily mobility of many users.

3.4.2 Benefits

Tailored travel information for users with reduced mobility:

• has a positive impact on the independent living of people with reduced mobility through easier planning of barrier-free trips;
• is a valuable tool to raise the public profile of major investments in accessible infrastructure;
• could reduce the need for costly special transport services;
• gives a better image to public transport.

3.4.3 Good Practice: Frankfurt (Rhein/Main) and Berlin-Brandenburg regions (DE)

The BAIM/BAIM-Plus project, one of the most advanced systems of online travel information for mobility impaired travellers in Europe, enables users to plan a barrier-free trip in advance. Transport associations in Frankfurt and Berlin-Brandenburg cooperated and developed an effective journey planner, which gives information on barrier-free travel chains in public transport, and details on the accessibility of interchanges, stops and vehicles. Detailed interchange maps visualising important information, facilitate the use of the service, which is available online at www.rmv.de and www.vbbonline.de.

3.4.4 What you should consider before implementation

City size	• Regional scale within the boundaries of a public transport service area; • The larger the area the better.
User needs	• Detailed and up-to-date information on barrier-free travel options, tailored to different needs, e.g. blind, physical impairments, cognitive impairments; • Accessibility details for stations and stops; • Routing information for barrier-free trip-chains (costly); • Adequate format of information provision (e.g. website).
Costs	• Costs depend on complexity and data requirements; • Barrier-free routing information (trip chains) is more costly to provide than static information, e.g. fully accessible lines and stops.
Time horizon	Several months of preparation and data gathering.
Key stakeholders involved	• Public transport operators and public transport associations; • Public authorities; • User representatives; • Companies or research institutes that support the technical and organisational implementation.
Crucial factors	• Assess user needs with user participation throughout project life; • Avoid excluding users by focusing only on technical solutions, personalised services still needed; • Choose right level of complexity and data requirements for local context; • Combine with other measures to improve accessibility of network.
Excluding factors	Lack of accessibility of vehicles and interchanges may be a severe barrier.

3.5 Passenger Friendly Interchanges

3.5.1 Key Characteristics

A number of traffic flows of a different nature meet and cross each other at an intermodal interchange. Enhanced transport functions are focused on providing solutions for smart and efficient interaction of these flows at interchanges. There are different points of view as to what we call a passenger friendly interchange. From the point of view of daily commuters, a short transfer path is the most important. For tourists the availability of information (positioning, up-to-date) is most relevant, while for families, children and older people, safety

and easy access are crucial. Finally, we must not forget people with reduced mobility people, or those who want to spend their waiting time usefully, before or after travelling.
All these different user groups come together in intermodal interchanges. Passenger friendliness of these interchanges is crucial to further developments in public transport.

3.5.2 Benefits

Passenger friendly interchanges:
• minimise overcrowding and congestion;
• help the efficient use of space;
• provide shorter routes for passengers;
• provide better access for different groups;
• create conditions for integrated travel information;
• provide an appropriate context for integrated ticketing systems;
• provide a better design for intermodal facilities (Park & Ride, Bike & Ride);
• provide a location for supplementary services;
• increase passenger satisfaction;
• increase public transport use.

3.5.3 Good Practice: Birkenhead (UK)

The Birkenhead bus station is part of a project of new infrastructure developments in Merseyside UK, built and managed by Merseytravel, the Merseyside Passenger Transport Executive. It was created in anticipation of a substantial increase in the usage of the newly developed Birkenhead shopping and leisure centre. The station is made of large panels of clear, toughened glass, providing clear sightlines, enhancing the travellers' experience, and most importantly, security.

3.5.4 What you should consider before implementation

City size	Can be implemented in a small station as well as for large interchanges.
User needs	• Brightness, good visibility, avoiding dark "cul de sacs" or dead ends; • Well-trained, customer-minded facility staff; • Sustainable design; • Short, straight and weather protected pathways; • Accessible environment: "easy to reach" and "easy to use".
Costs	The information system and design might bring a higher cost than

	a conventional interchange. Efficient use of space and rental of shop space can save money or generate income.
Time horizon	• Short term (less than 3 years); • Reconstruction works should not exceed 1-2 years.
Key stakeholders involved	• Interchange owner/manager; • Local authority; • City planning; • Public Transport Operators.
Undesirable secondary effects	In case of poor regulations, additional (leisure) services and city functions may marginalise the prior transport functions.

3.6 Innovative Cycling Facilities for Interchanges

3.6.1 Key Characteristics

Bicycle use is a promising alternative to the car as feeder transport to interchanges, if bicycles can be parked in a safe, secure place. From an environmental perspective, the combined use of cycling and public transport offers one of the best alternatives to the car and provides an additional travel choice for passengers.
Cycling is flexible, individual, and competitive to car use in terms of journey times in urban areas. In order to get the desired effect, the bicycle services offered at interchanges should be comprehensive and should include bicycle rental, guarded bicycle storage (an easy to use parking system), maintenance services, and the construction of extra cycle lanes and entry points to get easy access to the station. These measures have a key role in promoting a mode shift from car towards public transport.

3.6.2 Benefits

Cycling facilities at interchanges:
• increase the combined usage of public transport and bike;
• help shift trip-makers towards sustainable modes;
• make the travel chain more flexible;
• help to manage space in the often crowded area near public transport interchanges;
• offer a location for renting and repairing bikes;
• provide attractive points for tourists (by offering a new means of transport);
• reduce car usage;
• reduce the necessity for car ownership.

3.6.3 Good Practice: Combination of cycling and public transport in the Netherlands

In the Netherlands, public transport stations (metro, tram, bus) are very well equipped with bicycle storage facilities. Most Dutch households own at least one bike, and cycling plays an important role in everyday trips, in the first or the final part of a public transport journey, or in between public transport stops. In October 2006 the town of Zutphen opened the first free, guarded NS parking facility, an underground space for 3000 bicycles. The ground level was reshaped to a beautiful pedestrian area, available to all pedestrians.

3.6.4 What you should consider before implementation

City size	Any kind of interchange could be equipped.
User needs	• Easy access; • Guarded storage; • Additional services (public bike, maintenance).
Costs	Cheapest investment among transport investments.
Time horizon	Short term (within 1 year).
Key stakeholders involved	• Local authority; • Public transport operator; • Interchange owner/manager; • Cyclist associations; • Cycling service providers.
Crucial factors	• Topography; • Public transport network density; • Modal share; • Car drivers' behaviour; • Overall cycling infrastructure.
Excluding factors	Totally impossible context/ conditions for cycling make the measures unviable (lack of infrastructure, culture/behaviour of car drivers, inappropriate topology or climate, etc.).

3.7 Infrastructure for Innovative Bus Systems

3.7.1 Key Characteristics

A more efficient use of urban space, and especially urban space allocated to transport, can improve operational conditions for public transport. Giving priority to buses in congested cities has proven to be a very effective strategy. In its simplest form, a bus lane can be

implemented on a short stretch of road, as a through- or by-pass for a congested zone. In many cases however, bus lanes are connected to a separate road network with their own traffic management system, traffic signals, and bus stop facilities.
Bus Rapid Transit (BRT) and bus lanes are not only implemented to pass through congested road sections, but to connect several districts or suburban areas with each other. They operate in central (often congested) urban areas with the reliability of light rail, and with the flexibility of buses in peripheral areas.

3.7.2 Benefits

Innovative bus systems:

- reduce travel times (reduce the need to have differential journey times between peak and off peak hours);
- provide a comfortable way of travelling;
- provide a reliable service and schedule;
- enable users to rely on advertised journey times, increasing confidence in the service;
- use high capacity and low emission vehicles;
- are cheaper in terms of operation and implementation than a similar tramway investment;
- help the shift towards sustainable modes;
- reduce the complexity of the driving task;
- increase traffic safety.

3.7.3 Good Practice: BusWay in Nantes (FR)

As part of the 2005 “Buses with a high level of service” concept, the city of Nantes, launched a special “BusWay”, a 7 km long stretch bus lane, with 15 stops, connecting the ring road to the centre of Nantes in less than 20 minutes, with a frequency of 4 minutes at peak hours. This bus system incorporated some “tramway” elements, such as dedicated lanes, well-designed stations, priority at intersections, high frequency and extended hours, and park and ride facilities.

3.7.4 What you should consider before implementation

City size	• No size restrictions; • The actual scope and importance of the measures and network will depend on the city size.
User needs	• User friendly ticketing system; • Reliable and frequent service; • Attractive design of buses and stops;

	• Passenger friendly staff; • Accessible information.
Costs	Relatively high cost at implementation stage (infrastructure, vehicles) but cheaper than trams/light rail, operation costs are lower too.
Time horizon	Short term (less than 2 years).
Key stakeholders involved	• Local authority, road operator; • Bus manufacturers; • System provider; • Operator.
Crucial factors	• Political will to reallocate road space, despite competition with cars in this regard; • Financial support from private and public sector.
Excluding factors	• In case of low demand the measure is not viable; • In case of a very high demand, a tramline could be considered.
Undesirable secondary effects	Restrictions for car users (infrastructure)

3.8 Mobile Travel Information Services for the Public

3.8.1 Key Characteristics

Delivery of travel information to mobile devices provides new options for travellers on the move. Mobile travel information services (MTIS) provide comprehensive information for a traveller during a trip. On-trip information services have existed for many years in the form of on-platform and on-board announcements on buses and trains, whilst for the motorist variable message signs (VMS) and radio travel broadcasts are increasingly commonplace. Improved on-board and at station information is essential for public transport users, especially when considering accessibility for all. More promising is the use of Internet technology to provide integrated, location-based, multi-modal, real-time travel information and alerts to an individual's mobile device. Information can also be tailored to an individual's particular needs. MTIS can enhance the convenience of travel by public transport. They can thus contribute towards "green choices" by making public transport a more attractive option. They require integration of mobile communication, wireless, Internet, satellite and computing technologies.

3.8.2 Benefits

For travellers, MTIS:
• improve public transport services e.g. shorter journey duration by offering options in the event of travel problems;
• enhance public transport accessibility for many different users;
• provide a wide range of information on the move, and in real time;
• increase travel efficiency and the feeling of being in control of the journey.

For operators, MTIS:
• are a tool to change operations or justify improvements to infrastructure;
• improve safety through better co-ordinated emergency response;
• prioritise public transport;
• enhance environmental objectives by providing the information needed for people to make "green choices".

3.8.3 Good Practice: KAMO, Helsinki (FI)

The city of Helsinki planned a mobile guide for public transport, "KAMO", providing real-time information on journey planning, stop-specific timetable information, and fare payment. Once loaded onto the mobile phone, KAMO can be accessed using the phone's menu. Touching a radio frequency identification (RFID)-tag with a phone opens the application on the display independently of the menu. KAMO has been very successful, and is therefore to be expanded to other towns and cities.

3.8.4 What you should consider before implementation

City size	City or public transport network.
User needs	• Obtain up-to-date (if possible real-time) on-trip information by different means; • Make public transport more accessible and better utilised.
Costs	• Depend on the level and type of services to be provided by the system; • Marginal once system is up-and-running.
Time horizon	3 years between planning and implementation.
Key stakeholders involved	• Local authority, government department or transport operator; • Technology suppliers (e.g. network operators, computer specialists); • Passenger groups;

	• Data owners; • Media; • Emergency services.
Crucial factors	• Understand user needs; • Quantify benefits; • Source appropriate technology.
Excluding factors	• Limited complexity of the network; • Availability of alternative travel options.
Undesirable secondary effects	Improved information may encourage new trips, including those made by car.

3.9 Group Rapid Transit

3.9.1 Key Characteristics

Group Rapid Transit (GRT) is a new form of collective public transport using small automated electric “cyber-buses” to provide demand responsive feeder and shuttle services connecting e.g. a parking lot with a major transport terminal and/or with other facilities such as a business or retail park, university, hospital, hotels, shopping or exhibition center.
The system is rather like a lift or elevator in that the passenger presses a button to call the vehicle and then another on the vehicle to select the destination. The cyber-bus will then go directly to that destination unless called by other users to pick-up or set-down along the way. The cyber-buses will normally follow a fixed route, but can turn round at intermediate points in order to minimise the journey times for travellers.
The vehicles are electric and provide clean, green, efficient and sustainable public transport with low waiting times. They are supervised by a central control system but use obstacle avoidance technology so they are capable of mixing with other traffic cyclists, pedestrians, and possibly other vehicles, although only at lower speeds.

3.9.2 Benefits

GRT offers:
• a flexible alternative to shuttle bus schemes;
• highly efficient operation since cyber-buses only operate when there is a demand;
• drivers are not required so operating costs are cheaper than for equivalent bus or tram schemes;
• both scheduled and on-demand services are possible depending on the need (e.g. peak versus off peak);
• accessible to all and simple to operate;
• low waiting times;

• electric vehicles mean clean quiet operations, no pollution is produced locally;
• automated i.e. safe and efficient operation.

3.9.3 Good Practice: Parkshuttle Rivium (NL)

The Parkshuttle at Rivium has launched a unique scheme, using driverless electric cyber-buses to provide a connection for travellers between the Kralingse Zoom metro station and the Rivium business park. The cyber-buses run there and back, separated from pedestrians and other traffic on a special 4km lane, with 5 stops. The buses run to schedules in the peak, and on-demand in the off-peak periods. The average waiting time is 1.5 minutes in the peak, and 3 minutes off-peak, while the typical trip lasts from 5 to 7 minutes. While the start-up costs are believed to be higher than for a conventional bus scheme, the operating costs are significantly lower.

3.9.4 What you should consider before implementation

City size	GRT schemes tend to be thought of as providing the “last mile” connectivity to business or retail parks, main line terminals, hospitals, university campuses etc, although the potential is greater.
User needs	Passengers require on-demand or frequent public transport services with low waiting times and low cost.
Costs	Less than for an equivalent bus scheme using drivers, and less than for a tram. Capital costs are needed to procure the cyber-buses, provide the control system/centre and a depot for vehicle maintenance/charging; and also to provide and equip the guideway, stops and security measures.
Time horizon	Short - medium term. A scheme might take up to 3, and in some cases more, years to implement.
Key stakeholders involved	• Operating company; • Site or infrastructure owner, e.g. local authority; • National government for safety certification; • Local community and users
Crucial factors	• High initial cost compared to an equivalent bus scheme; • But lower operating costs.
Excluding factors	• Legal issues: need to certify driverless bus schemes for safety; • New system, so considered to be a high risk solution.
Undesirable secondary effects	Possible visual intrusion caused by elevated sections of guideway, or severance caused by guideway at street level.

(Source: http://www.niches-transport.org/index.php?id=7#390)

4 Accessible Public Transport systems: case studies and experience from Europe

4.1 Introduction

This chapter includes some ‘good practices’ from around Europe in the field of accessible public transport. The case studies were taken from the database of CIVITAS project (www.civitas.eu). The CIVITAS Initiative ("City-Vitality-Sustainability", or "Cleaner and Better Transport in Cities") aims at supporting cities introducing ambitious transport measures and policies towards sustainable urban mobility. The goal of CIVITAS is to achieve a significant shift in the modal split towards sustainable transport, an objective reached through encouraging both innovative technology and policy-based strategies.

4.2 Krakow (Poland) – Giving Priority to Public Transport

→ *The problem*

The municipality of Krakow, was facing over the last few years, a serious problem of increasing volumes of traffic on the city’s roads.

→ *Implementation of scheme*

The decision–makers and the responsible authorities came up with several solutions, if not to eliminate the problem, to certainly relieve some traffic congestion. Part of the program they applied was the expansion of priority facilities, the separation of bus and tram lanes, and the installation of special traffic lights for public transport vehicles.

→ *Results*

The results that have been noted are significant. There has been noteworthy improvement of the punctuality, the frequency, and the regularity of public transport vehicles, and reduction of the travel times. There has been a remarkable reduction in the number of private cars in the city centre. Passengers are now able to use improved information systems, while there are new databases for monitoring public transport operations, and new indicators for controlling public transport quality.

4.3 Bucharest (Romania) – Implementing a Real-Time Passenger Information System

→ *The scheme*

As part of the modernisation plans for Bucharest's public transport fleet, a real-time passenger information system has been installed at 26 tram stops. The information provided at each stop is real-time position of the vehicle on a map, name and estimated time to the next stop and terminus, and the names of the streets forming the junction.

→ *Results*

As a result of these measures, passengers are now able to plan their journeys, and use their time more efficiently. In fact, they now expect the same information for other modes of public transport.

4.4 Porto (Portugal) – Light-Weight Hybrid Bus Shuttle

→ *The problem*

The city of Porto has been facing the problem of extreme pollution in urban areas, and has decided to introduce a new light-weight hybrid bus shuttle, aiming to reach several important objectives. Firstly, it aims to reduce the weight and production costs of urban buses through the new bus construction technology. Furthermore, it aims to reduce the harmful CO emissions and promote a modal shift towards cleaner modes of transport.

→ *Results*

The expected results of this measure include a 10-15% reduction in CO emissions (compared to a bus running on fossil diesel), as well as less noise emission, through better insulation with innovative materials. Moreover, the new buses are going to be at least 30% lighter, and there is going to be increased safety for passengers, in case of accidents.

4.5 Perugia (Italy) – Intermodal Interchanges for Public Transport

→ *The scheme*

The municipality of Perugia has approved a new Urban Mobility Plan (UMP) with emphasis on creating a network of high quality interchange stops to increase safety and efficiency of travel time. The interconnections are going to be improved through the creation of footpaths, protected corridors, footbridges, and advanced information systems between rail and metro stations, and bus networks.

→ *Results*

There are going to be several results from this project, such as, more efficient multimodal interchanges, lower emissions and energy use, a substantial modal shift from private to

public transport, and a general improvement of the public transport network. Moreover, there is going to be an increase in customer satisfaction, and added value through the integration of the transport system.

4.6 Gorna Orayhovitsa (Bulgaria) – Integrated Plan for Sustainable Transport Development

→ *The problem*

The city of Gorna Oryahovitsa was for the past few years troubled with a number of problems, such as increased road traffic, low quality of life for the residents, and big environmental problems.

→ *The scheme*

As a result, the authorities have developed and approved an Integrated Concept for Sustainable Transport Development for 2010-2020, and a specific Action Plan for the first two years, including a specific agreement on a program for establishing clean and safe mobility among the population, and training of municipality staff to manage the implementation plan.

4.7 Vitoria – Gasteiz (Spain) – New Public Transport Network

→ *The scheme*

The city of Vitoria – Gasteiz planned and created a new public transport network that is expected to change the way the bus and tram system work.

→ *Results*

The expected results of this program are several. There is going to be an increase in the commercial speed of public transport by 20%, as well as an increase in the frequency of public transport services from currently 20 minutes to 10 minutes on work-days. Furthermore, the number of public transport journeys will be increased by 15%. Finally, there is going to be a significant modal shift towards public transport, and a significant reduction in the accident rate involving the public transport network.

4.8 Coimbra (Portugal) – Mobility Management

→ *The scheme*

Coimbra will implement a new approach to its mobility management strategy and develop several site-based travel plans and transport services for some of the largest public services in Coimbra, namely in the city's health cluster. The major objective of the measure is to

encourage hospital staff, patients, and visitors to use public transport instead of automobiles, and contribute to an overall modal shift in the health cluster. Thus, the city will provide 25% ticket discount on Park & Ride system for hospital staff; new public real-time PT information panels in the interior of the hospitals; and site-dedicated PT network maps and destination matrix.
Some very significant measures programmed are personalised travel planning, a car pooling/car sharing program, an improvement of pedestrian and cycling conditions, and a parking management scheme, as well as an integrated campaign promoting sustainable mobility.

→ *Results*

Overall, Coimbra expects that the measure will result in an increase in the number of municipal employees using public transport, as a result of a modal shift towards more sustainable modes of transport. The implementation of at least three mobility plans for large institutions in the area of Coimbra will result in the reduction of atmospheric pollution levels.

4.9 Aalborg (Denmark) – Travel Information Centre

→ *The scheme*

The city of Aalborg decided to strengthen the information level for users of public transport, such as real-time information on public transport services, arrangements in the city, and other types of tourist information services (walking planning, timetables, itineraries, etc).

→ *Results*

This scheme is important for public transport, as it is expected to improve the level of information for the users of public transport, to move a part of the personal service to a computer-based system, and to contribute to improving the image of public transport.
The program resulted in the public becoming more aware of new opportunities, and arrangements, and being able to easily access a high level of information regarding the public transport system.

4.10 Bologna (Italy) – Park and Ride System

→ *The scheme*

The city of Bologna has introduced a Park and Ride system, to reduce on street parking, while generating the revenue that will balance maintenance costs. Therefore, the city has introduced three park-and-ride schemes, Tanari, ex Riva-Calzoni, and ex-Euraquarium. Furthermore, it has developed an electronic system enabling users to book parking spaces in advance, and it constantly improves the parking facilities, and the public transport connections.

→ *Results*

The main objectives of the measure are to improve mobility in the city, increase the use of public transport, reduce on-street parking, and decrease congestion and pollution in the urban area.

4.11 La Rochelle (France) – Introducing Dedicated Bus Lanes

→ *The scheme*

The city of La Rochelle, in France, was facing severe congestion problems, therefore it decided to reform and restructure its bus network, to alleviate some of the problem. In order to improve bus times and service reliability, additional bus lanes were created at traffic hotspots in the urban area.

→ *Result*

The great majority of PT users have been satisfied with the introduction of the new bus lane, with a 24% modal shift from car to bus. Other benefits of the measure include an improvement in the general mobility system of the city, and more specifically, improvement of travel times and service, and fuel savings.

4.12 Genoa (Italy) – Agency for on-demand transport and other mobility services

→ *The scheme*

The city of Genoa took the initiative to introduce a new mobility service, bridging the gap between conventional public and high-cost private automobile transport, by providing a flexible demand-responsive service. Operated by the Mobility Agency of Genoa, the service includes three demand-responsive services, with the support of the EU LIFE Programme.

→ *Results*

The first two years of the project led to the recognition of the agency, and therefore of the service provided, while some significant results were the establishment of a management and dispatch centre for Genoa Disabled Persons Flexible Transport Services, and the introduction of several flexible services connecting outlying regions with the city of Genoa. A general reduction in the gap between traditional local public transport and the use of taxis and private cars in Genoa was achieved.

5 Suggested reading

The following documents/websites/articles provide some useful information on sustainable public transport systems:

- Niches project developed manuals for each of the thematic units presented in chapter 1. More detailed information can be found at: http://www.niches-transport.org/index.php?id=7#390
- Information regarding design of accessible bus stops : http://www.tfl.gov.uk/assets/downloads/businessandpartners/accessibile_bus_stop_design_guidance.pdf
- Information on mobility solutions as part of CIVITAS can be found at: http://civitas.eu/index.php?id=15
- Handbook on bus accessibility 'La accesibilidad del transporte en autobús: diagnóstico y soluciones' (available in Spanish) http://www.cermiaragon.org/es/index.php?mod=archive_document_detail&id=153&fil_id_category=5&menus_ids=salud
- 'Accessibility and the bus system: from concepts to practice', by M. Caiafa, Nick Tyler and I. Brown
- Lectures on Public Transport, MIT Open Courseware http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-258j-public-transportation-systems-spring-2010/lecture-notes/
- 'Intelligent transport- How cities can improve mobility', IBM Global Business Services
- 'Implementation of Zürich's Transit Priority Program', A. Nash and R. Sylvia, Mineta Transportation Institute, College of Business, San José State University, San Jose, CA 95192-0129, 2001
- 'Wellington Regional Land, Transport Strategy 2010-40', Greater Wellington Regional Council, October 2010
- Final 2008 Service Plan: Bus, Rapid Transit, and Boat Service Changes and Service Delivery Policy Modifications, Fall 2008, MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
- TCRP Report 88: A Guidebook for Developing a Transit Performance-Measurement System